

AHRQ Healthcare Horizon Scanning System – Status Update

Horizon Scanning Status Update: January 2015

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Statement of Funding and Purpose

This report incorporates data collected during implementation of the Agency for Healthcare Research and Quality (AHRQ) Healthcare Horizon Scanning System by ECRI Institute under contract to AHRQ, Rockville, MD (Contract No. HHS290-2010-00006-C). The findings and conclusions in this document are those of the authors, who are responsible for its content, and do not necessarily represent the views of AHRQ. No statement in this report should be construed as an official position of AHRQ or of the U.S. Department of Health and Human Services.

A novel intervention may not appear in this report simply because the System has not yet detected it. The list of novel interventions in the Horizon Scanning Status Update Report will change over time as new information is collected. This should not be construed as either endorsements or rejections of specific interventions. As topics are entered into the System, individual target technology reports are developed for those that appear to be closer to diffusion into practice in the United States.

A representative from AHRQ served as a Contracting Officer's Technical Representative and provided input during the implementation of the horizon scanning system. AHRQ did not directly participate in the horizon scanning, assessing the leads or topics, or provide opinions regarding potential impact of interventions.

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Financial Disclosure Statement

None of the individuals compiling this information has any affiliations or financial involvement that conflicts with the material presented in this report.

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Preface

The purpose of the AHRQ Healthcare Horizon Scanning System is to conduct horizon scanning of emerging health care technologies and innovations to better inform patient-centered outcomes research investments at AHRQ through the Effective Health Care Program. The Healthcare Horizon Scanning System provides AHRQ a systematic process to identify and monitor emerging technologies and innovations in health care and to create an inventory of emerging technologies that have the highest potential for impact on clinical care, the health care system, patient outcomes, and costs. It will also be a tool for the public to identify and find information on new health care technologies and interventions. Any investigator or funder of research will be able to use the AHRQ Healthcare Horizon Scanning System to select potential topics for research.

The health care technologies and innovations of interest for horizon scanning are those that have yet to diffuse into or become part of established health care practice. These health care interventions are still in the early stages of development or adoption except in the case of new applications of already-diffused technologies. Consistent with the definitions of health care interventions provided by the Institute of Medicine and the Federal Coordinating Council for Comparative Effectiveness Research, AHRQ is interested in innovations in drugs and biologics, medical devices, screening and diagnostic tests, procedures, services and programs, and care delivery.

Horizon scanning involves two processes. The first is identifying and monitoring new and evolving health care interventions that are purported to or may hold potential to diagnose, treat, or otherwise manage a particular condition or to improve care delivery for a variety of conditions. The second is analyzing the relevant health care context in which these new and evolving interventions exist to understand their potential impact on clinical care, the health care system, patient outcomes, and costs. It is NOT the goal of the AHRQ Healthcare Horizon Scanning System to make predictions on the future use and costs of any health care technology. Rather, the reports will help to inform and guide the planning and prioritization of research resources.

This edition of the Status Update lists interventions that have been identified and are being monitored. The next edition will be published in 2–3 months. We welcome comments on the list, which may be sent by mail to the Task Order Officer named in this report to: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by email to: effectivehealthcare@ahrq.hhs.gov.

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Introduction

The AHRQ Healthcare Horizon Scanning System produces reports and status updates from its activities. More than 4 years have passed since the system was initiated. The horizon time frame focuses on identifying topics anticipated to be within 3 years of possible diffusion into clinical practice. A few surrogates are used to determine this horizon, such as clinical investigation in phase III trials for interventions subject to regulatory processes of the U.S. Food and Drug Administration (FDA). Topics with FDA orphan drug status, fast-track status, or innovation pathway designation are considered if phase II trials are ongoing. For the broad priority area of “Functional Limitations and Disability,” AHRQ has designated use of the definition of disability used by the Department of Health and Human Services.

The Status Update is a summary of data elements collected as a result of implementing the Horizon Scanning Identification and Monitoring Protocol. Status Update reports are produced five times a year, with each new report superseding the prior version. This Status Update is organized into three main topic-status sections and by priority condition within each section. The table of contents provides direct links to each section’s priority condition tables. Topics that were already in the system for this tracking period are presented first as “Currently Tracked Interventions,” followed by “Interventions Added Since Last Update,” and then by “Interventions Tracked but Archived Since Last Update” (i.e., during the prior tracking period of 10 weeks). Each table provides information under the following column headings: Topic Title, Potential Patient Population, Intervention Description (including the Developer/Manufacturer[s] and Phase of Development), Potential Comparators, and Potential Health or Other Impacts.

Criteria for including topics in the Status Update are provided in detail in the “Horizon Scanning Protocol and Operations Manual,” which is available on the Effective Health Care Web site ([Protocol and Operations Manual](#)). Briefly, broad scanning is performed for each priority condition to detect “leads” to interventions and innovations that are anticipated to be within 3 years of potential diffusion into clinical practice. Sets of questions are applied to determine whether any given intervention addresses an “unmet need” such as a large gap in effective ways to screen, diagnose, treat, monitor, manage, or provide or deliver care for a health condition or disease. Interventions might be lacking entirely, or existing options may be less than optimal. Leads that appear to address an important unmet need are assigned to horizon scanning analysts and are assessed for grouping into potential topics. Potential topics are then described according to the PICO framework: potential patient Population, Intervention, potential Comparators to the intervention, and potential Outcomes of interest for the patient population.

During topic-nomination meetings, additional criteria are applied to each topic, including questions about the potential importance of the unmet need, the likelihood of the intervention being adopted in the United States, the innovativeness of the intervention, and the potential impact of the intervention on current treatments, sites of care, disparities in care, health care processes and infrastructure, patient and population health outcomes, understanding of the disease or condition, clinician and patient training needs, and costs of care. Topics accepted during topic nomination meetings are entered into the System for tracking and appear in the Status Update report as “Currently Tracked Interventions” and “Interventions Added Since Last Update.”

Topics accepted for tracking may also be designated during the meeting for further searches to collect more in-depth information about them. Such topics must be far enough along in development (typically phase III trials for drugs, phase II or III trials for devices, and pilot information for off-label use, programs, and care-delivery innovation topics) to have some

preliminary efficacy and safety data available. The horizon scanning medical librarians and analysts proceed with more in-depth and topic-specific searching for information on these topics and topic profiles are written.

Once topic profiles are developed, comments are sought from five to eight experts with a variety of perspectives and areas of expertise in health care. A topic may also be archived or retired if aggregated comments from experts suggest that an intervention is unlikely to meet an unmet need or to have impact on health outcomes or health care in the United States. Over time, a topic may be archived because development has ceased, because it no longer addresses an unmet need, is not novel, or because the intervention has diffused past early adoption and “timed out” in the horizon scanning system (i.e., 2 years after approval or initial diffusion).

Populating the horizon scanning system has been ongoing since December 2010. During that time, about 19,000 leads have been uploaded into the system and reviewed by analysts, from which about 2,090 topics have been initially identified and tracked through the system. This Status Update report contains 527 identified interventions we are currently tracking, which includes 38 new topics that were entered into the system during this reporting period. Since the last reporting period (November 30, 2014), we have archived 34 topics. The reason for archiving each topic is provided in its respective priority area table of archived topics. Three reasons account for the majority of archived topics: expert commenters saw no high-impact potential at this time for the parameters of interest to AHRQ; companies halted development for lack of funding or for trials failing to meet endpoints; or topics that had been tracked met criteria for retiring from the system because they have diffused since tracking started, have shown no movement at all in more than 2 years of tracking, or are 2 years past approval by FDA.

In this update, 4 priority areas comprise about 74.8% (394/527) of the interventions (including programs) being tracked this reporting period: the cancer priority area accounts for 36.9% (194/527) of tracked topics; functional limitations and disability priority area accounts for 19.5% (103/527), cardiovascular disease priority area accounts for 10.2% (54/527), and infectious disease priority area accounts for 8.3% (44/527).

Interventions being tracked in each of the remaining 10 priority conditions (arthritis, dementia, depression and other mental illness, developmental delays, diabetes, obesity, peptic ulcer disease and dyspepsia, pregnancy and childbirth, pulmonary diseases, and substance abuse) plus an additional area we designate as cross-cutting, account for 4% or fewer (each priority area) of the total topics tracked, for a combined total 25% (132/527) of topics being tracked in the system.

In terms of overall types of interventions, about 91% (rounded to the nearest percent) fall into one of two general categories. About 77% of topics are pharmaceutical/biotechnology (i.e., drug, vaccine, biologic) and about 14% are devices used as implants or used externally to deliver treatments. About 4% are technologies intended to screen, diagnose, identify risk, identify blood markers or gene mutations, or monitor a disease state (these are diagnostic devices, assays, imaging modalities). About 2% of topics are surgeries and procedures. About 1% are innovative programs, services, or care delivery practices, and another 2% involve information technology, information systems, or applications used in treating, managing, or monitoring patients. About 0.5% are assistive technologies (e.g., prostheses).

Section 1. Currently Tracked Interventions: 489 Interventions

Table 1. AHRQ Priority Condition: 01 Arthritis and Nontraumatic Joint Disease: 10 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Apremilast (Otezla) for treatment of ankylosing spondylitis	Patients in whom ankylosing spondylitis has been diagnosed	<p>Investigators have not found a cure for ankylosing spondylitis. Treatments are intended to reduce inflammation and improve mobility but are not effective for all patients. Apremilast (Otezla[®]) purportedly inhibits phosphodiesterase type 4 (PDE-4). By inhibiting the PDE-4 enzyme, apremilast purportedly increases intracellular cAMP, which modulates multiple inflammatory mediators. When FDA approved the product for psoriatic arthritis, it became available in 10, 20, and 30 mg strengths for oral administration. In trials for ankylosing spondylitis, it is being administered in 20 or 30 mg doses.</p> <p>Celgene Corp., Summit, NJ</p> <p>Phase III trial ongoing; approved Mar 2014 for treating adults who have active psoriatic arthritis</p>	<p>Corticosteroids Disease-modifying antirheumatic drugs Nonsteroidal anti-inflammatory drugs Physical therapy Sulfasalazine (Azulfidine) Tumor necrosis factor inhibitors</p>	<p>Reduced signs and symptoms Improved mobility Improved quality of life</p>
Brodalumab for treatment of psoriatic arthritis	Patients in whom psoriatic arthritis has been diagnosed	<p>In a subset of patients with psoriatic arthritis, the disease can progress to severe and painful symptoms that, without effective treatment, can lead to deformity and disability of the hands and fingers. Available treatments, such as disease-modifying antirheumatic drugs (DMARDs), can be suboptimal. T-helper 17 cells secrete tumor necrosis factor (TNF), interleukin-17 (IL-17), and other proinflammatory cytokines that are thought to play a key role in psoriatic arthritis pathogenesis. Standard of care focuses on inhibiting TNF; however, many patients' symptoms do not respond to TNF therapy. Brodalumab is a monoclonal antibody that purportedly blocks the IL-17 receptor, inhibiting IL-17 receptor-mediated signaling and improving psoriatic arthritis symptoms. In clinical trials, brodalumab is being given via subcutaneous injection every 2 weeks, 140 or 210 mg, for 16 weeks.</p> <p>Amgen, Inc., Thousand Oaks, CA</p> <p>Phase III trials ongoing</p>	<p>Apremilast Corticosteroids DMARDs (e.g., methotrexate, sulfasalazine) Immunosuppressants (e.g., azathioprine, cyclosporine, leflunomide) Nonsteroidal anti-inflammatory drugs TNF-alpha inhibitors Ustekinumab</p>	<p>Improved symptom scores as measured by the American College of Rheumatology 20/50/70 (% improvement) instruments Improved scores on disability measures Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Condoliase for treatment of lumbar disc herniation	Patients in whom lumbar disc herniation has been diagnosed	<p>About 3 million people in the U.S. are affected by lumbar disc herniation; males aged 20–49 have a particularly high incidence. Pharmacologic treatments focus primarily on reducing pain; no pharmacologic treatments exist for treating the disease. Disc herniation occurs when a partial protrusion of the nucleus pulposus, located in the center of each intervertebral disc, emerges from the anulus fibrosus (outer layer of the disc). Herniated discs exert pressure on the spinal nerve root causing pain and numbness. Condoliase (SI-6603) is an enzyme therapy purported to degrade glycosaminoglycans, which are the main components of the nucleus pulposus. Some clinical researchers assume that degrading glycosaminoglycans reduces pressure on the nerves by shrinking the nucleus pulposus. Condoliase purportedly does not break down proteins, leaving surrounding tissues intact, including blood vessels and nerves. In clinical trials, condoliase is administered at 1.25 U as a single local injection.</p> <p>Seikagaku Corp., Tokyo, Japan</p> <p>Phase III trial ongoing</p>	Lumbar disc replacement surgery Physical therapy	Improved leg pain
Ixezumab for treatment of psoriatic arthritis	Patients in whom active psoriatic arthritis has been diagnosed	<p>In a subset of patients with psoriatic arthritis, the disease can progress to severe and painful symptoms that, without effective treatment, can lead to deformity and disability of the hands and fingers. Available treatments, such as disease-modifying antirheumatic drugs (DMARDs), can be suboptimal. Ixezumab is a monoclonal antibody that purportedly blocks the activity of interleukin 17, which is thought to contribute to psoriatic arthritis pathogenesis. In the ongoing UNCOVER-2 trial, ixekizumab is being given by subcutaneous injection in two 80 mg injections at week 0, followed by weekly 80 mg injections until week 12.</p> <p>Eli Lilly and Co., Indianapolis, IN</p> <p>Phase III trial ongoing</p>	Apremilast Corticosteroids DMARDs (e.g., methotrexate, sulfasalazine) Immunosuppressants (e.g., azathioprine, cyclosporine, leflunomide) Nonsteroidal anti-inflammatory drugs Tumor necrosis factor–alpha inhibitors Ustekinumab	Improved symptom scores as measured by the American College of Rheumatology 20/50/70 (% improvement) instruments Improved disability measures Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Joint-sparing knee implant (KineSpring System) for treatment of knee osteoarthritis</p>	<p>Patients in whom knee osteoarthritis (OA) has been diagnosed</p>	<p>Younger, more active patients are often poor candidates for traditional joint replacement surgery because a prosthesis may not last for the rest of their lives. The KineSpring® System purportedly fills an unmet need in knee OA treatment by providing a minimally invasive option between conservative care and joint-modifying surgery for patients with primarily unicompartmental medial knee osteoarthritis. The system is intended to treat pain and restore knee function by supplementing natural joint structures and reducing joint overload. The device consists of an articulated absorber (spring) anchored with bone screws to the femoral and tibial cortices using standard surgical techniques. The absorber is designed to bear up to 30 lb (13.6 kg) of body weight per step, reducing the load on the joint; 2 ball-and-socket joints at the ends of the spring are purported to match natural knee motion. The absorber is implanted in the extracapsular space along the medial side of the joint through 2 incisions. The procedure purportedly spares the joint and is reversible; the device is extracapsular and extra-articular; no bone, ligament, or cartilage is removed.</p> <p>Moximed, Inc., Hayward, CA</p> <p>Pivotal investigational device exemption trial ongoing in U.S.</p>	<p>High tibial osteotomy Joint distraction Mesenchymal stem-cell therapy Nonsteroidal anti-inflammatory drugs Physical therapy Platelet-rich plasma Special orthotic devices Unloading braces Weight loss (if patient is overweight)</p>	<p>Reduced pain Improved mobility Improved quality of life</p>
<p>Lesinurad for treatment of hyperuricemia and allopurinol-refractory gout</p>	<p>Patients in whom hyperuricemia has been diagnosed and thus are at high risk of developing acute gout</p>	<p>Hyperuricemia is believed to be the most important risk factor for developing gout. About half of patients with gout do not achieve target goals for serum uric acid levels with the standard of care, allopurinol or febuxostat. Lesinurad (RDEA594) is a selective urate transporter inhibitor. This inhibition leads to uric acid excretion, reducing uric acid and crystal formation and potentially alleviating symptoms of acute gout or preventing gout flares. Lesinurad can be used as monotherapy or in combination with allopurinol or febuxostat. In clinical trials, lesinurad was administered orally, 200 mg, twice daily, or 400 mg, once daily.</p> <p>AstraZeneca, London, UK</p> <p>Phase III trials ongoing</p>	<p>Allopurinol Colchicine Febuxostat Nonsteroidal anti-inflammatory drugs Probenecid Steroids</p>	<p>Reduced uric acid accumulation and crystal formation Fewer acute flares</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Masitinib for treatment of rheumatoid arthritis	Patients in whom rheumatoid arthritis (RA) has been diagnosed	<p>RA is a chronic inflammatory disease causing polyarthritis with frequent progression to permanent joint damage, deformity, and functional disability. Biologic therapies have become standard of care for patients with RA that no longer responds to disease-modifying antirheumatic drugs (DMARDs). However, biologics must be administered by injection and are associated with increased incidence of serious infections, including tuberculosis. DMARDs with improved efficacy, tolerability, and convenient dosing are needed. Masitinib is a tyrosine kinase inhibitor that purportedly targets the activity of mast cells, which are involved in mediating inflammation in the synovium. Masitinib purportedly targets mast cells through selectively inhibiting KIT, platelet-derived growth factor receptor, Lyn, and to a lesser extent, fibroblast growth factor receptor 3. In clinical trials, masitinib is administered orally, 3 or 6 mg/kg, daily.</p> <p>AB Science S.A., Paris, France</p> <p>Phase II/III trial ongoing</p>	<p>Biologics (e.g., tocilizumab, adalimumab, abatacept) Corticosteroids DMARDs (e.g., hydroxychloroquine, methotrexate, sulfasalazine) Nonsteroidal anti-inflammatory drugs Tofacitinib Tumor necrosis factor-alpha inhibitors</p>	<p>Improved symptom scores as measured by American College of Rheumatology 20/50/70 (% improvement) instruments Improved quality of life</p>
Secukinumab for treatment of ankylosing spondylitis	Patients in whom ankylosing spondylitis has been diagnosed	<p>Ankylosing spondylitis is an inflammatory disease, a form of arthritis that primarily affects the spine and can cause vertebrae to fuse together; investigators have not found a cure. Treatments focus on reducing inflammation, improving mobility, and decreasing pain, but are not effective for all patients. Effective treatments are needed. Secukinumab is purportedly a monoclonal antibody antagonist for interleukin-17 (IL-17). IL-17 purportedly is involved in developing delayed-type hypersensitivity reactions by increasing chemokine production, which promotes the recruitment of inflammatory cells such as monocytes and neutrophils to the local area. By blocking the effects of IL-17-localized autoimmune reactions, ankylosing spondylitis pathology could be blocked while minimizing the systemic immunosuppression associated with tumor necrosis factor (TNF) blockers, which are often used in treatment. Administered subcutaneously, 75 or 150 mg, monthly.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase III trials ongoing</p>	<p>Corticosteroids Disease-modifying antirheumatic drugs Nonsteroidal anti-inflammatory drugs Physical therapy Sulfasalazine (Azulfidine) TNF inhibitors</p>	<p>Improved mobility Improved quality of life Reduced pain and other symptoms</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Secukinumab for treatment of psoriatic arthritis	Patients in whom psoriatic arthritis has been diagnosed	<p>In a subset of patients with psoriatic arthritis, the disease can progress to severe and painful symptoms that, without effective treatment, can lead to deformity and disability of the hands and fingers. Some patients do not have an adequate response to disease-modifying antirheumatic drugs (DMARDs), and other effective treatments are needed. Secukinumab is a monoclonal antibody antagonist for interleukin-17 (IL-17) purportedly involved in developing delayed-type hypersensitivity reactions. It purportedly does so by increasing chemokine production, which promotes the recruitment of inflammatory cells such as monocytes and neutrophils to the local area. By blocking these effects, psoriatic arthritis pathology could be obstructed while minimizing the systemic immunosuppression associated with the tumor necrosis factor (TNF) blockers that are often used in treatment. The drug is administered subcutaneously, 150 mg, monthly.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase III trials ongoing</p>	<p>Apremilast Corticosteroids DMARDs (e.g., methotrexate, sulfasalazine) Immunosuppressants (e.g., azathioprine, cyclosporine, leflunomide) Nonsteroidal anti-inflammatory drugs TNF-alpha inhibitors Ustekinumab</p>	<p>Improved symptom scores as measured by the American College of Rheumatology 20/50/70 (% improvement) instruments Improved scores on disability measures Improved quality of life</p>
Secukinumab for treatment of rheumatoid arthritis	Patients in whom rheumatoid arthritis (RA) has been diagnosed	<p>RA is a chronic inflammatory disease causing polyarthritis with frequent progression to permanent joint damage, deformity, and functional disability. Biologic therapies have become standard of care for patients with RA that no longer responds to disease-modifying antirheumatic drugs (DMARDs). However, biologics must be administered by injection and are associated with increased incidence of serious infections, including tuberculosis. DMARDs with improved efficacy and tolerability are needed. Secukinumab is a monoclonal antibody antagonist for interleukin-17 (IL-17). IL-17 purportedly is involved in developing delayed-type hypersensitivity reactions by increasing chemokine production, which promotes the recruitment of inflammatory cells such as monocytes and neutrophils to the local area. By blocking these effects, RA pathology could be blocked while minimizing the systemic immunosuppression associated with tumor necrosis factor (TNF) blockers, which are often used in treatment. Administered subcutaneously, 75 or 150 mg, monthly, with a 10 mg/kg loading dose.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase III trials ongoing</p>	<p>Biologics (e.g., tocilizumab, adalimumab, abatacept) Corticosteroids DMARDs (e.g., hydroxychloroquine, methotrexate, sulfasalazine) Nonsteroidal anti-inflammatory drugs Tofacitinib Tumor necrosis factor-alpha inhibitors</p>	<p>Improved symptom scores as measured by American College of Rheumatology 20/50/70 (% improvement) instruments Improved quality of life</p>

Table 2. AHRQ Priority Condition: 02 Cancer: 184 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
5-aminolevulinic acid fluorescence guidance for identifying clear surgical margins in glioma	Patients undergoing surgery for glioma	<p>Complete surgical resection of glioma improves outcomes in patients who are eligible for surgery; however, the highly invasive nature of glioma and the high degree of similarity between glioma tumors and surrounding healthy brain tissue make complete surgical resection and identification of clear surgical margins difficult. 5-aminolevulinic acid (5-ALA) is a small-molecule prodrug that is converted to protoporphyrin IX (PIX) in neoplastic cells, but not in normal cells. Illuminating PIX with ultraviolet light induces fluorescence in the visible light spectrum, potentially serving as a marker for glioma tissue. Researchers postulate that surgical resection guided by the pattern of PIX fluorescence could increase the percentage of glioma tissue removed, thereby improving outcomes. 5-ALA is administered as an oral medication about 3–5 hours before surgery at a dose of 20 mg/kg.</p> <p>Medac GmbH, Hamburg, Germany (developer); NX Development Corp., Louisville, KY, has optioned development rights in North America Multiple academic research institutions including Case Comprehensive Cancer Center, Cleveland, OH; Emory University, Atlanta, GA; St. Joseph's Hospital and Medical Center, Phoenix, AZ; University of California, San Francisco (investigators)</p> <p>Phase III trial (MC-ALS.3/GLI), phase III trials (BALANCE) ongoing; commercially available as Gliolan® in Europe; FDA granted orphan drug status</p>	Standard surgical resection without fluorescence assistance	Increased overall survival Increased progression-free survival Improved quality of life
90Y-clivatuzumab tetraxetan for treatment of pancreatic cancer	Patients with metastatic pancreatic cancer who have received at least 2 therapies, including at least 1 gemcitabine-containing regimen	<p>Only about 5% of patients with pancreatic cancers have disease that responds to the current standard of care (gemcitabine chemotherapy), and the prognosis for these patients is poor. 90Y-clivatuzumab tetraxetan is a novel radiopharmaceutical under investigation for treating pancreatic cancer. Clivatuzumab is a humanized monoclonal antibody that binds a mucin antigen expressed by most pancreatic cancer cells but is minimally expressed in pancreatitis or by normal pancreatic cells. Clivatuzumab is conjugated to the radioisotope yttrium-90 using the chelator tetraxetan. In clinical trials, 90Y-clivatuzumab tetraxetan is administered once weekly for 3 weeks of each 4-week cycle, in combination with weekly, low-dose gemcitabine (200 mg/m², intravenously).</p> <p>Immunomedics, Inc., Morris Plains, NJ</p> <p>Phase III trial (PANCRIT®-1) ongoing; FDA granted orphan drug and fast-track statuses</p>	Various chemotherapies including 1 or more of the following: 5-fluorouracil Capecitabine Erlotinib Gemcitabine Leucovorin Nab-paclitaxel Oxaliplatin	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Abemaciclib for treatment of breast cancer	Patients with estrogen receptor–positive, HER2–negative breast cancer in whom locally advanced disease is not amenable to treatment by surgery or who have metastatic disease	<p>Although endocrine therapies (e.g., estrogen receptor antagonists, aromatase inhibitors) are often effective in treating patients who have estrogen receptor–positive breast cancer, the response duration is typically limited to about 1 year. Abemaciclib (LY2835219) is a dual inhibitor of cyclin-dependent kinase (CDK) 4 and CDK 6, kinases involved in controlling cell-cycle progression. CDK 4 and CDK 6 regulate a cell-cycle checkpoint controlling initiation of DNA synthesis; therefore, their inhibition may limit tumor growth mediated by cell proliferation. Preclinical studies have demonstrated that estrogen receptor–positive breast cancer may be highly sensitive to CDK 4/6 inhibition and that this inhibition may be synergistic with endocrine therapies. Abemaciclib is being studied for use in combination with fulvestrant in various treatment settings for advanced disease. In clinical trials, it is given orally at a dose of 200 mg, once every 12 hours, in 28-day cycles. Abemaciclib is also being tested in advanced nonsmall cell lung cancer</p> <p>Eli Lilly and Co., Indianapolis, IN</p> <p>Phase III trials (MONARCH 2 and MONARCH 3) ongoing</p>	<p>Anastrozole Fluoxymesterone Fulvestrant High-dose estrogen LEE011 (in development) Palbociclib (in development) Progesterin Tamoxifen Toremifene</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Adenosine receptor agonist (CF102, CI-IB-MECA) for treatment of hepatocellular carcinoma	Patients with treatment-refractory or metastatic hepatocellular carcinoma (HCC)	<p>Patients with HCC that cannot be surgically resected have few treatment options and a poor prognosis; no 2nd-line therapy is available after sorafenib. CF102 is a highly specific and selective agonist of the A3 adenosine receptor (A3AR), which can downregulate the NF-κB and the Wnt signal transduction pathways and promote apoptosis of tumor cells. In clinical trials, CF102 is administered to patients orally at a dose of 25 mg, twice daily, in 28-day cycles.</p> <p>Can-Fite BioPharma, Ltd., Petach-Tikva, Israel</p> <p>Phase II trial ongoing; FDA granted orphan drug status</p>	<p>Locoregional treatment Regorafenib Sorafenib</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ado-trastuzumab emtansine (Kadcyla) for treatment of breast cancer	Patients in whom metastatic HER2-positive breast cancer has been diagnosed	<p>Patients with advanced HER2-positive breast cancer have a poor prognosis with current treatment options. Ado-trastuzumab emtansine (Kadcyla[®], formerly trastuzumab-DM1) is a combination of an HER2-specific antibody (trastuzumab, Herceptin[®]) and a cytotoxic microtubule inhibitor (DM1, mertansine). This combination is intended to enable preferential delivery of a highly cytotoxic agent to cells expressing HER2 to produce the same (or better) results as HER2 inhibition plus chemotherapy, but with reduced side effects. This agent is administered intravenously, at 3.6 mg/kg, every 3 weeks.</p> <p>F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>FDA approved Feb 2013 for treating HER2-positive metastatic breast cancer in patients who previously received trastuzumab and a taxane; 1st antibody-drug conjugate approved for treating breast cancer; additional phase III trials ongoing in adjuvant setting and 1st-line and 3rd-line treatment of metastatic disease</p>	Lapatinib plus capecitabine Trastuzumab plus chemotherapy (e.g., capecitabine, docetaxel, paclitaxel, vinorelbine) Trastuzumab plus lapatinib	Increased overall survival Increased progression-free survival Improved quality of life
Afatinib (Gilotrif) for treatment of head and neck cancer	Patients in whom advanced head and neck cancer has been diagnosed	<p>Patients with advanced head and neck cancer have a poor prognosis and high recurrence rate, suggesting the need for novel treatment options. Afatinib (Gilotrif[™]) is a small-molecule, irreversible ErbB-family inhibitor. It inhibits both epidermal growth factor receptor (EGFR; HER1) and HER2 receptor tyrosine kinases. Targeted EGFR-like receptor inhibition using the anti-EGFR monoclonal antibody cetuximab has demonstrated efficacy. Although multiple receptor tyrosine kinase inhibitors are available, none are approved for use in treating head and neck cancer. In clinical trials, afatinib is being tested as 1st-line treatment, 2nd-line treatment after a platinum-based regimen, and maintenance therapy. Afatinib is administered orally, 40–50 mg, once daily.</p> <p>Boehringer Ingelheim GmbH, Ingelheim, Germany</p> <p>Phase III trials (Lux-Head & Neck 1, 2, 3, and 4) ongoing</p>	Various combination or monotherapy regimens including: 5-fluorouracil Bleomycin Cetuximab Cisplatin Docetaxel Gemcitabine Ifosfamide Methotrexate Paclitaxel Vinorelbine	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Afatinib (Gilotrif) for treatment of metastatic breast cancer	Patients in whom advanced HER2-positive breast cancer has been diagnosed	<p>Patients with advanced HER2-positive breast cancer have a poor prognosis with current treatment options. Afatinib (Gilotrif™) is a small-molecule, irreversible ErbB family inhibitor. It inhibits both epidermal growth factor receptor (EGFR; HER1) and HER2 receptor tyrosine kinases; these receptor tyrosine kinases are overexpressed in breast cancers (about 20% of patients). Targeted EGFR-like receptor inhibition in these cancers has a high relative success rate. Although multiple receptor tyrosine kinase inhibitors are available, afatinib is unique in that its inhibition is irreversible. In a phase III clinical trial in HER2-positive breast cancer, afatinib (once daily oral dose) is administered in combination with intravenous vinorelbine (25 mg/m² once weekly).</p> <p>Boehringer Ingelheim GmbH, Ingelheim, Germany</p> <p>Phase III trial (LUX-Breast 1) ongoing</p>	<p>Ado-trastuzumab emtansine Lapatinib plus capecitabine Trastuzumab plus chemotherapy (e.g., paclitaxel, docetaxel, vinorelbine, capecitabine) Trastuzumab plus lapatinib</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Afatinib (Gilotrif) for treatment of nonsmall cell lung cancer	Patients in whom nonsmall cell lung cancer (NSCLC) has been diagnosed and who have certain EGFR mutations	<p>The 5-year survival rate for patients with advanced NSCLC is less than 15% with current treatments. Afatinib (Gilotrif™) is a small-molecule, irreversible ErbB inhibitor. It inhibits both epidermal growth factor receptor (EGFR; HER1) and HER2 receptor tyrosine kinases. These receptor tyrosine kinases are mutated and overexpressed in NSCLC in about 10% of patients; targeted EGFR-like receptor inhibition in these cancers has a relatively high success rate. Although other EGFR inhibitors are available, afatinib is unique in that its inhibition is irreversible. Within the <i>EGFR</i> gene mutations present in about 10% of NSCLCs, the majority are <i>EGFR</i> exon 19 deletions or exon 21 L858R substitutions. The product labeling indicates that afatinib is taken orally at a once-daily dosage of 40 mg.</p> <p>Boehringer Ingelheim, GmbH, Ingelheim, Germany</p> <p>FDA approved Jul 2013 for 1st-line treatment of metastatic NSCLC in patients whose tumors harbor specific types of <i>EGFR</i> gene mutations as detected by the FDA-approved companion diagnostic test (therascreen EGFR RGQ PCR Kit, QIAGEN, Manchester Ltd., UK)</p>	<p>1st-line: Combination chemotherapy (e.g., pemetrexed plus cisplatin) Targeted immunotherapy (e.g., bevacizumab, cetuximab, erlotinib) 2nd-line: Erlotinib Single agent chemotherapy (e.g., docetaxel, pemetrexed)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Aldoxorubicin for treatment of soft tissue sarcoma	Patients with unresectable or metastatic soft tissue sarcoma who have undergone at least 1 systemic therapy	<p>Patients with soft tissue sarcoma have few treatment options and a poor prognosis. Aldoxorubicin is a novel formulation of doxorubicin, a chemotherapy compound approved for use in treating soft tissue sarcoma, intended to provide targeted delivery of the compound to tumors. In this formulation, doxorubicin is coupled to albumin via an acid-sensitive linker. Circulating albumin preferentially accumulates in tumor tissues, which also generate acidic microenvironments. In these acidic conditions, the linker is cleaved, potentially releasing active doxorubicin locally at the site of the tumor. Aldoxorubicin is administered at a dosage of 350 mg/m², intravenously, once every 3 weeks, for up to 6 cycles.</p> <p>CytRx Corp., Los Angeles, CA</p> <p>Phase III trial ongoing under an FDA special protocol assessment; FDA granted orphan drug status</p>	Dacarbazine Doxorubicin Gemcitabine plus docetaxel Ifosfamide Pazopanib	Increased overall survival Increased progression-free survival Improved quality of life
Alectinib for treatment of nonsmall cell lung cancer	Patients with nonsmall cell lung cancer (NSCLC) harboring a genetic rearrangement that leads to constitutive activation of anaplastic lymphoma kinase (ALK)	<p>The 5-year survival rate for patients with advanced NSCLC is less than 15% with current treatments. ALK is an oncogenic tyrosine kinase that was identified in gene fusions that caused activation of ALK in lymphoblastoma. The ALK inhibitor crizotinib (Xalkori[®]) has been successful in treating ALK mutation-positive NSCLC, but acquired drug resistance is a major issue. Alectinib (RG7853, RO5424802) is a next-generation ALK inhibitor with purported clinical activity in patients with ALK mutation-positive NSCLC whose disease has become resistant to crizotinib. In a phase II clinical trial, alectinib is administered orally in a range of doses.</p> <p>F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>Phase II trials ongoing; phase III trials (ALEX and expanded access) ongoing; FDA granted breakthrough therapy status</p>	Docetaxel Gemcitabine Pemetrexed Platinum doublet Targeted immunotherapy (e.g., bevacizumab, erlotinib)	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Algenpantucel-L (HyperAcute-Pancreas) immunotherapy for pancreatic cancer</p>	<p>Patients in whom nonmetastatic adenocarcinoma of the pancreas has been diagnosed</p>	<p>Patients with pancreatic cancer have a 5-year survival rate of about 5%; effective treatment options are needed. Algenpantucel-L immunotherapy is intended to stimulate an immune response against the patient's pancreatic cancer cells. HyperAcute®-Pancreas therapy consists of 2 allogeneic pancreatic cancer cell lines that have been genetically engineered to express the enzyme alpha (1,3) galactosyl transferase, which marks the cells with a nonhuman carbohydrate that elicits a strong antibody immune response. Antibody binding to the cell lines leads to complement-mediated cell lysis, potentially leading to the uptake of pancreatic cancer antigens and a systemic immune response against the patient's cancer. Clinical trials are testing this intervention in surgically resected and unresectable/borderline resectable pancreatic cancers; it is being administered by injection in combination with standard of care chemoradiation. HyperAcute-Pancreas is administered at a dose of 300 million immunotherapy cells, via intradermal injection, biweekly, for up to 18 doses.</p> <p>NewLink Genetics Corp., Ames, IA</p> <p>Phase III trials (IMPRESS and PILLAR) ongoing under FDA special protocol assessment; trials examining use in surgically resected and unresectable disease; FDA granted fast-track and orphan drug statuses</p>	<p>Standard chemoradiation regimens (including systemic chemotherapy such as FOLFIRINOX, 5-fluorouracil, gemcitabine, and/or nab-paclitaxel)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>Alisertib for treatment of peripheral T-cell lymphoma</p>	<p>Patients in whom relapsed/refractory peripheral T-cell lymphoma (PTCL) has been diagnosed</p>	<p>Current treatment options for relapsed/refractory PTCL are largely palliative and generate responses in fewer than 50% of patients (with the exception of brentuximab vedotin for the anaplastic large cell lymphoma [ALCL] subtype). Alisertib is an Aurora A kinase inhibitor under study for treating PTCL. Aurora A kinase is an important regulator of the mitotic spindle and is required for progression through the mitotic phase of the cell cycle. Inhibiting Aurora A has been shown to cause mitotic errors, potentially leading to aneuploidy, apoptosis, and cellular senescence. Alisertib is administered orally, 50 mg, twice daily.</p> <p>Millennium Pharmaceuticals, Inc., subsidiary of Takeda Pharmaceutical Co., Ltd., Osaka, Japan</p> <p>Phase III trial ongoing</p>	<p>Alemtuzumab Bortezomib Brentuximab vedotin (ALCL subtype only) Cyclosporine (angioimmunoblastic T-cell lymphoma subtype only) Denileukin diftitox Gemcitabine Pralatrexate Radiation therapy Romidepsin</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Alvocidib for treatment of acute myeloid leukemia	Patients in whom acute myeloid leukemia (AML) has been diagnosed	<p>Only about 25% of patients in whom AML is diagnosed will survive for 5 years after diagnosis. Alvocidib inhibits cyclin-dependent kinases (CDKs), which are key regulators of cell-cycle progression. Deregulation of CDK activity purportedly contributes to uncontrolled cell division and growth of cancer cells. Alvocidib is administered intravenously in combination with standard multi-agent chemotherapy regimens.</p> <p>Tolero Pharmaceuticals, Inc., Lehi, UT</p> <p>Phase II trials complete; FDA granted orphan drug status</p>	Cladribine, cytarabine, and granulocyte colony stimulating factor (G-CSF) plus or minus mitoxantrone or idarubicin Fludarabine, cytarabine, and G-CSF plus or minus idarubicin High-dose cytarabine and anthracycline Mitoxantrone, etoposide, and cytarabine	Increased overall survival Increased progression-free survival Improved quality of life
Anamorelin for treatment of cancer-related cachexia/anorexia	Patients with nonsmall cell lung cancer in whom cancer-related cachexia/anorexia (CRCA) has been diagnosed	<p>CRCA is caused by metabolic and neurochemical alterations in the body that lead to the loss of the desire to eat (anorexia) and the wasting of skeletal muscle mass (cachexia). The condition can limit patients' tolerance of further treatment, directly affecting survival. Although a number of treatments have been applied to CRCA, many patients do not respond. Ghrelin, through its activity on the growth hormone secretagogue receptor, may increase appetite and inhibit leptin and proinflammatory cytokine expression. Anamorelin (ONO-7643) is a ghrelin receptor agonist that can potentially address both the appetite and metabolic (e.g., proinflammatory) aspects of CRCA. In clinical trials, it is being administered at a dosage of 100 mg, orally, daily.</p> <p>Helsinn Healthcare S.A., Lugano/Pazzallo, Switzerland</p> <p>Phase III trials (ROMANA 1 and ROMANA 2) ongoing</p>	Anticytokine antibodies Appetite stimulants (e.g., cannabinoids, corticosteroids, cyproheptadine) Dietary counseling Melanocortin antagonists Metabolic disturbance modulators (e.g., pentoxifylline, thalidomide) Progesterone derivatives	Improved lean body mass Improved muscle strength Increased body weight Increased overall survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Anti-PD-1L monoclonal antibody (MPDL3280A) for treatment of advanced non-small cell lung cancer	Patients with locally advanced or metastatic nonsmall cell lung cancer (NSCLC) that has progressed	<p>Patients with advanced NSCLC whose disease has progressed after 1st-line platinum-based chemotherapy have few treatment options and a poor prognosis. A hallmark of cancer is its ability to evade an immune response. MPDL3280A is a novel therapeutic that is intended to prevent immune tolerance of tumor cells. The drug's target is the programmed death-1 receptor ligand (PD-1L), which is frequently expressed in tumor microenvironments and purportedly leads to downregulation of T-cell activity via activation of the programmed death-1 immune checkpoint. MPDL3280A is a monoclonal antibody specific for PD-1L and is intended to prevent an interaction between the ligand and its receptor, potentially limiting activation of the immune checkpoint. In trials, MPDL3280A is administered as a 1,200 mg intravenous infusion on day 1 of a 21-day cycle.</p> <p>F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>Phase III trial ongoing</p>	Docetaxel Erlotinib Pemetrexed	Increased overall survival Increased progression-free survival Improved quality of life
Anti-PD-1L monoclonal antibody durvalumab (MEDI4736) for treatment of nonsmall cell lung cancer	Patients with locally advanced or metastatic nonsmall cell lung cancer (NSCLC) that has progressed after platinum-based chemotherapy	<p>The 5-year survival rate for patients with advanced NSCLC is less than 15%, and patients with advanced NSCLC whose disease has progressed after 1st-line platinum-based chemotherapy have few treatment options and a poor prognosis. A hallmark of cancer is its ability to evade an immune response. Durvalumab (MEDI4736) is a novel immunotherapy agent intended to prevent the immune tolerance of cancer cells. It is a monoclonal antibody against programmed death-1 receptor ligand (PD-1L), which is frequently expressed in tumor microenvironments and downregulates T cells via activation of the programmed death-1 (PD-1) immune checkpoint. Durvalumab purportedly limits activation of the immune checkpoint by preventing the interaction between PD-L1 and its receptor PD-1. In clinical trials (ATLANTIC), Durvalumab is administered intravenously every 2 weeks from day 1 for a maximum of 12 months or intolerable toxicity.</p> <p>Medimmune LLC subsidiary of AstraZeneca (London, UK)</p> <p>Phase III trials (PACIFIC and unnamed) ongoing</p>	Carboplatin in combination with any of the following: Docetaxel Erlotinib Paclitaxel Pemetrexed	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Astuprotimut-r for treatment of advanced melanoma	Patients with resectable stage IIIB or IIIC cutaneous melanoma that expresses melanoma antigenic epitope (MAGE)-A3 antigen	<p>Patients with advanced melanoma frequently experience disease recurrence after surgical resection of the primary tumor. Current immunotherapies used in the adjuvant setting have shown little effect on the duration of overall survival in this patient population. Astuprotimut-r (GSK2132231A) is a peptide-based therapeutic vaccine directed at the cancer-specific antigen MAGE-A3, which is expressed by a significant proportion of melanomas. It is being tested in the adjuvant setting for treating melanoma. In a multicenter, international phase III trial of 1,349 patients, GSK2132231A is being administered as a course of 13 injections over 27 months.</p> <p>GlaxoSmithKline, Middlesex, UK</p> <p>Phase III trial (DERMA) ongoing; Sept 2013, company announced phase III trial had failed to meet 1st co-primary endpoint of increasing disease-free survival; trial continues to assess 2nd co-primary endpoint of overall survival</p>	Granulocyte-macrophage colony stimulating factor Interferon-alpha Interleukin-2 Radiation therapy	Increased overall survival Increased progression-free survival Improved quality of life
Autologous dendritic cell immunotherapy (AGS-003) for treatment of renal cell carcinoma	Patients in whom advanced or metastatic renal cell carcinoma (RCC) has been diagnosed	<p>Approximately 14,000 deaths are attributable to kidney cancer in the U.S. each year. AGS-003 is a personalized immunotherapy in which dendritic cells are removed from the patient, loaded with messenger RNA isolated from the patient's tumor, then re-administered to the patient. In clinical trials, AGS-003 is being used in combination with sunitinib in patients with newly diagnosed advanced/metastatic RCC who have undergone unilateral or partial nephrectomy. AGS-003 is administered by intradermal injection. A full treatment course consists of 8 injections in year 1 followed by quarterly booster injections.</p> <p>Argos Therapeutics, Inc., Durham, NC</p> <p>Phase III trial (ADAPT) ongoing</p>	Axitinib Bevacizumab (with interferon alfa) Everolimus Interleukin-2 Pazopanib Sorafenib Sunitinib Temsirrolimus	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Autologous dendritic cell immunotherapy (DCVax-L) for glioblastoma multiforme	Patients in whom unilateral glioblastoma multiforme (GBM) has been diagnosed	<p>GBM is difficult to treat and associated with a very poor prognosis. New therapies that slow disease progression and improve survival are needed. DCVax[®]-L is an autologous dendritic cell vaccine intended to promote an immune response against a patient's glioblastoma. To prepare DCVax-L, both a tumor isolate and a blood draw to obtain immune cells are required. Dendritic cells (antigen-presenting cells of the immune system) are expanded from the patient's isolated immune cells and exposed to tumor lysate. These activated dendritic cells are then injected back into the patient intradermally every 2–6 months for up to 3 years.</p> <p>Northwest Biotherapeutics, Inc., Bethesda, MD</p> <p>Phase III trial (GBM) ongoing; Nov 2014, DCVax-L was approved in Germany and the UK through the early approval programs</p>	<p>Bevacizumab (under investigation) Other immunotherapeutics (in development, e.g., HSPPC-95, ICT107) Radiation therapy Surgical resection (with or without carmustine wafer) Temozolomide</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Autologous dendritic cell immunotherapy (ICT-107) for treatment of glioblastoma multiforme	Patients with glioblastoma multiforme (GBM) who have undergone surgical debulking treatment	<p>GBM is difficult to treat and associated with a very poor prognosis. New therapies that can improve survival and slow disease progression are needed. Personalized dendritic cell vaccine (ICT-107) is an autologous-derived therapeutic vaccine targeting 6 autologous tumor-associated antigens: AIM2, HER2, gp-100, melanoma antigenic epitope-1, TRP-2, and interleukin-13Ra2. ICT-107 is under investigation in newly diagnosed GBM. It is administered as an adjuvant to surgical resection and chemoradiation therapy; 4 induction doses are followed by a maintenance regimen that continues until disease progression.</p> <p>ImmunoCellular Therapeutics, Ltd., Woodland Hills, CA</p> <p>Phase IIb trial ongoing; company received suggestions from FDA on phase III protocol Sept 2014; preparing for trial initiation in 2015; FDA granted orphan drug status in 2010</p>	<p>Bevacizumab (in development) Other immunotherapeutics (in development, e.g., DCVax-L, HSPPC-95) Radiation therapy Surgical resection (with or without carmustine wafer) Temozolomide</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Bavituximab for treatment of advanced nonsmall cell lung cancer	Patients with locally advanced or metastatic nonsmall cell lung cancer (NSCLC) that has progressed after 1st-line chemotherapy	<p>Advanced NSCLC has a poor prognosis with few therapeutic options, and new treatments are needed for patients whose disease has progressed after 1st-line, platinum-based doublet chemotherapy. Bavituximab is a monoclonal antibody directed against phosphatidylserine (PS) exposed on the surface of cancer cells; PS expression is believed to be immunosuppressive. Bavituximab is thought to bind to PS and block the immunosuppressive signals to improve immune responses to the tumor; also, because chemotherapy increases the exposure of PS on tumor blood vessels, bavituximab combined with chemotherapy may hold potential for synergistic therapeutic effects. Administered intravenously 3 mg/kg, weekly, in combination with docetaxel for 2nd-line treatment of NSCLC.</p> <p>Peregrine Pharmaceuticals Inc., Tustin, CA</p> <p>Phase III trial (SUNRISE) ongoing; FDA granted fast-track status</p>	Docetaxel Erlotinib Paclitaxel Pemetrexed	Increased overall survival Increased progression-free survival Improved quality of life
BBI608 for treatment of gastric cancer	Patients with unresectable advanced gastric cancer or gastroesophageal junction cancer whose disease has progressed after receiving platinum-based chemotherapy	<p>Patients with locally advanced or metastatic gastric cancer or gastroesophageal junction cancer have a poor prognosis with available treatment options. Cancer stem cells (CSCs) are specialized cells in the tumor thought to be responsible for tumor growth, therapy resistance, and metastatic spread. Although standard therapies that target non-CSCs reduce tumor size, they do not affect CSCs, and this may cause the cancer to recur. BBI608 is a small molecule purported to target and kill CSCs within the tumor. In clinical trials, BBI608 is administered orally, at a dose of 460 mg, twice daily, in combination with intravenous paclitaxel.</p> <p>Boston Biomedical subsidiary of Sumitomo Dainippon Pharma Co., Ltd., Osaka, Japan</p> <p>Phase III trial (BRIGHTER) ongoing; also under study for treating colorectal cancer</p>	5-docetaxel 5-fluorouracil Capecitabine Carboplatin Cisplatin, Epirubicin Fluoropyrimidine Irinotecan Oxaliplatin Paclitaxel Ramucirumab	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Beta glucan immunomodulator (Imprime PGG) for treatment of advanced colorectal cancer	Patients in whom recurrent or metastatic KRAS wild-type colorectal cancer (CRC) has been diagnosed	<p>Many patients with late-stage CRC are unable to tolerate or do not benefit from available chemotherapeutic regimens; new therapies to treat advanced CRC are needed. Imprime PGG® is a novel beta glucan immunomodulator that purportedly induces an antitumor response by binding complement receptors 1–3 and stimulating neutrophils. Imprime PGG purportedly works synergistically with monoclonal antibody therapy such as cetuximab, and in clinical trials, this agent is being examined as part of a combination therapy with cetuximab. Imprime PGG is administered at a dose of 4 mg/kg, by injection, weekly.</p> <p>Biothera, Eagan, MN</p> <p>Phase III trial (PRIMUS) ongoing</p>	Cetuximab monotherapy Regorafenib	Increased overall survival Increased progression-free survival Improved quality of life
Bevacizumab (Avastin) for treatment of ovarian cancer	Patients in whom advanced or recurrent ovarian cancer has been diagnosed	<p>Ovarian cancer is the 2nd deadliest cancer after pancreatic cancer; no new 1st-line treatment options have been developed in the past decade. Bevacizumab (Avastin®) is a monoclonal antibody that binds vascular endothelial growth factor (VEGF) and prevents the interaction of VEGF with its receptors (Flt-1 and KDR) on the surface of endothelial cells. By blocking this interaction, bevacizumab prevents the proliferation of endothelial cells and the formation of new blood vessels needed to nourish growing tumors. This agent is on the market for several other indications and is being tested in the 1st- and 2nd-line settings in combination with standard chemotherapy. In clinical trials for treating ovarian cancer, bevacizumab is administered at 15 mg/kg, intravenously, on day 1 of each 3-week cycle.</p> <p>Genentech subsidiary of F. Hoffmann-La Roche, Ltd., Basel, Switzerland, and National Cancer Institute, Bethesda, MD</p> <p>Phase III trials ongoing; Nov 2014, FDA approved bevacizumab for treating ovarian cancer; Aug 2014, approved by EU for treating recurrent ovarian cancer resistant to platinum-containing chemotherapy; Nov 2013, approved in Japan</p>	Combination chemotherapy including 1 or more of the following: Carboplatin Gemcitabine Paclitaxel Pegylated liposomal doxorubicin Topotecan	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Binimetinib for treatment of metastatic melanoma	Patients in whom advanced melanoma has been diagnosed	<p>Patients with metastatic melanoma have a poor prognosis. About 15% of melanoma cases harbor the NRAS Q61 mutation; NRAS mutations are associated with higher mitotic rates and thicker tumors. Currently, no targeted therapies have been effective in NRAS mutation–positive melanomas. Binimetinib (MEK162) is a MEK1/2 inhibitor that effectively treated about 20% of BRAF- and NRAS-mutated melanomas in phase II trials. Binimetinib is also under investigation in combination with RAF inhibitors for treating BRAF-mutated melanoma. In a phase III trial in patients with NRAS-mutated melanoma, binimetinib is administered as a once-daily, oral dose of 45 mg (three 15 mg tablets).</p> <p>Novartis International AG, Basel, Switzerland; licensed by Array BioPharma, Inc., Boulder, CO</p> <p>Phase II and III trials (COLUMBUS and NEMO) ongoing</p>	<p>Dabrafenib Dacarbazine Interleukin-2 Ipilimumab Temozolomide Trametinib Vemurafenib</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Binimetinib for treatment of serous ovarian, fallopian tube, and peritoneal cancers	Patients in whom low-grade serous ovarian, fallopian tube, or peritoneal cancer has been diagnosed	<p>Few effective treatment options exist for recurrent or persistent primary ovarian, peritoneal, or fallopian tube cancer. MEK162 is a MEK1/2 inhibitor that targets the RAS/RAF/MEK/ERK pathway, which signals cancer cell proliferation and survival. A global, randomized phase III trial is evaluating MEK162 versus physician’s choice of standard cytotoxic chemotherapy in 300 patients with recurrent or persistent low-grade serous ovarian cancer after at least 1 platinum-based chemotherapy regimen and no more than 3 lines of chemotherapy regimens. MEK162 is administered as a once-daily, oral dose of 45 mg (three 15 mg tablets).</p> <p>Novartis International AG, Basel, Switzerland; licensed by Array BioPharma, Inc., Boulder, CO</p> <p>Phase III trial (MILO) ongoing</p>	<p>Bevacizumab (Avastin) Chemotherapy (monotherapy or combination therapy) Radiation Surgery (debulking)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Blinatumomab (Blinicyto) for treatment of acute lymphoblastic leukemia</p>	<p>Patients in whom Philadelphia chromosome–negative, B-cell lineage acute lymphoblastic leukemia (ALL) has been diagnosed</p>	<p>No new treatments for Philadelphia chromosome–negative relapsed/refractory ALL have been developed in 30 years; 5-year survival for this patient population is only 7%. Blinatumomab (Blinicyto™) is a molecule that is furthest in development in a novel class of antibody-based compounds intended to link tumor cells to cytotoxic T cells. The molecule consists of 2 separate antibody-antigen binding domains: (1) the domain specific for CD19, an antigen expressed by the immature lymphocytes expanded in ALL, and (2) the domain specific for CD3, a molecule expressed on the surface of cytotoxic T cells. Blinatumomab purportedly leads to leukemic cell apoptosis by bridging an interaction between leukemic cells and T cells. Blinatumomab is administered by intravenous infusion and is being studied in patients in whom the disease is newly diagnosed, has relapsed, or is refractory to other treatment.</p> <p>Amgen, Inc., Thousand Oaks, CA</p> <p>Phase III trials ongoing as adjunct to standard chemotherapy for newly diagnosed disease and as monotherapy for relapsed/refractory disease; Dec 2014, FDA granted accelerated approval for treating patients with "Philadelphia chromosome-negative relapsed or refractory B-cell precursor acute lymphoblastic leukemia"</p>	<p>Newly diagnosed ALL: CALGB 8811 Larson regimen Linker 4-drug regimen Hyper-CVAD with or without rituximab MRC UKALLXII/ECOG2993 regimen Relapsed/refractory ALL: Anthracyclines Asparaginase Cyclophosphamide Cytarabine (ara-C) Epidodophyllotoxins Vincristine</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>Buparlisib for treatment-refractory metastatic breast cancer</p>	<p>Patients with aromatase inhibitor or mTOR inhibitor–refractory, hormone receptor–positive, HER2–negative metastatic breast cancer</p>	<p>Patients with hormone receptor–positive breast cancer typically develop resistance to 1st-line therapy with estrogen receptor–targeted therapies. The phosphoinositide 3 kinase (PI3K)/mTOR pathway is a cell signaling pathway that is activated in a wide range of cancers and, in particular, may underlie tumor resistance to estrogen receptor–targeted therapies. Buparlisib (BKM120) is an orally administered pan-PI3K inhibitor (i.e., an inhibitor of all PI3K isoforms) that is intended to block the PI3K/mTOR pathway. In clinical trials, buparlisib is administered orally, 100 mg per day, in combination with the anti-estrogen drug fulvestrant.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase III trials (BELLE-2, -3 and -4) ongoing; also under study for treating endometrial cancer, glioblastoma, HER2-positive breast cancer, melanoma, nonsmall cell lung cancer, prostate cancer, and urothelial cancer</p>	<p>Everolimus plus exemestane Fulvestrant monotherapy</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Cabozantinib (Cometriq) for treatment of renal cell carcinoma	Patients with advanced renal cell carcinoma (RCC) who received previous treatment with a vascular endothelial growth factor receptor (VEGFR)-targeting tyrosine kinase inhibitor (e.g., sorafenib, sunitinib, axitinib, pazopanib, tivozanib)	<p>Patients whose RCC has progressed after targeted therapy (e.g., VEGF- or mTOR- inhibitors) have limited treatment options and a poor prognosis. Cabozantinib (Cometriq™) is a small-molecule receptor tyrosine kinase inhibitor that targets MET and vascular endothelial growth factor (VEGF) receptor 2 (VEGFR2). MET plays key roles in cell proliferation, migration, invasion, and angiogenesis. Overexpression of the hepatocyte growth factor ligand of MET and activation of the MET pathway supports tumors. Additionally, VEGFR2 and MET allow tumors to overcome hypoxia and stimulate angiogenesis. Selective anti-VEGF therapies do not inhibit MET, which may be responsible for tumor evasiveness and drug resistance in patients who receive VEGF tyrosine kinase inhibitors, making MET/VEGF co-inhibition an emerging target in cancer therapy. In clinical trials, cabozantinib is being tested in the 2nd-line setting after VEGFR-targeted tyrosine kinase inhibitor therapy. The recommended dose on the labeling approved by FDA in another indication—for treating medullary thyroid cancer—is a once-daily, oral dose of 140 mg.</p> <p>Exelixis, Inc., South San Francisco, CA</p> <p>Phase III trial (METEOR) ongoing; FDA approved Nov 2012 for treating progressive metastatic medullary thyroid cancer; labeling carries a black box warning for risk of gastrointestinal perforations, fistulas, and hemorrhage</p>	Axitinib Bevacizumab Everolimus Interleukin 2 Pazopanib Sorafenib Sunitinib Temozolomide	Increased overall survival Increased progression-free survival Improved quality of life
Cancer stem cell inhibitor (BBI608) for treatment of colorectal cancer	Patients with pretreated, unresectable, advanced colorectal cancer (CRC) who have received treatment with a thymidylate synthase inhibitor and whose disease is refractory to irinotecan- and oxaliplatin-containing regimens	<p>Current 2nd- and 3rd-line treatments for metastatic CRC are of limited efficacy, and the median overall survival of these patients is less than 1 year. BBI608 is a novel, 1st-in-class agent that targets cancer stem cells (CSCs). CSCs are self-replicating cells that differentiate into heterogeneous cancer cells and contribute to tumor growth, recurrence, and chemotherapy resistance. Although the exact mechanism of action is unknown, BBI608 is thought to inhibit multiple signaling pathways involved in CSC stemness (i.e., self-renewal and pluripotency), preventing these malignant processes. In clinical trials, BBI608 is administered as a twice-daily, oral dose of 480 mg, given as monotherapy (phase III trial) or in combination with best supportive care (phase II trial).</p> <p>Boston Biomedical subsidiary of Sumitomo Dainippon Pharma Co., Ltd., Osaka, Japan</p> <p>Phase III trial (CO23) ongoing</p>	Best supportive care Regorafenib	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Capsule endoscopy (PillCam COLON 2) for colorectal cancer screening	Patients who require further evaluation after incomplete colonoscopy	<p>In about 10% of colonoscopy procedures, colon imaging is incomplete—not technically possible despite adequate bowel preparation—potentially missing colorectal cancers and adenomatous polyps. Followup screening with a next-generation pill camera (PillCam COLON 2) represents a new option for this patient population. The device consists of a light-emitting diode and 2 miniature cameras on either end of a 12-by-33 mm pill. The 2 cameras are intended to enable better image capture as the device travels the intestinal tract. After ingestion by the patient, the pill camera sends up to 35 frames per second of data to a recorder worn by the patient over the course of about 10 hours; data are subsequently analyzed by a physician.</p> <p>Given Imaging, Ltd., Yoqne'am, Israel, a subsidiary of Covidien, plc., Dublin, Ireland</p> <p>FDA cleared for marketing under the de novo classification process in Jan 2014 for "detection of colon polyps in patients after an incomplete optical colonoscopy with adequate preparation, and a complete evaluation of the colon was not technically possible."</p>	Barium enema Computed tomography colonography Repeat dual- or triple-camera colonoscopy	Improved colorectal cancer/adenomatous polyp sensitivity Improved colorectal cancer/adenomatous polyp specificity
Chimeric antigen receptor therapy (CTL019) for treatment of relapsed or refractory acute lymphoblastic leukemia	Patients in whom relapsed or refractory acute lymphoblastic leukemia (ALL) has been diagnosed	<p>5-year survival for patients with relapsed or refractory ALL is about 7%. A treatment option under study is chimeric antigen receptor (CAR) gene therapy to genetically modify autologous T lymphocytes to promote T-cell activation, T-cell proliferation, and immune memory. CTL019 is produced by using a viral vector to transfect autologous T cells with a CAR transgene that encodes a protein consisting of 4 parts: (1) an extracellular domain consisting of an antibody variable chain specific for CD19 (a cell surface marker expressed by ALLs); (2) a hinge region; (3) a costimulatory domain (in this case, a portion of CD137); and (4) CD3-zeta (a signal transduction component of the T-cell receptor). Binding of the extracellular domain of this recombinant protein to CD19 on target cells activates the pathways, typically downstream of major histocompatibility complex activation and CD137 stimulation, purportedly activating a persistent immune response against CD19. CTL019 T cells are administered by intravenous infusion.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase II trials ongoing; FDA granted breakthrough therapy status</p>	Various cytotoxic chemotherapy regimens	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Cobimetinib for treatment of melanoma	Patients in whom BRAF mutation-positive, metastatic melanoma has been diagnosed	<p>Patients with BRAF mutation–positive melanoma frequently demonstrate a response to BRAF inhibitors; however, these responses are typically short in duration. MEK is a kinase that functions downstream of BRAF in the pathway driving melanoma pathogenesis in BRAF mutation–positive melanoma. Dual inhibition of BRAF and MEK may increase the duration of response to agents targeting the RAS/RAF/MEK/ERK pathway. Cobimetinib (GDC-0973) is an orally administered MEK inhibitor under study in combination with the BRAF inhibitor vemurafenib. In trials, cobimetinib is administered at an oral dose of 60 mg, once a day on days 1–21 of each 28-day treatment cycle.</p> <p>F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>Phase III trial (coBRIM) ongoing; Dec 2014, Roche submitted new drug application to FDA</p>	Dabrafenib Ipilimumab Trametinib Vemurafenib	Increased overall survival Increased progression-free survival Improved quality of life
Combination eflornithine/sulindac for prevention of colon cancer recurrence	Patients with a history of stage I–III colon cancer (primary resection 1 year prior) who are currently disease-free	<p>Recurrence of colon cancer after attempted curative resection is most likely in the 1st 3 years after surgery. Investigators are examining a new therapy (CPP-1X) for preventing colon cancer recurrence that combines eflornithine, a therapy for hirsutism and African trypanosomiasis, with sulindac, a nonsteroidal anti-inflammatory agent. This prophylactic therapy may lower the risk of recurrence when taken daily for 3 years. In late-stage clinical trials, patients are receiving oral combination therapy with once-daily eflornithine, two 250 mg tablets, plus once-daily sulindac, 150 mg, for 3 years.</p> <p>Cancer Prevention Pharmaceuticals, Inc., Tucson, AZ, in collaboration with SWOG, Portland, OR</p> <p>Phase III trials (PACES and unnamed) ongoing</p>	No commonly used chemopreventive agent exists for preventing colorectal cancer recurrence Compounds under investigation include: Aspirin Calcium supplements Curcumin Nonsteroidal anti-inflammatory drugs Omega-3 fatty acids	Reduced recurrence rate of high-risk adenoma or 2nd primary colorectal cancer Increased overall survival

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Custirsen for treatment of advanced or metastatic nonsmall cell lung cancer	Patients in whom advanced or metastatic nonsmall cell lung cancer (NSCLC) has been diagnosed	<p>The 5-year survival rate for patients with advanced NSCLC is less than 15% with available treatments. Custirsen (formerly OGX-011) is an antisense RNA molecule intended for treating advanced, unresectable NSCLC. An ongoing clinical trial is testing custirsen in the 2nd-line setting after 1st-line treatment with a platinum-based chemotherapy. It is given intravenously in combination with docetaxel: 3 loading doses of custirsen 640 mg are given over 2 hours in 5–9 days prior to day 1 of cycle 1; then custirsen 640 mg is given weekly every 21-day cycle.</p> <p>OncoGenex Pharmaceuticals, Inc., Bothell, WA Teva Pharmaceutical Industries, Ltd., Petach Tikva, Israel</p> <p>Phase III trial (ENSPIRIT) ongoing; Apr 2014, FDA granted fast-track status</p>	Docetaxel Erlotinib Pemetrexed Platinum doublet (with or without bevacizumab)	Increased overall survival Increased progression-free survival Improved quality of life
Custirsen for treatment of metastatic castration-resistant prostate cancer	Patients in whom castration-resistant prostate cancer (CRPC) has been diagnosed	<p>Median overall survival for patients with CRPC is only about 18 months. Custirsen (formerly OGX-011) is an antisense RNA molecule designed to reduce expression of clusterin, a cell survival protein activated by stress. Inhibition of clusterin expression using custirsen has been shown to enhance tumor cell death after treatment with chemotherapy. In clinical trials, custirsen is administered as an adjunct to chemotherapy. After 3 loading doses of custirsen (640 mg, intravenously [IV]), cabazitaxel (25 mg/m², IV) is administered on a 3-week cycle with weekly custirsen (640 mg, IV) and daily prednisone (10 mg, orally) until disease progression, unacceptable toxicity, or completion of 10 cycles. In the AFFINITY trial patients have been randomized to receive 2nd-line cabazitaxel (Jevtana®) and prednisone with or without custirsen.</p> <p>OncoGenex Pharmaceuticals, Inc., Bothell, WA</p> <p>Phase III trials (AFFINITY) ongoing testing 2nd-line Jevtana® (cabazitaxel) and prednisone with or without custirsen; FDA granted fast-track status; Apr 2014 top-line data from SYNERGY trial for metastatic prostate cancer indicated that custirsen failed to meet primary endpoint of improving overall survival; data are being analyzed as other trials continue</p>	Abiraterone Cabazitaxel Docetaxel Enzalutamide Radium-223 Sipuleucel-T	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Cyclin-dependent kinase 4/6 inhibitor (LEE011) for treatment of breast cancer	Postmenopausal women with advanced hormone receptor–positive, HER2-negative breast cancer who have received no prior therapy for advanced disease	<p>Although endocrine therapies (e.g., estrogen receptor antagonists, aromatase inhibitors) are often effective in treating patients who have estrogen receptor–positive breast cancer, the response duration is typically limited to about 1 year. LEE011 is a dual inhibitor of cyclin-dependent kinase (CDK) 4 and CDK 6, kinases involved in controlling cell cycle progression. CDK 4 and CDK 6 regulate a cell-cycle checkpoint controlling initiation of DNA synthesis, and their inhibition may limit tumor growth mediated by cell proliferation. Preclinical studies have demonstrated that hormone receptor–positive breast cancer may be highly sensitive to CDK 4/6 inhibition and that this inhibition may be synergistic with endocrine therapies. The drug is being studied in combination with letrozole in the 1st-line setting for advanced disease. In clinical trials, LEE011 is administered orally, once daily, 600 mg, on days 1–21 of each 28-day cycle.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase III trials (MONALEESA-1 and MONALEESA-7) ongoing</p>	<p>Abemaciclib (in development) Anastrozole Fluoxymesterone Fulvestrant High-dose estrogen Letrozole Palbociclib (in development) Progesterin Tamoxifen Toremifene</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Dabrafenib (Tafinlar) for treatment of <i>BRAF</i> V600E mutation–positive nonsmall cell lung cancer	Patients in whom <i>BRAF</i> ^{V600E} mutation–positive metastatic nonsmall cell lung cancer (NSCLC) has been diagnosed	<p>Patients with metastatic NSCLC have a poor prognosis when treated with conventional cytotoxic chemotherapy options. Increasingly, NSCLC subtypes are being characterized by mutations in genes thought to drive carcinogenesis (e.g., <i>ALK</i>, <i>EGFR</i>, <i>ROS1</i>), and therapies targeting these molecular drivers have improved outcomes for eligible patients. Recent research has determined that about 2% of NSCLCs harbor an activating mutation in the <i>BRAF</i> oncogene, presenting a novel target in treatment. Dabrafenib (Tafinlar®) is 1 of 2 commercially available <i>BRAF</i> inhibitors that are FDA-approved for treating <i>BRAF</i> mutation–positive melanoma, and it is under study for treating <i>BRAF</i> mutation–positive NSCLC either as a monotherapy or in combination with the MEK inhibitor trametinib (Mekinist®). Dabrafenib is administered orally, 150 mg, twice daily.</p> <p>GlaxoSmithKline, Middlesex, UK</p> <p>Phase II trial ongoing; FDA granted breakthrough therapy status</p>	<p>Docetaxel Erlotinib Pemetrexed</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Dacomitinib for treatment of nonsmall cell lung cancer	Patients in whom advanced nonsmall cell lung cancer (NSCLC) has been diagnosed	<p>The 5-year survival rate for patients with advanced NSCLC is less than 15%, and patients whose disease progresses after 1st-line chemotherapy have few treatment options. Angiogenesis inhibitors have had varying degrees of success in treating NSCLC. Dacomitinib is a novel pan-HER inhibitor that irreversibly inhibits HER-1 (EGFR), HER-2, and HER-4 tyrosine kinases. Treatment settings include 1st-line treatment of patients with activating mutations in the <i>EGFR</i> gene, 2nd-line treatment of patients after chemotherapy, and 2nd-line or 3rd-line treatment of patients previously treated with an EGFR inhibitor. In clinical trials, dacomitinib is administered in a once-daily, oral dose of 45 mg.</p> <p>Pfizer, Inc., New York, NY</p> <p>Phase III trials (BR26, ARCHER-1009, and ARCHER-1052) ongoing</p>	Afatinib Erlotinib	Increased overall survival Increased progression-free survival Improved quality of life
Daratumumab for treatment of multiple myeloma	Patients in whom multiple myeloma has been diagnosed	<p>Patients with relapsed/refractory multiple myeloma who have undergone treatment with both protease-inhibitor and immunomodulatory drug therapies have few remaining treatment options and a poor prognosis. Daratumumab is a fully human monoclonal antibody specific for CD38, a protein expressed on the surface of multiple myeloma cells. Daratumumab purportedly leads to multiple myeloma cell death through antibody-dependent, cell-mediated cytotoxicity and complement-dependent cytotoxicity. Patients are intended to have undergone treatment with both a protease inhibitor and an immunomodulatory drug before receiving this treatment. Daratumumab is administered by intravenous infusion at a dose of 16 mg/kg. In relapsed/refractory disease, it is being tested in combination with dexamethasone and lenalidomide or in combination with dexamethasone and bortezomib. As a 1st-line treatment, it is being tested in combination with bortezomib, melphalan, and prednisone.</p> <p>Janssen Biotech unit of Johnson & Johnson, New Brunswick, NJ</p> <p>Phase III trials ongoing; 1 additional phase III trial registered, but not yet recruiting; FDA granted breakthrough therapy status</p>	Multiple chemotherapy regimens (choice depends on prior therapy and patient condition), including: Bortezomib Bortezomib plus liposomal doxorubicin Carfilzomib Lenalidomide plus dexamethasone Pomalidomide plus dexamethasone	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Defibrotide (Defitelio) for treatment of chemotherapy-induced severe veno-occlusive disease	Patients receiving chemotherapy who have severe veno-occlusive disease	<p>Veno-occlusive disease is a side effect of the high-dose chemotherapy that is used as part of hematopoietic stem cell transplantation procedures. Severe veno-occlusive disease has a mortality rate approaching 100% with available treatments. Defibrotide (Defitelio®) is a polydisperse oligonucleotide with local antithrombotic, anti-ischemic, and anti-inflammatory activities. Study investigators have suggested that the drug may increase survival of endothelial cells and preserve the function of microvasculature. In a phase III trial, the drug was administered at a dosage of 25 mg/kg, intravenously, 4 times per day.</p> <p>Gentium S.p.A. (Villa Guardia, Italy), a majority owned indirect subsidiary of Jazz Pharmaceuticals, Inc. (Dublin, Ireland)</p> <p>Phase III trial ongoing; FDA granted orphan drug and fast-track statuses; Oct 2013, approved by European Commission</p>	<p>Analgesia Diuresis Renal replacement therapy Transfusion</p>	<p>Increased overall survival Improved quality of life</p>
Demcizumab for treatment of pancreatic cancer	Patients in whom locally advanced or metastatic pancreatic cancer has been diagnosed	<p>Only about 5% of patients with pancreatic cancers respond to the standard of care (gemcitabine chemotherapy), and the prognosis for these patients is poor. Demcizumab is a monoclonal antibody for delta-like ligand 4 (DLL4), a protein that has been implicated in maintaining cancer stem cells and promoting angiogenesis. By inhibiting DLL4, demcizumab is intended to both target the difficult-to-treat population of tumor-initiating cancer stem cells in the pancreas and reduce the blood supply to solid tumors. In ongoing phase Ib clinical trials, demcizumab is being tested in combination with abraxane and gemcitabine in 1st-line advanced pancreatic cancer. Demcizumab is administered intravenously, 2.5 mg/kg, once every 2 weeks.</p> <p>OncoMed Pharmaceuticals, Inc., Redwood City, CA, in collaboration with Celgene Corp., Summit, NJ</p> <p>Phase Ib and phase II trials (YOSEMITE) ongoing; FDA granted orphan drug status</p>	<p>Standard chemoradiation regimens Various chemotherapies including 1 or more of the following: 5-fluorouracil Capecitabine Erlotinib Gemcitabine Leucovorin Nab-paclitaxel Oxaliplatin</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Denosumab (Xgeva) for prevention of bone metastasis in breast cancer	Patients with early stage breast cancer at high risk of recurrence	<p>Breast cancer patients who have cancer in the lymph nodes, large tumors, or locally advanced disease have a high risk of disease recurrence. Metastasis to the bone represents 40% of all initial recurrences. Denosumab (Xgeva) is a monoclonal antibody that inhibits RANKL, a protein that stimulates bone removal. This agent is already approved for preventing skeletal-related events in patients with established bone metastases from solid tumors. Preclinical data suggest that RANKL inhibition may also prevent skeletal tumor formation. In an ongoing trial, denosumab is being tested in the adjuvant setting for prolonging bone metastasis-free survival and disease-free survival. In this setting denosumab is administered at 120 mg, once monthly, for 6 months followed by 120 mg, once every 3 months, for up to 5 years.</p> <p>Amgen, Inc., Thousand Oaks, CA</p> <p>Phase III trials (D-CARE, ABCSG-18, SAKK92/12, and 114273) ongoing</p>	Various chemotherapy regimens	<p>Increased overall survival Increased bone metastasis-free survival Improved quality of life</p>
Dinaciclib for treatment of chronic lymphocytic leukemia	Patients with chronic lymphocytic leukemia (CLL) who have undergone prior chemotherapy and/or chemoimmunotherapy or whose disease bears a 17p chromosomal deletion	<p>CLL is the most frequently diagnosed leukemia among adults in the U.S., and about 4,600 patients die of the disease each year. Dinaciclib is a small-molecule inhibitor of multiple cyclin-dependent kinases, enzymes responsible for regulating cell division and other essential cellular processes. Inhibiting cyclin-dependent kinases purportedly preferentially leads to cell death in neoplastic cells. In clinical trials, dinaciclib is administered intravenously, 14 mg/m², on days 1, 8, and 15 of a 28-day cycle.</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase III trial ongoing</p>	Alemtuzumab, bendamustine, chlorambucil, or lenalidomide with or without rituximab Ibrutinib Idelalisib Ofatumumab	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Dinutuximab for treatment of neuroblastoma	Patients with high-risk neuroblastoma who have undergone induction therapy and autologous stem cell transplantation	<p>Current treatments for patients with high-risk neuroblastoma result in 5-year survival rates of only 25% to 35%. A monoclonal antibody, dinutuximab (APN311/ch14.18) is specific for a tumor-associated disialoganglioside, GD2, that exhibits low levels of expression on normal tissues (e.g., neurons, skin melanocytes, peripheral sensory nerve fibers). The dinutuximab antibody purportedly targets neuroblastoma cells via antibody-dependent, cell-mediated cytotoxicity. In clinical trials, dinutuximab was administered intravenously at an unspecified dose in combination with cytokines (granulocyte macrophage colony-stimulating factor and interleukin-2) that enhance immune response and the standard neuroblastoma maintenance therapy isotretinoin.</p> <p>APEIRON Biologics AG, Vienna, Austria, in collaboration with the National Cancer Institute, Bethesda, MD</p> <p>Phase III trials completed and ongoing; FDA and European Medicines Agency (EMA) granted orphan drug status; EMA approved Dec 2013; company submitted biologics license application to FDA Apr 2014; FDA decision is scheduled Apr 2015</p>	Isotretinoin	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Doxorubicin transdrug (Livatag) for treatment of hepatocellular carcinoma	Patients with unresectable hepatocellular carcinoma (HCC) whose disease has progressed after treatment with sorafenib	<p>Patients with HCC that cannot be surgically resected have few treatment options and a poor prognosis; no 2nd-line therapy is available after sorafenib. Doxorubicin transdrug (Livatag[®]) is a nanoparticle formulation used to deliver chemotherapy (doxorubicin) to cancer cells developing resistance to previous chemotherapy agents. In clinical trials, patients are treated intravenously with 20 or 30 mg/m² doxorubicin transdrug every 4-week cycle until disease progression or toxicity.</p> <p>Onxeo, Paris, France (formed by the Jul 2014 merger of Topotarget a/s and BioAlliance Pharma SA)</p> <p>Phase III trial ongoing; FDA granted fast-track status</p>	Locoregional treatment Regorafenib Sorafenib (if not used in 1st-line setting)	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Duvelisib for treatment of chronic lymphocytic leukemia or small lymphocytic lymphoma	Patients with relapsed/refractory chronic lymphocytic leukemia (CLL) or small lymphocytic lymphoma (SLL)	<p>Duvelisib (IPI-145) is a small-molecule kinase inhibitor with activity against the delta and gamma isoforms of phosphoinositide 3-kinase (PI3K). PI3Ks regulate multiple aspects of cell proliferation and cell survival and, therefore, their inhibition may be of benefit in various cancers. The delta and gamma isoforms of PI3K are expressed predominately in cells of the hematopoietic lineages; inhibiting these isoforms (as opposed to all PI3Ks) may be effective in treating blood cancers such as CLL and SLL while limiting side effects on normal tissues. Duvelisib is orally administered at a dosage of 25 mg, twice daily.</p> <p>Infinity Pharmaceuticals, Inc., Cambridge, MA, in collaboration with AbbVie, North Chicago, IL</p> <p>Phase III trial ongoing</p>	<p>Chemoimmunotherapy Ibrutinib Idelalisib Lenalidomide with or without rituximab Ofatumumab Rituximab</p>	<p>Increased progression-free survival Increased overall survival Improved quality of life</p>
Duvelisib for treatment of follicular lymphoma	Patients with previously treated follicular lymphoma	<p>Follicular lymphoma is a B-cell malignancy that typically progresses slowly; however, the disease is seldom cured by chemotherapy and frequently becomes treatment resistant. Duvelisib (IPI-145) is a small-molecule kinase inhibitor with activity against the delta and gamma isoforms of phosphoinositide 3-kinase (PI3K). PI3Ks regulate multiple aspects of cell proliferation and cell survival; therefore, their inhibition may be of benefit in various cancers. The delta and gamma isoforms of PI3K are expressed predominately in cells of the hematopoietic lineages; inhibiting these isoforms (as opposed to all PI3Ks) may be effective in treating blood cancers such as follicular lymphoma while limiting side effects in normal tissues. In a clinical trial, duvelisib is administered orally, 25 mg, twice daily, in combination with intravenously administered rituximab.</p> <p>Infinity Pharmaceuticals, Inc., Cambridge, MA, in collaboration with AbbVie, North Chicago, IL</p> <p>Phase III trial ongoing</p>	<p>Idelalisib Rituximab monotherapy Various chemoimmunotherapy regimens (e.g., bendamustine plus rituximab, fludarabine plus rituximab)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>eIF5A1 modulator (SNS01-T) for treatment-refractory B-cell malignancies</p>	<p>Patients in whom a treatment-refractory B-cell malignancy (i.e., diffuse large B-cell lymphoma, mantle cell lymphoma, or multiple myeloma) has been diagnosed</p>	<p>SNS01-T is a novel therapeutic intended to sensitize cancer cells to apoptotic signals by targeting eukaryotic translation initiation factor 5A1 (eIF5A1). eIF5A1 functions as a shuttle protein, selectively translocating mRNAs from the nucleus to cytosolic ribosomes for translation. It exists in pro-apoptotic and antiapoptotic forms; the antiapoptotic form is generated by posttranslational modification. SNS01-T consists of 2 nucleic acid-based molecules: (1) a plasmid that drives expression of a pro-apoptotic form of eIF5A1 that has been modified to prevent its post-translational modification to the antiapoptotic form and (2) an antisense molecule that inhibits expression of endogenous eIF5A1, which normally serves as the precursor to antiapoptotic eIF5A1. By altering the balance of pro-apoptotic and antiapoptotic eIF5A1, SNS01-T purportedly promotes cell death over cell growth and survival. In clinical trials, it is administered by intravenous infusion, twice weekly.</p> <p>Sevion Therapeutics (formerly Senesco Technologies, Inc.), Bridgewater, NJ</p> <p>Phase I/II trial ongoing; FDA granted orphan drug status for treating diffuse large B-cell lymphoma, mantle cell lymphoma, and multiple myeloma</p>	<p>Various chemotherapeutic regimens</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>Elotuzumab for treatment of multiple myeloma</p>	<p>Patients in whom multiple myeloma or relapsed/refractory multiple myeloma has been diagnosed</p>	<p>Although treatments for multiple myeloma have improved, the median life expectancy for patients in whom multiple myeloma is diagnosed is only 5–7 years. Immunotherapeutic options for multiple myeloma are not available. CS1 has been identified as a glycoprotein expressed preferentially on multiple myeloma cells, and elotuzumab is a humanized, monoclonal antibody specific for CS1. It purportedly has an anticancer effect through antibody-dependent cellular cytotoxicity. In clinical trials, elotuzumab is being administered as an adjunct to conventional therapy with a combination of lenalidomide and dexamethasone.</p> <p>Bristol-Myers Squibb, New York, NY</p> <p>Phase III trials ongoing; FDA granted orphan drug status; FDA granted breakthrough therapy status</p>	<p>For stem cell transplant-eligible patients, 1st-line therapy such as: Bortezomib/ dexamethasone Cyclophosphamide/ dexamethasone For patients ineligible for stem cell transplant, 1st-line therapy such as: Bortezomib/ dexamethasone Lenalidomide/low-dose dexamethasone, Melphalan/ prednisone plus bortezomib</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Eltrapuldencel-T for treatment of melanoma	Patients in whom metastatic melanoma has been diagnosed	<p>Patients with metastatic melanoma have a poor prognosis, with current treatments yielding a 5-year survival rate of 15% to 20%. Eltrapuldencel-T is a hybrid immunotherapy developed from the patient's own tumor and dendritic cells. To prepare this therapy, both a tumor isolate and a blood draw to obtain immune cells are required. Dendritic cells (antigen-presenting cells of the immune system) are expanded from the patient's isolated immune cells and exposed to isolated cancer stem cells from the tumor sample. The activated dendritic cells are formulated into an injectable solution. In clinical trials, this immunotherapy is given over 3 weeks as a weekly subcutaneous injection of 10 million to 20 million cells, and then as a monthly injection for an additional 5 months.</p> <p>NeoStem, Inc., New York, NY, which acquired developer California Stem Cell, Inc., Irvine, CA, in Apr 2014</p> <p>Phase III trial (Intus) ongoing; FDA granted fast-track and orphan drug statuses</p>	<p>Dabrafenib (if BRAF-positive) Dacarbazine Interleukin-2 Ipilimumab Temozolomide Trametinib (if BRAF-positive) Vemurafenib (if BRAF-positive)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Enobosarm (Ostarine) for treatment of cancer-related cachexia	Patients in whom cancer-related cachexia has been diagnosed	<p>Many patients with cancer experience a wasting syndrome known as cachexia, which is characterized by weight loss, muscle atrophy, fatigue, weakness, and anorexia. Cachexia may involve a tumor-related inflammatory immune response that triggers catabolism. No effective therapies exist to prevent or slow its progression. Enobosarm (Ostarine®) is a selective androgen receptor modulator that is under investigation for lung cancer-related cachexia. In phase III trials, it is being administered in a once-daily, oral dose of 3 mg.</p> <p>GTx, Inc., Memphis, TN</p> <p>Phase III trial (POWER1) completed, phase III trial (POWER2) ongoing; FDA granted fast-track status</p>	<p>Cannabinoids Corticosteroids Dietary modifications Hormonal therapy (in development; i.e., insulin, ghrelin) Progestogens</p>	<p>Improved physical function Increased lean body mass Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Entinostat for treatment of breast cancer	Patients with locally advanced/unresectable or metastatic estrogen receptor-positive breast cancer whose disease has progressed following treatment with nonsteroidal aromatase inhibitor	<p>Few effective treatment options exist for recurrent, advanced breast cancers that have become resistant to endocrine therapy or are hormone receptor negative. Entinostat (SNDX-275) is a class I histone deacetylase (HDAC) inhibitor. The exact mechanism of HDAC anticancer efficacy is unclear. In breast cancer, entinostat purportedly downregulates growth factor signaling pathways and upregulates estrogen receptors to combat endocrine drug resistance and inhibit tumor growth. In clinical trials, entinostat is being tested at various dosages and as part of various combination therapy regimens. In a clinical trial of entinostat plus exemestane for treating estrogen receptor-positive breast cancer, entinostat is administered orally, at dose of 5 mg, once weekly.</p> <p>Syndax Pharmaceuticals, Inc., Waltham, MA, in collaboration with the National Cancer Institute, Bethesda, MD, under a cooperative research and development agreement</p> <p>Phase III trial (E2112) ongoing; FDA granted breakthrough therapy status</p>	Everolimus plus exemestane Targeted therapies (in development; e.g., bevacizumab) Various single-agent or combination chemotherapy regimens	Increased overall survival Increased progression-free survival Improved quality of life
Epidermal growth factor receptor inhibitor (AZD9291) for treatment of metastatic nonsmall cell lung cancer	Patients with advanced, metastatic, epidermal growth factor receptor (EGFR) T790M mutation-positive, nonsmall cell lung cancer (NSCLC) whose disease has progressed after treatment with an EGFR tyrosine kinase inhibitor	<p>EGFR-inhibitor treatments have improved outcomes for patients with EGFR mutation-positive NSCLC relative to cytotoxic chemotherapy; however, EGFR inhibitors have limitations. First, NSCLC frequently develops resistance to EGFR inhibitors. This resistance is often mediated by a mutation in <i>EGFR</i> (T790M), which renders the kinase insensitive to available inhibitors. Second, EGFR inhibitors have activity against wild-type in addition to mutant <i>EGFR</i>, and inhibiting EGFR in cells that are not cancerous can lead to substantial toxicity. AZD9291 is a highly selective, irreversible inhibitor of both the activating sensitizing EGFR mutation and the activating resistance mutation, T790M, while sparing the activity of wild-type <i>EGFR</i>. Therefore, AZD9291 can purportedly be used as treatment for patients whose disease has progressed during treatment with existing EGFR inhibitors. In clinical trials, AZD9291 is administered orally, 80 mg, twice a day.</p> <p>AstraZeneca, London, UK</p> <p>Phase I/II trial (AURA), phase II trials (AURA2 and unnamed) and phase III trials (AURA3 and FLAURA) ongoing; FDA granted breakthrough therapy status</p>	Tyrosine kinase inhibitors Platinum-based chemotherapy combined with any of the following: Docetaxel Erlotinib Paclitaxel Pemetrexed	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Erismodegib for treatment of medulloblastoma	Patients in whom hedgehog pathway–activated, progressive or recurrent medulloblastoma has been diagnosed	<p>Patients with recurrent medulloblastoma have a 2-year survival rate of less than 10%. The hedgehog signaling pathway, which is involved in cellular growth, differentiation, and repair, is constitutively activated in about 30% of medulloblastomas. Blocking this pathway may inhibit tumor growth. Erismodegib (also known as LDE225 and sonidegib) selectively binds and antagonizes Smoothed, a G protein–coupled receptor in the hedgehog signaling pathway. In clinical trials, erismodegib is being compared with temozolomide for treating recurrent or progressive medulloblastoma in groups of patients stratified according to pretreatment with radiation therapy and/or temozolomide. Erismodegib is given at an unspecified dose as a once-daily oral medication.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase I/II and phase II trials ongoing</p>	Combination chemotherapy Radiation therapy	Increased overall survival Increased progression-free survival Improved quality of life
Etirinotecan pegol for treatment of breast cancer	Patients with metastatic breast cancer whose disease has progressed after 2 systemic chemotherapy regimens including anthracycline-, taxane-, and capecitabine-containing regimens	<p>Patients with breast cancer that is refractory to standard systemic chemotherapy regimens have few treatment options and a poor prognosis. Etirinotecan pegol (NKTR-102) is a novel formulation of the topoisomerase I inhibitor irinotecan. Etirinotecan pegol is a modified version of irinotecan in which the drug is linked to a macromolecule core. The linkage purportedly renders the drug inert in the bloodstream and allows the slow release of the drug as the linkages are metabolized in the patient. Slow release extends the time during which the patient’s disease is exposed to therapeutic levels of the drug, thus limiting exposure to high levels of the drug at the time of infusion. Additionally, the large drug-polymer conjugate may preferentially accumulate in tumor tissues because of the increased permeability of tumor vasculature. In clinical trials, etirinotecan pegol is administered at an intravenous dosage of 145 mg/m², once every 21 days.</p> <p>Nektar Therapeutics, San Francisco, CA</p> <p>Phase III trial (BEACON) ongoing; FDA granted fast-track status; NKTR-102 is approved for treating colorectal cancer and under study for treating ovarian cancer, lung cancer, and glioma</p>	Eribulin Gemcitabine Ixabepilone Nab-paclitaxel Pemetrexed Vinorelbine	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Everolimus (Afinitor) for treatment of advanced HER2-positive breast cancer	Patients in whom advanced HER2-positive breast cancer has been diagnosed	<p>Although HER2-targeted therapies such as trastuzumab and lapatinib have improved outcomes for patients with HER2-positive advanced breast cancer, not all patients have disease that responds to these therapies. Everolimus (Afinitor®) is a small-molecule inhibitor of the protein mTOR, which is a central regulator of cell growth. Everolimus targets a novel cellular pathway compared with other HER2-targeted therapies. Using everolimus to inhibit mTOR by everolimus has been demonstrated to be effective in treating multiple cancer types (e.g., renal cell carcinoma, astrocytoma). In clinical trials, everolimus was administered at a daily, oral dose of 5 mg, in combination with vinorelbine and trastuzumab.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase III trial (BOLERO-3) ongoing; FDA approved everolimus Jul 2012 for postmenopausal women with advanced hormone receptor–positive, HER2-negative breast cancer in combination with exemestane after treatment failure with letrozole or anastrozole</p>	<p>Cytotoxic chemotherapy HER2-targeted antibody therapies: Pertuzumab Trastuzumab HER2-targeted tyrosine kinase inhibitors: Afinitinib Lapatinib</p>	<p>Increased progression-free survival Increased overall survival Improved quality of life</p>
Everolimus (Afinitor) for treatment of diffuse large B-cell lymphoma	Patients with diffuse large B-cell lymphoma (DLBCL) who have achieved a complete response after 1st-line rituximab-based chemoimmunotherapy and are at high risk of disease recurrence	<p>DLBCL is refractory to 1st-line treatment in about 1/3 of diagnosed patients, or disease recurs after 1st-line treatment. Patients with relapsed/refractory disease have a poor prognosis and few treatment options. The mTOR inhibitor everolimus is under study as a maintenance therapy in patients whose disease has responded to 1st-line chemoimmunotherapy. The mTOR pathway affects multiple cancer-related cellular processes (cell growth, cell proliferation, angiogenesis) and activation of the mTOR pathway has been implicated in lymphoma pathogenesis. In clinical trials of maintenance therapy for patients with DLBCL who achieved a complete response after 1st line therapy and are at increased risk of recurrence based on International Prognostic Index score at time of diagnosis, everolimus was administered orally, 10 mg, once daily.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase III trial ongoing</p>	<p>High-dose chemotherapy with autologous stem cell transplant Watchful waiting/observation</p>	<p>Increased disease-free survival Increased overall survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Ex vivo expanded cord blood as allogeneic bone marrow transplant for treatment of hematologic malignancies</p>	<p>Patients with a hematologic malignancy who need a bone marrow transplant and for whom no suitable matched donor is available</p>	<p>Individuals being treated for a hematologic malignancies may receive high-dose chemotherapy (myeloablative therapy) and/or whole body irradiation followed by a bone marrow transplant to enable them to make healthy blood cells again. Perfectly matched bone marrow donors are not available for all patients who could benefit from transplantation, because of the difficulty in identifying perfectly matched donors. Although an exact match is needed for adult marrow transplants to avoid complications from graft-versus-host disease (GVHD), cord blood reportedly causes significantly less GVHD; however, the number of stem cells in cord blood is not large enough to provide complete bone marrow engraftment. The manufacturer of this product is using an off-the-shelf preparation of mesenchymal precursor cells to expand cord blood stem cells ex vivo to improve engraftment rates upon introduction to the host. Because an imperfect match may be tolerated when using cord blood as the donor source, it may provide a suitable treatment option for many patients receiving high-dose chemotherapy and in need of a bone marrow transplant to restore their ability to make healthy blood cells.</p> <p>Mesoblast, Ltd., New York, NY</p> <p>Phase III trial ongoing</p>	<p>Pooled unexpanded cord blood transplant Unexpanded cord blood transplant</p>	<p>Improved bone marrow engraftment rate Improved rate of neutrophil recovery Improved rate of platelet recovery</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Ex vivo expanded cord blood (StemEx) for allogeneic bone marrow transplant for treatment of hematologic malignancies</p>	<p>Patients with hematologic malignancies who need a bone marrow transplant and for whom no suitable matched donor is available</p>	<p>Individuals being treated for hematologic malignancies may receive high-dose chemotherapy (myeloablative therapy) followed by a bone marrow transplant to reconstitute their ability make healthy blood cells. Perfectly matched bone marrow donors are not available for all patients who could benefit from transplantation, because of the difficulty in identifying perfectly matched donors. Although an exact match is needed for adult marrow transplants to avoid complications from graft-versus-host disease (GVHD), cord blood reportedly causes significantly less GVHD; however, the number of stem cells in cord blood is not large enough to provide complete bone marrow engraftment. StemEx is a graft of stem cells and progenitor cells isolated from a single unit of cord blood. Stem cells and progenitor cells are enriched ex vivo by means of copper chelation, which reduces the availability of copper and purportedly promotes cell proliferation over differentiation. The enriched cell population is then infused into the patient along with the remainder of the cord blood unit in an effort to enable the patient to make healthy blood cells after myeloablative therapy.</p> <p>Gamida Cell, Ltd., Jerusalem, Israel, in partnership with Teva Pharmaceutical Industries, Ltd., Petach-Tikva, Israel</p> <p>Phase II/III trial ongoing; FDA granted orphan drug status for use as hematopoietic support in patients with recurrent or refractory hematologic malignancies who are receiving high-dose chemotherapy, in patients with chronic myeloid leukemia, and in patients with myelodysplastic syndromes</p>	<p>Pooled unexpanded cord blood transplant Unexpanded cord blood transplant</p>	<p>Increased overall survival Improved bone marrow engraftment rate Improved neutrophil recovery rate Improved platelet recovery rate</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Farletuzumab for treatment of ovarian cancer	Patients with recurrent ovarian cancer who are candidates for platinum and taxane-based therapy	<p>Patients with recurrent ovarian cancer have median overall survival times of less than 2 years and few treatment options. Farletuzumab (MORAb-003) is a monoclonal antibody specific for the folate receptor, which is expressed on the majority of ovarian cancer cells, but not on cells of normal tissues. Farletuzumab's action purportedly leads to antibody-dependent cell-mediated cytotoxicity of folate-receptor-expressing cells. In late-phase clinical trials, farletuzumab is being administered intravenously, once weekly, 1.25 or 2.5 mg/kg. In platinum-sensitive disease, farletuzumab is being tested in combination with carboplatin/taxane doublet therapy.</p> <p>Morphotek subsidiary of Eisai Co., Ltd., Tokyo, Japan</p> <p>Phase III trial (FAR-131) ongoing; FDA granted orphan drug status</p>	<p>Platinum-sensitive ovarian cancer: combination chemotherapy including 1 or more of the following: Carboplatin Docetaxel Gemcitabine Paclitaxel Pegylated liposomal doxorubicin Topotecan</p> <p>Platinum-refractory ovarian cancer: Docetaxel Etoposide Gemcitabine Paclitaxel Pegylated liposomal doxorubicin Topotecan</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ganetespib for treatment of nonsmall cell lung cancer	Patients with advanced or metastatic nonsmall cell lung cancer (NSCLC) who have undergone 1 systemic therapy for advanced or metastatic disease	<p>Patients with advanced NSCLC that has progressed after chemotherapy have a poor prognosis and few treatment options. Ganetespib (STA-9090) is a novel anticancer agent that inhibits hsp90 activity. Hsp90 is a molecular chaperone that is responsible for the proper folding and stability of a wide range of proteins in the cell. In particular, hsp90 has been implicated in maintaining the stability of multiple mutated proteins with proneoplastic properties, including mutated p53, BCR-ABL, Raf-1, Akt, ErbB2, and hypoxia-inducible factor 1 alpha. Additionally, hsp90 has been shown to increase the activity of proteins known to have a cytoprotective effect in cells exposed to cytotoxic chemotherapy; therefore, hsp90 inhibition might act synergistically with cytotoxic agents. In treating NSCLC, ganetespib is being tested as an adjunct to the cytotoxic agent docetaxel. Ganetespib is administered at a dose of 150 mg/m², intravenously, once weekly for 3 weeks followed by 1 week of rest.</p> <p>Synta Pharmaceuticals Corp., Lexington, MA</p> <p>Phase II/III and III trials (GALAXY-1 and GALAXY-2) ongoing; FDA granted fast-track status</p>	Crizotinib (if ALK-positive) Erlotinib Single-agent chemotherapy (e.g., docetaxel, pemetrexed)	Increased overall survival Increased progression-free survival Improved quality of life
Gemtuzumab ozogamicin for treatment of acute myeloid leukemia	Patients in whom acute myeloid leukemia (AML) has been diagnosed	<p>With current treatments, the 5-year survival rate for patients with AML ranges from 20% to 70%, depending on disease subtype. Gemtuzumab ozogamicin is an AML treatment that conjugates a highly toxic chemotherapy agent to a monoclonal antibody specific for a cell surface marker expressed on most AML cells (CD33). The conjugate is intended to preferentially target AML cells with the toxic chemotherapy. Gemtuzumab ozogamicin is administered intravenously; various dosing schedules have been reported. During a recently completed phase III trial, investigators administered gemtuzumab ozogamicin in combination with a standard chemotherapy regimen using daunorubicin and cytarabine.</p> <p>Pfizer, Inc., New York, NY</p> <p>FDA approved in 2000 for treating AML; drug withdrawn from U.S. market in 2010 after negative study results and high toxicity observed in postmarket trials; drug remains available in Europe, where trials have shown benefit using an altered dosing scheme; Pfizer is analyzing data to determine whether to make new FDA submission; the drug is available in the U.S. only to patients already taking it</p>	Standard chemotherapy with daunorubicin and cytarabine	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Gene-mediated cytotoxic immunotherapy (ProstAtak) for prostate cancer	Patients in whom intermediate- to high-risk, localized prostate cancer has been diagnosed	<p>Prostate cancer recurrence rates after 1st-line treatment range between 10% and 60% depending on whether tumor pathology indicates that the tumor is low risk or high risk; therapies that could reduce this recurrence rate are highly sought. A gene-mediated cytotoxic immunotherapy (GMCI), ProstAtak™, is being tested for preventing recurrence after conventional therapy. GMCI purportedly leads to direct tumor cytotoxicity as well as a protective immune response. The treatment consists of an adenovirus vector that contains a herpes simplex virus (HSV) thymidine kinase gene (Adv-tk). After the virus is injected into the tumor site, the patient receives the anti-HSV drug valacyclovir, which is activated by the tk transgene and produces an active drug that kills rapidly dividing cells. This, in turn, leads to local cytotoxicity through local release of activated valacyclovir and the release of tumor antigens that may be taken up by dendritic cells and produce a systemic immune response. In treating prostate cancer, GMCI is being administered in combination with radiation therapy (RT). Patients receive 3 GMCI injections at 2–8 weeks before 1st RT, at the time of 1st RT, and 2–3 weeks after 1st RT.</p> <p>Advantagene, Inc., Auburndale, MA</p> <p>Phase III trial ongoing under an FDA special protocol assessment</p>	Androgen-deprivation therapy Radiation therapy Surgical resection	Increased overall survival Increased disease-free survival Improved quality of life
Gene therapy (EGEN-001) for recurrent or persistent ovarian cancer	Patients with recurrent or persistent ovarian, primary peritoneal, or fallopian tube cancer who have received at least 1 round of treatment with a platinum-based regimen	<p>Patients with platinum-resistant ovarian cancer have a poor prognosis and few treatment options. EGEN-001 is a novel gene therapy intended to induce the expression of interleukin-12 (IL-12) in tumor cells; IL-12 expression purportedly leads to 3 antitumor activities: (1) activation and proliferation of natural killer (NK) cells, leading to an innate immune response against the tumor; (2) maturation and proliferation of T lymphocytes, leading to an adaptive immune response against the tumor; and (3) activation of NK cells and T lymphocytes leading to upregulation of interferon gamma, which has antiangiogenic properties. EGEN-001 is formulated with the TheraPlas™ delivery system that forms active nanoparticles that transfect cells with a plasmid expressing IL-12; this formulation is optimized for delivery into the tumor microenvironment. This agent is being tested in platinum-refractory ovarian cancer. In clinical trials, EGEN-001 is administered by intraperitoneal catheter, 24 mg/m², weekly.</p> <p>EGEN, Inc., Huntsville, AL, in collaboration with Celsion Corp., Lawrenceville, NJ (Celsion acquired EGEN in Jun 2014)</p> <p>Phase II trial ongoing; FDA granted orphan drug status; early stage trials ongoing in other treatment settings and disease indications</p>	Docetaxel Etoposide Gemcitabine Paclitaxel Pegylated liposomal doxorubicin Topotecan	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Glambatimumab vedotin for treatment-refractory breast cancer</p>	<p>Patients with metastatic, glycoprotein NMB (GPNMB)-overexpressing, triple-negative breast cancer</p>	<p>Therapies with improved efficacy are needed for patients with metastatic triple-negative breast cancer, because these patients have limited treatment options and a poor prognosis. Glambatimumab vedotin is an antibody-drug conjugate that links a highly toxic chemotherapy drug to a monoclonal antibody specific for GPNMB, a protein known to be overexpressed in some breast tumors. GPNMB has been implicated in enhancing the metastatic potential of breast cancer cells, particularly the triple-negative breast cancer subtype. A companion diagnostic test to determine whether a patient's cancer expresses GPNMB will be used to determine patient eligibility for treatment with glambatimumab vedotin. In a phase III trial, this agent will be compared with capecitabine in patients previously treated with anthracycline and taxane chemotherapy. Glambatimumab vedotin is an intravenous medication given at a dose of 1.88 mg/kg, once every 3 weeks.</p> <p>Celldex Therapeutics, Inc., Needham, MA</p> <p>Phase II trial (METRIC) ongoing; May 2010, FDA granted fast-track status for treatment-resistant or refractory breast cancer</p>	<p>Albumin-bound paclitaxel Capecitabine Docetaxel Doxorubicin Eribulin Gemcitabine Ixabepilone Liposomal doxorubicin Paclitaxel Vinorelbine</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>Gonadotropin-releasing hormone analogues for prevention of ovarian failure in women receiving gonadotoxic chemotherapy</p>	<p>Women undergoing gonadotoxic systemic chemotherapy for cancer</p>	<p>About 25% of women undergoing systemic chemotherapy for conditions such as breast cancer experience premature menopause as a side effect of treatment. No consensus on treatment exists for preventing this side effect. Ovarian suppression using gonadotropin-releasing hormone analogues (e.g., goserelin, triptorelin) may protect ovarian function against the effects of chemotherapy through several mechanisms, including decreasing the number of primordial follicles entering the relatively chemotherapy-sensitive differentiation stage; decreasing ovarian perfusion, thereby reducing ovarian exposure to chemotherapy; upregulating intragonadal antiapoptotic molecules (e.g., sphingosine-1-phosphate); and protecting ovarian germline stem cells. In clinical trials, gonadotropin-releasing hormone analogues (i.e., goserelin or triptorelin) are administered concomitantly with standard cytotoxic chemotherapy regimens.</p> <p>SWOG, Portland, OR, and International Breast Cancer Study Group IBCSG, Bern, Switzerland</p> <p>Phase III (POEMS) trial ongoing; agents could be prescribed off label</p>	<p>Other fertility preservation techniques (e.g., embryo, ovarian tissue, or oocyte cryopreservation)</p>	<p>Decreased rate of amenorrhea at 12 months after chemotherapy Preserved fertility Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>High-intensity focused ultrasound (Ablatherm system) for treatment of localized prostate cancer</p>	<p>Patients in whom localized prostate cancer has been diagnosed</p>	<p>High-intensity focused ultrasound (HIFU) is a noninvasive treatment under study for treating prostate cancer. HIFU ablates tissue by using sound waves to generate heat within a small, focused area, leaving surrounding tissue unaffected. The noninvasive and targeted nature of HIFU has the potential to reduce side effects associated with invasive procedures and radiation therapy and, unlike those procedures, may also be repeated in the event of local recurrence. HIFU ablation is performed in a 1–3 hour outpatient procedure. The most advanced clinical trial of the Ablatherm® HIFU system in the U.S. is studying its use in treating patients who have localized prostate cancer and have not undergone prostate cancer treatment.</p> <p>EDAP TMS S.A., Lyon, France</p> <p>Phase II/III trial met primary endpoint; Jul 2014, FDA's Gastroenterology & Urology Devices panel voted 9-0 against the device's effectiveness, 5-3 against its safety (with 1 abstention) 8-0 (with 1 abstention) that risks outweigh the benefits; Nov 2014, FDA sent a "not approvable" letter to the company, which has until Apr 29, 2015 to submit an amended PMA addressing FDA's concerns; available in Europe since 2000</p>	<p>Brachytherapy External beam radiation Observation Other HIFU systems (in development) Radical prostatectomy</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>High-intensity focused ultrasound (Sonablate system) for treatment of localized prostate cancer</p>	<p>Patients in whom localized prostate cancer has been diagnosed</p>	<p>High-intensity focused ultrasound (HIFU) is a noninvasive treatment under study for treating prostate cancer. HIFU ablates tissue by using sound waves to generate heat within a small, focused area, leaving surrounding tissue unaffected. The noninvasive and targeted nature of HIFU has the potential to reduce side effects associated with invasive procedures and radiation therapy and, unlike those procedures, may also be repeated in the event of local recurrence. HIFU ablation is performed in a 1–3 hour outpatient procedure. The most advanced clinical trial of the Sonablate system in the U.S. is studying its use in treating patients with localized prostate cancer that has recurred after initial therapy with external beam radiation therapy.</p> <p>SonaCare Medical, LLC (formerly USHIFU, LLC), Charlotte, NC</p> <p>Phase III trial ongoing for prostate cancer; system available in Europe since 2001; Oct 2014, FDA issued a "not approvable" letter in response to the PMA submission reviewed by FDA's advisory panel, but suggested changes to improve trial design</p>	<p>Brachytherapy External beam radiation Observation Other HIFU systems (in development) Radical prostatectomy</p>	<p>Increased overall survival Increased progression-free survival Improved patient quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Hypoxia-activated DNA alkylating agent (TH-302) for treatment of pancreatic cancer	Patients in whom metastatic pancreatic adenocarcinoma has been diagnosed	<p>About 5% of patients with pancreatic cancer respond to the current standard of care (gemcitabine chemotherapy), and the prognosis for these patients is very poor. Hypoxic areas of tumors are often refractory to conventional chemotherapy because of the tissues' inaccessibility to standard drugs and/or slow rate of cell division. Thus, new options are needed. TH-302 is a novel cytotoxic agent purported to be preferentially activated in hypoxic conditions. In its activated form, TH-302 is said to be a potent DNA alkylating agent (dibromo isophoramide mustard). Selectively activating TH-302 in hypoxic conditions might target alkylating activity to tumors. TH-302 is administered intravenously, and in clinical trials for pancreatic cancer, it is being administered at a dose of 340 mg/m², in combination with gemcitabine.</p> <p>Threshold Pharmaceuticals, South San Francisco, CA, in partnership with Merck KGaA, Darmstadt, Germany</p> <p>Phase III trial (MAESTRO) ongoing; FDA granted orphan drug status</p>	<p>Various chemotherapies including 1 or more of the following: 5-Fluorouracil Capecitabine Erlotinib Gemcitabine Leucovorin Nab-paclitaxel Oxaliplatin</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Hypoxia-activated DNA alkylating agent (TH-302) for treatment of soft tissue sarcoma	Patients in whom locally advanced, unresectable or metastatic soft tissue sarcoma has been diagnosed	<p>Until recently, doxorubicin was the only FDA-approved treatment option for soft tissue sarcomas (excluding gastrointestinal stromal tumors and liposarcomas), and no consensus treatment exists for patients whose disease has progressed on doxorubicin chemotherapy. The disordered growth of tumors often leads to areas of tissues with inadequate blood supply, leading to hypoxic conditions. These hypoxic areas of tumors are often refractory to conventional chemotherapy because of the tissues' inaccessibility to standard drugs and/or slow rate of cell division. TH-302 is a novel cytotoxic agent that purportedly is preferentially activated in hypoxic conditions. In its activated form, TH-302 is a potent DNA alkylating agent (dibromo isophoramide mustard). Selectively activating TH-302 in hypoxic conditions might target alkylating activity to tumors. In clinical trials for soft tissue sarcoma, TH-302 is being used as 1st-line therapy in combination with doxorubicin to try to target both the hypoxic and normoxic regions of the tumor. TH-302 is an intravenous medication administered at a dose of 300 mg/m², on days 1 and 8 of a 21-day cycle.</p> <p>Threshold Pharmaceuticals, South San Francisco, CA, with Merck KGaA, Darmstadt, Germany</p> <p>Phase III trial (TH-CR-406) ongoing; companies signed agreement in Feb 2012 to codelop and commercialize TH-302; FDA granted orphan drug status; Nov 2014 FDA granted fast-track status</p>	<p>Doxorubicin monotherapy</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ibrutinib (Imbruvica) for treatment of chronic lymphocytic leukemia	Patients with chronic lymphocytic leukemia (CLL)	<p>Ibrutinib (Imbruvica™) is a small-molecule kinase inhibitor with activity against Bruton's tyrosine kinase (Btk). Btk is essential for transduction of the B-cell receptor (BCR) signaling pathway, and many B-cell malignancies, including CLL, purportedly depend on BCR signaling for survival; therefore, its inhibition may be of therapeutic benefit in patients with these conditions. Ibrutinib is under study in patients with various stages of CLL, including recurrent/refractory CLL and in patients aged 65 years or older with newly diagnosed CLL. In trials, ibrutinib is orally administered at a once-daily dosage of 560 mg.</p> <p>Pharmacyclics, Inc., Sunnyvale, CA, in partnership with the Janssen Biotech unit of Johnson & Johnson, New Brunswick, NJ</p> <p>Phase III trials ongoing; FDA granted orphan drug and breakthrough therapy statuses; Feb 2014, FDA granted accelerated approval for treating patients with "chronic lymphocytic leukemia (CLL) who have received at least one prior therapy"; Jul 2014, FDA granted full approval and expanded label to include patients with CLL who carry a deletion in chromosome 17</p>	<p>For patients with recurrent/refractory CLL: Various chemotherapy regimens (e.g., bendamustine plus rituximab, ofatumumab) For patients aged 65 years or older with CLL: 1 or more of the following: Alemtuzumab Bendamustine Chlorambucil Cladribine; Cyclophosphamide Prednisone Also: Fludarabine Lenalidomide Rituximab</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Ibrutinib (Imbruvica) for treatment of diffuse large B-cell lymphoma	Patients with newly diagnosed the nongerminal-center B-cell (GCB) subtype of diffuse large B-cell lymphoma (DLBCL)	<p>Although the majority of patients with DLBCL respond to standard 1st-line chemotherapy, some patients' disease is resistant to this therapy and a significant number of patients experience relapse after an initial response. Many B-cell malignancies purportedly depend on B-cell receptor (BCR) signaling for survival. In particular, preclinical studies have demonstrated the dependence of the non-GCB subtype of DLBCL on BCR signaling for survival. Bruton's tyrosine kinase (Btk) is essential for transduction of the BCR signaling pathway; therefore, its inhibition may be of therapeutic benefit in these patients. In trials for treating non-GCB DLBCL, ibrutinib (Imbruvica™) has been administered in a once-daily, oral dose of 560 mg in combination with standard 1st-line chemotherapy (rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisone).</p> <p>Pharmacyclics, Inc., Sunnyvale, CA, in partnership with the Janssen Biotech unit of Johnson & Johnson, New Brunswick, NJ</p> <p>Phase III trial ongoing; FDA granted orphan drug status</p>	<p>Combination therapy with rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisone</p>	<p>Increased overall survival Increased progression-free survival Increased disease-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ibrutinib (Imbruvica) for treatment of indolent non-Hodgkin's lymphoma	Patients with indolent non-Hodgkin's lymphoma (i.e., follicular lymphoma, marginal zone lymphoma) who have undergone treatment with a CD20 antibody plus chemotherapy	<p>Indolent non-Hodgkin's lymphomas are B-cell malignancies that typically progress slowly; however, they are seldom cured by chemotherapy and patients' disease frequently develops resistance to therapies. Ibrutinib (Imbruvica™) is a small-molecule kinase inhibitor with activity against Bruton's tyrosine kinase (Btk). Btk is essential for transduction of the B-cell receptor (BCR) signaling pathway, and many B-cell malignancies purportedly depend on BCR signaling for survival; therefore, its inhibition may be of therapeutic benefit in patients with these conditions. In trials, ibrutinib is orally administered at a once-daily dosage of 560 mg.</p> <p>Pharmacyclics, Inc., Sunnyvale, CA, in partnership with the Janssen Biotech unit of Johnson & Johnson, New Brunswick, NJ</p> <p>Phase III trial ongoing</p>	<p>Various rituximab-based regimens (rituximab monotherapy; rituximab and a chemotherapeutic agent such as bendamustine, fludarabine) Idelalisib</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Ibrutinib (Imbruvica) for treatment of mantle cell lymphoma	Patients with newly diagnosed or recurrent/refractory mantle cell lymphoma (MCL)	<p>Although patients with MCL frequently respond to initial chemotherapy treatment, the disease eventually progresses in most patients. Median overall survival is between 5 and 7 years. Ibrutinib (Imbruvica™) is a small-molecule kinase inhibitor with activity against Bruton's tyrosine kinase (Btk). Btk is essential for transduction of the B-cell receptor (BCR) signaling pathway, and many B-cell malignancies (including MCL) purportedly depend on BCR signaling for survival; therefore, its inhibition may be of therapeutic benefit in patients with MCL. In trials, ibrutinib has been orally administered at a once-daily dose of 560 mg.</p> <p>Pharmacyclics, Inc., Sunnyvale, CA, in partnership with the Janssen Biotech unit of Johnson & Johnson, New Brunswick, NJ</p> <p>Phase III trials ongoing in newly diagnosed and recurrent/refractory MCL; FDA approved Nov 2013 for patients with MCL who have received at least 1 prior therapy</p>	<p>Various chemotherapies including 1 or more of the following: Bendamustine Bortezomib Cyclophosphamide Etoposide Fludarabine Lenalidomide Mitoxantrone Pentostatin Procarbazine Rituximab Temsirrolimus</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ibrutinib (Imbruvica) for treatment of Waldenström's macroglobulinemia	Patients with Waldenström's macroglobulinemia that has been previously treated	<p>Although several off-label treatments are in use for Waldenström's macroglobulinemia, no treatments are FDA-approved for this indication, and no standard treatment exists. Ibrutinib (Imbruvica™) is a small-molecule kinase inhibitor with activity against Bruton's tyrosine kinase (Btk). Btk is essential for transduction of the B-cell receptor (BCR) signaling pathway, and many B-cell malignancies (including Waldenström's macroglobulinemia) purportedly depend on BCR signaling for survival; therefore, its inhibition may be of therapeutic benefit. In a phase III clinical trial, ibrutinib is being administered at a once-daily dose of 420 mg, either as a monotherapy or in combination with rituximab.</p> <p>Pharmacyclics, Inc., Sunnyvale, CA, in partnership with the Janssen Biotech unit of Johnson & Johnson, New Brunswick, NJ</p> <p>Phase III trial ongoing; FDA granted breakthrough therapy status Feb 2013; supplemental new drug application (sNDA) submitted to FDA in Oct 2014; an Apr 2015 FDA decision deadline for the sNDA has been established under the Prescription Drug User Fee Act</p>	<p>Various chemotherapy regimens, including:</p> <ul style="list-style-type: none"> Bendamustine Bortezomib Cladribine Cyclophosphamide Dexamethasone Doxorubicin Fludarabine Prednisone Rituximab Thalidomide Vincristine 	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Idelalisib (Zydelig) for treatment of chronic lymphocytic leukemia	Patients in whom chronic lymphocytic leukemia (CLL) has been diagnosed	<p>Idelalisib (Zydelig®) inhibits a novel target: phosphoinositide 3-kinase (PI3K) delta, which is a kinase that promotes cell survival, division, and growth. The delta isoform of Class I PI3K is expressed only in blood cells, and targeted inhibition could treat blood-based cancers without side effects on other tissues. The drug is under study in combination with rituximab or rituximab plus bendamustine for previously treated CLL. In ongoing trials, the drug is administered orally, 150 mg, twice daily.</p> <p>Gilead Sciences, Inc., Foster City, CA</p> <p>Phase III trials ongoing; FDA granted breakthrough therapy status for treating relapsed CLL; Jul 2014, FDA granted accelerated approval for treating relapsed CLL, "in combination with rituximab, in patients for whom rituximab alone would be considered appropriate therapy due to other co-morbidities"</p>	<p>Various chemotherapy regimens including 1 or more of the following:</p> <ul style="list-style-type: none"> Cyclophosphamide Doxorubicin Fludarabine Ibrutinib Obinutuzumab Prednisolone Rituximab Vincristine 	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Idelalisib (Zydelig) for treatment of indolent non-Hodgkin's lymphoma	Patients with previously treated, indolent, non-Hodgkin's lymphoma (NHL)	<p>Indolent NHLs are B-cell malignancies that typically progress slowly; however, they are seldom cured by chemotherapy and patients' disease frequently develops resistance to therapies. Idelalisib (Zydelig®) is a small-molecule inhibitor of phosphoinositide 3-kinase (PI3K) delta, a kinase that regulates activation, proliferation, and survival of B cells. In phase III clinical trials, idelalisib is being administered orally, at a twice-daily dose of 150 mg.</p> <p>Gilead Sciences, Inc., Foster City, CA</p> <p>Phase III trials ongoing; Jul 2014, FDA granted accelerated approval for treating relapsed follicular B-cell lymphoma and small lymphocytic lymphoma</p>	Regimens including rituximab monotherapy or chemoimmunotherapy with rituximab and a chemotherapeutic agent (e.g., bendamustine, fludarabine)	<p>Increased overall survival</p> <p>Increased progression-free survival</p> <p>Improved quality of life</p>
Immunomodulatory peptide (SGX942) for treatment of anticancer therapy-related mucositis	Patients who develop oral mucositis (OM) due to anticancer therapies	<p>OM is a complication commonly experienced by patients undergoing anticancer therapy (e.g., chemotherapy, radiation therapy). Significant mouth pain is associated with OM; it makes eating and drinking difficult and impairs quality of life. Severe cases of OM delay or interrupt treatment. Current therapies for OM, such as narcotics and lidocaine, have significant side effects and limited efficacy. SGX942 is a water soluble, 5-amino-acid peptide with anti-inflammatory and anti-infective properties. It is a member of a novel drug class called innate defense regulators that target the immune system. SGX942 binds to an intracellular adaptor protein, sequestosome-1, or p62, which has a pivotal function in signal transduction during activation and control of the immune defense system. In clinical trials, it is administered intravenously over 4 minutes.</p> <p>Soligenix, Inc., Princeton, NJ</p> <p>Phase II trial ongoing; FDA granted fast-track status Jun 2013</p>	Lidocaine Narcotics	<p>Decreased pain and oral side effects</p> <p>Improved ability to eat and drink</p> <p>Improved treatment adherence</p> <p>Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Immunotherapy (CRS-207 and GVAX) for treatment of pancreatic cancer</p>	<p>Patients with metastatic pancreatic cancer who have received at least 1 round of chemotherapy</p>	<p>In pancreatic cancer, the standard of care (gemcitabine chemotherapy) achieves a response rate in only 5% of cases, and the prognosis for patients is poor. CRS-207 is an attenuated strain of <i>Listeria</i>, which has been genetically engineered to express the pancreatic cancer-associated antigen mesothelin. GVAX is a mixture of 2 pancreatic cancer cell lines that have been irradiated and genetically modified to express the immune cytokine GM-CSF. This combination immunotherapy purportedly targets pancreatic cancer through a 2-step process. Initially, the secreted GM-CSF purportedly recruits immune cells to the site of inoculation and primes T cells to recognize cancer cells. Subsequently, CRS-207-infected dendritic cells boost the immune response to target and kill cancer cells overexpressing mesothelin. In clinical trials, patients are injected twice with 5.00E+08 cells of GVAX on weeks 1 and 4. 1.00E+09 CFU of CRS-207 are inoculated on the 1st day of weeks 7, 10, 13, and 16. The GVAX and CRS-207 duo is also being tested in combination with nivolumab.</p> <p>Aduro BioTech, Inc., Berkeley, CA</p> <p>Phase II clinical trials (ECLIPSE, ADU-CL-01, and ADU-CL-06) ongoing; FDA granted orphan drug and breakthrough therapy statuses</p>	<p>Various chemotherapies including 1 or more of the following: 5-fluorouracil Cisplatin Capecitabine Erlotinib Gemcitabine Leucovorin Nab-paclitaxel Oxaliplatin</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>Injected hydrogel (SpaceOAR) to protect healthy tissue during radiation therapy</p>	<p>Patients undergoing radiation therapy treatment for cancers that are adjacent to delicate healthy structures (e.g., prostate cancer)</p>	<p>SpaceOAR™ system (spacing organs at risk) is a hydrogel injected as a liquid that becomes solid in the body and is intended for use during radiation therapy to create distance between the targeted tumor and organs at risk of collateral radiation damage (e.g., displace the rectum from the prostate).</p> <p>Augmenix, Inc., Waltham, MA</p> <p>Phase III pivotal trial completed; postmarket surveillance trial recruiting; Conformité Européene (CE) marked; company stated it expects FDA approval early 2015</p>	<p>Radiation therapy without normal-tissue spacer</p>	<p>Reduced radiation-associated side effects to healthy tissue</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Inotuzumab ozogamicin for treatment-refractory acute lymphoblastic leukemia	Patients in whom recurrent or treatment-refractory acute lymphoblastic leukemia (ALL) has been diagnosed	<p>Among patients who experience an ALL relapse, only about 30% will achieve long-term remission with subsequent therapies. Inotuzumab ozogamicin is an antibody-drug conjugate that links the cytotoxic antibiotic calicheamicin to an antibody specific for CD22, a marker highly expressed by ALL cells. In clinical trials, inotuzumab ozogamicin monotherapy is administered once weekly, by intravenous infusion.</p> <p>Pfizer, Inc., New York, NY</p> <p>Phase III trial ongoing; FDA granted orphan drug status</p>	<p>Various combinations of the following chemotherapy agents: Anthracyclines Asparaginase Cyclophosphamide Cytarabine (ara-C) Epipodophyllotoxins Vincristine</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Ipilimumab (Yervoy) for treatment of advanced nonsmall cell lung cancer	Patients with recurrent or metastatic nonsmall cell lung cancer (NSCLC) who have not received previous systemic therapy	<p>The 5-year survival rate for patients with advanced NSCLC is less than 15% with current treatments. Ipilimumab (Yervoy™) is a 1st-in-class, cytotoxic T-lymphocyte antigen 4 (CTLA-4)-targeted immunotherapy. By blocking the activity of CTLA-4, ipilimumab may increase antitumor cytotoxic activity (reduce immune tolerance to tumor cells). This agent is being tested as 1st-line treatment as part of combination therapy with carboplatin and paclitaxel. Ipilimumab is administered at a dosage of 10 mg/kg, intravenously, once every 3 weeks for 4 doses, then once every 12 weeks beginning at week 24.</p> <p>Bristol-Myers Squibb, New York, NY</p> <p>Phase III trials ongoing</p>	<p>Combination chemotherapy (e.g., pemetrexed plus cisplatin) Targeted immunotherapy (e.g., bevacizumab, cetuximab) Targeted therapy (e.g., crizotinib/ceritinib [if ALK-positive], afatinib/erlotinib [if EGFR mutation—positive])</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Ipilimumab (Yervoy) for treatment of metastatic hormone-refractory prostate cancer	Patients in whom metastatic, chemotherapy-naïve castration-resistant prostate cancer (CRPC) has been diagnosed	<p>Men with progressive metastatic CRPC have a poor prognosis and few treatment options. Ipilimumab (Yervoy™) is a 1st-in-class targeted anticytotoxic T-lymphocyte antigen 4 therapy; it is intended to block the activity of cytotoxic T-lymphocyte antigen 4, which could lead to increased antitumor cytotoxic activity (reduce immune tolerance to tumor cells). Ipilimumab is administered by intravenous infusion at a dose of 10 mg/kg. Treatment consists an induction phase (4 doses, 1 every 3 weeks) followed by a maintenance phase (1 dose every 12 weeks).</p> <p>Bristol-Myers Squibb, New York, NY</p> <p>Phase III trial in chemotherapy-naïve patients ongoing; Sept 2013, company announced phase III trial did not meet its primary endpoint of improving overall survival in patients who had previously undergone docetaxel therapy</p>	<p>Abiraterone Docetaxel Enzalutamide Radium-223 Sipuleucel-T</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ipilimumab (Yervoy) for treatment of small cell lung cancer	Patients in whom extensive-disease small cell lung cancer (SCLC) has been newly diagnosed	<p>Patients with advanced SCLC have extremely low survival rates with current treatments. Ipilimumab (Yervoy™) is a cytotoxic T-lymphocyte antigen 4 (CTLA-4)-targeted immunotherapy previously approved for treating metastatic melanoma. By blocking the activity of CTLA-4, ipilimumab may increase antitumor cytotoxic activity and reduce immune tolerance to tumor cells. This agent is being tested as a 1st-line treatment in combination with etoposide and platinum therapy. Ipilimumab is administered at a dose of 10 mg/kg, intravenously, once every 3 weeks for 4 doses, then once every 12 weeks beginning at week 24.</p> <p>Bristol-Myers Squibb, New York, NY</p> <p>Phase III trial ongoing</p>	Etoposide and platinum therapy (cisplatin or carboplatin) Radiation therapy	Increased overall survival Increased progression-free survival Improved quality of life
Isocitrate dehydrogenase-2 inhibitor (AG-221) for treatment of acute myeloid leukemia	Patients with acute myeloid leukemia (AML) harboring a mutation in the isocitrate dehydrogenase-2 (<i>IDH2</i>) gene	<p>Only about 25% of patients in whom AML is diagnosed will survive for 5 years after diagnosis. About 20% of AML cases harbor a mutation in the <i>IDH2</i> gene, which encodes an enzyme that regulates fundamental aspects of cell metabolism. Mutant forms of <i>IDH2</i> observed in AMLs lead to both a decrease in the levels of alpha-ketoglutarate (the normal <i>IDH2</i> metabolite) and an increase in the levels of another metabolite, D-2-hydroxyglutarate. These shifts purportedly have several potentially tumorigenic effects, including stimulating angiogenesis and affecting histone modification and DNA methylation. <i>IDH2</i> loss of function has also been hypothesized to promote tumorigenesis through alteration of cell metabolism and increased susceptibility to oxidative stress. AG-221 is a small-molecule inhibitor of <i>IDH2</i>. In clinical trials, it is administered orally at an undisclosed dose.</p> <p>Agios Pharmaceuticals, Inc., Cambridge, MA</p> <p>Phase I trial ongoing; FDA granted fast-track status</p>	Cladribine, cytarabine, and granulocyte colony stimulating factor (G-CSF) plus or minus mitoxantrone or idarubicin Fludarabine, cytarabine, and G-CSF plus or minus idarubicin High-dose cytarabine and anthracycline Mitoxantrone, etoposide, and cytarabine	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Lenvatinib for treatment of differentiated thyroid cancer	Patients with differentiated thyroid cancer that is resistant to radioiodine therapy	<p>Differentiated thyroid cancer (e.g., papillary, follicular) comprises the majority of thyroid cancers. Although many differentiated thyroid cancers are treated successfully with radioiodine, patients with disease that is resistant to the agent have few treatment options and a poor prognosis. Lenvatinib (E7080) is a small-molecule multikinase inhibitor with activity against multiple tyrosine kinases involved in signaling pathways that regulate cell growth, cell proliferation, and angiogenesis (e.g., vascular endothelial growth factor receptors 2 and 3). In a late-phase clinical trial, lenvatinib is given orally as a once-daily dose of 24 mg.</p> <p>Eisai Co., Ltd., Tokyo, Japan</p> <p>Phase III trial (SELECT) ongoing; Oct 2014, FDA granted priority review and orphan drug statuses</p>	Pazopanib (off label) Sorafenib Sunitinib (off label)	Increased overall survival Increased progression-free survival Improved quality of life
Lenvatinib for treatment of hepatocellular carcinoma	Patients with unresectable, advanced, stage B or C hepatocellular carcinoma (HCC)	<p>Patients with HCC that cannot be surgically resected have few treatment options and a poor prognosis; no 2nd-line therapy is available after sorafenib. Lenvatinib (E7080) is a small-molecule multikinase inhibitor with activity against multiple tyrosine kinases involved in signaling pathways that regulate cell growth, proliferation, and angiogenesis (e.g., vascular endothelial growth factor receptors 2 and 3). In a late-phase clinical trial, lenvatinib is given orally as a once-daily dosage of 12 mg.</p> <p>Eisai Co., Ltd., Tokyo, Japan</p> <p>Phase III trial ongoing</p>	Locoregional treatment Regorafenib Sorafenib	Increased overall survival Increased progression-free survival Improved quality of life
Lestaurtinib for treatment of infantile acute lymphoblastic leukemia	Infants in whom acute lymphoblastic leukemia (ALL) has been diagnosed	<p>The remission rate for infants with ALL is high; however, for a certain percentage of patients, the disease does not respond to treatment. Lestaurtinib is a small-molecule inhibitor of FMS-like tyrosine kinase 3 (FLT-3), a signaling molecule that promotes cell proliferation and survival in several hematologic malignancies. Although FLT-3 amplification or activating mutation is rare in adult ALL, a significant fraction of infant ALL cases harbor such genetic changes, and FLT-3 activity may contribute to ALL pathogenesis. Lestaurtinib is, therefore, being investigated as an addition to current 1st-line ALL treatment regimens. In clinical trials, lestaurtinib is administered orally, once daily, at an unspecified dose during postinduction chemotherapy.</p> <p>National Cancer Institute, Bethesda, MD</p> <p>Phase III trial ongoing</p>	Multiagent chemotherapy regimens lacking lestaurtinib	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Leukocyte interleukin (Multikine) immune therapy for head and neck cancer	Patients in whom head and neck cancer has been diagnosed	<p>Advanced head and neck cancer has a poor prognosis and high recurrence rate, suggesting the need for novel treatment options. Multikine (leukocyte interleukin injection) is a mix of immune stimulators (tumor necrosis factor, interleukin-1, other cytokines) that is intended to be delivered before conventional treatment (surgery, radiotherapy, chemotherapy). In a clinical trial, Multikine is administered before standard of care therapy in treatment-naive patients. The manufacturer asserts that this is when the immune system is best able to mount an immune response. Multikine will be administered at a dose of 400 IU, delivered by injection directly to the tumor and nearby lymph nodes, 5 times a week for 3 weeks. This agent will be administered in combination with low non-chemotherapeutic doses of cyclophosphamide, indomethacin, and zinc (CIZ).</p> <p>CEL-SCI Corp., Vienna, VA, in partnership with Ergomed Clinical Research, Ltd., London, UK, for development abroad</p> <p>Phase III trial ongoing (IT-MATTERS)</p>	Surgical resection and chemoradiation therapy	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Masitinib for treatment of activating c-KIT mutation–positive melanoma	Patients with unresectable, advanced or metastatic melanoma that harbors an activating mutation in the <i>c-KIT</i> gene	<p>A subset of melanomas harbor an activating mutation in the <i>c-KIT</i> gene, which encodes a receptor tyrosine kinase (mast/stem cell growth factor receptor, KIT, CD117). In particular, between 10% and 20% of acral and mucosal melanomas harbor activating c-KIT mutations. Although KIT kinase inhibitors have been developed for other cancers dependent on KIT activity (e.g., imatinib for treating gastrointestinal stromal tumors), no KIT kinase inhibitor is approved for treating c-KIT mutation–positive melanoma. Masitinib is a kinase inhibitor with activity against KIT as well as platelet-derived growth factor receptors, the intracellular kinase Lyn, and to a lesser extent, fibroblast growth factor receptor 3. Masitinib is under study as a monotherapy for treating melanoma at an oral dose of 7.5 mg/kg, daily.</p> <p>AB Science S.A., Paris, France</p> <p>Phase III trial ongoing</p>	Dacarbazine Interleukin-2 Ipilimumab Nilotinib (in development)	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Masitinib for treatment of pancreatic cancer</p>	<p>Patients in whom advanced/metastatic pancreatic cancer has been diagnosed</p>	<p>Only about 5% of patients with pancreatic cancers respond to the current standard of care (gemcitabine chemotherapy), and the prognosis for these patients is very poor. Masitinib is an orally administered multikinase inhibitor under study for treating patients who have pancreatic cancer. Masitinib inhibits several tyrosine kinases that have been shown to be overexpressed in pancreatic cancers (e.g., platelet-derived growth factor receptors, fibroblast growth factor receptor-3) or whose expression is associated with chemotherapy resistance (e.g., focal adhesion kinase). Additionally, masitinib inhibits mast cell differentiation, proliferation, and granulation through its activity on stem cell growth factor receptor (KIT) and Lyn kinase. Tumor infiltration by mast cells has been associated with increased tumor growth and spread. In clinical trials, masitinib (at an oral dosage of 9 mg/kg/day) has been used in combination with gemcitabine.</p> <p>AB Science S.A., Paris, France</p> <p>Phase III trial (AB07012) ongoing; FDA granted orphan drug status; also under investigation for treating a wide variety of cancers and other indications, including amyotrophic lateral sclerosis, Alzheimer's disease, and severe asthma</p>	<p>Various chemotherapies including 1 or more of the following: 5-Fluorouracil Capecitabine Erlotinib Gemcitabine Leucovorin Nab-paclitaxel Oxaliplatin</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>Methylated septin 9 plasma DNA test (Epi proColon 2.0) for colorectal cancer screening</p>	<p>Patients eligible for routine colorectal cancer (CRC) screening</p>	<p>Many patients for whom screening for CRC is recommended do not follow the recommendation because of the unpleasantness of various screening procedures, including fecal occult blood testing and colonoscopy. This genetic test (Methylated Septin 9 Plasma DNA Test; Epi proColon 2.0) is a blood test that screens DNA from plasma samples for a specific methylated version of the septin 9 gene that is commonly found in CRC.</p> <p>Epigenomics AG, Berlin, Germany; company has entered a commercialization agreement with Polymedco, Inc., Cortlandt Manor, NY, for distribution of test in North American markets</p> <p>Epigenomics submitted PMA Jan 2013 for the test kit for Epi proColon 2.0; FDA granted priority review status; in Jun 2014, company announced it had received a "not approvable letter" from FDA requesting additional data on likelihood of adoption by individuals who are not compliant with screening recommendations; ADMIT trial to assess compliance compared to fecal immunochemical testing ongoing; available in Europe as Epi proColon 2.0 since 2011</p>	<p>Colonoscopy Computed tomographic colonography Fecal DNA tests Fecal immunochemical testing Fecal occult blood testing Sigmoidoscopy</p>	<p>Increased sensitivity and specificity Increased predictive values Avoided unnecessary followup procedures Improved adherence with CRC screening Earlier intervention for identified cancer</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Midostaurin for treatment of acute myeloid leukemia bearing FLT3 mutations	Patients with newly diagnosed acute myeloid leukemia (AML) bearing an internal tandem duplication in the <i>FLT3</i> gene (ITD- <i>FLT3</i>)	<p>The presence of activating <i>FLT3</i> mutations in AML is associated with a poor prognosis, and patients identified as having disease bearing such a mutation more often experience disease recurrence after initial therapy. Midostaurin is a small-molecule kinase inhibitor that has activity against <i>FLT3</i> and additional tyrosine kinases (e.g., c-KIT). Adding midostaurin's anti-<i>FLT3</i> activity to conventional 1st-line therapy (cytarabine and daunorubicin) might improve response rates and decrease recurrence. Treatment is intended for patients younger than 60 years who are able to tolerate high-dose cytarabine consolidation therapy. In a late-stage clinical trial, midostaurin is being given in a twice-daily oral dose for 2 weeks. Patients are administered midostaurin after both induction therapy with cytarabine and daunorubicin and consolidation therapy with high-dose cytarabine.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase III trial ongoing; FDA granted orphan drug status</p>	Cytarabine/daunorubicin	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Mitochondrial metabolism disruptor (CPI-613) for treatment of various cancers	Patients with advanced malignancies, in particular, acute myeloid leukemia (AML), myelodysplastic syndrome, and pancreatic cancer	<p>The metabolic activity of cancer cells is altered significantly from that of noncancerous cells; therefore, therapies targeting aspects of cellular metabolism specific to cancer cells may be effective against a wide range of cancer types. CPI-613 is a novel, lipoic acid derivative that purportedly functions by inhibiting a mitochondrial enzyme (pyruvate dehydrogenase) that is essential for converting pyruvate to acetyl coenzyme A (acetyl-CoA). Cancer cells may be particularly sensitive to this disruption because the metabolic state of cancer cells downregulates both pyruvate dehydrogenase activity and other metabolic pathways that could provide a source of acetyl-CoA (e.g., fatty acid metabolism). In clinical trials, CPI-613 is given intravenously at a dose of 3,000 mg/m², on days 1 and 4 of the 1st 3 weeks of each 4-week cycle.</p> <p>Cornerstone Pharmaceuticals, Inc., Cranbury, NJ</p> <p>Phase I/II trials ongoing in hematologic malignancies; phase II trial ongoing in myelodysplastic syndrome; phase I/II trial ongoing in pancreatic cancer; FDA granted orphan drug status for AML, myelodysplastic syndrome, and pancreatic cancer</p>	Various chemotherapy regimens	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Monocyte development inhibitor (PRM-151) for treatment of myelofibrosis	Patients in whom myelofibrosis has been diagnosed	<p>Recently approved treatments for patients with myelofibrosis have shown promise in improving symptoms; however, they do not address the bone marrow fibrosis underlying the condition. PRM-151 is a recombinant version of an endogenous protein (pentraxin-2) that regulates monocyte activation and differentiation. PRM-151 purportedly inhibits the differentiation of circulating monocytes into fibrocytes and, therefore, has the potential to limit pathogenic fibrosis in patients with myelofibrosis. In a clinical trial, PRM-151 is administered intravenously at a dose of 10 mg/kg on varying days of six 28-day cycles, with or without ruxolitinib.</p> <p>Promedior, Inc., Lexington, MA</p> <p>Phase II trial ongoing; FDA granted orphan drug and fast-track status</p>	Ruxolitinib	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Motolimod for treatment of platinum-resistant ovarian cancer	Women with ovarian cancer whose disease has progressed or recurred after receiving platinum-based chemotherapy	<p>Ovarian cancer is the 2nd deadliest cancer after pancreatic cancer and is typically diagnosed at advanced stages. Patients who have been treated with 1st-line platinum-based chemotherapy often have recurrent disease and a poor prognosis. Motolimod (VTX-2337) is a toll-like receptor 8 (TLR8) agonist. This agonist is a signaling component of the innate immune system and upon induction can activate various cell types of the innate immune response (dendritic cells, macrophages, and natural killer cells). Additionally, these activated cells produce cytokines that recruit cells of the adaptive immune response. TLR agonists purportedly promote a synergistic immune response against cancer cells, possibly through activation of T cells and/or differentiation of B cells into antibody-secreting plasma cells. Immune-response activation by motolimod might overcome immune tolerance to tumor-associated antigens, potentially leading to an anticancer immune response. In clinical trials, it is being tested in combination with pegylated liposomal doxorubicin as 2nd-line treatment for recurrent ovarian cancer.</p> <p>VentiRx Pharmaceuticals, Inc., Seattle, WA</p> <p>Phase II trial (GOG-3003) ongoing; FDA granted fast-track and orphan drug statuses</p>	Bevacizumab Paclitaxel	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Moxetumomab pasudotox for treatment of advanced hairy cell leukemia	Patients with hairy cell leukemia who have undergone at least 2 systemic therapies or are intolerant of purine analog therapy	<p>Patients with hairy cell leukemia who are intolerant of or whose disease is resistant to purine-based chemotherapy have no approved treatment options and a poor prognosis. Hairy cell leukemia is characterized by strong expression of the cell surface marker CD22, a protein expressed by various B cells. Moxetumomab pasudotox is an antibody-drug conjugate (ADC) that links a bacterially derived endotoxin to a CD22-specific monoclonal antibody. The ADC purportedly delivers the endotoxin preferentially to CD22-expressing cells, targeting hairy cell leukemia cells while sparing the majority of normal tissues. In clinical trials, moxetumomab pasudotox is being administered intravenously, 40 mcg/kg, on days 1, 3, and 5 of a 28-day cycle.</p> <p>National Cancer Institute, Bethesda, MD</p> <p>Phase III trial ongoing</p>	No approved therapies exist for chemotherapy-resistant hairy cell leukemia	<p>Increased overall survival</p> <p>Increased progression-free survival</p> <p>Improved quality of life</p>
MUC-1 therapeutic vaccine (CVac) for ovarian cancer	Patients with ovarian cancer who are in 1st or 2nd remission after cytoreduction and chemotherapy	<p>No maintenance therapies are approved to preserve remission in ovarian cancer treatment. CVac™ is an autologous dendritic cell-based vaccine that is primed with mucin-1 (MUC-1; a tumor antigen) coupled to mannan (a sugar derivative that acts as an immune stimulant). The vaccine is intended to induce an immune response to ovarian cancer cells, preventing or slowing recurrence. CVac is administered via intradermal injection, every 4 weeks for 3 cycles, then every 12 weeks for 3 cycles.</p> <p>Prima BioMed, Ltd., Melbourne, Australia</p> <p>Phase II trials ongoing (CAN-003, CANVAS, and CAN-301); FDA granted orphan drug and fast-track statuses</p>	Other ovarian cancer vaccines (in development)	<p>Decreased recurrence rates</p> <p>Increased overall survival</p> <p>Increased progression-free survival</p> <p>Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
MUC-1 therapeutic vaccine (TG4010) for nonsmall cell lung cancer	Patients with metastatic, chemotherapy-naïve nonsmall cell lung cancer (NSCLC) that is mucin-1 (MUC-1)-positive	<p>The 5-year survival rate for patients with advanced NSCLC is less than 15% with available treatments. About 60% of NSCLC tumors express MUC-1, and this protein is a potential therapeutic target for treating NSCLC. TG4010 is a therapeutic cancer vaccine that comprises a viral vector encoding both a tumor antigen (MUC-1) and an immune stimulant (interleukin-2). Patients' tumors must be MUC-1-positive, and patients must have normal levels of natural killer cells at the time treatment is initiated. In clinical trials, TG4010 is being administered in combination with standard of care cytotoxic chemotherapy in the 1st-line setting. The vaccine is given by subcutaneous injection on a weekly basis for the 1st 6 weeks of chemotherapy, and once every 3 weeks thereafter.</p> <p>Transgene SA, Cedex, France</p> <p>Phase IIb/III trial (TIME) ongoing; Dec 2009, FDA granted fast-track status</p>	<p>Combination chemotherapy (e.g., pemetrexed plus cisplatin) Targeted therapy (e.g., afatinib, bevacizumab, cetuximab, crizotinib, erlotinib)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Mulleptide vaccine (IMA901) for renal cell carcinoma	Patients who are receiving sunitinib in the 1st-line setting for metastatic and/or locally advanced renal cell carcinoma (RCC)	<p>RCC is typically highly resistant to conventional chemotherapy/radiation therapy, and few treatment options exist. IMA901 is a therapeutic cancer vaccine comprised of 10 different tumor-associated peptides that are found to be highly overexpressed in the majority of patients who have RCC. Immunization is intended to induce cellular immune responses against renal tumors, and IMA901 purportedly has a stable, off-the-shelf formulation. This agent is intended for the 1st-line setting in advanced disease. The vaccine is administered intradermally, over the course of 4 months, with granulocyte macrophage colony-stimulating factor and sunitinib.</p> <p>Immatics Biotechnologies GmbH, Tübingen, Germany</p> <p>Phase III trial (IMA901-301) ongoing; FDA granted orphan drug status</p>	Sunitinib	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Mycobacterial cell wall–nucleic acid complex (MCNA) for treatment of non–muscle-invasive bladder cancer	Patients in whom non–muscle-invasive bladder cancer (cancer on the surface of the bladder) has been diagnosed	<p>Treatments that can provide better outcomes and reduce rates of recurrence are needed for patients with bladder cancer. Urocidin™ is a mycobacterial cell wall/DNA preparation proposed to create a localized immune response. The mechanism of action is unclear. In clinical trials, urocidin is administered to patients who did not respond to bacillus Calmette-Guérin (BCG) treatment. Urocidin is administered by transurethral catheter directly into the bladder, 8 mg, weekly.</p> <p>Telesta Therapeutics, Inc., Belleville, Ontario, Canada</p> <p>Phase II/III trial complete; Nov 2012, a 2nd phase III trial was discontinued; company plans to file biologics license application with FDA early in 2015; FDA granted fast-track status in 2006</p>	BCG treatment Cystectomy Intravesical chemotherapy Radiation therapy	<p>Avoided cystectomy</p> <p>Increased overall survival</p> <p>Increased progression-free survival</p> <p>Improved quality of life</p>
Nabiximols oromucosal spray (Sativex) for persistent, chronic cancer pain	Patients with cancer who have chronic pain	<p>Effective pain management for chronic cancer pain is challenging because of side effects of opioid therapies and some patients' reluctance to avail themselves of opioid therapy. Additionally, for patients with advanced cancers, opioid therapies may provide inadequate pain relief. Nabiximols (Sativex), which is sprayed under the tongue, is a whole-plant medicinal cannabis extract that contains tetrahydrocannabinol (THC) and cannabidiol as its main components. It is administered orally as a spray at a 100 mcL dose, which contains 2.5 mg cannabidiol and 2.7 mg THC.</p> <p>GW Pharmaceuticals, plc, Salisbury, UK, and Otsuka Holdings Co., Ltd., Tokyo, Japan</p> <p>Phase III trials ongoing; FDA granted fast-track status; approved in Europe and Canada for treating pain and symptoms of multiple sclerosis and neuropathic-related cancer pain</p>	Opioids	<p>Avoided side effects of opioids</p> <p>Reduced pain</p> <p>Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Nab-paclitaxel (Abraxane) for treatment of pancreatic cancer	Patients in whom advanced/metastatic pancreatic cancer has been diagnosed Patients with nonmetastatic pancreatic cancer who have recently undergone surgical tumor resection	<p>Only about 5% of patients with pancreatic cancers respond to the standard of care (gemcitabine chemotherapy), and the prognosis for these patients is poor. Nab-paclitaxel (Abraxane®) is an albumin-bound nanoparticle form of the microtubule stabilizing agent paclitaxel. In clinical trials for patients with pancreatic cancer, nab-paclitaxel (125 mg/m²) is being administered in combination with gemcitabine. Besides the direct antitumor activity of paclitaxel, preliminary studies have indicated that it may lead to increased intratumoral concentrations of gemcitabine.</p> <p>Celgene Corp., Summit, NJ</p> <p>Phase III trial (Apact) in the adjuvant setting is ongoing; FDA approved Sept 2013 for treating metastatic pancreatic cancer</p>	<p>Various chemotherapies including 1 or more of the following: 5-Fluorouracil Capecitabine Erlotinib Gemcitabine Leucovorin Oxaliplatin</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Necitumumab for treatment of advanced nonsmall cell lung cancer	Patients in whom advanced nonsmall cell lung cancer (NSCLC) has been diagnosed	<p>The 5-year survival rate for patients with advanced NSCLC is less than 15% with current treatments. Necitumumab is a monoclonal antibody antagonist directed against the epidermal growth factor (EGF) receptor protein, which may downregulate tumor activity; necitumumab may competitively inhibit the binding of EGF and other ligands, such as transforming growth factor-alpha, and block activation of receptor-associated kinases. These actions inhibit cell growth and induce apoptosis; the drug may also mediate antibody-dependent cellular cytotoxicity. The drug is in a similar class as cetuximab, which is used for treating many cancers but is not labeled for treating NSCLC. In clinical trials, necitumumab was administered at a dosage of 800 mg, intravenously, on days 1 and 8 of every 3-week cycle; it has been tested in the 1st-line setting in combination with cisplatin and gemcitabine or pemetrexed.</p> <p>Eli Lilly and Co., Indianapolis, IN; formerly in partnership with Bristol-Myers Squibb, New York, NY</p> <p>Phase III trials (SQUIRE and INSPIRE) ongoing in squamous and nonsquamous NSCLC; May 2014, Lilly announced that SQUIRE phase III trial treating squamous NSCLC met primary increased overall-survival endpoint</p>	<p>Combination chemotherapy (e.g., pemetrexed plus cisplatin) Targeted immunotherapy (e.g., bevacizumab, cetuximab)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Nelipepimut-S (NeuVax) for prevention of breast cancer recurrence	Patients with HER2-positive, early stage breast cancer who are positive for human leukocyte antigen (HLA)-A2 and/or HLA-A3	<p>Although many patients with early stage breast cancer achieve remission after 1st-line chemotherapy, a significant proportion eventually have disease recurrence. Although some patients undergo maintenance therapy with trastuzumab, only patients whose tumors express high levels of HER2 are eligible for this therapy. Nelipepimut-S (NeuVax™) is a therapeutic cancer vaccine that combines an HER2-derived peptide (E75) with the immune stimulant granulocyte macrophage colony-stimulating factor. The vaccine is designed to induce a cytotoxic T-cell response against cells expressing HER2. NeuVax is under study as maintenance therapy for disease-free patients whose tumors expressed low levels of the HER2 protein. It is administered by intradermal injection, monthly for 6 months, then once every 6 months as maintenance therapy.</p> <p>Galena Biopharma, Portland, OR</p> <p>Phase III trial (PRESENT) ongoing; phase II trial ongoing for combination therapy with trastuzumab</p>	Aromatase inhibitors Tamoxifen	Increased overall survival Increased progression-free survival Improved quality of life
Nintedanib (Vargatef) for treatment of colorectal cancer	Patients with metastatic colorectal cancer (mCRC) whose disease has progressed after receiving standard 1st-line treatment	<p>Although many patients have mCRC that responds to 1st-line chemotherapy, disease ultimately progresses in the vast majority of patients. Current 2nd-line treatments for mCRC are of limited efficacy, and the median overall survival of these patients is less than 1 year. Nintedanib (Vargatef™) is a tyrosine kinase inhibitor that has activity against vascular endothelial growth factor receptor, platelet-derived growth factor receptor, and fibroblast growth factor receptor tyrosine kinases, which regulate tumor growth and angiogenesis. In clinical trials, nintedanib is being tested as an adjunct to conventional 2nd-line therapies (i.e., pemetrexed, docetaxel). Nintedanib is administered as an oral tablet, twice daily.</p> <p>Boehringer Ingelheim GmbH, Ingelheim, Germany</p> <p>Phase III trial (LUME Colon 1) ongoing</p>	Various FOLFIRI-based therapies with or without cetuximab or panitumumab Bevacizumab Chemotherapy-free interval Leucovorin plus 5-fluorouracil Ramucirumab (in development)	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Nintedanib (Vargatef) for treatment of ovarian cancer	Patients in whom chemotherapy-naïve ovarian cancer has been diagnosed	<p>A significant fraction of patients with ovarian cancer have disease that is resistant or refractory to available 1st-line treatments. Nintedanib (Vargatef™) is a tyrosine kinase inhibitor that has activity against vascular endothelial growth factor receptor, platelet-derived growth factor receptor, and fibroblast growth factor receptor tyrosine kinases, which regulate tumor growth and angiogenesis. In late-phase clinical trials, nintedanib is being tested as an adjunct to the conventional 1st-line therapy of intravenous carboplatin plus paclitaxel. Nintedanib is administered as an oral tablet, at a dosage of 200 mg, twice daily.</p> <p>Boehringer Ingelheim GmbH, Ingelheim, Germany</p> <p>Phase III trial (LUME-Ovar 1) ongoing</p>	<p>Combination chemotherapy including 1 or more of the following: Carboplatin Docetaxel Gemcitabine Paclitaxel Pegylated liposomal doxorubicin Topotecan</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Nintedanib (Vargatef) for treatment-resistant nonsmall cell lung cancer	Patients with nonsmall cell lung cancer (NSCLC) whose disease has progressed during or after 1st-line systemic chemotherapy	<p>The 5-year survival rate for patients in whom NSCLC has been diagnosed is less than 15%, and patients whose disease progresses after 1st-line chemotherapy have few treatment options. Nintedanib (Vargatef) is a tyrosine kinase inhibitor that has activity against vascular endothelial growth factor receptor, platelet-derived growth factor receptor, and fibroblast growth factor receptor tyrosine kinases, which regulate tumor growth and angiogenesis. In late-phase clinical trials, nintedanib is being tested as an adjunct to conventional 2nd-line therapies (i.e., pemetrexed, docetaxel). Nintedanib is administered as an oral tablet, twice daily.</p> <p>Boehringer Ingelheim GmbH, Ingelheim, Germany</p> <p>Phase III trials (LUME-Lung 1 and LUME-Lung 2) ongoing; Nov 2014, the European Commission approved nintedanib for treating NSCLC after 1st-line chemotherapy</p>	<p>Various combination therapies including 1 or more of the following: Bevacizumab Carboplatin Crizotinib Docetaxel Erlotinib Pemetrexed</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Niraparib for treatment of BRCA-positive breast cancer	Patients with BRCA mutation-positive, HER2-negative, platinum-sensitive, locally advanced or metastatic breast cancer; hormone receptor-positive breast cancer must be refractory to endocrine treatment	<p>Patients with treatment-resistant, BRCA mutation-positive, advanced breast cancer have a poor prognosis, and better therapy options are needed. Niraparib (MK-4827) is a small-molecule drug intended to inhibit poly-ADP ribose polymerase (PARP), which is an important enzyme in the DNA-repair pathway. Investigators have observed that tumor cells are particularly sensitive to PARP inhibition, and sensitivity to PARP inhibition is thought to be dependent on loss of <i>BRCA</i> function. In clinical trials, niraparib is being tested in patients after treatment with anthracycline and taxane chemotherapy. In these trials, niraparib is administered daily, orally, at a dose of 300 mg.</p> <p>TESARO, Inc., Waltham, MA</p> <p>Phase III trial (BRAVO) ongoing</p>	<p>Combination or single agent chemotherapy with 1 of the following: Alkylating agents (e.g., cyclophosphamide) Anthracyclines (e.g., doxorubicin) Antimetabolites (e.g., fluorouracil, gemcitabine) PARP inhibitors (e.g., BMN 673, olaparib, veliparib [under development]) Taxanes (e.g., docetaxel, paclitaxel)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Niraparib for treatment of ovarian, fallopian tube, or primary peritoneal cancer	Patients in whom platinum-sensitive, high-grade serous ovarian, fallopian tube, or primary peritoneal cancer has been diagnosed	<p>Patients in whom advanced ovarian, fallopian tube, or primary peritoneal cancer has been diagnosed often have recurrent disease and poor prognosis. Niraparib is a small-molecule drug intended to inhibit poly-ADP ribose polymerase (PARP), which is an important enzyme in a DNA-repair pathway. Investigators have observed that tumor cells are particularly sensitive to PARP inhibition. In clinical trials, niraparib (MK-4827) is being tested in the maintenance setting after 2 rounds of treatment with a platinum-based chemotherapy. In these trials, niraparib is administered daily, orally, at a dose of 300 mg.</p> <p>TESARO, Inc., Waltham, MA</p> <p>Phase III trial (NOVA) ongoing</p>	Bevacizumab	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Nivolumab for treatment of advanced melanoma	Patients in whom advanced melanoma has been diagnosed	<p>Clinical trials with the immune checkpoint inhibitor ipilimumab (Yervoy®) have demonstrated the potential of immune therapies in melanoma. However, ipilimumab has a relatively low response rate, and the prognosis for patients with advanced melanoma remains poor. Nivolumab (BMS-936558) is a fully human monoclonal antibody that targets an immune-checkpoint pathway distinct from that of ipilimumab. Nivolumab purportedly blocks the programmed death-1 (PD-1) co-inhibitory receptor expressed by activated T cells. The activity of this pathway has been shown to limit T cell activation; therefore, blocking its activity may enhance the body's immune response, potentially overcoming immune tolerance to melanoma. This agent is being tested in patients with unresectable, advanced melanomas and in patients whose disease has progressed after anti-CTLA-4 therapy. In clinical trials, nivolumab is administered intravenously at a dose of 3 mg/kg, once every 2 weeks.</p> <p>Bristol-Myers Squibb, New York, NY</p> <p>Phase III trials (CheckMate 037, CheckMate 066 and CheckMate 067) ongoing in several treatment settings as monotherapy and combination therapy with ipilimumab; Dec 2014, FDA approved nivolumab under its accelerated approval program for treating unresectable or metastatic melanoma that has progressed after 1st-line treatment; FDA had also granted priority review (Sept 2014) and fast-track status (Jul 2013)</p>	<p>Dabrafenib (if BRAF-positive) Dacarbazine Ipilimumab Trametinib (if BRAF-positive) Vemurafenib (if BRAF-positive)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Nivolumab for treatment of advanced nonsmall cell lung cancer	Patients with platinum-resistant advanced or metastatic nonsmall cell lung cancer (NSCLC)	<p>Patients with squamous or nonsquamous NSCLC whose disease has progressed after 1st-line platinum-based chemotherapy have few treatment options and a poor prognosis. A hallmark of cancer is its ability to evade an immune response. Nivolumab is a novel therapeutic that is intended to prevent immune tolerance of tumor cells. The drug's target is the programmed death-1 (PD-1) pathway, which acts as an immune checkpoint that downregulates T-cell activity. Nivolumab is a monoclonal antibody specific for the PD-1 receptor that purportedly blocks activation of this pathway. In trials, nivolumab is administered as a 3 mg/kg intravenous infusion, once every 2 weeks.</p> <p>Bristol-Myers Squibb, New York, NY</p> <p>Phase III trials (CheckMate 017, CheckMate 026, CheckMate 057, and CheckMate 153) ongoing; FDA granted fast-track status; company expects to file new drug application in 1st half of 2015</p>	<p>Docetaxel Erlotinib Pemetrexed Platinum doublet (plus or minus bevacizumab)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Nivolumab for treatment of advanced renal cell carcinoma	Patients with advanced or metastatic clear cell renal cell carcinoma (ccRCC) who have undergone treatment with at least 1 antiangiogenic kinase inhibitor	<p>Patients with advanced renal cell carcinoma whose disease has progressed after 1st-line treatment with a tyrosine kinase inhibitor have few treatment options and a poor prognosis. A hallmark of cancer is its ability to evade an immune response. Nivolumab is a novel therapeutic that is intended to prevent immune tolerance of tumor cells. The drug targets the programmed death-1 (PD-1) pathway, which acts as an immune checkpoint that downregulates T-cell activity. Nivolumab is a monoclonal antibody specific for the PD-1 receptor that purportedly blocks activation of this pathway. Nivolumab is administered as a 3 mg/kg intravenous infusion, once every 2 weeks.</p> <p>Bristol-Myers Squibb, New York, NY</p> <p>Phase III trials (CheckMate 025 and CheckMate 214) ongoing; FDA granted fast-track status</p>	<p>Axitinib Bevacizumab Everolimus Interferon Interleukin-2 Pazopanib Sorafenib Sunitinib</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Nivolumab for treatment of head and neck carcinoma	Patients in whom head and neck cancer has been diagnosed	<p>Advanced head and neck cancer has a poor prognosis and high recurrence rate, suggesting the need for novel treatment options. A hallmark of cancer is its ability to evade an immune response. Nivolumab (BMS-936558; MDX-1106) is a novel therapeutic intended to prevent immune tolerance of tumor cells. The drug's target is the programmed death-1 (PD-1) pathway, which acts as an immune checkpoint that downregulates T-cell activity. Nivolumab is a monoclonal antibody specific for the PD-1 receptor that purportedly blocks activation of this pathway. Nivolumab is administered as a 3 mg/kg intravenous infusion, once every 2 weeks.</p> <p>Bristol-Myers Squibb, New York, NY</p> <p>Phase III trial (CheckMate 141) ongoing</p>	<p>Various regimens including 1 or more of the following: 5-Fluorouracil Bleomycin Cetuximab Chemoradiation therapy Cisplatin Docetaxel Gemcitabine Ifosfamide Leukocyte interleukin therapy (in development) Methotrexate Oncolytic reovirus (in development) Paclitaxel Surgical resection Vinorelbine</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Nivolumab for treatment of Hodgkin's lymphoma	Patients with Hodgkin's lymphoma who have been treated with autologous stem cell transplant and brentuximab vedotin	<p>Patients with Hodgkin's lymphoma that has progressed after autologous stem cell transplant and treatment with brentuximab vedotin have exhausted standard treatment options and have a poor prognosis. A hallmark of cancer is its ability to evade an immune response. Nivolumab is a novel therapeutic that is intended to prevent immune tolerance of tumor cells. The drug's target is the programmed death-1 (PD-1) pathway, which acts as an immune checkpoint that downregulates T-cell activity. Nivolumab is a monoclonal antibody specific for the PD-1 receptor that purportedly blocks activation of this pathway. In trials, nivolumab is administered as a 3 mg/kg intravenous infusion, once every 2 weeks.</p> <p>Bristol-Meyers Squibb, New York, NY</p> <p>Phase II trial ongoing; FDA granted breakthrough therapy status</p>	No standard therapy exists for this patient population	<p>Increased progression-free survival</p> <p>Increased overall survival</p> <p>Improved quality of life</p>
Nucleoside analog (RX-3117) for treatment of pancreatic cancer	Patients with gemcitabine-resistant pancreatic cancer	<p>Only about 5% of patients with pancreatic cancers respond to the standard of care (gemcitabine chemotherapy), and the prognosis for these patients is poor. RX-3117 is an inactive nucleoside analog that can inhibit DNA and RNA synthesis when it is phosphorylated by the enzyme uridine cytidine kinase (UCK), which leads to apoptotic cell death of tumor cells. Although UCK is overexpressed in multiple human tumors (e.g., pancreatic, nonsmall cell lung, breast, ovarian cancers), it has a scant presence in normal tissues, so targeting it could improve safety and efficacy in patients who have cancer. In clinical trials, patients will undergo 8 cycles of an undetermined dose of RX-3117 taken orally, 3 times a week, for 3 weeks followed by a week of rest.</p> <p>Rexahn Pharmaceuticals, Inc., Rockville, MD</p> <p>Phase Ib trial ongoing; FDA granted orphan drug status</p>	<p>Various chemotherapies including 1 or more of the following:</p> <ul style="list-style-type: none"> 5-fluorouracil Cisplatin Capecitabine Erlotinib Gemcitabine Leucovorin Nab-paclitaxel Oxaliplatin 	<p>Increased overall survival</p> <p>Increased progression-free survival</p> <p>Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label maraviroc (Selzentry) for prevention of graft-versus-host disease	Patients at high risk of developing graft-versus-host disease (GVHD) after undergoing allogeneic stem cell transplantation	<p>About 50% of patients undergoing allogeneic stem cell transplantation develop GVHD, a condition in which donor cells in an allogeneic hematopoietic stem cell transplant mount an immune response against recipient tissues. Patients with acute GVHD typically exhibit damage to the skin, liver, and gastrointestinal tract, and GVHD is lethal in up to 80% of patients with severe forms of the disease. Current prophylactic treatments for GVHD target donor immune cells in a way that may delay immune system reconstitution and/or limit graft-versus-tumor immune responses. A potential molecular target in GVHD is chemokine (C-C motif) receptor 5 (CCR5), which has been shown to play a role in the pathogenesis of GVHD by promoting lymphocyte recruitment to the involved tissues. Maraviroc (Selzentry®) is a CCR5 antagonist that may limit lymphocyte recruitment to target tissues, potentially limiting the extent of recipient tissue damage. In clinical trials, maraviroc is administered at an oral dose of 300 mg, daily, in combination with standard GVHD prophylaxis.</p> <p>University of Pennsylvania, Philadelphia</p> <p>Phase II trial ongoing; FDA approved in 2007 for treating HIV; marketed by Pfizer, Inc. (New York, NY), but the manufacturer does not appear to be seeking a labeled indication for this use</p>	Methotrexate Tacrolimus	Reduced rate of acute GVHD Increased overall survival Improved quality of life
Off-label metformin for treatment of breast cancer	Patients in whom breast cancer has been diagnosed	<p>An estimated 233,000 new cases of invasive breast cancer are diagnosed each year in the U.S., and an estimated 40,000 individuals will die of the disease. Retrospective studies of patients with diabetes taking metformin, preclinical studies of in vitro cell lines, and in vivo cancer models have demonstrated that metformin may have antineoplastic properties. Metformin may exert its effects by activating AMP-activated protein kinase, which functions to limit downstream components of the mTOR pathway. Additionally, metformin's actions in reducing circulating insulin levels may be antineoplastic because of the potential growth-stimulating activity of insulin. Metformin is being studied in multiple breast cancer settings and could represent a novel treatment with a relatively low side-effect profile.</p> <p>National Cancer Institute, Bethesda, MD, and multiple other academic institutions</p> <p>Phase II trials ongoing in neoadjuvant setting; phase III trial ongoing in adjuvant setting to prevent recurrence; phase II trial for preventing primary breast cancer in obese women; phase I/II trials ongoing in metastatic disease; multiple phase II/III trials ongoing of metformin in combination with other chemotherapy agents</p>	Various chemotherapy regimens Various hormone therapies	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label rosuvastatin (Crestor) to prevent colon cancer recurrence	Patients who have had a stage I or II colon cancer surgically resected	<p>Patients who undergo curative resection of stage I or II colon cancers have a 50% recurrence rate in the 1st 3 years after surgery, making a chemopreventive agent for this patient population highly sought. Retrospective studies of clinical trials assessing the use of statins for cardiovascular applications suggested that patients treated with statins had a reduced incidence of precancerous colon polyps; therefore, rosuvastatin (Crestor) is believed to have potential as a chemopreventive agent for colon cancer.</p> <p>National Surgical Adjuvant Breast and Bowel Project, Pittsburgh, PA (investigator), National Cancer Institute, Bethesda, MD (investigator)</p> <p>Phase III trial ongoing</p>	<p>No commonly used chemopreventive agent exists for treating colorectal cancer</p> <p>Compounds under investigation include: Aspirin Calcium supplements Curcumin Nonsteroidal anti-inflammatory drugs Omega-3 fatty acids</p>	<p>Reduced recurrence rate of adenomatous polyps Increased overall survival</p>
Olaparib (Lynparza) for treatment of ovarian cancer	Patients with BRCA-mutated ovarian cancer who have had a complete or partial response to platinum-based cytotoxic therapy	<p>Patients with advanced ovarian cancer often have recurrent disease and a poor prognosis. Olaparib (Lynparza™) is a novel, small-molecule drug intended to inhibit PARP, which functions in a DNA repair pathway; no PARP inhibitors are available on the market. It has been observed that cancers are often deficient in a 2nd DNA repair pathway, and loss of both types of DNA repair is hypothesized to result in cancer cell lethality in response to DNA damage. Olaparib is being tested in clinical trials as a maintenance therapy for patients with BRCA mutation, after treatment with a platinum-based chemotherapy. In clinical trials, it is administered at a dosage of 300 mg, orally, twice daily.</p> <p>AstraZeneca, London, UK</p> <p>Phase III trials (SOLO1, SOLO2, and SOLO3) ongoing; Dec 2014, FDA approved olaparib as monotherapy for patients with germline BRCA-mutated advanced ovarian cancer, after 3 or more chemotherapy regimens; earlier, FDA had granted orphan drug status</p>	<p>Bevacizumab Paclitaxel</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Olaparib (Lynparza) for treatment of BRCA-mutated breast cancer	<p>Patients with nonmetastatic, invasive, triple-negative breast cancer who have mutations in the <i>BRCA1</i> or <i>BRCA2</i> genes (adjuvant treatment)</p> <p>Patients with metastatic breast cancer with germline mutations in the <i>BRCA1</i> or <i>BRCA2</i> genes (metastatic treatment)</p>	<p>Improved treatment options are needed for patients with advanced BRCA mutation-positive breast cancers that have recurred or progressed after chemotherapy. Olaparib (Lynparza™) is a novel, small-molecule drug intended to inhibit poly (ADP-ribose) polymerase (PARP), which functions in a DNA-repair pathway; no PARP inhibitors are FDA approved. Investigators have observed that cancers are often deficient in a 2nd DNA repair pathway, and they hypothesize that loss of both types of DNA repair results in cancer cell lethality in response to DNA damage. Olaparib (AZD-2281) is being tested in clinical trials as a maintenance therapy for patients with BRCA mutation-positive breast cancer after treatment with a platinum-based chemotherapy and as a treatment for metastatic BRCA mutation-positive breast cancer. In clinical trials, olaparib is administered at a dosage of 300 mg, orally, twice daily.</p> <p>AstraZeneca, London, UK</p> <p>Phase III trials (OlympiA and OlympiAD) ongoing</p>	<p>Combination or single agent chemotherapy with 1 or more of the following:</p> <ul style="list-style-type: none"> Alkylating agents (e.g., cyclophosphamide) Anthracyclines (e.g., doxorubicin) Antimetabolites (e.g., fluorouracil, gemcitabine) PARP inhibitors (e.g., BMN 673, niraparib, veliparib [under development]) Taxanes (e.g., docetaxel, paclitaxel) 	<p>Increased overall survival</p> <p>Increased progression-free survival</p> <p>Improved quality of life</p>
Olaparib (Lynparza) for treatment of pancreatic cancer	<p>Patients with germline BRCA1- or BRCA2-mutation metastatic pancreatic cancer who are receiving 1st-line platinum-based chemotherapy and whose disease has not progressed during treatment</p>	<p>In pancreatic cancer, the standard of care (gemcitabine chemotherapy) achieves a response rate in only 5% of cases, and the prognosis for patients is poor. Olaparib (Lynparza™) is a novel, small-molecule drug intended to inhibit poly (ADP-ribose) polymerase (PARP), which functions in a DNA-repair pathway; no PARP inhibitors are FDA approved. Investigators have observed that cancers are often deficient in a 2nd DNA repair pathway, and they hypothesize that loss of both types of DNA repair results in cancer cell lethality in response to DNA damage. In clinical trials, olaparib is administered at a dosage of 300 mg, orally, twice daily.</p> <p>AstraZeneca, London, UK</p> <p>Phase III trial (POLO) registered</p>	<p>Various chemotherapies including 1 or more of the following:</p> <ul style="list-style-type: none"> 5-fluorouracil Cisplatin Capecitabine Erlotinib Gemcitabine Leucovorin Nab-paclitaxel Oxaliplatin 	<p>Increased overall survival</p> <p>Increased progression-free survival</p> <p>Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Onartuzumab (MetMab) for treatment of metastatic HER2-negative gastric cancer</p>	<p>Patients with locally advanced or metastatic gastric cancer that expresses high levels of MET and low levels of HER2</p>	<p>Patients with locally advanced or metastatic gastric cancer have a poor prognosis with current treatment options. MET is a receptor tyrosine kinase that can promote cell proliferation, survival, motility, and invasion. MET overexpression has been reported in gastric cancers and correlates with a poor prognosis. Onartuzumab (MetMab) is a monoclonal antibody that binds to the extracellular domain of MET. This binding may prevent receptor activation by the extracellular domain's cognate ligand (hepatocyte growth factor), potentially having an antineoplastic effect. In a clinical trial, onartuzumab is being administered intravenously; investigators have not provided dosage being tested. In clinical trials, it is being used in combination with a chemotherapy regimen consisting of oxaliplatin, folinic acid, and 5-fluorouracil.</p> <p>F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>Phase III trial (MetGastric) ongoing</p>	<p>Various chemotherapy regimens, including 1 or more of the following: 5-docetaxel 5-FU Capecitabine Carboplatin Cisplatin Epirubicin Fluoropyrimidine Irinotecan Oxaliplatin Paclitaxel</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>Oncolytic reovirus (Reolysin) for treatment of head and neck cancer</p>	<p>Patients with recurrent or metastatic head and neck cancers</p>	<p>Advanced head and neck cancer has a poor prognosis and high recurrence rate, suggesting the need for novel treatment options. Reolysin® is an oncolytic reovirus being developed to treat various cancer and cell proliferative disorders. It replicates in cells that have activated RAS, which may play a role in more than 2/3 of all cancers. In a phase III trial, Reolysin was given to patients with squamous cell carcinoma of the head and neck in the 2nd-line treatment setting after 1st-line treatment with a platinum-based chemotherapy. In this trial, Reolysin was administered in combination with paclitaxel and carboplatin and compared to chemotherapy alone.</p> <p>Oncolytics Biotech, Inc., Calgary, Alberta, Canada</p> <p>Phase III trial (REO 018) completed May 2014; company stated intention to seek FDA approval for randomized, follow-on phase III trial for recurrent head and neck cancers</p>	<p>Various combination or monotherapy regimens including: 5-fluorouracil Bleomycin Cetuximab Cisplatin Docetaxel Gemcitabine Ifosfamide Methotrexate Paclitaxel Vinorelbine</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Oncolytic virus (DNX-2401) for treatment of glioblastoma	Patients with recurrent malignant gliomas, including glioblastoma multiforme (GBM)	<p>GBM can be difficult to treat and is often associated with a poor prognosis. In 60% of patients, disease progresses after initial treatment; more effective treatments are needed. DNX-2401 is a recombinant adenovirus engineered to infect cells overexpressing the RGD integrin and selectively replicate in Rb-deficient cells, 2 common alterations of GBM tumor cells. Purportedly, injecting DNX-2401 directly into the patient's brain tumor could kill tumor cells without harming normal brain cells, potentially improving patient survival and decreasing cancer recurrence. In clinical trials, 1×10^7 viral particles are injected through a catheter to deliver DNX-2401 directly into the tumor. It is administered every 28 days as monotherapy or in combination with interferon gamma or temozolomide.</p> <p>DNAtrix, Inc., Houston, TX</p> <p>Phase I trials (TARGET-1, D24GMB, and unnamed) ongoing; phase II trial planned; FDA granted fast-track and orphan drug statuses</p>	<p>Adjuvant: Radiation therapy Temozolomide</p> <p>Recurrence: Bevacizumab Bevacizumab plus chemotherapy Combination PVC (i.e., procarbazine, lomustine, and vincristine) Cyclophosphamide Nitrosourea Platinum-based regimens Temozolomide</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Opto-acoustic ultrasound imaging device (Imagio) for diagnostic breast imaging	Patients with a suspicious breast mass	<p>Positive results from traditional breast screening approaches (e.g., mammography, self-breast exam) lead to expensive diagnostic imaging and breast biopsy in a large number of patients whose tumors are eventually diagnosed as benign. Additionally, for patients with dense breast tissue, mammographic screening may fail to detect some cancers. To address these issues, the Imagio™ breast imaging system combines traditional ultrasound with opto-acoustic imaging to create a map of the vasculature in and around suspicious masses. This approach is centered on 2 hallmarks of cancerous lesions: enhanced angiogenesis and deoxygenation. Opto-acoustic imaging directs a short laser pulse into the target tissue, generating local tissue heating and expansion that causes ultrasonic pressure-waves to move through the tissue. These waves are detected by high-frequency pressure sensors to generate an opto-acoustic blood map that is projected on traditional ultrasound. In clinical trials, Imagio is used in diagnostic imaging procedures in patients with suspected breast lesions.</p> <p>Seno Medical Instruments, Inc., San Antonio, TX</p> <p>Unphased pivotal trial (PIONEER-01) ongoing; has European Union Conformité Européene (CE) mark</p>	<p>Breast biopsy Diagnostic breast MRI Diagnostic breast ultrasound</p>	<p>Increased sensitivity and specificity Increased predictive values Fewer unnecessary followup procedures</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ovarian tissue cryopreservation for fertility preservation in women undergoing gonadotoxic cancer treatment	Women undergoing gonadotoxic cancer treatment who wish to preserve fertility	<p>Because cancer treatments have improved, resulting in long-term survival, procedures for maintaining long-term quality of life are of increasing interest. Females (children or adults) who have undergone systemic chemotherapy or whole-body radiation therapy especially may wish to preserve their ability to have children. A new option involves ovarian tissue cryopreservation. Before the patient undergoes treatment, clinicians collect ovarian tissue in a laparoscopic procedure requiring general anesthesia. Collected tissue is prepared to withstand the freezing process, and is then cryopreserved until completion of cancer treatment. Upon remission, the tissue is transplanted back into the patient to restore normal hormonal cycling and, if successful, fertility.</p> <p>Various research institutions, including Weill Medical College of Cornell University, New York, NY, and Boston IVF, Boston, MA</p> <p>Several unphased trials ongoing; case series of successful pregnancies and births</p>	Oocyte cryopreservation Ovarian suppression with gonadotropin releasing hormone analogues or antagonists	Successful pregnancy Live birth
Palbociclib (Ibrance) for treatment of estrogen receptor–positive breast cancer	Patients in whom locally advanced/unresectable or metastatic, estrogen receptor–positive, HER2–negative breast cancer has been diagnosed	<p>Although endocrine therapies (e.g., estrogen receptor antagonists, aromatase inhibitors) are often effective in treating patients with estrogen receptor–positive breast cancer, the response is typically limited to about 1 year. Palbociclib (Ibrance™) is a dual inhibitor of cyclin-dependent kinase (CDK) 4 and CDK 6, which are kinases involved in controlling cell-cycle progression. CDK 4 and CDK 6 regulate a cell-cycle checkpoint controlling initiation of DNA synthesis; therefore, their inhibition may limit tumor growth mediated by cell proliferation. Preclinical studies have demonstrated that estrogen receptor–positive breast cancer may be highly sensitive to CDK 4/6 inhibition and that this inhibition may be synergistic with endocrine therapies. The drug is being studied for use in combination with letrozole as 1st-line treatment for advanced disease, in combination with fulvestrant for treating endocrine therapy–refractory advanced disease, and in combination with exemestane for treating aromatase inhibitor–resistant advanced disease. In clinical trials, palbociclib is administered as a once-daily, oral dose of 125 mg, on days 1–21 of each 28-day cycle.</p> <p>Pfizer, Inc., New York, NY</p> <p>Phase III trials (PEARL, PENELOPE-B, PALOMA-2, PALOMA-3, and PALOMA-4) ongoing; FDA granted breakthrough therapy status; Oct 2014, FDA granted priority review to palbociclib; FDA scheduled decision date is Apr 13, 2015</p>	Abemaciclib (in development) Anastrozole Fluoxymesterone Fulvestrant High-dose estrogen LEE011 (in development) Letrozole Progesterin Tamoxifen Toremifene	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Pegylated arginine deiminase for treatment of hepatocellular carcinoma	Patients with advanced hepatocellular carcinoma (HCC) whose disease has failed to respond to 1 course of systemic therapy	<p>For patients whose disease cannot be cured by surgical removal of the tumor, survival rates for HCC are very low (about 5%), with median survival after diagnosis of only about 6 months. Pegylated arginine deiminase (ADI-PEG 20) is a pegylated preparation of arginine deiminase, which acts by depleting the essential amino acid arginine from the bloodstream. Research has demonstrated that the cells of many tumor types are unable to autonomously synthesize arginine and, therefore, tumor cells are preferentially affected by the loss of arginine supply in the blood. This agent is intended for use in the 2nd-line setting. It is administered at a dosage of 18 mg/m², weekly, by intramuscular injection.</p> <p>Polaris Pharmaceuticals, Inc., San Diego, CA</p> <p>Phase III trial (ADI-PEG 20) initiated under FDA special protocol assessment; FDA granted orphan drug status; also under investigation for treating hematological malignancies, mesothelioma, melanoma, lung cancer, and prostate cancer</p>	Locoregional therapy Sorafenib (if not used in 1st-line setting)	Increased overall survival Increased progression-free survival Improved quality of life
Pembrolizumab (Keytruda) for treatment of advanced melanoma	Patients in whom advanced (unresectable stage III or IV) melanoma has been diagnosed	<p>Patients with metastatic melanoma have a poor prognosis, with current treatments yielding a 5-year survival rate of less than 10%. Clinical trials with the immune checkpoint inhibitor ipilimumab have demonstrated the potential of immune therapies in melanoma; however, the utility of ipilimumab is limited by its relatively low response rate, and the prognosis for patients with advanced melanoma remains poor. Pembrolizumab (Keytruda®) is a monoclonal antibody that targets a novel immune-checkpoint pathway distinct from that of ipilimumab.</p> <p>Pembrolizumab purportedly blocks the programmed death-1 (PD-1) co-inhibitory receptor expressed by activated T cells. The activity of this pathway has been shown to limit T-cell activation; therefore, blocking its activity may enhance the body's immune response, potentially overcoming immune tolerance to melanoma. Pembrolizumab is administered by intravenous infusion at a dose of 10 mg, once every 2 weeks.</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase III trial (KEYNOTE-006) ongoing; Sept 2014, FDA approved pembrolizumab for treatment of patients with advanced or unresectable melanoma who are no longer responding to ipilimumab or BRAF inhibitors (after granting breakthrough therapy status), basing its decision on results from phase Ib KEYNOTE-001 trial; also under investigation for treating breast cancer, nonsmall cell lung cancer, renal cell carcinoma, and other indications</p>	Dabrafenib Dacarbazine Ipilimumab Trametinib Vemurafenib	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Pembrolizumab (Keytruda) for treatment of head and neck carcinoma</p>	<p>Patients in whom head and neck cancer has been diagnosed</p>	<p>Advanced head and neck cancer has a poor prognosis and high recurrence rate, suggesting the need for new treatments. A hallmark of cancer is its ability to evade an immune response. Pembrolizumab (Keytruda®) is a novel therapeutic that is intended to prevent immune tolerance of tumor cells. The drug's target is the programmed death-1 (PD-1) pathway, which acts as an immune checkpoint that downregulates T-cell activity. Pembrolizumab is a monoclonal antibody specific for the PD-1 receptor that purportedly blocks activation of this pathway. In the phase I KEYSTONE-012 trial, pembrolizumab was administered as a 200 mg intravenous infusion, once every 3 weeks.</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase III trial (KEYNOTE-040) ongoing; FDA granted accelerated approval Sept 2014 for treating melanoma</p>	<p>Surgical resection Various combination or monotherapy regimens including: 5-fluorouracil Bleomycin Cetuximab Chemoradiation Cisplatin Docetaxel Gemcitabine Ifosfamide Leukocyte interleukin therapy (in development) Methotrexate Nivolumab (in development) Oncolytic reovirus (in development) Paclitaxel Vinorelbine</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>Pembrolizumab (Keytruda) for treatment of nonsmall cell lung cancer</p>	<p>Patients with PD-L1–positive nonsmall cell lung cancer (NSCLC) that has progressed after therapy with a platinum-containing doublet</p>	<p>The 5-year survival rate for patients with advanced NSCLC (stage IIIA, IIIB, or IV) is less than 15%. A hallmark of cancer is its ability to evade an immune response. Pembrolizumab (Keytruda®) is a monoclonal antibody that targets a novel immune-checkpoint pathway, blocking the programmed death-1 (PD-1) co-inhibitory receptor expressed by activated T cells. The activity of this pathway has been shown to limit T-cell activation; therefore, blocking its activity may enhance the body's immune response, potentially overcoming immune tolerance of malignant cells. Pembrolizumab is administered by intravenous infusion at a low or high dose (to be established based on maximum tolerated dose), once every 3 weeks.</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase II/III trial (KEYNOTE-010) and phase III trials (KEYNOTE-024 and KEYNOTE-042) ongoing; Oct 2014, FDA granted breakthrough therapy status for treating NSCLC</p>	<p>Erlotinib MEDI4736 (in development) MPDL3280A (in development) Nivolumab (in development) Single-agent chemotherapy (e.g., docetaxel, pemetrexed)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Pembrolizumab (Keytruda) for treatment of urothelial cancer	Patients with urothelial cancer of the renal pelvis, ureter, bladder, or urethra, that is transitional cell or mixed transitional/nontransitional cell type	<p>About 90% of urothelial cancers begin in the bladder and have a 5-year survival rate of 85% when detected early. In contrast, the survival rate of advanced urothelial cancer is 14% for patients with lymph node–positive and metastatic disease. A hallmark of cancer is its ability to evade an immune response. Pembrolizumab (Keytruda®) is a novel therapeutic that is intended to prevent immune tolerance of tumor cells. The drug’s target is the programmed death-1 (PD-1) pathway, which acts as an immune checkpoint that downregulates T-cell activity. Pembrolizumab is a monoclonal antibody specific for the PD-1 receptor that purportedly blocks activation of this pathway. In the phase I KEYSTONE-012 trial, pembrolizumab is administered as a 200 mg intravenous infusion, once every 3 weeks.</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase III trial (KEYNOTE-045) registered; FDA granted accelerated approval Sept 2014 for treating melanoma</p>	Radiotherapy combined with 1 or more chemotherapy agents (i.e., 5-fluorouracil, cisplatin, gemcitabine, paclitaxel) Surgery (cystectomy)	Increased overall survival Increased progression-free survival Improved quality of life
Peptide-cytokine complex (NGR-hTNF) for treatment of malignant pleural mesothelioma	Patients with malignant pleural mesothelioma who have undergone treatment with pemetrexed and cisplatin	<p>NGR-hTNF (human tumor necrosis factor) is a peptide-cytokine complex; NGR peptide binds preferentially to tumor vasculature and TNF may induce an immune cell reaction/apoptosis, thereby destroying tumors. Ongoing clinical trials are testing NGR-hTNF as 1st- and 2nd-line treatments. This agent is administered at 0.8 mcg/m², intravenously, every 3 weeks until confirmed evidence of disease progression or unacceptable toxicity occurs.</p> <p>MolMed, S.p.A., Milan, Italy</p> <p>Phase III trial completed; did not meet overall survival endpoint, but reported improved survival in 40% of subgroup that had more advanced cancer; phase II trial ongoing; FDA granted orphan drug status</p>	1st-line: Pemetrexed plus cisplatin 2nd-line: Single-agent chemotherapy (e.g., doxorubicin, gemcitabine, vinorelbine)	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Photodynamic therapy with Tookad photosensitive agent for treatment of localized prostate cancer	Patients in whom localized low-risk prostate cancer has been diagnosed	<p>Current treatment of localized prostate cancer can adversely affect surrounding healthy tissue and also lead to debilitating temporary and long-term side effects or complications. Tookad is a photosensitive agent that can be excited by a specific wavelength of light to release energy that can cause local necrosis. In a photodynamic therapy procedure using Tookad, the drug is injected by needle into the prostate. After the drug diffuses into the prostate, laser light is used to excite the drug, potentially leading to destruction of targeted prostate tissue while sparing surrounding healthy tissue.</p> <p>Steba Biotech S.A., Cedex, France</p> <p>Phase III trials ongoing</p>	Radiation therapy Radical prostatectomy Watchful waiting	Increased overall survival Increased progression-free survival Fewer therapy-related side effects Improved quality of life
Plitidepsin for treatment of recurrent or treatment-refractory multiple myeloma	Patients with multiple myeloma who have undergone at least 3 treatments, including bortezomib- and lenalidomide-based regimens	<p>Although treatments for multiple myeloma have improved, the median life expectancy for patients in whom multiple myeloma is diagnosed is only 5–7 years. Additionally, because several newer treatments for multiple myeloma have been moved into the frontline setting as combination therapies, additional salvage treatments are needed. Plitidepsin is a cyclodepsipeptide that demonstrated anticancer activity in preclinical studies and was isolated from the tunicate <i>Aplidium albicans</i>. The purported mechanism of action of plitidepsin is the induction of cell-cycle arrest and apoptosis through the induction of oxidative stress, activation of Rac1, and the sustained activation of Jun-N terminal kinase and p38 mitogen-activated protein kinase. In a late-stage clinical trial for treating multiple myeloma, plitidepsin is being administered by infusion at a dose of 5 mg/m² in combination with orally administered dexamethasone.</p> <p>PharmaMar subsidiary of Grupo Zeltia, Madrid, Spain</p> <p>Phase III trial ongoing; FDA granted orphan drug status</p>	Combination chemotherapy including 1 or more of the following: Bendamustine Bortezomib Carfilzomib Cisplatin Cyclophosphamide (including high dose) Dexamethasone Etoposide Lenalidomide Pomalidomide Thalidomide	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Prophage G-series therapeutic vaccine (HSPPC-96) for treatment of glioma</p>	<p>Patients with primary or recurrent gliomas, including glioblastoma multiforme (GBM)</p>	<p>Gliomas, which include GBM, are difficult to treat and associated with a very poor prognosis. New therapies that improve survival and slow disease progression are needed. Prophage (HSPPC-96) is a cancer vaccine derived from antigens displayed by a patient's individual tumor. Laboratory workers coimmunoprecipitate antigens from a tumor sample with heat-shock protein GP96. Vaccinations with these antigens are given to stimulate an immune response against residual cancer cells. 2 versions of the vaccine are in clinical trial testing: Prophage G-100 for newly diagnosed gliomas and Prophage G-200 for progressive or recurrent glioma. In clinical trials, the vaccines are delivered as weekly or biweekly intradermal injections as part of combination therapy with temozolomide or bevacizumab.</p> <p>Agenus, Inc., Lexington, MA, in collaboration with University of California, San Francisco (UCSF), and the National Cancer Institute (NCI), Bethesda, MD</p> <p>Phase I/II and II trials (UCSF-05103 and HeatShock) completed, phase II trial (NCI-2013-00444) ongoing, phase III trial planned; FDA granted orphan drug status</p>	<p>Adjuvant: Radiation therapy Temozolomide Recurrence: Bevacizumab Bevacizumab plus chemotherapy Combination PVC (i.e., procarbazine, lomustine, vincristine) Cyclophosphamide Nitrosourea Platinum-based regimens Temozolomide</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>ProstVac for treatment of castration-resistant prostate cancer</p>	<p>Patients in whom asymptomatic or minimally symptomatic metastatic castration-resistant prostate cancer (CRPC) has been diagnosed</p>	<p>Men with progressive, metastatic CRPC often have a poor prognosis and few treatment options. No viral vector vaccine is approved. ProstVac® is a prime-boost immune therapy strategy using fowlpox and vaccinia viral vectors encoding prostate-specific antigen and 3 immune costimulatory molecules; the patient's immune system is primed using the vaccinia virus followed by multiple fowlpox vector boosts. Given in 1 primer step and then weekly injections to generate an immune response.</p> <p>BN ImmunoTherapeutics unit of Bavarian Nordic A/S, Kvistgård, Denmark</p> <p>Phase III trial ongoing</p>	<p>Abiraterone Enzalutamide Sipuleucel-T</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Quizartinib for treatment of acute myeloid leukemia bearing FLT3 mutations	Patients with treatment-refractory acute myeloid leukemia (AML) bearing an internal tandem duplication in the <i>FLT3</i> gene (ITD-FLT3)	<p>No FLT3 inhibitors are available for treating AML, and patients with recurrent or treatment-refractory AML have no effective treatment options. About 30% of AML cases bear an activating mutation in the gene encoding the receptor tyrosine kinase FLT3, a mutation that constitutively activates various cell proliferative and anti-apoptotic pathways. Patients whose disease harbors an activating FLT3 mutation have a worse prognosis than patients whose disease does not. Quizartinib is an orally administered selective inhibitor of FLT3 kinase activity that is under study as a treatment for AML. Its dosage was not specified in the phase III clinical trial record.</p> <p>Ambit Biosciences, San Diego, CA, a subsidiary of Daiichi Sankyo Co., Ltd., Tokyo, Japan</p> <p>Phase III trial ongoing; FDA granted orphan drug status and fast-track statuses</p>	Cladribine, cytarabine, and granulocyte colony stimulating factor (G-CSF) plus or minus mitoxantrone or idarubicin High-dose cytarabine and anthracycline Fludarabine, cytarabine, and G-CSF plus or minus idarubicin Mitoxantrone, etoposide, and cytarabine	Increased overall survival Increased progression-free survival Improved quality of life
Radiofrequency ablation of liposomal-encapsulated doxorubicin (ThermoDox) for treatment of hepatocellular carcinoma	Patients in whom hepatocellular carcinoma (HCC) has been diagnosed	<p>Patients with HCC that cannot be surgically resected have few treatment options and a poor prognosis. ThermoDox™ is a heat-labile liposomal encapsulation of the chemotherapeutic agent doxorubicin. When radiofrequency (RF) energy is applied to the target tissue after administration of ThermoDox, it induces local hyperthermia (39.5–42.0 °C) and targeted release of the cytotoxic agent. ThermoDox is being tested in patients with treatment-naïve HCC whose disease is not eligible for surgical resection.</p> <p>Celsion Corp., New York, NY</p> <p>Phase III trial (OPTIMA) ongoing; Jan 2013, 1st phase III trial (HEAT) failed its progression-free-survival endpoint</p>	RF tumor ablation Systemic chemotherapy Targeted immunotherapy (e.g., sorafenib) Transcatheter arterial chemoembolization	Decreased need for liver transplantation Reduced side effects Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Radium-223 dichloride (Xofigo) for treatment of bone metastases associated with solid tumors	Patients in whom bone metastases associated with advanced hormone-refractory metastatic prostate cancer have been diagnosed	<p>Bone metastases occur in late stages of the majority of solid tumors and are associated with significant morbidity and mortality; however, few treatments targeting bone metastases are available. Pain is a common symptom of bone metastases and significantly hinders quality of life. Nonnarcotic treatments for the pain from bone metastases are needed. Radium-223 dichloride is a preparation of radium-223, an alpha particle–emitting isotope that has a natural affinity for bone. It purportedly accumulates in the bone where it preferentially attacks tumors rather than bone marrow because of the short distance over which alpha particles are cytotoxic. Radium-223 dichloride is administered at 50 kBq (1.35 microcurie)/kg, at 4-week intervals, for 6 total injections.</p> <p>Algeta ASA, Oslo, Norway, in collaboration with Bayer AG, Leverkusen, Germany (Bayer acquired Algeta in Dec 2013)</p> <p>May 2013, FDA approved (after priority review) for treating bone metastases associated with advanced, hormone-refractory, metastatic prostate cancer; investigations ongoing in osteosarcoma and breast cancer with bone metastases</p>	Cabozantinib (in development) Denosumab	Increased overall survival Increased progression-free survival Increased rate of alkaline phosphatase normalization Reduced pain from bone metastases Improved quality of life
Ramucirumab (Cyramza) for treatment of gastric cancer	Patients with metastatic gastric cancer whose disease has progressed after 1st-line therapy with a platinum agent and a fluoropyrimidine	<p>Patients with gastric cancer that has progressed after 1st-line chemotherapy have a poor prognosis with median survival times of less than 1 year. Ramucirumab is a novel monoclonal antibody that binds to the extracellular domain of vascular endothelial growth factor (VEGF) receptor 2 (VEGFR2), which is a receptor tyrosine kinase that acts as a central mediator of tumor angiogenesis. Available VEGF-pathway inhibitors include a monoclonal antibody specific for VEGF and small-molecule inhibitors of the kinase activity of VEGFR2 (and other receptor tyrosine kinases). Therefore, ramucirumab represents a novel mechanism of action for inhibiting VEGF-pathway signaling. Treatment is intended for disease that has progressed after standard 1st-line platinum-based or fluoropyrimidine-based regimens. In clinical trials for gastric cancer, ramucirumab is intravenously administered at a dose of 8 mg/kg, once every 2 weeks.</p> <p>ImClone Systems subsidiary of Eli Lilly and Co., Indianapolis, IN</p> <p>Apr 2014, FDA approved ramucirumab (after granting orphan drug status and fast-track status) as a single agent for treating advanced gastric cancer or gastroesophageal junction adenocarcinoma that has progressed after chemotherapy, basing its decision on results from phase III REGARD trial; Nov 2014, ramucirumab received a 2nd FDA approval for use in combination with paclitaxel after phase III RAINBOW trial met its primary endpoint</p>	Taxane (e.g., docetaxel, paclitaxel) monotherapy Various irinotecan-based single and combination therapies	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Ramucirumab (Cyramza) for treatment of hepatocellular carcinoma</p>	<p>Patients with advanced-stage hepatocellular carcinoma (HCC) whose disease is not amenable to locoregional therapy and who have had sorafenib therapy</p>	<p>No consensus exists on treatment for HCC that has progressed after treatment with sorafenib, and these patients have a poor prognosis. Ramucirumab is a novel monoclonal antibody that binds to the extracellular domain of vascular endothelial growth factor (VEGF) receptor 2 (VEGFR2), which is a receptor tyrosine kinase that acts as a central mediator of tumor angiogenesis. Available inhibitors of the VEGF pathway include a monoclonal antibody specific for VEGF and small-molecule inhibitors of the kinase activity of VEGFR2 (and other receptor tyrosine kinases). Therefore, ramucirumab represents a novel mechanism of action for inhibiting VEGF-pathway signaling. This agent is intended for 2nd-line treatment after 1st-line sorafenib therapy. In clinical trials for HCC, ramucirumab is administered intravenously, 8 mg/kg, once every 2 weeks.</p> <p>Eli Lilly and Co., Indianapolis, IN</p> <p>Phase III trial (REACH) ongoing</p>	<p>No consensus exists on treatment for this patient population</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>Ramucirumab (Cyramza) for treatment of metastatic colorectal cancer</p>	<p>Patients in whom metastatic colorectal cancer (CRC) has been diagnosed</p>	<p>Current 2nd-line treatments for metastatic CRC are of limited efficacy, and the median overall survival of these patients is less than 1 year. Ramucirumab (Cyramza) is a novel monoclonal antibody that binds to the extracellular domain of vascular endothelial growth factor (VEGF) receptor 2 (VEGFR2), which is a receptor tyrosine kinase that acts as a central mediator of tumor angiogenesis. Available inhibitors of the VEGF pathway include a monoclonal antibody specific for VEGF and small-molecule inhibitors of the kinase activity of VEGFR2 (and other receptor tyrosine kinases). Therefore, ramucirumab represents a novel mechanism of action for inhibiting VEGF-pathway signaling. Treatment is intended for patients whose disease has progressed after standard 1st-line chemotherapy with bevacizumab, oxaliplatin, and a fluoropyrimidine. In clinical trials for CRC, ramucirumab is intravenously administered, 8 mg/kg, once every 2 weeks as an adjunct to the standard 2nd-line FOLFIRI (folinic acid [leucovorin], 5-fluorouracil, and irinotecan) regimen.</p> <p>ImClone Systems subsidiary of Eli Lilly and Co., Indianapolis, IN</p> <p>Phase III trial (RAISE) ongoing; Lilly announced trial met its primary endpoint of overall survival</p>	<p>Various FOLFIRI-based therapies with or without cetuximab or panitumumab</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Regorafenib (Stivarga) for treatment of gastrointestinal stromal tumors	Patients with advanced gastrointestinal stromal tumors (GISTs) that have progressed after treatment with imatinib and sunitinib	<p>Patients with GIST whose disease progresses after imatinib and sunitinib therapy have few treatment options and a poor prognosis with approximate progression-free survival of 100 days and overall survival of 300 days. Regorafenib (Stivarga®) inhibits multiple tyrosine kinases, including the pro-angiogenic kinases vascular endothelial growth factor receptor 2 and TIE-2 (as well as RAF, RET, and KIT); inhibition of both primary angiogenic kinase pathways is a novel combination in multikinase-inhibitor drugs (e.g., regorafenib, imatinib, sunitinib). For treating GIST, regorafenib is administered at a dose of 160 mg, orally, once daily for 3 weeks of each 4-week cycle.</p> <p>Bayer AG, Leverkusen, Germany</p> <p>Phase III trials ongoing; FDA approved Feb 2013 for treating “locally advanced, unresectable or metastatic gastrointestinal stromal tumor (GIST) who have been previously treated with imatinib mesylate and sunitinib malate”</p>	Sorafenib	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Regorafenib (Stivarga) for treatment of hepatocellular carcinoma	Patients with unresectable hepatocellular carcinoma (HCC) that has progressed after treatment with sorafenib	<p>Patients with HCC that cannot be surgically resected have few treatment options and a poor prognosis; no 2nd-line therapy is available after sorafenib. Regorafenib (Stivarga®) inhibits multiple tyrosine kinases, including the pro-angiogenic kinases vascular endothelial growth factor receptor and TIE-2 (as well as RAF, RET, and KIT). Inhibition of both primary angiogenic kinase pathways puts regorafenib in a class of novel multikinase-inhibitor drugs including imatinib and sunitinib. In clinical trials for treating HCC, regorafenib is administered orally, 160 mg daily, for 3 weeks of every 4-week cycle.</p> <p>Bayer AG, Leverkusen, Germany</p> <p>Phase III (RESOURCE) trial ongoing; FDA approved for treating gastrointestinal stromal tumors and metastatic colorectal cancer</p>	Locoregional treatment	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Remestemcel-L (Prochymal) for treatment of acute graft-versus-host disease	Pediatric patients with treatment-refractory, acute graft-versus-host disease (GVHD)	<p>GVHD is a relatively rare condition that most often occurs when donor cells in an allogeneic hematopoietic stem cell transplant mount an immune response against recipient tissues. Patients with acute GVHD typically exhibit damage to the skin, liver, and gastrointestinal tract, and GVHD is lethal in up to 80% of patients with severe forms of the disease. Remestemcel-L (Prochymal[®]) is an off-the-shelf preparation of mesenchymal stem cells expanded from allogeneic donors. Mesenchymal stem cells are purported to have immunomodulatory effects that may downregulate the antirecipient immune response that underlies GVHD. In clinical trials, remestemcel-L was administered by intravenous injection, twice weekly, for 4 weeks.</p> <p>Mesoblast, Ltd., Melbourne, Australia (formerly developed by Osiris Therapeutics, Inc., Columbia, MD, whose stem cell unit was acquired by Mesoblast)</p> <p>Phase III trials complete; FDA granted orphan drug and fast-track status; available under expanded access program since 2008; Health Canada approved 2012</p>	<p>Anti-thymocyte globulin Corticosteroids Methotrexate and cyclosporine Mycophenolate mofetil Other immunosuppressants Photopheresis</p>	<p>Increased overall survival Improved quality of life</p>
Rigosertib (Estybon) for treatment of myelodysplastic syndrome	Patients with azacitidine- or decitabine-refractory myelodysplastic syndrome with excess blasts	<p>Patients with myelodysplastic syndrome with excess blasts that has not responded to azacitidine or decitabine treatment have a poor prognosis and no standard treatment options. Rigosertib (Estybon[®]) is a small-molecule, multikinase inhibitor with activity against both the alpha and beta isoforms of the phosphoinositide 3 kinase (PI3K) and polo-like kinase 1 (PLK1). Inhibiting PI3K may disrupt cell signaling that promotes cell growth and survival, and inhibiting PLK1 may disrupt mitosis, leading to cell-cycle arrest. In clinical trials, rigosertib is being administered as a monotherapy in a 72-hour continuous intravenous infusion.</p> <p>Onconova Therapeutics[®], Inc., Newtown, PA</p> <p>Phase III trial ongoing; in Feb 2014, Onconova announced that the phase III trial failed to meet its primary endpoint of extending overall survival</p>	<p>Hematopoietic stem cell transplant Immunosuppressive therapy (e.g., antithymocyte globulin with or without cyclosporine)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Rindopepimut for treatment of glioblastoma multiforme	Patients with newly diagnosed glioblastoma multiforme (GBM) who have undergone primary surgical resection	<p>GBM is difficult to treat and associated with a very poor prognosis. New therapies that improve survival and slow disease progression are needed. Rindopepimut (CDX-110) is a peptide-based vaccine designed to stimulate an immune response to cells expressing the epidermal growth factor receptor vIII (EGFRvIII) variant. EGFRvIII is an oncogenic splice variant of EGFR, and this variant represents a potential target antigen for anticancer therapy. In clinical trials, rindopepimut is being administered in combination with the immune stimulant granulocyte macrophage colony-stimulating factor (GM-CSF) and standard maintenance chemotherapy (temozolomide). It is being tested as 1st-line treatment in newly diagnosed (phase III trial) and recurrent (phase II trial) GBM and is administered at a dosage of 500 mcg rindopepimut/150 mcg GM-CSF, via intradermal injection, biweekly during month 1, then monthly thereafter.</p> <p>Celldex Therapeutics, Inc., Needham, MA</p> <p>Phase III trial (ACT IV) ongoing; phase IIb trial (ReACT) with expansion cohort ongoing in recurrent GBM; FDA granted orphan drug and fast-track statuses</p>	Bevacizumab Temozolomide monotherapy	Increased overall survival Increased progression-free survival Improved quality of life
Rociletinib for treatment of nonsmall cell lung cancer	Patients with advanced, epidermal growth factor receptor (EGFR) mutation-positive, nonsmall cell lung cancer (NSCLC) whose disease has progressed after treatment with an EGFR inhibitor	<p>EGFR-inhibitor treatments have improved outcomes for patients with EGFR mutation-positive NSCLC relative to cytotoxic chemotherapy; however, these inhibitors have limitations. First, NSCLC frequently develops resistance to EGFR inhibitors. This resistance is often mediated by a mutation in <i>EGFR</i> (T790M), which renders the kinase insensitive to current inhibitors. Second, available EGFR inhibitors have activity against wild-type <i>EGFR</i> in addition to mutant forms, and the inhibition in noncancer cells can lead to substantial toxicity. Rociletinib (CO-1686) is a novel, irreversible EGFR inhibitor that is specific for mutant forms of <i>EGFR</i>, including <i>EGFR</i> harboring the T790M resistance mutation. Therefore, it has potential efficacy in patients whose disease has progressed during treatment with existing EGFR inhibitors and might improve on the tolerability of EGFR-inhibitor therapy. In clinical trials, rociletinib is being administered orally, at doses between 500 and 1,000 mg, twice daily.</p> <p>Clovis Oncology, Boulder, CO</p> <p>Phase I/II and phase II trials ongoing; phase III trial registered, but not yet recruiting; FDA granted orphan drug and breakthrough therapy statuses</p>	Afatinib Docetaxel Erlotinib Pemetrexed	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Rose bengal (PV-10) for treatment of advanced melanoma	Patients in whom advanced or metastatic melanoma has been diagnosed	<p>Patients with advanced melanoma have few treatment options and a poor prognosis. PV-10 is a solution of the fluorescein derivative rose bengal. Rose bengal preferentially accumulates in cancer cells because of the increased lipid content of their cell membranes, which allows the drug to cross. Within the cells, rose bengal accumulates in lysosomes, triggering lysosomal release and cellular toxicity. Besides causing local tumor cell lysis, rose bengal has been associated with a bystander effect in which untreated lesions exhibit a response to treatment. This effect is thought to be due to uptake of tumor antigens by cells of the immune system after tumor lysis, leading to a systemic immune response. It is administered by intralesional injection.</p> <p>Provectus Biopharmaceuticals, Inc., Knoxville, TN</p> <p>Phase II trial completed, phase III trial (PV-10-MM-31) ongoing; FDA granted orphan drug status</p>	Dacarbazine Granulocyte colony stimulating factor Interleukin-2 Ipilimumab Temozolomide Vemurafenib	Increased overall survival Increased progression-free survival Improved quality of life
Rucaparib for treatment of ovarian, fallopian tube, or primary peritoneal cancer	Patients in whom platinum-sensitive, high-grade epithelial ovarian, fallopian tube, or primary peritoneal cancer has been diagnosed. Patients must have undergone at least 2 platinum-based treatment regimens.	<p>Ovarian, fallopian tube, or primary peritoneal cancer frequently recurs in patients who have undergone initial treatment. Rucaparib is a small-molecule inhibitor of poly-ADP ribose polymerase (PARP), which is an important enzyme in a cellular DNA pathway. Cancer cells are thought to particularly sensitive to PARP inhibition, potentially because of underlying defects in alternative DNA repair pathways. Rucaparib is being studied in the maintenance setting after completing successful platinum-based chemotherapy. Rucaparib is a tablet orally administered twice daily (dose not specified in trial description).</p> <p>Clovis Oncology, Boulder, CO</p> <p>Phase III trial ongoing; FDA granted orphan drug status</p>	Bevacizumab Paclitaxel	Increased progression-free survival Increased overall survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ruxolitinib (Jakafi) for treatment of pancreatic cancer	Patients in whom recurrent metastatic pancreatic adenocarcinoma has been diagnosed	<p>Only about 5% of patients with pancreatic cancers respond to the current standard of care (gemcitabine chemotherapy), and the prognosis for these patients is very poor. Pancreatic cancer cells often have dysregulated JAK-STAT activity caused by elevated levels of pro-inflammatory cytokines, which can lead to growth and proliferation of pancreatic cancer cells and resistance to chemotherapy. Ruxolitinib (Jakafi®) is a Janus kinase (JAK) inhibitor that inhibits the activity of both JAK 1 and JAK 2, which are purported to be key targets in pancreatic cancer. In clinical trials, patients are treated twice daily with 15 mg of ruxolitinib in combination with capecitabine.</p> <p>Incyte Corp., Wilmington, DE</p> <p>Phase II trial (RECAP) and phase III trials (Janus 1 and Janus 2) ongoing; FDA granted orphan drug status</p>	<p>Various chemotherapies including 1 or more of the following: 5-Fluorouracil Capecitabine Erlotinib Gemcitabine Leucovorin Nab-paclitaxel Oxaliplatin</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Ruxolitinib (Jakafi) for treatment of polycythemia vera	Patients in whom polycythemia vera has been diagnosed	<p>Polycythemia vera is a rare myeloproliferative neoplasm with limited treatment options. Patients with polycythemia vera typically have elevated red blood cell counts, and these patients are at increased risk for cardiovascular events and disease symptoms (e.g., enlarged spleen). Many patients with polycythemia vera harbor activating mutations in Janus kinase 2 (JAK2), and JAK2 activity is thought to lead to the blood cell deregulation and overproliferation observed in polycythemia vera. Ruxolitinib (Jakafi®) is a small-molecule inhibitor of JAK1 and JAK2 used in treating the JAK2-associated myeloproliferative neoplasm myelofibrosis. In clinical trials of ruxolitinib in patients with polycythemia vera, the drug is administered at a twice daily dosage of between 5 and 25 mg, depending on patient response.</p> <p>Incyte Corp., Wilmington, DE, in collaboration with Novartis International AG, Basel, Switzerland</p> <p>Phase III trials ongoing; FDA granted orphan drug status; Dec 2014, FDA approved for treating patients with "polycythemia vera who have had an inadequate response to or are intolerant of hydroxyurea"</p>	<p>Antiplatelet therapy (e.g., aspirin) Hydroxyurea Interferon Phlebotomy</p>	<p>Decreased progression to myelofibrosis or leukemia Decreased spleen volume Increased complete hematologic response rate Increased hematocrit control rate Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Selinexor for treatment of acute myeloid leukemia	Patients aged 60 years and older with recurrent or refractory acute myeloid leukemia (AML) who are ineligible for high-dose chemotherapy and hematopoietic stem cell transplantation	<p>Many patients with AML who are aged 60 years or older are unable to tolerate high-dose induction chemotherapies. Therefore, disease remission in this patient population is relatively low. Tumor suppressors normally function in cells to inhibit the aberrant cellular activities associated with cancer development. Many tumor suppressors (e.g., p53, pRB, TOXO, APC, NPM1) require nuclear localization to function, and many tumor types have been shown to drive cytoplasmic localization of these tumor suppressors through overexpression of the nuclear export factor CRM1. Selinexor (KPT-330) is an antagonist of CRM1 activity that purportedly restores nuclear localization of tumor suppressors to potentially inhibit growth and survival of cancers. Selinexor is administered orally, 55 mg/m², twice weekly.</p> <p>Karyopharm Therapeutics, Inc., Natick, MA</p> <p>Phase II trials ongoing; FDA granted orphan drug status</p>	5-Azacytidine Decitabine Low-dose cytarabine	Increased overall survival Increased progression-free survival Improved quality of life
Selumetinib for treatment of KRAS-positive non-small cell lung cancer	Patients with locally advanced or metastatic, KRAS mutation-positive non-small cell lung cancer (NSCLC) who have undergone 1 round of therapy for advanced/metastatic disease	<p>The 5-year survival rate for patients with advanced NSCLC is less than 15% with available treatments. The mitogen-activated protein kinase (MAPK)/extracellular signal-regulated kinase (ERK) pathway is a central regulator of cellular responses to growth signals. Aberrant activity of this pathway has been implicated in the development of many cancer types. MAPK kinase (MEK) is a protein kinase that plays a role in this pathway by controlling activation of ERK; therefore, inhibiting MEK activity could inhibit cancer cell growth and survival. However, no MEK inhibitor is available. Selumetinib (AZD6244, ARRY-142886) is a MEK inhibitor under study for treating KRAS mutation-positive NSCLC. In clinical trials, selumetinib is administered at an oral dosage of 25 mg, twice daily, in combination with docetaxel and pegylated granulocyte colony stimulating factor.</p> <p>AstraZeneca, London, UK</p> <p>Phase III trial (SELECT-1) ongoing</p>	Ceritinib (if ALK mutation-positive) Crizotinib (if ALK mutation-positive) Cytotoxic chemotherapy (e.g., docetaxel, pemetrexed) Erlotinib	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Selumetinib for treatment of metastatic uveal melanoma	Patients in whom advanced uveal melanoma has been diagnosed	<p>Uveal melanoma arises from melanocytes within the choroid of the eye. In 50% of patients, the cancer may metastasize and have a poor outcome, with a median survival of less than 12 months. Although radiotherapy is used to treat advanced cutaneous melanoma, no effective therapy has been identified for patients with metastatic uveal melanoma. The mitogen-activated protein kinase (MAPK)/extracellular signal-regulated kinase (ERK) pathway is a central regulator of cellular responses to growth signals. Aberrant activity of this pathway has been implicated in the development of many cancer types. The MAPK kinase (MEK) is a protein kinase that plays a role in this pathway by controlling activation of ERK; therefore, inhibiting MEK activity could inhibit cancer cell growth and/or survival. Selumetinib (AZD6244, ARRY-142886) is a MEK inhibitor under study for treating uveal melanoma. In clinical trials, it is administered orally at a dose of 75 mg, twice daily, indefinitely until disease progression or intolerable toxic effects.</p> <p>AstraZeneca, London, UK</p> <p>Phase III trial (SUMIT) ongoing</p>	Gamma knife therapy Radiotherapy Surgery Thermotherapy	Increased overall survival Increased progression-free survival Improved quality of life
Seviprotimut-L therapeutic melanoma antigen vaccine to prevent melanoma recurrence	Patients at high risk of recurrence after surgical resection of stage IIB, IIC, or III melanoma	<p>After surgical resection of a primary melanotic tumor, disease recurs in many patients, and few adjuvant treatments to prevent recurrence are available. Seviprotimut-L (POL-103A) is a polyvalent vaccine that is generated by isolating peptides secreted by 3 human melanoma cell lines grown in culture. In clinical trials, seviprotimut-L was administered intradermally as adjuvant therapy after surgical resection and radiation. Treatment was divided into four 0.2 mL injections.</p> <p>Polynoma LLC subsidiary of CK Life Sciences Int'l (Holdings), Inc., Hong Kong</p> <p>Phase III trial (MAVIS) ongoing</p>	High-dose interferon	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Siltuximab (Sylvant) for treatment of multicentric Castleman's disease	Patients in whom multicentric Castleman's disease has been diagnosed	<p>Castleman's disease is a lymphoproliferative disorder that can cause serious, possibly life-threatening symptoms or progress to more aggressive diseases such as lymphomas. Patients with the multicentric form of Castleman's disease frequently experience relapses following treatment with cytotoxic chemotherapy. The disease purportedly develops through an autoinflammatory process involving elevated levels of interleukin-6 (IL-6). Siltuximab (Sylvant™) is an IL-6 monoclonal antibody that has the potential to limit IL-6 activity. In clinical trials, siltuximab was administered by intravenous infusion once every 3 weeks at a dose of 11 mg/kg.</p> <p>Janssen Biotech unit of Johnson & Johnson, New Brunswick, NJ</p> <p>Phase II trial ongoing; FDA granted orphan drug status; FDA approved Apr 2014 for "the treatment of patients with multicentric Castleman's disease (MCD) who are human immunodeficiency virus (HIV) negative and human herpesvirus-8 (HHV-8) negative"</p>	Various chemotherapy regimens including 1 or more of the following: carmustine, cladribine, chlorambucil, cyclophosphamide, doxorubicin, etoposide, melphalan, vinblastine, and vincristine	Increased remission rate Increased remission duration Improved quality of life
Sorafenib (Nexavar) for treatment of breast cancer	Patients in whom metastatic or locally advanced/unresectable HER2-negative breast cancer has been diagnosed; patients must have received up to 2 chemotherapy regimens that included at least 1 anthracycline	<p>Improved therapy options are needed for patients with advanced breast cancer that has progressed on or is refractory to standard chemotherapy regimens. Sorafenib (Nexavar®) is a multiple kinase inhibitor (VEGFR, PDGFR, and Raf kinases) that targets the MAP kinase pathway to inhibit tumor cell proliferation and angiogenesis. Sorafenib is an oral medication approved for treating kidney and liver cancer; it is typically administered at a dosage of 400 mg, twice daily. In a trial of patients with advanced breast cancer, sorafenib is administered at a dosage of 600 mg, daily, in combination with capecitabine.</p> <p>Bayer AG, Leverkusen, Germany, and Onyx Pharmaceuticals, a subsidiary of Amgen, Inc., Thousand Oaks, CA</p> <p>Phase III trial (RESILIENCE) ongoing</p>	Single-agent or combined chemotherapy regimens (e.g., capecitabine, cyclophosphamide, gemcitabine, nab-paclitaxel, platinum agents, vinorelbine) Various targeted therapies (under development; e.g., bevacizumab)	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Sorafenib (Nexavar) for treatment of differentiated thyroid cancer	Patients with radioactive iodine (RAI)-refractory differentiated thyroid cancer	<p>RAI-refractory thyroid cancer is difficult to treat and associated with poor prognoses, and affected patients have limited treatment options. Sorafenib is a multiple kinase inhibitor (tyrosine and Raf kinases) that targets the MAP kinase pathway to inhibit tumor cell proliferation and angiogenesis. Sorafenib is an oral medication approved for treating kidney and liver cancer; it is typically administered at a dose of 400 mg, twice daily.</p> <p>Bayer AG, Leverkusen, Germany, and Onyx Pharmaceuticals (now a subsidiary of Amgen, Inc., Thousand Oaks, CA)</p> <p>FDA approved for treating late-stage (metastatic) differentiated thyroid cancer Nov 2013; approved in 2005 for treating advanced kidney cancer and in 2007 for treating surgically unresectable liver cancer</p>	<p>Ablation Chemotherapy Lenvatinib Off-label sunitinib (trials ongoing) Radiation therapy Surgical intervention</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Specialized care model for adolescents and young adults with cancer	Adolescents and young adults (AYAs) with cancer	<p>AYAs undergoing treatment for cancer have unique care needs that often go unmet in traditional pediatric or adult cancer units. Treatment adherence and psychological issues are of particular concern in this patient population. The Teenage Cancer Trust and Teen Cancer America work with hospitals to develop specialized cancer units and care programs that address the needs of this patient population. Program features include redesigned inpatient and outpatient facilities, provider training, clinical trial counseling/enrollment, and psychosocial support.</p> <p>Teen Cancer America, LiveStrong Foundation, and various cancer centers have developed AYA-specific models</p> <p>Several dozen U.S. AYA-specific cancer centers have been established within children’s hospitals and adult cancer centers; additional sites in development</p>	<p>Adult cancer units Pediatric cancer units</p>	<p>Improved physical and emotional health outcomes Improved treatment adherence Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Spicamycin-derived, nonopioid, nonnarcotic (KRN5500) for treatment of chronic cancer pain	Patients with chronic cancer pain, especially chemotherapy-induced neuropathic pain	<p>Pain management medications are not always effective in controlling chronic cancer pain, and their long-term use carries significant side effects (e.g., constipation, nausea, possible opioid addiction, kidney damage, gastrointestinal bleeding associated with nonsteroidal anti-inflammatory drugs [NSAIDs]). KRN5500 is a novel spicamycin derivative that was originally identified as a potential cancer treatment, a compound that could induce differentiation of myeloid leukemia cells. Although KRN5500 did not exhibit efficacy against leukemia, 1 patient with chronic neuropathic pain from previous cancer treatments experienced significant relief from that pain. Additional studies of KRN5500 for pain have been undertaken.</p> <p>DARA BioSciences, Inc., Raleigh, NC</p> <p>Phase IIa trial completed; FDA granted fast-track status in 2011; FDA granted orphan drug status in Feb 2014</p>	NSAIDs Opioid analgesics	Reduced pain Improved quality of life
Stool DNA molecular test (Cologuard) for colorectal cancer screening	Patients undergoing routine colorectal cancer (CRC) screening	<p>A test that obviates the need for the bowel preparation required by current screening methods could improve adherence to recommended CRC screening guidelines. This genetic test (Cologuard™) screens stool DNA for genetic mutations and epigenetic modifications commonly found in CRC: 4 genes plus 1 biomarker. This test kit is the next generation of the ColoSure™ test, which looked for epigenetic modification in only a single genetic locus.</p> <p>Exact Sciences Corp., Madison, WI</p> <p>Aug 2014, FDA approved for screening for colorectal cancer in people aged 50 years or older at average risk for CRC</p>	Colonoscopy Computed tomographic colonography Fecal occult blood testing Sigmoidoscopy	Increased sensitivity and specificity for precancerous lesions and CRC Improved positive and negative predictive values Reduced unnecessary followup for screening

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Suicide gene–engineered donor lymphocytes after hematopoietic stem cell transplant for treatment of acute leukemias</p>	<p>Patients with acute lymphoblastic leukemia or acute myeloid leukemia (AML) who are undergoing myeloablative chemotherapy followed by hematopoietic stem cell transplant (SCT)</p>	<p>Allogeneic SCT is the most effective treatment for AML; however, its use is complicated by potential adverse events including the development of graft-versus-host disease (GVHD), in which alloreactive donor T cells attack recipient tissues. The traditional approach to reducing GVHD has been the use of T cell–depleted grafts comprised of only hematopoietic stem cells; however, this approach is hampered by reduced levels of hematopoietic cell engraftment and reduced graft-versus-leukemia immune response. Infusion of suicide gene–engineered donor lymphocytes following hematopoietic SCT is an approach being taken to overcome these shortcomings. In this approach, donor T cells are genetically modified to express herpes simplex virus–derived thymidine kinase. Thymidine kinase converts the prodrug ganciclovir to a toxic agent, thereby conferring selective toxicity on thymidine kinase–expressing cells and providing a means to promote the “suicide” of GVHD-causing T cells. The infusion of T cells after hematopoietic SCT is purported to promote engraftment and graft-versus-leukemia immune activity.</p> <p>MolMed, S.p.A., Milan, Italy</p> <p>Phase III trial ongoing</p>	<p>Hematopoietic SCT</p>	<p>Increased overall survival Decreased time to immune reconstitution Increased engraftment rate Reduced incidence of acute GVHD Reduced incidence of chronic GVHD Improved quality of life</p>
<p>Talazoparib PARP inhibitor for treatment of BRCA-mutated breast cancer</p>	<p>Patients in whom locally advanced or metastatic, BRCA mutation–positive breast cancer has been diagnosed</p>	<p>Improved treatment options are needed for patients with advanced BRCA mutation–positive breast cancers that have recurred or progressed after chemotherapy. Talazoparib (BMN 673) is a novel agent that inhibits the nuclear enzyme poly ADP-ribose polymerase (PARP). PARP is activated by single-strand DNA breaks and catalyzes post-translational ADP-ribosylation of nuclear proteins involved in DNA repair. Talazoparib binds PARP and prevents PARP-mediated DNA repair. Accumulated DNA strand breaks in the cell promote genomic instability and eventually lead to apoptosis, potentially underlying talazoparib's antineoplastic potential. This agent is being tested for treating advanced breast cancers in patients with BRCA 1 or 2 mutations. In clinical trials, talazoparib is administered daily, 1 mg, orally, for 21 consecutive days and is being compared with a physician's choice of drug (e.g., capecitabine, eribulin, gemcitabine, vinorelbine).</p> <p>BioMarin Pharmaceutical, Inc., Novato, CA</p> <p>Phase III trial (EMBRACA) ongoing</p>	<p>Combination or single agent chemotherapy with 1 of the following: Alkylating agents (e.g., cyclophosphamide) Anthracyclines (e.g., doxorubicin) Antimetabolites (e.g., fluorouracil, gemcitabine) PARP inhibitors (e.g., niraparib, olaparib, veliparib [under development]) Taxanes (e.g., docetaxel, paclitaxel)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Talimogene laherparepvec for treatment of advanced melanoma	Patients in whom advanced melanoma has been diagnosed	<p>Patients with advanced melanoma have a poor prognosis and few treatment options, suggesting a need for novel treatment options. Talimogene laherparepvec (TVEC) granulocyte macrophage colony-stimulating factor (GM-CSF) is an oncolytic virus. TVEC purportedly replicates only in tumor cells. It is engineered to lyse tumor cells and express tumor-specific antigens and GM-CSF, which help generate tumor-specific immune responses for additional benefit. In trials, it is administered up to 4 mL of 10⁸ pfu/mL/per intratumoral injection.</p> <p>Amgen, Inc., Thousand Oaks, CA</p> <p>Phase III trial (OPTiM) ongoing; Sept 2014, Amgen announced it submitted a new drug application to FDA</p>	<p>Dacarbazine Dabrafenib (if BRAF positive) Interleukin-2 Ipilimumab Temozolomide Trametinib (if BRAF positive) Vemurafenib (if BRAF positive)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Tasquinimod for treatment of castration-resistant prostate cancer	Patients in whom asymptomatic or mildly symptomatic castration-resistant prostate cancer (CRPC) has been diagnosed	<p>Median overall survival for patients with CRPC is only about 18 months. Advanced prostate tumors can become resistant to androgen-deprivation therapy; new treatments with novel mechanisms of action are needed. Tasquinimod is a novel oral antiangiogenic compound that is intended to restrict blood flow to prostate tumors, thus inhibiting growth; tasquinimod may also exert antitumor effects. Administered at doses of 0.25, 0.5, or 1.0 mg/day.</p> <p>Active Biotech, AB, Lund, Sweden</p> <p>Phase III trial ongoing</p>	<p>Abiraterone Enzalutamide Sipuleucel-T</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Telotristat etiprate for treatment of neuroendocrine tumor–associated carcinoid syndrome	Patients in whom metastatic neuroendocrine tumor–associated carcinoid syndrome has been diagnosed	<p>Patients with carcinoid tumors that are not amenable to surgical resection have few treatment options to control disease symptoms, and not all patients respond to current therapies. A hallmark of many carcinoid tumors is the overproduction of serotonin, which leads to complications such as severe diarrhea, flushing, and cardiac damage. Telotristat etiprate (X1606/LX1032) is intended to reduce systemic serotonin levels by inhibiting an enzyme involved in the synthesis of serotonin, tryptophan hydroxylase. In clinical trials, it is administered at a dose of 250 mg, orally, 3 times per day.</p> <p>Lexicon Pharmaceuticals, Inc., The Woodlands, TX</p> <p>Phase III trials (TELEPATH, TELESTAR, TELECAST) ongoing; FDA granted orphan drug and fast-track statuses</p>	<p>Chemotherapy (e.g., capecitabine, dacarbazine, 5-fluorouracil, temozolomide) Interferon alfa Octreotide</p>	<p>Decreased rate of bowel movements Decreased 5-HIAA levels Decreased rate of flushing episodes Improved quality of life (e.g., less pain, discomfort)</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Tergenpumatucel-L (HyperAcute Lung) for treatment of non-small cell lung cancer	Patients in whom advanced non-small cell lung cancer (NSCLC) has been diagnosed	<p>The 5-year survival rate for patients with advanced NSCLC is less than 15% with current treatments. Tergenpumatucel-L immunotherapy is intended to stimulate an immune response against the patient's lung cancer cells. The therapy consists of 3 allogeneic lung cancer cell lines that represent 3 major types of NSCLC. These cell lines have been genetically engineered to express the enzyme alpha (1,3) galactosyl transferase, which marks the cells with a nonhuman carbohydrate that elicits a strong antibody immune response. Antibody binding to the cell lines leads to complement-mediated cell lysis, potentially leading to the uptake of NSCLC antigens and a systemic immune response against the patient's cancer. In clinical trials, HyperAcute-Lung is being administered by injection on a weekly or biweekly basis.</p> <p>NewLink Genetics Corp., Ames, IA</p> <p>Phase II/III trial ongoing</p>	Various combination therapies including: Bevacizumab Carboplatin Crizotinib Docetaxel Erlotinib Pemetrexed Various immunotherapies (in development)	Improved overall survival Improved progression-free survival
Tivantinib for treatment of hepatocellular carcinoma	Patients with unresectable hepatocellular carcinoma (HCC) that has failed to respond to 1 prior sorafenib-containing therapy	<p>Patients with HCC that cannot be surgically resected have few treatment options and a poor prognosis; no effective 2nd-line therapy is available for this type of cancer. Tivantinib (ARQ 197) is a small-molecule inhibitor of c-met receptor tyrosine kinase; c-met has been implicated in a number of tumor-associated biologic processes (e.g., cell dissociation, migration, and proliferation, apoptosis inhibition). No c-met inhibitors are approved. In clinical trials, tivantinib is given orally, 120 mg, twice daily.</p> <p>ArQule, Inc., Woburn, MA, in partnership with Daiichi Sankyo Co., Ltd., Tokyo, Japan</p> <p>Phase III trials (JET-HCC and METIV-HCC) ongoing</p>	Locoregional therapy	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Toll-like receptor 9 agonist (MGN1703) maintenance therapy after 1st-line therapy for metastatic colorectal cancer	Patients with metastatic colorectal cancer (mCRC) whose disease has responded to 1st-line chemotherapy	<p>Although many patients have mCRC that responds to 1st-line chemotherapy, disease ultimately progresses in the vast majority of patients. MGN1703 is under study as a maintenance therapy intended to prevent or delay disease recurrence. MGN1703 is a DNA molecule that is intended to function as an agonist of toll-like receptor 9 (TLR9). TLR9 signaling is a component of the innate immune system, and agonists of TLR9 purportedly promote immune system activation, possibly through dendritic cell maturation and/or differentiation of B cells into antibody-secreting plasma cells. Immune-response activation by MGN1703 could overcome immune tolerance to tumor-associated antigens, potentially leading to an anticancer immune response.</p> <p>MOLOGEN AG, Berlin, Germany</p> <p>Phase II trial (IMPACT) completed, phase III trial (IMPALA) ongoing</p>	Bevacizumab Chemotherapy-free interval Leucovorin plus 5-fluorouracil	Increased overall survival Increased progression-free survival Improved quality of life
Trabectedin (Yondelis) for treatment of ovarian, fallopian tube, or primary peritoneal cancer	Patients with platinum-sensitive, advanced or relapsed epithelial ovarian, fallopian tube, or primary peritoneal cancer who have undergone at least 2 platinum-based treatment regimens	<p>Ovarian, fallopian tube, or primary peritoneal cancer frequently recurs after initial treatment. Trabectedin (Yondelis®) has a unique mechanism of action associated with the minor groove of DNA. The interaction between trabectedin and DNA interferes with gene transcription, cell division, and DNA repair. In phase III clinical trials, trabectedin is being tested in combination with pegylated liposomal doxorubicin for treating advanced-relapsed epithelial ovarian, primary peritoneal, or fallopian tube cancer. It is administered intravenously, 1.1 mg/m², once every 3 weeks.</p> <p>Janssen Pharmaceuticals unit of Johnson & Johnson, New Brunswick, NJ</p> <p>Phase III trials (INOVATYON and unnamed) ongoing</p>	Bevacizumab Docetaxel Etoposide Gemcitabine Paclitaxel Pegylated liposomal doxorubicin Topotecan	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Trans sodium crocetinate for treatment of glioblastoma	Patients in whom glioblastoma multiforme (GBM) has been diagnosed	<p>GBM is difficult to treat and associated with a very poor prognosis. New therapies that improve survival and slow disease progression are needed. Radiation therapy is often applied; however, the efficacy of this therapy can purportedly be limited by the hypoxic tumor environment. Trans sodium crocetinate (TSC) is a 1st-in-class small-molecule drug that, when delivered systemically, is said to preferentially re-oxygenate tumor tissue while leaving healthy tissue unaffected. As a result, TSC may sensitize tumor tissues to radiation or chemotherapy. In a clinical trial, TSC is administered in combination with temozolomide and radiation therapy to patients who received no prior therapy other than glucocorticoids. TSC is given at a dose of 0.25 mg/kg, intravenously, for 9–18 doses.</p> <p>Diffusion Pharmaceuticals LLC, Charlottesville, VA</p> <p>Phase II trial ongoing; FDA granted orphan drug status</p>	<p>Immunotherapeutics (in development, e.g., HSPPC-95, ICT107) Radiation therapy Surgical resection (with or without carmustine wafer) Temozolomide</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Trebananib for treatment of ovarian cancer	Patients with epithelial ovarian, primary peritoneal, or fallopian tube cancer	<p>Patients with treatment-resistant ovarian, peritoneal, or fallopian tube cancer have a poor prognosis, and more effective treatments are needed. Trebananib (AMG 386) is a peptibody that binds to the signaling molecules angiopoietin 1 and angiopoietin 2 and consists of a peptide specific for angiopoietin 1/2 fused to the Fc region of a human antibody. It is intended to block activation of the TIE2 receptor by angiopoietin 1/2; the angiopoietin/TIE2 pathway acts in parallel with the vascular endothelial growth factor (VEGF)/VEGF receptor pathway to promote angiogenesis. The drug represents a novel 1st-in-class neutralizing inhibitor of angiopoietin 1/2. It is being tested in the 2nd-line setting in combination with paclitaxel or pegylated doxorubicin after a platinum-based chemotherapy regimen and in the 1st-line setting in combination with paclitaxel and carboplatin. In clinical trials, trebananib is administered at a dose of 15 mg/kg, intravenously, once weekly.</p> <p>Amgen, Inc., Thousand Oaks, CA</p> <p>Phase III trials (TRINOVA-1, TRINOVA-2 and TRINOVA-3) ongoing in 1st and 2nd-line treatment settings; Nov 2014, Amgen announced TRINOVA-1 trial (2nd-line setting in combination with paclitaxel) failed to meet its secondary endpoint of overall survival; FDA granted orphan drug status for treating ovarian cancer</p>	<p>Docetaxel Etoposide Gemcitabine Liposomal doxorubicin Paclitaxel Topotecan</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Veliparib for treatment of advanced or metastatic squamous nonsmall cell lung cancer	Previously untreated patients in whom advanced or metastatic squamous nonsmall cell lung cancer (NSCLC) has been diagnosed	<p>The 5-year survival rate for patients with advanced NSCLC is less than 15%, and patients whose disease progresses after 1st-line chemotherapy have few treatment options. Veliparib (ABT-888) is a small-molecule inhibitor of poly adenosine diphosphate-ribose polymerase (PARP), an enzyme involved in DNA repair. By inhibiting PARP's DNA repair, veliparib may potentiate the anticancer activity of cytotoxic chemotherapy drugs whose mechanism of action induces DNA damage. In a phase III trial, veliparib is being tested at an unspecified oral dosage in combination with the platinum chemotherapy agent carboplatin and the taxane paclitaxel.</p> <p>AbbVie, North Chicago, IL</p> <p>Phase III trial ongoing</p>	Carboplatin in combination with any of the following: Docetaxel Paclitaxel Pemetrexed	Increased overall survival Increased complete response rate Improved quality of life
Veliparib for treatment of triple-negative breast cancer	Patients with early stage, triple-negative breast cancer or locally advanced/metastatic HER2-negative, BRCA mutation-positive breast cancer	<p>Triple-negative breast cancer (i.e., low expression of estrogen receptor, progesterone receptor, and human epidermal growth factor receptor 2) is not amenable to endocrine therapy or treatment with any of the targeted agents developed for breast cancer, and treatment presents a significant clinical challenge. Veliparib (ABT-888) is a small-molecule inhibitor of poly adenosine diphosphate-ribose polymerase (PARP), an enzyme involved in DNA repair. By inhibiting PARP's DNA repair, veliparib may potentiate the anti-cancer activity of cytotoxic chemotherapy drugs whose mechanism of action involves inducing DNA damage. Additionally, PARP inhibition may exhibit synthetic lethality with cells harboring loss-of-function mutations in <i>BRCA1</i> (a breast cancer predisposition gene that is also involved in DNA repair), and triple-negative breast cancers frequently harbor such mutations. Veliparib is an orally administered medication. In a phase III trial in the neoadjuvant setting, veliparib is being tested at an unspecified dosage in combination with the platinum chemotherapy agent carboplatin and the taxane paclitaxel followed by doxorubicin plus cyclophosphamide. In a phase III trial in the metastatic setting, veliparib is being tested in combination with carboplatin and paclitaxel. Testing for BRCA mutation status will require use of companion diagnostic test. AbbVie has partnered with Myriad Genetics, Inc. (Salt Lake City, UT), to use Myriad's BRACAnalysis test as the companion diagnostic test for veliparib.</p> <p>AbbVie, North Chicago, IL</p> <p>Phase III trials ongoing</p>	Combination or single agent chemotherapy with 1 of the following: Alkylating agents (e.g., cyclophosphamide) Anthracyclines (e.g., doxorubicin) Antimetabolites (e.g., fluorouracil, gemcitabine) PARP inhibitors (e.g., BMN 673, niraparib, olaparib [under development]) Taxanes (e.g., docetaxel, paclitaxel)	Increased overall survival Increased complete response rate Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Venetoclax for treatment of chronic lymphocytic leukemia	Patients with relapsed or refractory chronic lymphocytic leukemia (CLL) who have undergone at least 1 chemotherapy regimen	<p>Ability to avoid programmed cell death (i.e., apoptosis) is a hallmark of cancer. In certain malignancies, this trait is thought to be mediated by the anti-apoptotic protein Bcl-2. Because of this, inhibition of Bcl-2 is a promising target in treating various cancers including CLL. Venetoclax (ABT-199) is a small-molecule inhibitor of Bcl-2 that purportedly leads to apoptosis in the malignant B-cells of CLL. In an ongoing phase III trial, venetoclax is being given at a daily, oral dose of 400 mg, in combination with chemoimmunotherapy consisting of rituximab and bendamustine.</p> <p>AbbVie, North Chicago, IL, in collaboration with F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>Phase III trial ongoing; FDA granted orphan drug status in 2012</p>	Ibrutinib Idelalisib Ofatumumab Various chemoimmunotherapy regimens, including rituximab plus bendamustine	Increased overall survival Increased progression-free survival Improved quality of life
Volasertib for treatment of acute myeloid leukemia	Elderly patients in whom acute myeloid leukemia (AML) has been diagnosed	<p>Many patients with AML who are aged 65 years or older are unable to tolerate high-intensity induction chemotherapies; therefore, the disease remission rate in this patient population is relatively low. Volasertib (BI 6727) inhibits polo-like kinase (PLK), which plays a key role in cell cycle progression. Inhibiting PLK purportedly leads to cell-cycle arrest and cell death in rapidly dividing cells. Volasertib is administered intravenously. In clinical trials, it is being used in combination with low-dose cytarabine.</p> <p>Boehringer Ingelheim GmbH, Ingelheim, Germany</p> <p>Phase III trial ongoing; FDA granted breakthrough therapy status in Sept 2013 and orphan drug status in Apr 2014</p>	5-azacytidine Decitabine Low-dose cytarabine	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Vosaroxin (Qinprezo) for treatment of relapsed or refractory acute myeloid leukemia</p>	<p>Patients in whom acute myeloid leukemia (AML) has been diagnosed</p>	<p>For patients with relapsed AML, the only potentially curative treatment is a hematopoietic stem cell transplant; however, in some patients, disease relapses after transplantation or they are not candidates or cannot find a suitable donor. Vosaroxin (Qinprezo™) is a 1st-in-class, anticancer quinolone derivative. During normal topoisomerase activity, the enzyme cleaves and then re-ligates double-strand breaks to maintain DNA topology during replication; vosaroxin purportedly intercalates into DNA and inhibits topoisomerase II activity, which results in replication-dependent, site-selective, double-strand breaks in DNA leading to G2 arrest and apoptosis. Unlike other topoisomerase II inhibitors, vosaroxin is not a P-glycoprotein substrate, evading the most common mechanism for multidrug resistance. It may be used in combination with cytarabine. It is given as an intravenous infusion, 90 mg/m² for days 1 and 4 for induction and 70 mg/m² for all other cycles.</p> <p>Sunesis Pharmaceuticals, Inc., South San Francisco, CA</p> <p>Phase III trial ongoing</p>	<p>Various chemotherapies including 1 or more of the following: Anthracycline Cladribine Clofarabine Cytarabine Etoposide Fludarabine Granulocyte colony-stimulating factor Idarubicin Mitoxantrone</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>Web-based education program (Preparatory Education About Clinical Trials) to increase enrollment in oncology clinical trials</p>	<p>Patients in whom cancer has been diagnosed who may be eligible to enroll in clinical trials</p>	<p>Numerous barriers have been identified that inhibit patients from enrolling in oncology trials. Novel programs are needed to improve cancer patients' knowledge and preparedness to consider clinical trial enrollment as an option. To address this unmet need, investigators have developed a tailored, interactive, Web-based intervention called PRE-ACT (Preparatory Education About Clinical Trials). Patients with a diagnosis of cancer complete an initial assessment to determine personal barriers to clinical trial participation. Afterwards, the intervention provides patients with customized educational video clips designed to address individual barriers that may them from considering a clinical trial and to improve preparedness to consider clinical trials as a treatment option. Patients assigned to the comparator group receive general text about clinical trials excerpted from National Cancer Institute materials. PRE-ACT is intended for use before a patient's initial consultation with an oncologist.</p> <p>Case Comprehensive Cancer Center of Case Western Reserve University, Cleveland, OH</p> <p>Phase III trial completed</p>	<p>Physician counseling Patient research</p>	<p>Increased consideration of clinical trial enrollment Improved preparedness to discuss clinical trial opportunities Increased rates of clinical trial enrollment</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Xilonix for treatment of cancer-related cachexia	Patients in whom cancer-related cachexia has been diagnosed	<p>Although a number of treatments have been developed to address cancer-related cachexia (wasting of skeletal muscle mass), many patients do not respond to these treatment options. Cancer-related cachexia may limit patients' ability to tolerate further treatment and/or directly affect survival. Cancer-related cachexia is caused by metabolic and neurochemical alterations in the body that lead to the wasting of skeletal muscle mass. Although the mechanism by which tumors induce cachexia is poorly understood, a hypothesis states that interleukin-1-alpha-mediated pro-inflammatory signals to the central nervous system may induce systemic cachexia. MABp1 (Xilonix™) is a monoclonal antibody that acts as an interleukin-1-alpha antagonist, potentially disrupting this pro-inflammatory signaling. It is administered intravenously.</p> <p>XBiotech, Austin, TX</p> <p>Phase III trials ongoing; FDA granted fast-track status</p>	<p>Appetite stimulants (e.g., cannabinoids, corticosteroids, cyproheptadine, progesterone derivatives)</p> <p>Dietary counseling</p> <p>Melanocortin antagonists</p> <p>Metabolic disturbance modulators (e.g., anti-cytokine antibodies, pentoxifylline, thalidomide)</p>	<p>Increased body weight</p> <p>Increased lean body mass</p> <p>Increased muscle strength</p> <p>Increased overall survival</p> <p>Improved quality of life</p>
Zoptarelin doxorubicin for treatment of endometrial cancer	Patients in whom endometrial cancer has been diagnosed	<p>Cytotoxic chemotherapy such as doxorubicin has proven anticancer effects; however, efficacy is inhibited by dose-limiting toxicities on normal tissues. Zoptarelin doxorubicin (AEZS-108) is a conjugate of a luteinizing hormone-releasing hormone (LHRH) analogue and doxorubicin. The LHRH analog targets cells that express the LHRH receptor, which includes the cells of many cancer types. Compared with naked doxorubicin, zoptarelin doxorubicin is purported to preferentially target LHRH receptor-expressing cells, potentially sparing normal tissue from the toxic effects of the conjugated chemotherapeutic agent. In trials, the agent is being given as an intravenous infusion in a dosage of 267 mg/m², every 3 weeks, up to 9 treatment cycles. Additional trials are testing zoptarelin doxorubicin for treating prostate and breast cancer.</p> <p>AEterna Zentaris, Inc., Quebec, Quebec, Canada, in partnership with the German branch of Ergomed, plc, Guilford, UK</p> <p>Phase III trial (ZoptEC) ongoing</p>	Doxorubicin	<p>Increased overall survival</p> <p>Increased progression-free survival</p> <p>Improved quality of life</p>

Table 3. AHRQ Priority Condition: 03 Cardiovascular Disease: 52 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
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Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Abdominal stent graft system (Ovation Prime) for treatment of abdominal aortic aneurysms with small vessel anatomy	Patients with abdominal aortic aneurysms (AAAs) who have small vessel anatomy	<p>Surgical therapy options to treat AAAs include open abdominal and endovascular surgeries. Endovascular repair of AAAs is a minimally invasive way to repair an aneurysm with lower perioperative risks and faster recovery than open surgery. But the relatively large size of available stent systems for endovascular repair has made patients with small vessel anatomy ineligible for endovascular repair of AAAs. The Ovation Prime™ abdominal stent graft system is intended to provide a minimally invasive alternative to open surgery for patients with AAAs and small vessel anatomy.</p> <p>TriVascular, Inc., Santa Rosa, CA</p> <p>FDA granted humanitarian device exemption Nov 2011; FDA approved Oct 2012 for treating AAA; postmarket trials ongoing; Apr 2014, FDA approved expanded indication, eliminating the minimum aortic neck length requirement and including clarification on appropriate vascular access techniques</p>	Open surgical repair	Decreased perioperative risks Decreased mortality Faster recovery
Alferminogene tadenovec gene therapy (Generx) for treatment of chronic angina pectoris	Patients in whom coronary artery disease and stable angina have been diagnosed	<p>Angina pectoris is a debilitating manifestation of coronary artery disease. According to 2007 American Heart Association statistics, more than 8.9 million people in the U.S. live with chronic angina pectoris, and angina is diagnosed in an estimated additional 400,000 Americans each year. Treatment strategies include surgical revascularization or pharmacologic agents. Many patients who are not suitable candidates for revascularization procedures experience chronic angina despite pharmacologic treatment. Alferminogene tadenovec (Generx®) is a DNA-based angiogenic growth factor that purportedly increases myocardial blood flow by developing collateral blood vessels around the heart to try to relieve angina symptoms. To administer alferminogene tadenovec, an interventional cardiologist uses balloon angioplasty to occlude a coronary artery and produce transient ischemia while also infusing nitroglycerin. The company states that this facilitates the "transfection of Generx into heart cells by several mechanisms, including enhanced penetration through microvessel endothelium and upregulation of Coxsackie-Adenovirus Receptor." The intended delivery of the gene therapy is 40% to the right coronary circulation and 60% to the left coronary circulation.</p> <p>Taxus Cardium Pharmaceuticals Group, Inc., San Diego, CA</p> <p>Phase III trial ongoing (ASPIRE)</p>	Angioplasty Beta blockers Calcium channel blockers Coronary bypass surgery Coronary stents Long-acting nitrates Ranolazine	Decreased angina Fewer cardiovascular events Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Alirocumab (Praluent) for treatment of hypercholesterolemia resistant to statins</p>	<p>Patients in whom hypercholesterolemia has been diagnosed</p>	<p>In the U.S., more than 34 million people have hypercholesterolemia. Treatments include lifestyle changes, such as diet and exercise, and pharmacotherapy. Alirocumab represents a new mechanism of action for hypercholesterolemia treatment. It is a monoclonal antibody that targets PCSK9 (proprotein convertase subtilisin/kexin type 9) to inhibit its activity. PCSK9 is a protein involved in regulating circulating low-density lipoprotein (LDL) levels through degradation of the LDL receptor; therefore, pharmacologic inhibition of PCSK9 might decrease circulating LDL levels. In clinical trials, alirocumab is being administered subcutaneously every other week in addition to daily oral statin therapy.</p> <p>Sanofi, Paris, France Regeneron Pharmaceuticals, Inc., Tarrytown, NY</p> <p>ODYSSEY worldwide phase III clinical trials program announced in Jul 2012 comprising 10 trials enrolling 22,000 patients; Aug 2014, the manufacturers announced an expedited review process after purchasing a special voucher held by BioMarin Pharmaceuticals Inc., Novato, CA; the manufacturers filed for FDA approval in the 4th quarter of 2014</p>	<p>Pharmacotherapy (e.g., statins)</p>	<p>Improved lipid levels Reduced morbidity Reduced mortality</p>
<p>Anacetrapib for lipid management in coronary artery disease</p>	<p>Patients in whom coronary artery disease (CAD) has been diagnosed or who are at risk of developing the disease</p>	<p>According to the American Heart Association, in the U.S., more than 16 million adults are living with CAD and more than 1 million new cases are diagnosed each year. Treatments include lifestyle modifications, pharmacotherapies, and surgery. Anacetrapib is a cholesterol ester transfer protein inhibitor intended to raise high-density lipoproteins by 100% and reduce low-density lipoproteins, thereby improving lipid profiles. Its precursor was torcetrapib, whose development was stopped because of a high rate of cardiovascular adverse events. Anacetrapib has been reported to not raise blood pressure of subjects in clinical trials thus far; it is given 100 mg once daily for 76 weeks in addition to a statin.</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase III trials (DEFINE, REVEAL) ongoing for indications including dyslipidemia, hypercholesterolemia, homozygous familial hypercholesterolemia</p>	<p>Lifestyle changes Pharmacotherapy (e.g., statins)</p>	<p>Improved cardiovascular outcomes Reduced risk of heart attack</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Andexanet alfa for reversal of factor Xa inhibitors</p>	<p>Patients experiencing a major bleed from factor Xa inhibitor anticoagulant therapy who need reversal to stop bleeding</p>	<p>Factor Xa inhibitors are prescribed to millions of patients in the U.S. for both treating and preventing deep vein thrombosis (DVT), pulmonary embolism (PE), and stroke from atrial fibrillation. This class of anticoagulant drugs directly binds to and inhibits factor Xa without having an effect on other components of the coagulation cascade. Patients treated with factor Xa inhibitors may experience a major bleeding event that could result in a need for emergency surgery. Andexanet alfa is a modified factor Xa molecule intended to directly reverse major bleeding in patients treated with factor Xa inhibitors. Andexanet alfa purportedly acts as a factor Xa decoy by sequestering factor Xa inhibitors in the blood, thus restoring normal hemostatic processes. In clinical trials, it has been intravenously administered at a dose of 400 mg, followed by a continuous infusion of 480 mg at 4 mg/minute for 120 minutes.</p> <p>Portola Pharmaceuticals, Inc., South San Francisco, CA, in collaboration with Bayer AG, Leverkusen, Germany, and the Janssen Pharmaceuticals unit of Johnson & Johnson, New Brunswick, NJ</p> <p>Phase IV trial ongoing; FDA granted breakthrough therapy status; the companies plan to file a biologics license application in 2015 under an accelerated approval pathway</p>	<p>Transfusion</p>	<p>Reduced major bleeding</p>
<p>Angiotensin receptor neprilysin inhibitor (LCZ696) for treatment of heart failure</p>	<p>Patients in whom heart failure (HF) has been diagnosed</p>	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that HF prevalence will increase 25% from 2013 to 2030 and that costs will increase 120%. HF treatments depend on the stage of disease, and angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) are used to treat stage A (i.e., early stage) disease, but are sometimes ineffective or suboptimally effective. LCZ696 is a 1st-in-class angiotensin receptor neprilysin inhibitor (ARNI) that purportedly acts in several ways on the neurohormonal systems of the heart. It reportedly blocks receptors that exert harmful effects while at the same time promoting protective mechanisms. In this way, LCZ696 is believed to reduce strain on a failing heart so the heart muscle can recover. In clinical trials, it is being administered at twice-daily doses of 50, 100, or 200 mg.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Pivotal phase III PARADIGM-HF trial closed early on basis of Data Monitoring Committee in Mar 2014 because of strength of interim results; FDA granted fast-track status; company announced rolling new drug application submission</p>	<p>ACE inhibitors ARBs Beta blockers Diuretics Inotropes Nesiritide Vasodilators</p>	<p>Decreased morbidity Decreased mortality Improved HF symptoms Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Autologous bone marrow–derived cells (Ixmyelocel-T) for treatment of critical limb ischemia	Patients in whom critical limb ischemia (CLI) has been diagnosed	<p>Outcomes for patients with CLI are poor, and many patients require amputation. This intervention represents a novel treatment modality for this condition. Tissue repair cell (Ixmyelocel-T) technology consists of bone marrow extracted from the patient, expanded over the course of 12 days at the manufacturer’s facility using the company’s proprietary process, and reinfused into the patient 14 days after extraction. The formulation includes monocytes, macrophages (intended to destroy dead tissue, stimulate regeneration, and reduce inflammation), mesenchymal stem cells (intended to promote angiogenesis), and endothelial progenitor cells (intended to promote blood vessel lining and generate cardiovascular tissue).</p> <p>Vericel Corp., Cambridge, MA</p> <p>Phase II trial ongoing, FDA granted fast-track status</p>	<p>Percutaneous angioplasty and stenting Pharmacotherapy (e.g., cilostazol, pentoxifylline) Surgery</p>	<p>Tissue regeneration Improved circulation Reduced need for amputation Reduced morbidity and mortality</p>
Autologous bone marrow–derived stem cell therapy (C-Cure) for heart failure	Patients in whom severe heart failure (HF) has been diagnosed	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that HF prevalence will increase 25% from 2013 to 2030 and that costs will increase 120%. HF treatments depend on disease stage. No treatments are available to repair heart tissue and reverse HF. Options to treat end-stage HF include ventricular assist device implants, total artificial heart implant, or a heart transplant. C-Cure® consists of stem cells derived from a patient’s bone marrow and cultured in a proprietary laboratory process to become cardiac lineage cells intended to improve heart function when injected into the patient’s heart. The company states that the process “reprograms” cells so they become heart precursor cells with “the aim of replicating the normal process of cardiac development in the embryo” and purportedly stimulating heart-tissue repair. The company has developed a proprietary catheter called C-Cath®ez® to deliver the processed cells to the patient.</p> <p>Cardio3 BioSciences, S.A., Mont-Saint-Guibert, Belgium</p> <p>Phase III trial (CHART-1) ongoing; Jan 2014, company announced FDA approved start of 2nd phase III trial (CHART-2)</p>	<p>Angiotensin-converting enzyme inhibitors Angiotensin II receptor blockers Beta blockers Digoxin Diuretics Heart transplantation Minimally invasive heart surgery Ventricular assist devices</p>	<p>Increased left ventricular ejection fraction and other heart-function outcomes Improved activities of daily living Increased survival</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Bucindolol hydrochloride (Gencaro) for treatment of atrial fibrillation	Patients in whom atrial fibrillation (AF) has been diagnosed	<p>AF has a prevalence of more than 2.7 million people in the U.S. and is associated with 15% to 25% of all strokes. Long-term anticoagulant therapy is the most effective stroke-prevention strategy in patients with AF; however, contraindications, bleeding complications, and patient adherence to therapy make this strategy difficult. Bucindolol hydrochloride (Gencaro) is a pharmacologically unique beta blocker and mild vasodilator being investigated for treating AF. According to the manufacturer, bucindolol hydrochloride is considered part of the beta blocker class because it blocks beta-1 and beta-2 receptors in the heart. This action purportedly prevents these receptors from binding with other, receptor-activating molecules. In a planned clinical trial, the manufacturer intends to enroll patients who respond favorably to bucindolol hydrochloride because they have a genetic variant of the beta-1 cardiac receptor. In clinical trials, the drug is being administered as a twice-daily capsule, in doses of 6.25, 12.5, 25, 50, or 100 mg. A companion diagnostic genetic test is also in development.</p> <p>ARCA Biopharma, Inc., Broomfield, CO</p> <p>Phase IIb/III GENETIC-AF trial ongoing; Jan 2014, FDA accepted investigational device exemption application for trial for a companion diagnostic test to detect common genetic variations associated with AF</p>	<p>Amiodarone (Cordarone[®], Pacerone[®]) Dronedarone (Multaq[®]) Propafenone (Rythmol[®]) Sotalol (Betapace[®]) Dofetilide (Tikosyn[®]) Flecainide (Tambocor[™])</p>	<p>Improved cardiac function Reduced AF</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Cardiac contractility modulation (Optimizer III Implantable Pulse Generator system) for treatment of heart failure</p>	<p>Patients in whom heart failure (HF) has been diagnosed</p>	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. Optimizer III™ system is a device implant intended to treat patients who have New York Heart Association Class III HF and an ejection fraction or 25% to 45%. These patients are unable to achieve desired optimal medical therapy goals and are not candidates for cardiac resynchronization therapy. According to the manufacturer, the device is "typically implanted in the right pectoral region and is connected to 3 standard pacemaker leads that are threaded through veins into the right side of the heart. 1 lead is used to sense atrial activity, and the other 2 are used to sense ventricular activity...." It purportedly delivers nonexcitatory electrical signals during the absolute refractory period (between beats) to produce more forceful contraction during the heartbeat. It is intended as an adjunct to optimal medical therapy. The system also uses the OMNI Programmer System, a portable programmer intended to enable medical personnel to tailor Optimizer signal parameters to individual patient needs. It uses a battery that can be charged in the patient's home.</p> <p>Impulse Dynamics, NV, Willemstad, Netherlands Antilles</p> <p>Phase II/III FIX-HF-5B trial ongoing; Conformité Européene (CE) marked</p>	<p>Angiotensin-converting enzyme inhibitors Angiotensin II receptor blockers Beta blockers Digoxin Diuretics Heart transplantation Minimally invasive heart surgery Ventricular assist devices</p>	<p>Delayed progression of HF Delayed need for ventricular assist devices Improved 6-minute walk test Improved symptom relief Reduced hospitalizations Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Catheter-based renal denervation (Symplicity System) for treatment-resistant hypertension	Patients in whom uncontrolled hypertension has been diagnosed	<p>Many pharmacotherapies are available for treating hypertension, and typically 3 types of pharmacotherapy are used in conjunction to try to lower blood pressure. Yet, many cases of hypertension are not controlled with these interventions, and because such treatment-resistant hypertension is associated with high morbidity (e.g., end-organ damage) and mortality, novel interventions are warranted. Hyperactivity of the afferent and efferent sympathetic nerves from and to the kidneys are thought to play a role in blood pressure regulation and the pathophysiology of hypertension, and deactivating these nerves might reduce this hyperactivity, potentially lowering blood pressure. The Symplicity® catheter system is intended to accomplish renal denervation through a minimally invasive procedure. The device affects the output of the sympathetic nerves outside the renal artery walls. The system consists of a proprietary generator and flexible catheter that is inserted through the femoral artery and threaded into the renal artery near each kidney. Once in place, the catheter tip delivers low-power radiofrequency energy to deactivate surrounding sympathetic nerves. Renal denervation does not involve a permanent implant.</p> <p>Medtronic, Inc., Minneapolis, MN</p> <p>Phase III trial (SYMPPLICITY HTN-3) ongoing; completed enrollment May 2013; FDA and the Centers for Medicare & Medicaid Services (CMS) accepted Symplicity renal denervation system for consideration in their parallel review program, which allows CMS to begin its national coverage determination process while FDA completes its review of safety and efficacy; Dec 2013, the company announced enrollment of a phase III trial, SYMPPLICITY HTN-4; Jan 2014, the company announced that the SYMPPLICITY HTN-3 trial did not meet primary efficacy endpoint, but did meet primary safety endpoint; enrollment suspended in SYMPPLICITY HTN-4 trial; Mar 2014, the company announced that it will continue to develop the Symplicity device; 9 trials ongoing in Europe</p>	Pharmacotherapy (e.g., angiotensin converting enzyme inhibitors, angiotensin II receptor blockers, beta blockers) Renal artery stents	Controlled hypertension with fewer or no medications Reduced rates of blindness, heart attacks, kidney failure, and stroke

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Catheter-based ventricular restoration implant (Parachute) for treatment of heart failure	Patients in whom ischemic heart failure (HF) has been diagnosed	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. Treatments for HF depend on the stage of disease. Left ventricular remodeling (enlargement) occurs in many patients who experience a myocardial infarction, resulting in decreased cardiac output, fatigue, and shortness of breath. The unaffected portion of the heart compensates for this output loss and becomes overloaded. The Parachute™ Ventricular Partitioning Device purportedly has the potential to be the 1st minimally invasive, catheter-based treatment for ischemic HF. According to its manufacturer, the Parachute implant is deployed in the left ventricle to partition the damaged portion of the heart from the functional heart segment, potentially decreasing the left ventricle's volume and restoring its geometry and function. According to the company, the procedure is performed with the patient under conscious sedation in a catheterization lab and takes about 75 minutes.</p> <p>CardioKinetix, Inc., Menlo Park, CA</p> <p>Phase III trial ongoing (PARACHUTE IV pivotal trial in U.S.; other trials ongoing in Europe and Asia); Oct. 2012, received Conformité Européene (CE) mark</p>	<p>Angiotensin-converting enzyme inhibitors Angiotensin II receptor blockers Beta blockers Digoxin Diuretics Heart transplantation Minimally invasive heart surgery Ventricular assist devices</p>	<p>Improved HF symptoms Increased cardiac output Increased survival Reduced left ventricular volume Reduced morbidity</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Cerebral protection device (TriGuard) for prevention of stroke during transcatheter aortic valve implantation	Patients undergoing transcatheter aortic valve implantation or replacement	<p>Aortic stenosis occurs in about 4% to 5% of people aged 75 years or older, and an estimated 300,000 people have the condition worldwide. Causes of severe aortic stenosis include buildup of calcium deposits on the aortic valve, prior radiation therapy, certain medications, and a history of rheumatic fever. An estimated 30% of patients with symptomatic, severe aortic stenosis are not suitable candidates for open-heart valve implantation but may be candidates for a less invasive option, transcatheter aortic valve implantation. However, this procedure is associated with a risk of embolic debris being released during the procedure and causing a stroke or death. The TriGuard™ cerebral protection device is intended to deflect embolic debris during endovascular procedures. It consists of a self-positioning nitinol frame and mesh purported to provide full coverage to all brain areas. Using a 9-French–diameter catheter, the filter is advanced via femoral access into the aortic arch where it deflects embolic debris from entering the brachiocephalic artery, left common carotid artery, and the left subclavian artery. After completing the procedure, clinicians recapture the filter inside the catheter and remove it from the patient.</p> <p>Keystone Heart, Ltd., Caesarea Business Park, Israel</p> <p>DEFLECT III trial ongoing in Europe, FDA investigational device exemption trial planned; has Conformité Européene (CE) mark</p>	Embollic protection devices (e.g., balloons, baskets, filters)	Increased embolic protection

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Cerebral protection system (Sentinel) for prevention of stroke during transcatheter aortic valve implantation	Patients undergoing transcatheter aortic valve implantation or replacement	<p>Aortic stenosis occurs in about 4% to 5% of people aged 75 years or older, and an estimated 300,000 people have the condition worldwide. Causes of severe aortic stenosis include buildup of calcium deposits on the aortic valve, prior radiation therapy, certain medications, and a history of rheumatic fever. An estimated 30% of patients with symptomatic, severe aortic stenosis are not suitable candidates for open-heart valve implantation but may be candidates for the less-invasive transcatheter aortic valve implantation procedure. However, this approach is associated with a risk of embolic debris being released during the procedure and causing a stroke or death. The Sentinel™ Cerebral Protection System is a device intended to capture and remove embolic debris during endovascular procedures. It consists of a handle assembly, articulating sheath, and 2 deployable filters. Before valve implantation, the filters are advanced via radial approach. Using a 6-French-diameter catheter, the proximal filter is delivered to the brachiocephalic artery, and then a distal filter is delivered to the left common carotid artery. The procedure can be performed with each filter in place to capture any debris that may enter cerebral circulation. After completing the procedure, clinicians recapture both filters inside the catheter and remove them from the patient.</p> <p>Claret Medical, Inc., Santa Rosa, CA</p> <p>Pivotal FDA investigational device exemption trial (SENTINEL) ongoing; received Conformité Européenne (CE) mark</p>	Embollic protection devices (e.g., balloons, baskets, filters)	Increased embolic protection

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Electrical stimulation of carotid baroreceptors (Barostim neo Legacy system) for treatment-resistant hypertension</p>	<p>Patients in whom severe, drug-resistant hypertension has been diagnosed</p>	<p>Available pharmacotherapies for treating hypertension do not achieve desired blood pressure control in many cases. Uncontrolled and treatment-resistant hypertension is associated with high morbidity and mortality; novel interventions are needed. Baroreceptors in the aortic arch and the carotid sinuses are fibers that act as natural blood pressure sensors and control nervous system activity that affects the heart, kidneys, and peripheral blood vessels. When baroreceptors are stimulated by an increase in blood pressure, sympathetic efferent nerves are inhibited. Signaling by sympathetic efferent nerves typically increases blood pressure through its effects on cardiac, renal, and vasomotor targets. Therefore, blocking sympathetic nervous system activity in response to elevated blood pressure, combined with a simultaneous increase in parasympathetic activity, can act as a negative-feedback loop to stabilize blood pressure by reducing heart rate and fluid volume and dilating arteries. The Barostim neo Legacy system uses a pacemaker-like implantable pulse generator, inserted subcutaneously near the clavicle, to continuously deliver electrical signals to baroreceptors in both the left and right carotid arteries in the neck, via 2 carotid sinus leads. Device voltage can be titrated by physicians, via an external programmer, until the patient reaches a predetermined hemodynamic endpoint or the maximum dose is reached. The Neo System has 1 carotid sinus lead, and implantation requires only a unilateral incision. The company purports that this and the smaller lead design lead to a shorter procedure time and a greater patient safety profile than its 1st-generation Rheos system.</p> <p>CVRx, Inc., Minneapolis, MN</p> <p>Dec 2014, FDA granted humanitarian device exemption approval for use in patients with resistant hypertension who were previously implanted with the Rheos Carotid Sinus Leads Models 1010R, 1010L, 1014L, and 1014R; Conformité Européene (CE) marked in 2011; Dec 2014 received CE mark for use in patients undergoing magnetic resonance imaging; Barostim neo is also in separate HOPE4HF trial for treating heart failure</p>	<p>Catheter-based renal denervation (in development) Optimal medical management</p>	<p>Reduced cardiovascular events Reduced hypertension Reduced mortality Reduced stroke incidence Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Electrical stimulation of carotid baroreceptors (Barostim neo System) for treatment of heart failure</p>	<p>Patients in whom heart failure (HF) has been diagnosed</p>	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. Treatments for HF depend on the stage of disease. Baroreceptors in the aortic arch and the carotid sinuses are fibers that act as natural blood pressure sensors and control nervous system activity in the heart, kidneys, and peripheral blood vessels. When baroreceptors are stimulated by an increase in blood pressure, sympathetic efferent nerves are inhibited. Signaling by sympathetic efferent nerves typically increases blood pressure through its effects on cardiac, renal, and vasomotor targets. Therefore, blocking sympathetic nervous system activity in response to elevated blood pressure, combined with a simultaneous increase in parasympathetic activity, can act as a negative-feedback loop to stabilize blood pressure by reducing heart rate and fluid volume and dilating arteries. Researchers are investigating baroreceptor stimulation for treating HF. The Neo System has 1 carotid sinus lead, and implantation requires only a unilateral incision. The company purports that this and a smaller lead design lead to a shorter procedure time and a greater patient safety profile than its 1st-generation Rheos system. In 2 trials, the system is being implanted in adult patients with left ventricular ejection fraction of 35% or less.</p> <p>CVRx, Inc., Minneapolis, MN</p> <p>3 pivotal trials ongoing; Sept 2014, received Conformité Européene (CE) mark for treating hypertension in 2011 and HF in Oct 2014; Dec 2014, CE marked for use in patients undergoing an MRI</p>	<p>Angiotensin-converting enzyme inhibitors Angiotensin II receptor blockers Beta blockers Digoxin Diuretics Heart transplantation Minimally invasive heart surgery Ventricular assist devices</p>	<p>Improved left ventricular ejection fraction Fewer cardiovascular events Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Endovascular aneurysm sealing system (Nellix) for treatment of infrarenal abdominal aortic aneurysms	Patients in whom an infrarenal abdominal aortic aneurysm (AAA) has been diagnosed	<p>Surgical options to treat AAAs include open abdominal and minimally invasive endovascular graft surgeries. The relatively large size of available stent systems for endovascular repair has made patients with small vessel anatomy ineligible for endovascular repair of AAAs. The Nellix device is an endovascular aneurysm sealing system intended to treat infrarenal AAAs, and was originally developed as an alternative to endovascular stent grafts. The device purportedly seals the aneurysm sac, thus reducing the risk for aneurysm rupture or leakage. The device consists of bilateral stents that maintain blood flow from infrarenal segments to the legs, and endobags, which are inflated with a biostable polymer to seal the aneurysm. The Nellix device is inserted via a catheter through the femoral artery.</p> <p>Endologix, Irvine, CA</p> <p>Pilot trials completed; EVAS FORWARD-IDE and EVAS-Global trials recruiting; Conformité Européenne (CE) marked</p>	Endovascular stent grafts Open surgical repair	Decreased mortality Reduced leakage Reduced rupture
Evacetrapib for prevention of cardiovascular events	Patients in whom high-risk cardiovascular disease (CVD) has been diagnosed	<p>Despite available treatments, CVD remains the leading cause of mortality worldwide. Evacetrapib (LY2484595) is a cholesteryl ester transfer protein (CETP) inhibitor that is intended to raise functional high-density lipoprotein (HDL) by modulating CETP activity through a mechanism that purportedly differs from other CETP inhibitors in development. Administered orally as a 130 mg tablet once daily for up to 4 years, in addition to standard of care.</p> <p>Eli Lilly and Co., Indianapolis, IN</p> <p>Phase III (ACCELERATE) trial ongoing but no longer recruiting; completion anticipated in 2016</p>	Pharmacotherapy Sclerotherapy	Improved HDL profile Reduced cardiovascular morbidity and mortality Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Evolocumab for treatment of hyperlipidemia and familial hypercholesterolemia	Patients in whom hyperlipidemia has been diagnosed	<p>Despite available therapies, cholesterol levels of some patients with severe hyperlipidemia are not adequately managed, and cardiovascular risk remains high. Reductions in low-density lipoprotein cholesterol (LDL-C) levels are associated with decreased cardiovascular events. Statins are typically used to decrease cardiovascular risk in patients with high LDL-C levels; however, many patients are intolerant to statins or do not achieve a sufficient response. Evolocumab is a monoclonal antibody against proprotein convertase subtilisin/kexin type 9 (PCSK9), and purportedly decreases LDL-C levels by increasing the number of LDL receptors at the hepatocellular surface. In clinical trials, Evolocumab has been given as subcutaneous injections in doses of 70, 105, or 140 mg every 2 weeks, or doses of 280, 350, or 420 mg every 4 weeks. In some trials, it has been given combination with statins.</p> <p>Amgen, Inc., Thousand Oaks, CA</p> <p>14 phase III trials ongoing for hyperlipidemia as monotherapy, as combination therapy with statins, and as therapy for familial-related hypercholesterolemia: LAPLACE-2, YUKAWA-2, GAUSS-2, GAUSS-3, MENDEL-2, RUTHERFORD-2, TAUSSIG, TESLA, THOMAS-1, and THOMAS-2; Sept 2014, the manufacturer submitted a biologics license application to FDA covering all indications; Nov 2014, Amgen announced that FDA accepted its biologics license application and a decision date is scheduled for Aug 27, 2015</p>	Mipomersen (in development) MTP-I inhibitors (in development) Statins	Fewer cardiovascular events

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Extra-aortic balloon counter-pulsation heart-assist device (C-Pulse) for treatment of class III or IV heart failure</p>	<p>Patients with New York Heart Association Class III or ambulatory Class IV heart failure (HF)</p>	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. Treatments for HF depend on the stage of disease. Available implanted devices for HF (e.g., left ventricular-assist devices) contact the patient's blood, elevating the risk of blood clots and stroke. Thus, patients must take daily anticoagulant therapy. The C-Pulse® heart-assist system is an implanted device that does not require taking anticoagulants. It consists of a mechanical balloon cuff that is wrapped around the outside of the aorta during a minimally invasive or full sternotomy procedure. The device is intended to reduce the workload of the left ventricle. The system's driver operates outside the body and is connected to the C-Pulse device. According to the manufacturer, when the balloon inflates, blood flow to the coronary arteries increases, potentially providing additional oxygen to the heart. The company claims that during deflation, the workload required by the left ventricle is reduced. The company also states that the balloon counter-pulsation inflation and deflation is synchronized to the patient's electrocardiogram (similar to a pacemaker). The company cautions that the device is not MRI compatible and that some brands of cell phones have interfered with the C-Pulse driver system.</p> <p>Sunshine Heart, Inc., Eden Prairie, MN</p> <p>Pivotal phase III investigational device exemption trial (COUNTER HF™) ongoing; received Conformité Européene (CE) mark Jul 2012</p>	<p>Angiotensin-converting enzyme inhibitors Angiotensin II receptor blockers Beta blockers Digoxin Diuretics Heart transplantation Minimally invasive heart surgery Ventricular assist devices</p>	<p>Increased cardiac output Increased survival Reduced cardiac workload Reduced risk of stroke or thrombi Decreased morbidity</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Freedom Driver System (portable driver) for Total Artificial Heart as bridge to heart transplantation	Patients with nonreversible biventricular failure who are candidates for heart transplantation	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have heart failure (HF). About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. The temporary Total Artificial Heart (TAH-t) functions in place of ventricles and valves by pumping blood to both the pulmonary and systemic circulations. This TAH-t is distinguished from earlier devices by its portable driver (Freedom® driver), the system that powers the device and is intended to allow patients to recover and remain at home, rather than remaining hospitalized. The driver weighs 13.5 lb, compared with the 418 lb weight of the hospital-based system. The driver includes 2 onboard batteries and a power adaptor.</p> <p>SynCardia Systems, Inc., Tucson, AZ</p> <p>FDA approved Jun 2014 for clinically stable patients in whom the SynCardia TAH-t is implanted (FDA approved TAH-t in 2004); Health Canada approved May 2011; Conformité Européene (CE) marked Mar 2010; worldwide, more than 100 patients have received system for out-of-hospital use</p>	TAH-t used with in-hospital driver	<p>Extended survival for patients awaiting heart transplantation</p> <p>Reduced hospitalization costs</p> <p>Restored mobility</p>
Gene therapy (Mydicar) for treatment of heart failure	Patients in whom heart failure (HF) has been diagnosed	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. HF treatments depend on the stage of disease. Genetically targeted enzyme replacement (Mydicar®) is an adjunct therapy for treating HF. It is intended to correct or replace faulty genes, restore levels of key proteins, and restore the heart's pumping capacity. Mydicar uses a nonpathogenic, recombinant, adeno-associated virus delivered directly to the heart in an outpatient procedure.</p> <p>Celladon Corp., La Jolla, CA</p> <p>Phase II trials ongoing; FDA granted fast-track and breakthrough therapy statuses</p>	<p>Angiotensin-converting enzyme inhibitors</p> <p>Angiotensin II receptor blockers</p> <p>Beta blockers</p> <p>Digoxin</p> <p>Diuretics</p> <p>Heart transplantation</p> <p>Minimally invasive heart surgery</p> <p>Ventricular assist devices</p>	<p>Improved left ventricular ejection fraction</p> <p>Improved cardiovascular outcomes (reduction in cardiovascular events)</p> <p>Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Idarucizumab for reversal of dabigatran-induced anticoagulation	Patients in whom reversal of dabigatran-induced anticoagulation is needed	<p>Dabigatran etexilate mesylate is indicated to reduce the risk of stroke and systemic embolism in patients with nonvalvular atrial fibrillation, to treat deep venous thrombosis (DVT) and pulmonary embolism (PE) in patients who have been treated with a parenteral anticoagulant for 5–10 days, and to reduce the risk of recurrent DVT and PE. No antidote exists to reverse dabigatran-induced anticoagulation. Idarucizumab is a fully humanized antibody fragment being investigated as an antidote for dabigatran etexilate mesylate.</p> <p>Boehringer Ingelheim GmbH, Ingelheim, Germany</p> <p>Phase III trial ongoing, FDA granted breakthrough therapy status</p>	Blood transfusion	Reduced major bleeding
Imatinib (Gleevec) for treatment of pulmonary artery hypertension	Patients in whom pulmonary artery hypertension (PAH) has been diagnosed	<p>About 1,000 new cases of PAH are diagnosed in the U.S. each year. Women are twice as likely as men to develop the condition. PAH has no cure and can result in heart failure and death. PAH is typically treated with medication, although surgical treatment options may also be considered. Imatinib (Gleevec®) is a small-molecule, ABL kinase inhibitor that purportedly inhibits cellular processes that are responsible for uncontrolled growth of arterial smooth muscle cells. In clinical trials, imatinib has been administered orally, 200–400 mg, once daily.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase III trials completed and ongoing</p>	Calcium channel blockers Endothelin receptor antagonists Phosphodiesterase type 5 inhibitors Prostanoids	Improved exercise capacity Reduced mortality Fewer hospitalizations
Implantable cardiac monitor (AngelMed Guardian System) for detecting myocardial infarction	Patients at high risk of myocardial infarction (MI)	<p>MI is a leading killer of both men and women in the U.S. and the mean time from MI symptom onset to arrival at a hospital is reported to be about 3 hours, even for people who have had a previous heart attack. Patients who have had 1 MI are often at high risk of another. Early treatment can prevent or limit damage to the heart muscle. Preventive measures are aimed at lowering risk factors for coronary artery disease. The AngelMed Guardian® system is an implantable cardiac device intended to detect rapid ST-segment changes that might signal a major cardiac event. When it detects an ST-segment change, the system is intended to alert patients so they can seek immediate medical care. The system alerts the patient through a series of vibrations, sounds, and visual warnings.</p> <p>Angel Medical Systems, Shrewsbury, NJ</p> <p>Phase III ALERTS pivotal trial ongoing, but not recruiting; Conformité Européene (CE) marked Sept 2010</p>	Conventional, external MI detection technologies Patient report Routine physician followup	Earlier detection of impending heart attack Prevented heart damage Increased overall survival

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Implantable cardioverter-defibrillator (Evera MRI ICD system) for treatment of ventricular tachyarrhythmias	Patients in whom ventricular tachyarrhythmia has been diagnosed who might need MRI scans in the future	<p>Ventricular tachyarrhythmia (VT) describes a broad class of abnormal heart rhythms that originate in ventricular tissue and includes ventricular tachycardia (i.e., rapid heartbeat) and ventricular fibrillation (i.e., irregular heartbeat). Implantable cardioverter-defibrillators (ICDs) are the preferred treatment for patients with ventricular fibrillation who are at risk for sudden cardiac death. More than half of patients receiving an ICD are expected to need magnetic resonance imaging (MRI) within a decade of receiving an ICD. Traditionally, MRI use in patients with ICDs has been contraindicated because of the risk of device malfunction caused by the magnetic field. The Evera MRI™ ICD system is intended for patients who may need to undergo MRI in the future. The device is purportedly the 1st ICD that allows MRI scans of any region of the body. The device consists of a tiny computer and battery contained in a titanium case about the size of a pocket watch. Like conventional ICDs, the device is implanted below the clavicle and connected to the heart with transvenous leads. The Evera system includes SureScan® technology, which enables the device to be set to the appropriate mode for an MRI environment. The manufacturer previously developed an MRI-compatible pacemaker (REVO) that uses the same SureScan technology.</p> <p>Medtronic, Inc., Minneapolis, MN</p> <p>Pivotal investigational device exemption trial ongoing</p>	Other implantable defibrillators	Reduced device interactions with MRI
Injectable biopolymer (Algisyl-LVR) for prevention or reversal of advanced heart failure	Patients with advanced heart failure (HF) and an enlarged left ventricle from mitral valve regurgitation, ischemia, dilated cardiomyopathy, or other disorders	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. Treatments for HF depend on the stage of disease. Algisyl-LVR™ is a polysaccharide biopolymer made from marine algae. It is intended to be injected during open-heart surgery directly into myocardium in the left ventricle; it then thickens, forming gel-like bodies that remain in heart muscle as permanent implants. These implants are intended to thicken heart muscle wall, reduce chamber size, decrease local muscle wall stress, and allow for reshaping of dilated ventricle. The material is inert (i.e., does not interact with the human immune system).</p> <p>Cardio Polymers, now part of LoneStar Heart, Inc., Laguna Hills, CA</p> <p>Phase II/III trial ongoing (Augment-HF); Oct 2014, received Conformité Européene (CE) mark</p>	Drug therapy Ventricular assist devices	<p>Increased left ejection fraction Reduced progression of HF Increased regression of HF Improved cardiovascular outcomes Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ivabradine for treatment of heart failure	Patients with symptomatic (New York Heart Association class II–IV) chronic heart failure (HF) and systolic dysfunction who are on stable background therapy and in a normal sinus rhythm	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. Treatments for HF depend on the stage of disease. Ivabradine is a selective inhibitor of hyperpolarization-activated cyclic-nucleotide-gated "funny" current involved in pacemaking and responsiveness of the sinoatrial node. It is intended to slow heart rate and allow more time for blood to flow to the heart. Ivabradine is administered orally at a starting dosage of 5 mg twice per day.</p> <p>Servier, Neuilly sur Seine, France (EU manufacturer) Amgen, Inc., Thousand Oaks, CA (U.S. manufacturer)</p> <p>Phase III trials completed and ongoing; approved in European Union in 2005 as Procoralan; FDA granted fast-track and priority review statuses; FDA decision date expected on or before Feb 27, 2015</p>	<p>Angiotensin-converting enzyme inhibitors Angiotensin II receptor blockers Beta blockers Digoxin Diuretics Heart transplantation Minimally invasive heart surgery Ventricular assist devices</p>	<p>Reduced HF hospitalizations Fewer coronary events Reduced incidence of myocardial infarction Improved quality of life Increased survival</p>
Leadless pacemaker (Micra Transcatheter Pacing System) for treatment of heart failure	Patients in whom heart failure (HF) has been diagnosed	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. HF treatment depends on the stage of disease. Cardiac resynchronization therapy (CRT) is an approved therapy for patients with HF who have a low ejection fraction and a prolonged QRS duration. Approved CRT pacemakers or defibrillators require that surgeons implant leads, 1 of which is threaded to the left ventricle in a technically challenging process associated with risk of lead failure and infection. Because of these limitations, many patients who are appropriate candidates for CRT do not opt to receive the therapy. The Micra Transcatheter Pacing System (TPS) is a leadless implantable device intended to treat HF. The device is implanted in a catheter-guided procedure directly into the ventricle of the heart. The manufacturer purports that Micra TPS is the world's smallest pacemaker, at a size approximating a "large vitamin" to 10% of the size of a standard pacemaker, but does not report exact dimensions. The competing Nanostim device (St. Jude Medical) also is purportedly 10% the size of a standard pacemaker (41.4 mm).</p> <p>Medtronic, Inc., Minneapolis, MN</p> <p>Phase III trial ongoing</p>	<p>Nanostim leadless pacemaker (in development) Ventricular pacing with leads</p>	<p>Fewer adverse events Fewer lead complications Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Leadless pacemaker (Nanostim) for treatment of heart failure	Patients in whom heart failure (HF) has been diagnosed	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. HF treatments depend on the stage of disease. Cardiac resynchronization therapy (CRT) is an approved therapy for patients with HF who have a low ejection fraction and a prolonged QRS duration. Approved CRT pacemakers or defibrillators require that surgeons implant leads, 1 of which is threaded to the left ventricle in a technically challenging process associated with risk of lead failure and infection. Because of these limitations, many patients who are appropriate candidates for CRT do not opt to receive the therapy. The Nanostim leadless pacemaker may offer an alternative as a leadless implantable device intended to treat HF. The device is implanted via a catheter-guided procedure directly into the ventricle of the heart. Nanostim is purported to be less than 10% the size of traditional pacemakers (41.4 mm) and can also be fully retrieved if necessary. The competing Micra TPS leadless pacemaker in development by Medtronic also purports to be about 10% of the size of a standard pacemaker, but does not report exact dimensions.</p> <p>St. Jude Medical, Inc., St. Paul, MN</p> <p>Phase III investigational device exemption trial ongoing (LEADLESS II IDE); Conformité Européene (CE) marked in 2013</p>	Micra TPS leadless pacemaker (in development) Ventricular pacing device with leads	Fewer adverse events Fewer lead complications Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Levosimendan (Simdax) for treatment of low cardiac output syndrome	Patients undergoing cardiac surgery who are at risk for low cardiac output syndrome	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have heart failure (HF). About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. Treatments for HF depend on the stage of HF. Levosimendan (Simdax[®]) is a calcium sensitizer approved outside the U.S. for treating acute decompensated HF and in clinical trials in the U.S. The drug purportedly increases the heart's sensitivity to calcium, thus increasing myocardial contractility. It is being investigated for treating patients who are at risk for low cardiac output syndrome after cardiac surgery. In clinical trials, levosimendan is being administered intravenously at a dose of 0.2 mcg/kg/minute for the 1st hour, followed by 0.1 mcg/kg/minute for an additional 23 hours.</p> <p>Tenax Therapeutics, Inc., Morrisville, NC</p> <p>Phase III trial (LEVO-CTS) ongoing under FDA special protocol assessment; FDA granted fast-track status; approved in Sweden in 2000 and numerous other countries outside U.S.</p>	Heart transplantation Minimally invasive heart surgery Pharmacotherapy (e.g., angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, beta blockers, digoxin, diuretics) Ventricular assist devices	Improved left ventricular ejection fraction Reduced cardiovascular events Improved quality of life
Noninvasive fractional flow reserve estimation using coronary computed tomographic angiography for diagnosis of coronary artery stenosis and virtual treatment planning	Patients in whom coronary artery stenosis is suspected	<p>Despite available pharmacotherapy, coronary artery disease remains the leading cause of death in the U.S. Current treatment options include lifestyle changes, pharmacotherapy, and surgery. Fractional flow reserve (FFR) measurement during invasive coronary angiography is used to identify coronary lesions that cause ischemia and aids in clinical decisionmaking for coronary revascularization. No noninvasive methods exist that can determine the clinical significance of both a coronary lesion and stent placement at that lesion. FFR estimation using coronary computed tomography (CT) angiography is a noninvasive method that purportedly improves accuracy of diagnosing coronary lesions. Computer modeling associated with the FFR estimation technology aids in clinical decisionmaking for revascularization by predicting changes in FFR if a stent is placed across the diagnosed obstruction.</p> <p>HeartFlow, Inc., Redwood City, CA</p> <p>Phase IV trial completed; DISCOVER-FLOW study complete; PLATFORM study ongoing</p>	FFR-guided coronary angiography	Improved coronary revascularization Decreased morbidity associated with invasive angiography

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label anakinra interleukin-1 receptor antagonist for prevention of new-onset heart failure after acute myocardial infarction	Patients who have experienced an acute myocardial infarction (MI)	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have heart failure (HF). About 50% of people with HF die within 5 years of diagnosis. HF can occur after an acute MI. Anakinra is a recombinant protein that inhibits interleukin-1 (IL-1) receptors, which may play a role in the inflammatory process. IL-1 blockade with anakinra is being investigated for preventing HF in patients who have experienced acute MI. In various clinical trials, anakinra is being administered to patients who have experienced acute "chest pain (or equivalent) with an onset within 12 hours and ECG [electrocardiographic] evidence of ST segment elevation (>1 mm) in 2 or more anatomically contiguous leads" or acute decompensated HF within the previous 24 hours with screening plasma C-reactive protein levels at either >5 mg/L or >2 mg/L (depending on the trial). The drug is administered as a 100 mg, subcutaneous, daily injection for 14 days or a high dose of 100 mg, twice daily, for the 1st 3 days followed by 100 mg daily on days 4–14.</p> <p>Virginia Commonwealth University, Richmond American Heart Association, Dallas, TX National Heart, Lung, and Blood Institute, Bethesda, MD</p> <p>Phase II and III trials ongoing; anakinra (Kineret®) approved in 2001 for treating rheumatoid arthritis; manufacturer does not appear to be sponsoring any of the completed or planned clinical trials</p>	<p>Angiotensin-converting enzyme inhibitors Angiotensin II receptor blockers Beta blockers Diuretics Inotropes Nesiritide Vasodilators</p>	<p>Decreased morbidity Decreased mortality Improved HF symptoms Improved quality of life</p>
Off-label methotrexate for treatment of diabetes-associated cardiovascular disease	Patients with type 2 diabetes mellitus (T2DM) or metabolic syndrome who have had a heart attack	<p>Inflammation is thought to play an important role in cardiovascular disease; however, it is not known whether treating inflammation will decrease the risk of cardiovascular disease. Conditions such as T2DM and metabolic syndrome are associated with an enhanced proinflammatory response, and patients with these conditions are at increased risk of experiencing myocardial infarction (MI) and stroke. The anti-inflammatory agent methotrexate is being investigated to prevent stroke, MI recurrence, and cardiovascular death in patients with T2DM or metabolic syndrome who have a history of MI. In a clinical trial, methotrexate is being administered orally at a dosage of 15–20 mg weekly plus 1.0 mg folic acid 6 days/week.</p> <p>National Heart, Lung, and Blood Institute, Bethesda, MD Brigham and Women's Hospital, Boston, MA and 188 other institutions</p> <p>Phase III trial ongoing</p>	<p>Anticoagulants Antidiabetes agents Antihypertensives Antiplatelets Cholesterol-lowering agents Lifestyle changes</p>	<p>Decreased risk of stroke Decreased risk of MI recurrence Decreased risk of cardiovascular death Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label rituximab for treatment of systemic sclerosis-associated pulmonary artery hypertension	Patients in whom systemic sclerosis-associated pulmonary artery hypertension (SSc-PAH) has been diagnosed	<p>About 1,000 new cases of PAH are diagnosed in the U.S. each year. Women are twice as likely as men to develop the condition. PAH has no cure and can result in heart failure and death. PAH is typically treated with medication, although surgical treatment options may also be considered. 1-year survival for patients with SSc-PAH ranges from 50% to 81%, and treatment is limited to vasodilator therapy. Rituximab, a genetically engineered anti-CD20 antibody for treating B-cell lymphoma, is being investigated for immune mechanisms associated with B-cell dysregulation and pathogenic autoantibody response in SSc-PAH. It is being administered in 2 infusions, 1,000 mg each, 14 days apart.</p> <p>National Institute of Allergy and Infectious Diseases, Bethesda, MD (trial sponsor)</p> <p>Phase II trial ongoing</p>	Calcium channel blockers Endothelin receptor antagonists Phosphodiesterase type 5 inhibitors Prostanoids	Improved exercise capacity Reduced mortality Reduced hospitalization
Percutaneous left atrial appendage ligation (Lariat Suture delivery device) for prevention of atrial fibrillation-associated stroke	Patients in whom atrial fibrillation (AF) has been diagnosed	<p>AF has a prevalence of more than 2.7 million people in the U.S. and is associated with 15% to 25% of all strokes. Long-term anticoagulant therapy is the most effective stroke-prevention strategy in patients with AF; however, contraindications, bleeding complications, and patient adherence to therapy make this strategy difficult. Surgical ligation of the left atrial appendage (LAA) is performed in patients intolerant to anticoagulant therapy, but because of its invasive nature, this procedure is risky. The new percutaneous approach to ligating the LAA using the Lariat Suture delivery device may provide a minimally invasive option for stroke prevention in patients with AF.</p> <p>SentreHEART, Inc., Redwood City, CA</p> <p>FDA approved in 2009 for soft tissue ligation and subsequently adapted for use for LAA; invitational observational study ongoing; PLACE II trial ongoing; phase IV PLACE III trial at University of California, San Francisco, withdrawn before enrollment</p>	Amplatzer Cardiac Plus AtriClip LAA Exclusion System AtriClip Gillinov-Cosgrove LAA Clip Cryoablation Long-term anticoagulation therapy Radiofrequency ablation Watchman LAA device (in development) WaveCrest LAA device (in development)	Decreased atrial fibrillation-associated stroke occurrence Decreased morbidity

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Percutaneous left atrial appendage occlusion device (Watchman) for prevention of atrial fibrillation-associated stroke</p>	<p>Patients with atrial fibrillation who are not good surgical candidates</p>	<p>Atrial fibrillation has a prevalence of more than 2.7 million people in the U.S. and is associated with 15% to 25% of all strokes. Long-term anticoagulant therapy is the most effective stroke-prevention strategy in patients with atrial fibrillation; however, contraindications, bleeding complications, and patient adherence to therapy make this strategy difficult. The Watchman device is a permanent implant that is placed in the left atrial appendage (LAA) to prevent strokes in patients with atrial fibrillation. Stroke prevention is accomplished by occluding the LAA opening to prevent clots that may have formed in the LAA from entering the systemic circulation. The implantable device is a component of a 3-part system called the Watchman LAA Closure Technology. This system also includes a delivery catheter and transseptal access sheath, which is used to access the LAA and serves as a conduit for the delivery catheter. The implantable device has a self-expanding nitinol frame with a permeable polyester fabric that is preloaded within the delivery catheter. Once expanded, the fabric covers the atrium-facing surface of the device. Fixation barbs on the frame allow the device to be secured in the LAA. The Watchman device is available in 5 sizes (i.e., 21, 24, 27, 30, and 33 mm). It is implanted in a percutaneous catheterization procedure, using a standard transseptal technique and fluoroscopic guidance.</p> <p>Boston Scientific Corp., Natick, MA</p> <p>Phase III trials completed and ongoing; Dec 2013, FDA Circulatory System Devices advisory panel voted 13-1 that the device is safe and effective and that its benefits outweigh its risks; Jun 2014, FDA notified the company that a 3rd advisory panel would need to be convened before gaining approval; Oct 2014, FDA Circulatory System Devices advisory panel voted 6-5 (with 1 abstention) that the benefits outweigh the potential risks. The panel also voted 12-0 on a reasonable assurance of safety, but 6-7 against on a reasonable assurance of effectiveness.</p>	<p>Amplatzer Cardiac Plus AtriClip LAA Exclusion System AtriClip Gillinov-Cosgrove LAA Clip Cryoablation Lariat Suture Delivery LAA device (in development) Long-term anticoagulation therapy Radiofrequency ablation WaveCrest LAA device (in development)</p>	<p>Reduced morbidity Reduced stroke risk Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Percutaneous left atrial appendage occlusion device (WaveCrest) for prevention of atrial fibrillation–associated stroke</p>	<p>Patients with atrial fibrillation (AF) who are not good surgical candidates</p>	<p>AF has a prevalence of more than 2.7 million people in the U.S. and is associated with 15% to 25% of all strokes. Long-term anticoagulant therapy is the most effective stroke-prevention strategy in patients with AF; however, contraindications, bleeding complications, and patient adherence to therapy make this strategy difficult. The WaveCrest left atrial appendage (LAA) occlusion system is a permanent implant that is placed in the LAA to prevent strokes in patients with atrial fibrillation. Stroke prevention is accomplished by occluding the LAA opening to prevent clots that may have formed in the LAA from entering the systemic circulation. The system also includes a delivery catheter, which is used to access the LAA and serves as a conduit for the delivery catheter. The implantable device has a self-expanding frame with a permeable fabric that is preloaded within the delivery catheter. Once expanded, the fabric covers the atrium-facing surface of the device. Fixation anchors on the frame allow the device to be secured in the LAA. The WaveCrest LAA occluder is implanted in a percutaneous catheterization procedure, using a standard transseptal technique and fluoroscopic guidance.</p> <p>Coherex Medical, Inc., Salt Lake City, UT</p> <p>Pilot trial completed; Sept 2013, Conformité Européene (CE) marked</p>	<p>Amplatzer Cardiac Plus AtriClip LAA Exclusion System AtriClip Gillinov-Cosgrove LAA Clip Cryoablation Lariat Suture Delivery Device (in development) Long-term anticoagulation therapy Radiofrequency ablation Watchman LAA device (in development)</p>	<p>Reduced AF-associated stroke risk</p>
<p>Portable warm blood perfusion system (Organ Care System) for normothermic heart transplantation</p>	<p>Patients who require heart transplantation</p>	<p>According the U.S. Department of Health and Human Services, nearly 29,000 people in the U.S. received an organ transplant in 2013. Currently, donor hearts being transported for transplantation are stopped and transported on ice, in a cooler (i.e., cold ischemic storage). This method has limits, such as a narrow treatment window, the potential for damage, and the inability to test the heart for function. The Organ Care System (OCS Heart) is intended to keep the heart in a “living” state as it is transported. Through an internal gas supply, internal monitor, and pulsatile pumping system, OCS Heart purportedly provides blood oxygenation and flow, warms the heart as necessary, maintains humidity, and protects the heart from contamination from the time of removal from the donor to implantation in the recipient. The manufacturer states that with this method, the heart may withstand longer periods of time outside of the body and be less vulnerable to damage during transportation, and it can be tested for function and tissue matching. The system includes a compact wireless unit to monitor heart function during transport.</p> <p>TransMedics, Inc., Andover, MA</p> <p>Pivotal phase II/III trial completed; Apr 2014, manufacturer submitted premarket application to FDA</p>	<p>Cold ischemic storage</p>	<p>Increased graft survival Decreased graft dysfunction Increased use of available organs Reduced total cost of care</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Riociguat (Adempas) for treatment of chronic thromboembolic pulmonary hypertension	Patients in whom chronic thromboembolic pulmonary hypertension (CTEPH) has been diagnosed	<p>About 5,000 new cases of CTEPH are diagnosed in the U.S. each year. CTEPH is a type of pulmonary hypertension caused by the accumulation of emboli in the pulmonary artery. It is typically treated surgically with a procedure called pulmonary thromboendarterectomy, but medical therapy may be considered for patients who are unsuited for surgery. Riociguat purportedly stimulates the soluble guanylate cyclase pathway that is involved in nitric oxide signaling and vasodilation, which may relieve symptoms of CTEPH. Riociguat (Adempas) is administered orally, 1.0, 1.5, 2.0, or 2.5 mg, 3 times daily.</p> <p>Bayer AG, Leverkusen, Germany</p> <p>FDA approved Oct 2013 for treating CTEPH; received marketing authorization from European Commission Mar 2014</p>	Calcium channel blockers Endothelin receptor antagonists Phosphodiesterase type 5 inhibitors Prostanoids	Improved exercise capacity Fewer hospitalizations Reduced mortality
Selexipag (Uptravi) for treatment of pulmonary artery hypertension	Patients in whom pulmonary artery hypertension (PAH) has been diagnosed	<p>About 1,000 new cases of PAH are diagnosed in the U.S. each year. Women are twice as likely as men to develop the condition. PAH has no cure and can result in heart failure and death. PAH is typically treated with medication, although surgical treatment options may also be considered. Selexipag (Uptravi) is a 1st-in-class, selective prostacyclin (PGI₂) receptor agonist; prostacyclin counteracts the vasoconstrictor and prothrombotic activity of endothelin. Selexipag is a long-acting, nonprostanoid prostacyclin receptor agonist that mimics the actions of endogenous prostacyclin and exerts vasodilating effects. It is administered as an oral tablet, twice daily.</p> <p>Actelion Pharmaceuticals, Ltd., Allschwil, Switzerland</p> <p>Phase III trials ongoing; Jun 2014, Actelion announced completion of the pivotal phase III GRIPHON study; Dec 2014, company submitted a new drug application to FDA</p>	Calcium channel blockers Endothelin receptor antagonists Phosphodiesterase type 5 inhibitors Prostanoids	Improved exercise capacity Reduced mortality Reduced hospitalization

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Serelaxin for treatment of acute heart failure	Patients in whom acute heart failure (HF) has been diagnosed	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. About 80% of patients admitted to the hospital with acute HF experience dyspnea as a major symptom. In these patients, 50% do not experience relief 24 hours after treatment, and 25% still experience dyspnea at the time of discharge. New therapies for acute HF are needed for faster and more complete symptom resolution. Serelaxin (RLX030) is recombinant, human relaxin-2, a naturally occurring vasoactive peptide hormone that regulates hemodynamic adaptations to pregnancy and is being investigated in treating acute HF. In clinical trials, serelaxin (30 mcg/kg) was administered intravenously for 48 hours after acute HF diagnosis.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase III RELAX-AHF trial completed; FDA granted breakthrough therapy status Jun 2013; Mar 2014, FDA Cardiovascular and Renal Drugs advisory panel voted 11-0 against approval because the evidence was insufficient to support the indication; May 2014, FDA rejected approval of serelaxin due to insufficient evidence of efficacy and issued a complete response letter. The company met with FDA and stated it "will continue to expedite [its] clinical trial program to build the supporting body of evidence." Results from the company's ongoing phase III trial are expected by 2016.</p>	Diuretics Vasodilators	Relief of dyspnea Decreased mortality

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Silk Road System for prevention of stroke during carotid artery stenting	Patients undergoing placement of carotid artery stents	<p>Carotid artery stenting (CAS), as it is currently performed, is associated with risk of embolic debris releasing during the procedure and causing a stroke or death. Available embolic protection devices include baskets and filters, which have purportedly limited efficacy and significant risks to patients. The Silk Road System device is intended to provide safer and more effective cerebral embolic protection during CAS. The system enables the interventional cardiologist to deliver a stent directly from the neck rather than from the femoral artery to avoid complications associated with catheterization that starts from the femoral artery in the groin, as is typical. Starting from the groin can purportedly increase the risk of releasing plaque debris, which can travel to the brain and cause stroke. To protect the patient's brain during the procedure, the Silk Road system purportedly temporarily reverses blood flow to move any debris away from the brain. It does not use a catchment device as other embolic protection technologies do. The clinician can purportedly regulate the speed of carotid blood flow and even stop it momentarily if needed. The device consists of a circuit of arterial and venous sheaths that are connected by surgical tubing and an in-line flow controller for clinician manipulation.</p> <p>Silk Road Medical, Sunnyvale, CA</p> <p>Pivotal ROADSTER trial ongoing; Nov 2014, the company submitted a premarket approval application to FDA for its ENROUTE transcrotid stent system</p>	Embolc protection devices (e.g., balloons, baskets, filters)	Increased embolic protection
Stem cell mobilization using granulocyte-colony stimulating factors for treatment of peripheral artery disease	Patients in whom critical limb ischemia (CLI) from peripheral artery disease has been diagnosed	<p>Patients with CLI are at high risk of amputation and are limited in their ability to walk because of ulceration and pain. Small-vessel peripheral vascular disease and other coexisting morbidities preclude many patients from surgical treatment, and noninvasive treatment options are needed. The use of granulocyte-colony stimulating factors (G-CSFs) to mobilize a patient's stem cells to create angiogenic potential (i.e., minute vessel-forming capability) so they circulate and promote angiogenesis in ischemic areas is a minimally invasive treatment option under study. The intervention purportedly improves vascularization in ischemic limb areas of patients with CLI. In an ongoing clinical trial, G-CSFs are being injected subcutaneously, 5 mcg/kg/day, for 10 days.</p> <p>Sponsored by Washington University School of Medicine, St. Louis, MO Northwestern University, Evanston, IL</p> <p>Phase III clinical trial completed</p>	Angioplasty with stent or drug-eluting balloon placement Bypass surgery Percutaneous transluminal angioplasty	Improved blood flow Improved ambulation Decreased ulceration Decreased pain Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Synthetic urodilatin (ularitide) for treatment of acute heart failure	Patients in whom acute decompensated heart failure (ADHF) has been diagnosed	<p>ADHF is a public health burden because of the large number of hospitalizations and the cost of care. Despite treatment, patients with ADHF have both an increased mortality risk and a high risk of needing hospital readmission. Thus, new treatment options are needed. Ularitide is a synthetic form of urodilatin, the natriuretic peptide that is formed in the kidney. This peptide has natriuretic, diuretic, and vasodilatory properties and is being investigated for treating ADHF. In clinical trials, it is being administered intravenously for 48 hours at a dosage of 15 ng/kg/min.</p> <p>Cardioentis, Ltd., Zug, Switzerland</p> <p>Phase III TRUE-AHF trial ongoing</p>	Diuretics Inotropes Nesiritide Vasodilators	Improvement in heart failure symptoms Decreased morbidity Decreased mortality Improved quality of life
Targeted ventricular reshaping (VenTouch System) for treatment of functional mitral regurgitation	Patients in whom functional mitral regurgitation (MR) has been diagnosed	<p>MR is a cardiac valve disease that typically occurs slowly without symptoms as progressive damage to the mitral valve prevents the mitral leaflets from closing properly. Poorly functioning leaflets allow blood to flow backward between the chambers as the heart pumps. Left untreated, severe MR can lead to heart failure and serious cardiac arrhythmias. Some patients are not candidates for open surgery and could benefit from a minimally invasive option. The VenTouch Targeted Ventricular Reshaping System is a minimally invasive device intended to repair the root cause of MR. It consists of an impermeable bladder that is positioned over a targeted area of the posterior and septal lateral left ventricle. The bladder is then injected with a saline solution until the desired level of regurgitation is achieved. The system applies a light amount of pressure that forces valve leaflets closer together, thus reducing regurgitation. The device is implanted without open surgery or cardiopulmonary bypass. After implantation, the device reportedly can be adjusted in the office setting via a permanently accessible, subcutaneous port.</p> <p>Mardil Medical, Inc., Plymouth, MN</p> <p>Pilot trial completed</p>	MitraClip Clip Delivery System (percutaneous minimally invasive) Mitral valve surgery Pharmacotherapy	Reduced risk of cardiac events Reduced mitral regurgitation Reduced operative morbidity Reduced mortality Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Transcatheter mitral valve repair (MitraClip) for treatment of mitral regurgitation	Patients with degenerative mitral valve disease with prolapse who are not good candidates for open surgical repair	<p>Mitral regurgitation (MR) is a cardiac valve disease that typically occurs slowly without symptoms as progressive damage to the mitral valve prevents the mitral leaflets from closing properly. Poorly functioning leaflets allow blood to flow backward between the chambers as the heart pumps. Left untreated, severe MR can lead to congestive heart failure or serious cardiac arrhythmias. Some patients are not candidates for open surgery and could benefit from a minimally invasive option. The MitraClip® purportedly provides a minimally invasive transcatheter approach that requires a transseptal puncture to access the left heart chambers. In lieu of sutures, a flexible metal clip covered in polyester fabric (MitraClip) is used to grasp both leaflets of the mitral valve, thus providing for greater closure and leak reduction. The device is intended for patients whose valve disease originates mainly from the center of the valve.</p> <p>Abbott Laboratories, Abbott Park, IL</p> <p>FDA approved Oct 2013 for use in patients "with significant symptomatic degenerative mitral regurgitation who are at prohibitive risk for mitral valve surgery"</p>	Open surgical mitral valve repair Pharmacotherapy	Decreased cost of HF complications Reduced mitral regurgitation Slowed disease progression Improved quality of life
Transcatheter mitral valve (Tiara) for treatment of mitral regurgitation	Patients in whom severe mitral regurgitation (MR) has been diagnosed	<p>MR is a cardiac valve disease that typically occurs slowly without symptoms as progressive damage to the mitral valve prevents the mitral leaflets from closing properly. Poorly functioning leaflets allow blood to flow backward between the chambers as the heart pumps. Left untreated, severe MR can lead to congestive heart failure or serious cardiac arrhythmias. Some patients are not candidates for open surgery and could benefit from a minimally invasive option. The transcatheter mitral valve (Tiara) implantation uses fluoroscopic guidance in a minimally invasive procedure to replace the native mitral heart valve without open-heart surgery; a 32-French-diameter catheter is used for delivery of a self-expanding nitinol frame stent with a bovine pericardial tissue valve. According to the manufacturer, the valve is "shaped to match the natural orifice of the mitral valve and minimize obstruction of the LV [left ventricular] outflow tract." It is implanted using a transapical, transcatheter approach. Rather than repairing the mitral valve, the Tiara valve is intended to replace the diseased valve.</p> <p>Neovasc, Inc., Vancouver, British Columbia, Canada</p> <p>Pilot trial completed; FDA approved start of investigational device exemption trial (TIARA-I)</p>	MitraClip Open surgical mitral valve repair Pharmacotherapy	Reduced MR Slowed disease progression Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Ultrasound (ClotBust-ER) for treatment of acute ischemic stroke</p>	<p>Patients in whom acute ischemic stroke has been diagnosed</p>	<p>Although stroke is a leading cause of death in the U.S., only a single drug, tissue plasminogen activator (tPA), is approved for neuroprotection. It is effective only when administered within a narrow window of symptom onset, and only a very small percentage of patients experiencing an acute stroke receive tPA because most do not present for treatment within the necessary time frame. Transcranial ultrasound is a new treatment intended to dissolve blood clots causing ischemic stroke. However, technical challenges are associated with administering transcranial ultrasound, and sonographers capable of detecting occluded cerebral artery segments are available only in specialized stroke centers or emergency departments. ClotBust™-ER is a hands-free ultrasound device that employs multiple transducers operating at 2 MHz. It is intended to deliver therapeutic ultrasound energy to the vessel occlusion in the brain to treat ischemic stroke in patients eligible for intravenous thrombolytic therapy. The system includes multiple ultrasound transducers mounted on an adjustable head frame worn by the sonographer to administer therapeutic ultrasound in the principal regions in which the majority of vessel occlusions in the brain occur. Because the transducers self-align based on anthropometric landmarks, they do not need to be aimed by a trained sonographer.</p> <p>Cerevast Therapeutics, Inc., Redmond, WA</p> <p>Phase III trial ongoing</p>	<p>Anticoagulant therapy (e.g., tPA [alteplase], aspirin) as indicated by patient history and time of presentation for care</p>	<p>Improved clot lysis Reduced stroke-related morbidity and mortality</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Ultrasound-guided external focused ultrasound (Kona Surround Sound) for treatment-resistant hypertension</p>	<p>Patients in whom treatment-resistant hypertension has been diagnosed</p>	<p>Despite available pharmacotherapies for treating hypertension, many cases of are not well controlled. Treatment-resistant hypertension is associated with high morbidity (e.g., end-organ damage) and mortality, and novel interventions are needed for this population. Focused ultrasound therapy might offer an option for this patient population. Hyperactivity of the afferent and efferent sympathetic nerves from and to the kidneys are thought to play a role in blood pressure regulation and the pathophysiology of hypertension, and deactivating these nerves might reduce this hyperactivity, potentially lowering blood pressure. The Kona Surround Sound[®] system uses a mobile platform consisting of ultrasound image-guided focused ultrasound energy. The ultrasound imaging component tracks the position of renal nerves and delivers focused ultrasound energy externally to ablate them without damaging the renal artery. It is distinguished from magnetic resonance-guided focused ultrasound in that it uses an ultrasound platform for both the imaging and the ablation. According to the manufacturer, the noninvasive, mobile delivery platform system provides an alternative to minimally invasive, catheter-based renal denervation; it can be performed in any hospital exam room and does not require the use of a catheterization laboratory.</p> <p>Kona Medical, Inc., Bellevue, WA</p> <p>Phase II trial ongoing</p>	<p>Catheter-based renal denervation systems (in development) Optimal medical therapy with 3 antihypertensive agents Renal artery stents</p>	<p>Controlled hypertension with fewer or no medications Reduced rates of blindness, heart attack, kidney failure, and stroke</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Vagus nerve stimulation (CardioFit) for treatment of heart failure	Patients in whom severe congestive heart failure (HF) has been diagnosed	<p>Data from 2007 to 2010 from the National Health and Nutrition Examination Survey indicate that 5.1 million people older than the age of 20 years in the U.S. have HF. About 50% of people with HF die within 5 years of diagnosis. Projections suggest that the prevalence of HF will increase 25% from 2013 to 2030 and that costs will increase 120%. Treatments for HF depend on the stage of disease. CardioFit® vagus nerve stimulation is an implantable device intended to improve heart-pumping capacity in patients with severe congestive HF. The system is intended to stimulate the vagus nerve, which purportedly controls parasympathetic innervation of the heart. The company purports that stimulation will stimulate the parasympathetic nervous system, potentially lowering the heart rate, lessening the heart's workload, and alleviating heart failure symptoms. The system consists of a stimulator that is implanted subcutaneously in the right subclavicular region (similar to a pacemaker); a sensing lead, which is passed through a vein into the right ventricle where it monitors heart activity and can halt stimulation as needed; and a stimulation lead, placed around the right vagus nerve about 2–3 cm below the carotid artery bifurcation. The stimulator is wirelessly programmed by the clinician. The manufacturer states that the procedure can be conducted using either local or general anesthesia.</p> <p>BioControl Medical, Yehud, Israel</p> <p>Phase III INOVATE-HF investigational device exemption trial expanded to allow full enrollment May 2013 in final phase of pivotal trial; trial is ongoing</p>	<p>Angiotensin-converting enzyme inhibitors Angiotensin II receptor blockers Beta blockers Digoxin Diuretics Heart transplantation Minimally invasive heart surgery Ventricular assist devices</p>	<p>Improved left ventricular ejection fraction Improved 6-minute walk test Reduced need for medication Improved quality of life</p>
Vepoloxamer for treatment of acute limb ischemia	Patients in whom acute limb ischemia has been diagnosed	<p>Acute limb ischemia results from a blood flow obstruction caused suddenly by an embolism or thrombosis. Patients with acute limb ischemia experience poor outcomes, with many requiring amputation. Treatment strategies target thrombolysis of the obstruction with pharmacological agents or surgery. Vepoloxamer (MST-188) is a pharmaceutical agent being investigated as adjunct therapy for patients with acute limb ischemia currently treated with tissue plasminogen (tPA). It purportedly improves the clot-busting action of tPA and minimizes perfusion injury. According to the manufacturer, vepoloxamer inhibits multiple inflammatory processes and binds to damaged cellular membranes, thus increasing blood flow to the extremities. In clinical trials, the drug is being injected via continuous fusion, 100 mg/kg, for 1 hour followed by 30 mg/kg/hour, for up to 48 hours.</p> <p>Mast Therapeutics, Inc., San Diego, CA</p> <p>Phase II trial ongoing; FDA granted orphan drug and fast-track statuses</p>	<p>Surgery Thrombolytics</p>	<p>Improved circulation Reduced need for amputation Reduced morbidity and mortality</p>

Table 4. AHRQ Priority Condition: 04 Dementia (including Alzheimer’s): 15 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>[18F] FDDNP positron emission tomography for diagnosis of chronic traumatic encephalopathy</p>	<p>Patients at risk of developing chronic traumatic encephalopathy (CTE)</p>	<p>An estimated 1.6 million to 3.8 million repetitive, mild traumatic brain injuries occur in contact sports each year. CTE is a progressive neurodegenerative disease seen most often in athletes with a history of repetitive brain trauma. It can lead to dementia, memory loss, anger, confusion, and depression. The disease is diagnosed only after evaluating brain tissue posthumously for evidence of degenerated tissue and elevated tau protein. To find ways to diagnose the disease in living patients, researchers have studied positron emission tomography (PET) imaging with 2-(1-[6-[(2-[fluorine-18]fluoroethyl)(methyl)amino]-2-naphthyl)-ethylidene]malononitrile (FDDNP). FDDNP is a radiotracer that binds to tau protein and amyloid deposits and may prove useful in locating these tau protein deposits in the amygdala and subcortical regions of the brain. In an unphased trial of PET imaging with FDDNP, results showed that compared with tau protein deposits in control patients, increased tau protein deposits were present in these regions in the 5 retired National Football League players who participated.</p> <p>University of California, Los Angeles</p> <p>Phase II trial ongoing; unphased trial completed</p>	<p>Posthumous diagnosis</p>	<p>Improved treatment protocol Reduced mild cognitive impairment and other CTE symptoms Improved quality of life</p>
<p>Beta-amyloid precursor protein site–cleaving enzyme inhibitor (MK-8931) for treatment of Alzheimer’s disease</p>	<p>Patients in whom probable, prodromal, or mild to moderate Alzheimer’s disease (AD) has been diagnosed</p>	<p>No approved disease-modifying agents are available for treating AD; therapy is limited to managing symptoms. MK-8931 is a beta-amyloid precursor protein site–cleaving enzyme (BACE) inhibitor being investigated for treating AD and prodromal AD. BACE is an enzyme known to play a role in initiating synthesis of amyloid beta peptide. Because abnormal amyloid beta peptide accumulation is hypothesized to be a biomarker of AD and AD progression, researchers purport that BACE inhibitors may potentially halt or delay AD. In clinical trials, MK-8931 is administered as a once-daily oral dose of 12 or 40 mg.</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase II/III and III trials ongoing</p>	<p>Behavior therapy Deep brain stimulation (investigational) Nutritional therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)</p>	<p>Reduced amyloid beta load in brain Regressed or slowed disease progression Reduced morbidity and mortality Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Brexpiprazole for treatment of agitation associated with Alzheimer's disease	Patients in whom probable Alzheimer's disease (AD) has been diagnosed	<p>Worldwide, more than 35 million people have AD; in the U.S, an estimated 5 million people have symptoms of AD and it is the 6th-leading cause of death. Besides the neurocognitive declines associated with the disease, patients with AD also have physical or verbal outbursts not associated with confusion or patient needs; as a group, these behaviors are classified as agitation. Drugs commonly used to treat agitation are not consistently effective and have multiple side effects. Additional, effective pharmaceutical interventions are needed. Neurobiologic data suggest that agitation may be the result of reduced serotonin levels and increased levels of noradrenaline and dopamine. Brexpiprazole (OPC-34712) is a dopamine D₂ receptor partial agonist purported to reduce agitation in patients with AD. In proposed clinical trials, brexpiprazole is administered in tablet form, daily.</p> <p>Otsuka Holdings Co., Ltd., Tokyo, Japan, in collaboration with H. Lundbeck a/s, Valby, Denmark</p> <p>Multiple phase III trials ongoing</p>	<p>Caregiver intervention and environmental modification (removed or alleviated stressors) Pharmaceutical combinations that are not antipsychotics (e.g., antiepileptics, lithium, anxiolytics, analgesics, beta-adrenoceptor antagonists, cannabinoid receptor agonists, hormonal agents) Physician-selected typical and atypical antipsychotics Prazosin</p>	<p>Potentially reduced cost of care Reduced agitation (as measured by accepted rating scales and inventories) Improved quality of life</p>
Leuco-methylthionium (LMTX) for treatment of Alzheimer's disease and behavioral variant frontotemporal dementia	Patients in whom probable Alzheimer's disease (AD) or probable behavioral variant frontotemporal dementia (bvFTD) has been diagnosed	<p>No approved disease-modifying agents are available for treating AD or bvFTD; therapy is limited to managing symptoms. As these forms of dementia progress, patients' cognitive and psychosocial skills decline, severely limiting functional independence. Leuco-methylthionium (LMTX) is an investigational therapy that inhibits tau aggregation and purportedly dissolves tau protein tangles and oligomers. These tangles and oligomers are classic biomarkers of probable dementia states, including AD; investigators hypothesize that preventing their formation may reverse dementia or delay disease progression. In clinical trials, LMTX is administered daily as an oral tablet, at varying doses up to 300 mg.</p> <p>TauRx Pharmaceuticals Ltd., Singapore, Republic of Singapore</p> <p>Multiple phase III trials ongoing</p>	<p>Behavioral therapy Deep brain stimulation (investigational) Nutritional therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)</p>	<p>Increased survival Slowed progression of AD symptoms Slowed progression of bvFTD symptoms Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Magnetic resonance imaging and neuropsychologic assessment for diagnosis of Alzheimer's disease	Patients in whom symptoms of mild cognitive impairment indicative of probable Alzheimer's disease (AD) have been diagnosed	<p>A diagnosis of probable AD can be made only after the disease has progressed to a point at which cognitive impairment and disease-associated biomarkers (e.g., accumulation of beta-amyloid protein or presence of tau protein tangles) are irreversible. The ability to advance diagnostic timelines might enable better treatment outcomes for patients at risk of AD. This diagnostic method combines neuropsychologic assessment of cognitive function (and impairment) with analysis of brain structural data acquired using magnetic resonance imaging (MRI). The combination of diagnostic tools purportedly increases the classification, sensitivity, and specificity of identifying patients who will progress to dementia indicative of probable AD. Results of reported studies identify specific cognitive predictors (deficits in free recall and recognition episodic-memory tasks) and brain structural changes (thinning of right anterior cingulate gyrus) as highly suggestive of progression to dementia.</p> <p>Dr. Sylvie Belleville at Institut Universitaire de Gériatrie de Montréal/Université de Montréal, Montreal, Quebec, Canada</p> <p>No registered ongoing clinical trials</p>	Cognitive assessment Noninvasive retinal imaging (in development) Structural neuroimaging evaluation (PET imaging)	New diagnostic models Contribution to comprehensive early intervention programs Improved quality of life
Nicotinic alpha-7 agonist (EVP-6124) for treatment of Alzheimer's disease	Patients in whom probable Alzheimer's disease (AD) has been diagnosed	<p>No approved disease-modifying agents are available for treating AD; available therapies are limited to symptom management. In patients with AD, cells in the medial temporal lobe begin to die, interrupting memory storage and recall. AD is also marked by a decline in the amount of cholinergic neurons and the associated acetylcholine (ACh) neurotransmitter in the brain. EVP-6124 is an alpha-7 nicotinic ACh receptor agonist that purportedly has a novel mechanism for treating cognitive impairment in AD, acting as a co-agonist with ACh to enhance cognition. By acting as a co-agonist and sensitizing the alpha-7 receptor, EVP-6124 purportedly allows smaller amounts of ACh to activate the receptor. In clinical trials, patients received daily capsules of EVP-6124 at doses of 0.1, 0.3, or 1.0 mg, alone or with previously prescribed donepezil or rivastigmine.</p> <p>FORUM Pharmaceuticals, Inc., (formerly EnVivo Pharmaceuticals), Watertown, MA</p> <p>3 phase III trials ongoing; also being investigated for treating cognitive impairment comorbid to schizophrenia</p>	Behavior therapy Deep brain stimulation (investigational) Nutritional therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)	Reduced caregiver burden Reduced cost of care Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Noninvasive digital retinal fluorescence imaging for screening for Alzheimer's disease</p>	<p>Patients at risk for developing Alzheimer's disease (AD)</p>	<p>A diagnosis of probable AD can be made only after the disease has progressed to a point at which cognitive impairment and disease-associated biomarkers (e.g., accumulation of beta-amyloid protein or presence of tau protein tangles) are irreversible. The ability to advance diagnostic timelines with an early screening test might enable better outcomes for patients at risk of AD. Research has shown that beta-amyloid plaques, commonly hypothesized to indicate AD in living and postmortem patient analyses, are localized in brain regions and in the retina. The NeuroVision Imaging System (NVI) is a noninvasive digital retinal fluorescence imaging technology that reportedly can accurately identify these plaques in retinal tissue of patients 15–20 years earlier than standard clinical diagnostics. It is intended for use in screening as an adjunct to brain imaging. The digital fluorescence imaging technology uses curcumin, a component of tumeric, as a plaque labeling agent. Patients receive a curcumin supplement during an office visit and return another day for imaging. The curcumin shows as a fluorescent yellow color to display the amyloid-beta plaques in people's retinas. If that test results correlates with brain images, researchers believe it can be used for screening for AD. The patient sits in front of the imaging machine with head placed in a chin and forehead positioning rest during the procedure. In clinical trials, patients ingest 20 g curcumin, mixed in pudding, along with 500 IU vitamin E, for 7 days, with retinal imaging conducted at baseline and after 7 days.</p> <p>NeuroVision Imaging, LLC, Sacramento, CA in collaboration with Cedars-Sinai Medical Center, Los Angeles, CA</p> <p>Unphased clinical trial registered in Australia; company announced plans to submit premarket notification to seek FDA 510(k) clearance in late 2014</p>	<p>Cognitive assessment of probable AD Combined brain imaging analysis (MRI) with neuropsychologic assessment (in development) Structural neuroimaging evaluation (positron emission tomography imaging) of probable AD</p>	<p>New diagnostic models Contribution to comprehensive early intervention programs Improved patient quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label atomoxetine (Strattera) for treatment of mild cognitive impairment	Patients in whom mild cognitive impairment (MCI) has been diagnosed	<p>MCI may be a precursor to Alzheimer's disease (AD). No disease-modifying agents are available for treating AD; therapy is limited to managing symptoms. Atomoxetine (Strattera®) is a selective norepinephrine reuptake inhibitor (SNRI) that is approved for improving attention span and decreasing impulsiveness and hyperactivity in children and adults with attention-deficit/hyperactivity disorder. SNRIs have been demonstrated to increase brain levels of norepinephrine, a neuromodulator implicated in behavioral control; consequently, investigators hypothesize that these properties may make atomoxetine effective for treating MCI. In clinical trials, atomoxetine is administered orally, at dosages up to 100 mg, daily.</p> <p>Eli Lilly and Co., Indianapolis, IN (manufacturer) Emory University, Atlanta, GA, with the National Institute on Aging, Bethesda, MD (investigators)</p> <p>2 phase II trials ongoing</p>	Behavior therapy Nutrition therapy Pharmacotherapy (approved; e.g., donepezil, galantamine, memantine, rivastigmine)	Improved cognitive performance Delayed progression to AD Reduced morbidity
Off-label carvedilol (Coreg) for treatment of Alzheimer's disease	Patients in whom probable mild Alzheimer's disease (AD) has been diagnosed	<p>No approved disease-modifying agents are available for treating AD; therapy is limited to managing symptoms. Carvedilol (Coreg) is a beta-adrenergic receptor antagonist indicated for hypertension and certain types of heart failure. Research suggests that inhibiting the beta adrenergic system might reduce amyloid beta load and slow cognitive decline from AD. Carvedilol is available as tablets in dosages from 3.125 to 25 mg; a controlled-release formulation is also available at dosages from 10–80 mg. In clinical trials for patients with mild AD, carvedilol is administered daily, at a dosage of 25 mg.</p> <p>GlaxoSmithKline, Middlesex, UK (manufacturer) Johns Hopkins University, Baltimore, MD (study sponsor) Mount Sinai School of Medicine, New York, NY (study sponsor)</p> <p>Phase IV trial ongoing</p>	Behavior therapy Deep brain stimulation (investigational) Nutritional therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)	Decreased beta-amyloid levels in cerebrospinal fluid Delayed disease progression Improved episodic memory Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label deep brain stimulation for treatment of Alzheimer's disease	Patients in whom probable Alzheimer's disease (AD) has been diagnosed	<p>No approved disease-modifying agents are available for treating AD; available therapy options are limited to symptom management. Deep brain stimulation (DBS) involves implanting a battery-operated neurostimulator in the brain to deliver electrical stimulation to targeted areas that moderate neural activity in the memory circuit, including the entorhinal and hippocampal areas. Researchers have suggested that continuous stimulation in these areas might reverse impaired glucose utilization in the temporal and parietal lobes, which some researchers hypothesize are involved in AD.</p> <p>Various study sponsors: Functional Neuromodulation, Ltd., Toronto, Ontario, Canada (ADvance study using Medtronic DBS system) Ohio State University, Columbus (appears to be an independent study)</p> <p>1 trial completed, 1 phase I/II study ongoing; 1 unphased trial ongoing. Case studies of DBS targeting nucleus basalis of Meynert and fornix have been reported</p>	Behavioral therapy Nutritional therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)	Delayed progression to AD Reduced morbidity Improved quality of life
Off-label intranasal insulin for treatment of Alzheimer's disease	Patients in whom probable Alzheimer's disease (AD) has been diagnosed	<p>No approved disease-modifying agents are available for treating AD; therapy is limited to managing symptoms. Intranasal insulin represents a new mechanism of action for treating AD. Insulin is known to play a role in normal brain function, modulating glucose metabolism in the hippocampus, facilitating memory at optimal levels, modulating levels of beta amyloid, and providing neuroprotection for synapses against beta amyloid. Patients with AD have reduced levels of insulin and insulin activity. Because peripherally-delivered insulin has significant potential safety risks, multiple researchers are investigating intranasally delivered insulin (branded insulin, delivered via a nasal drug delivery device) for treating AD. In completed and ongoing clinical trials, various insulin formulations are intranasally administered at dosages ranging from 10 to 40 IU daily.</p> <p>HealthPartners Research Foundation, Minneapolis, MN University of Kansas, Lawrence University of Washington, Seattle Wake Forest University, Winston-Salem, NC, in collaboration with Alzheimer's Disease Cooperative Study, a service of the National Institute on Aging and University of California, San Diego</p> <p>Phase II and II/III trials ongoing</p>	Behavioral therapy Deep brain stimulation (investigational) Nutritional therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)	Slowed disease progression or regression Improved memory Improved long-term outcomes Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label pioglitazone to delay onset of mild cognitive impairment due to Alzheimer's disease	Patients at risk of developing mild cognitive impairment (MCI) due to Alzheimer's disease (AD)	<p>AD is a progressive, degenerative, neurologic condition characterized by cognitive impairment and memory loss. It is the most common cause of dementia among older people. In patients with AD, cells in the medial temporal lobe begin to die, interrupting memory storage and recall. Patients with early onset forms of AD exhibit MCI, a neuropsychological status characterized by small but significant declines in working memory, short- and long-term memory, and general executive functioning. Pioglitazone is a glitazone approved for treating diabetes mellitus. Researchers hypothesize that pioglitazone's anti-inflammatory properties may delay the onset of MCI in patients who have a genetic predisposition to developing AD. In clinical studies, pioglitazone is administered orally at low dosages, up to 0.8 mg, once daily for up to 5 years.</p> <p>Takeda Pharmaceutical Co., Ltd., Osaka, Japan (manufacturer) Zinfandel Pharmaceuticals, Inc., Durham, NC (clinical trial partner)</p> <p>2 Phase III trials ongoing; case report published in 2014</p>	Behavioral therapy Deep brain stimulation (investigational) Nutritional therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)	Delayed onset of MCI symptomatic of early AD Reduced long-term cost of care Improved quality of life
Receptor for advanced glycation-endproducts inhibitor (TTP448) for treatment of mild Alzheimer's disease	Patients in whom mild probable Alzheimer's disease (AD) has been diagnosed	<p>No approved disease-modifying agents are available for treating AD; available therapy options are limited to managing symptoms. In many cases of AD, postmortem analysis of the patient's brain tissues reveals an accumulation of amyloid-beta, in the form of amyloid plaques. Researchers hypothesize that these accumulations trigger a cycle of chronic inflammation and inflammatory response, also involving nuclear factor kappa B (NF-κB) and the receptor for advanced glycation endproducts (RAGE). Preliminary research suggests that regulating NF-κB or RAGE activity may reduce amyloid-beta accumulation and subsequently prevent or minimize cognitive and behavioral symptoms associated with AD. TTP448 is a small-molecule drug purported to block endogenous ligands, including amyloid-beta, from binding to RAGE. In late-phase clinical trials, TTP448 is administered orally, 5 mg, once daily, for 18 months.</p> <p>TransTech Pharma, Inc., High Point, NC</p> <p>Phase III trial ongoing; Mar 2013, FDA granted fast-track status</p>	Behavior therapy Deep brain stimulation (investigational) Nutritional therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)	Reduced amyloid plaque accumulation Reduced caregiver burden Reduced cognitive decline Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Selective serotonin receptor-6 antagonist (Lu AE58054) plus donepezil for treatment of Alzheimer's disease</p>	<p>Patients in whom probable Alzheimer's disease (AD) has been diagnosed</p>	<p>No approved disease-modifying agents are available for treating AD; therapy is limited to managing symptoms. Lu AE58054 is a serotonin 5-HT₆ antagonist intended to treat cognitive impairments symptomatic of AD and other neurocognitive disorders, as a complement to donepezil. Clinical trials are under way to investigate an optimal dosage, with patients receiving oral doses of 30 or 60 mg Lu AE58054 paired with 10 mg donepezil, once daily.</p> <p>H. Lundbeck a/s, Valby, Denmark, and Otsuka Holdings Co., Tokyo, Japan</p> <p>4 phase III trials ongoing</p>	<p>Behavioral therapy Deep brain stimulation (investigational) Nutritional therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)</p>	<p>Reduced cognitive impairment symptoms Improved quality of life</p>
<p>Solanezumab for prevention or treatment of Alzheimer's disease</p>	<p>Patients in whom mild probable Alzheimer's disease (AD) has been diagnosed</p>	<p>No approved disease-modifying agents exist for treating AD; therapy is limited to managing symptoms. Solanezumab is a fully humanized anti-beta-amyloid antibody that binds to soluble beta amyloid and is intended to draw the peptide away from the brain through the blood to promote clearance of beta-amyloid protein from damaged sites in the brain. It is intended for mild-to-moderate AD and, in clinical trials, is administered at a dosage of 400 mg, intravenously, every 4 weeks for 80 weeks.</p> <p>Eli Lilly and Co., Indianapolis, IN</p> <p>Multiple phase III trials ongoing (mild AD treatment and at-risk patient prevention)</p>	<p>Behavioral therapy Deep brain stimulation (investigational) Nutritional therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)</p>	<p>Decreased brain beta-amyloid load Slowed or halted disease progression Improved memory and cognition Improved survival Improved quality of life</p>

Table 5. AHRQ Priority Condition: 05 Depression and Other Mental Health Disorders: 18 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Avatar system for treatment of auditory hallucinations in schizophrenia	Patients in whom schizophrenia has been diagnosed	<p>Of 1.4 million people in the U.S. who have schizophrenia with auditory hallucinations, 10% do not respond to available psychopharmaceuticals. Furthermore, despite an apparently high response to medication, 80% of individuals with schizophrenia are functionally unable to work. Thus, new treatments for schizophrenia are urgently needed. The avatar computer-based system exposes patients with treatment-resistant disease to an avatar that looks, speaks, and sounds like the voices they hear in their heads. The therapist (who is hidden) controls what the avatar says. During the sessions, the patient must learn to tolerate and fight back against the avatar's frightening voice and messages. Avatar therapy purportedly reduces the frequency and severity of these patients' auditory hallucinations; it is administered across seven 30-minute sessions.</p> <p>University College London, London, UK Institute of Psychiatry, King's College London, London, UK</p> <p>Pilot study with 16 patients completed, with results published in 2013</p>	Cognitive behavior therapy Cognitive remediation Computerized cognitive training	Fewer symptoms Improved functioning Improved quality of life
Bitopertin for treatment of negative symptoms of schizophrenia	Patients in whom schizophrenia has been diagnosed	<p>Existing pharmacotherapies for schizophrenia may have limited efficacy and are associated with unwanted side effects in many patients. Additionally, available treatments inadequately address the negative and cognitive symptoms of schizophrenia. Bitopertin is a glycine transporter type 1 inhibitor. Elevating extracellular synaptic glycine concentration by blocking glycine transporter type 1 has been hypothesized to potentiate NMDA receptor function. It is intended to mediate negative symptoms, which include blank stares, monotone and monosyllabic speech, lack of animation, seeming lack of interest in the world and other people, and inability to feel pleasure. Available treatment focuses on positive symptoms. In trials, the drug is being given orally, once daily, at unspecified dose levels.</p> <p>F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>3 phase III trials ongoing and 1 phase III trial completed; Jan 2014, manufacturer reported that phase III trials did not meet primary endpoints</p>	Pharmacotherapy (e.g., atypical antipsychotics)	Decreased symptom severity Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Bright-light adjunctive therapy for nonseasonal major depressive disorder and bipolar major depression	Patients in whom nonseasonal major depressive disorder (MDD) or bipolar depression (BPD) has been diagnosed	<p>Many pharmacologic and psychotherapeutic options are available for patients in whom MDD or BPD has been diagnosed, yet fewer than half of these patients achieve remission. Additionally, many available treatments have undesired side effects. Bright-light therapy (BLT) has long been used to treat seasonal affective disorder but not for nonseasonal forms of MDD. The exact mechanism of action unknown, but BLT is thought to target depression-associated neurotransmitter systems (serotonin, noradrenaline, dopamine) and the same brain structures as antidepressant pharmacotherapy. Ongoing clinical trials are investigating BLT as a standalone or adjunctive treatment, with varied dosing protocols, for patients with MDD or BPD with or without comorbidities.</p> <p>Douglas Mental Health University Institute, Montreal, Quebec, Canada National Institute of Mental Health, Bethesda, MD New York State Psychiatric Institute, New York, NY University of British Columbia, Vancouver, Canada University of Pittsburgh, Pittsburgh, PA</p> <p>Phase III trial completed (Canada); unphased and early phase trials ongoing</p>	Cognitive behavior therapy Deep brain stimulation Electroconvulsive therapy Off-label ketamine Off-label scopolamine Psychotherapy Selective serotonin reuptake inhibitors Serotonin-norepinephrine reuptake inhibitors Transcranial magnetic stimulation Tricyclic antidepressants Vagal nerve stimulation	Improved depression rating scale scores Reduced symptom severity Improved quality of life
Combination opioid receptor modulator (ALKS 5461) for treatment of major depressive disorder	Patients in whom major depressive disorder (MDD) or treatment-resistant MDD has been diagnosed	<p>Fewer than half of patients with MDD achieve remission with approved antidepressant therapy, and available pharmacotherapies are often associated with undesirable side effects. ALKS 5461 is a novel adjunctive medication that purportedly safely treats MDD through a combination of agonists and antagonists, including the selective mu-opioid receptor modulator samidorphan, that act on opioid receptors. In late-phase clinical trials, ALKS 5461 is administered as a sublingual tablet, once daily, at 1 of 2 experimental titration schedules.</p> <p>Alkermes, plc, Dublin, Ireland</p> <p>Multiple pivotal phase III trials ongoing; 12 phase III trials (pivotal clinical development program) planned; Oct 2013, FDA granted fast-track status</p>	Drugs (e.g., selective serotonin reuptake inhibitors, serotonin-norepinephrine reuptake inhibitors, tricyclic antidepressants) Procedures (e.g., deep brain stimulation, electroconvulsive therapy, transcranial magnetic stimulation [investigational], vagus nerve stimulation) Psychotherapy	Improved depression rating scale scores Reduced symptom severity Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Deep brain stimulation of the subcallosal cingulate (Libra System) for treatment-resistant major depressive disorder</p>	<p>Patients in whom treatment-resistant depression or major depressive disorder (MDD) has been diagnosed</p>	<p>Fewer than half of patients with MDD achieve remission with approved antidepressant therapy, and available pharmacotherapies are often associated with undesirable side effects. When multiple medications, psychotherapy, and electroconvulsive therapy have failed, no treatment options are available for MDD. The Libra™ Deep Brain Stimulation (DBS) System is an implant intended to send mild pulses of current from an implanted device to stimulate the brain. The mechanism of action of DBS is unknown, but investigators hypothesize that electrical stimulation modulates activity in brain areas believed to be hyperactive in patients with MDD. For treating MDD, the manufacturer is investigating placement of the leads in Brodmann area 25 of the subcallosal cingulate gyrus.</p> <p>St. Jude Medical, Inc., St. Paul, MN</p> <p>Unphased trials ongoing</p>	<p>DBS (with other systems or in other brain areas) Electroconvulsive therapy Off-label ketamine Off-label scopolamine Repetitive transcranial magnetic stimulation Vagus nerve stimulation</p>	<p>Improved depression rating scale scores Reduced symptom severity Improved quality of life</p>
<p>Ecopipam for treatment of Tourette's syndrome</p>	<p>Patients in whom Tourette's syndrome (TS) has been diagnosed</p>	<p>About 200,000 people in the U.S. have received a diagnosis of TS, and many patients have severely debilitating TS that does not respond to available pharmacotherapy, or they experience serious adverse events. An unmet need exists for more effective treatments. Dopamine D₁ receptor overactivity is thought to be a primary cause of TS symptoms, particularly tics. Ecopipam is a selective dopamine 1 (D₁)/dopamine 5 (D₅) antagonist under investigation as a potential treatment for prominent TS symptoms. In clinical trials, ecopipam is administered orally in the evening for 8 weeks, at a dosage of 50 mg/day for the 1st 2 weeks, and 100 mg/day for 6 weeks.</p> <p>Psydon Pharmaceuticals, Inc., Germantown, MD</p> <p>Phase II trial ongoing; Sept 2010, FDA granted orphan status</p>	<p>Palliative pharmacotherapy (e.g., antidepressants, botulinum toxin type A [Botox] injections, central adrenergic inhibitors, fluphenazine, pimozide, stimulant medications)</p>	<p>Reduced tic frequency and severity Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Mobile apps to aid in treatment of major depressive disorder</p>	<p>Patients in whom major depressive disorder has been diagnosed</p>	<p>Psychotherapy for major depression traditionally involves in-person meetings between a therapist and patient or client. This method has limitations, including issues of access by all those in need, lack of intervention at critical moments, and an inability to reach individuals who lack the means or willingness to enter a traditional therapeutic relationship. To address these unmet needs, researchers have created mobile applications (“apps”) that purportedly provide psychotherapeutic benefit to patients with depression. These apps range in their capabilities and intended benefits. Features include medication adherence monitoring, real-time information feedback to health professionals, tools for patient self-assessment of emotional state, cognitive behavioral modification guides, and tools or resources intended to develop or support coping and other emotional skills.</p> <p>Various research institutions, including Northwestern University, Evanston, IL; University of California, San Francisco; National Institute of Mental Health, Bethesda, MD</p> <p>Clinical trials ongoing; pilot data and systematic review of small trials published in 2013</p>	<p>Cognitive behavior therapy In-person psychotherapy Internet-delivered psychotherapy (not on a mobile device) Video-game based cognitive behavior therapy</p>	<p>Improved depression rating scale scores Reduced symptom severity Improved quality of life</p>
<p>Nicotinic alpha-7 agonist (EVP-6124) for adjunctive treatment of cognitive symptoms of schizophrenia</p>	<p>Patients with clinically stable schizophrenia who are being treated with 1 or 2 atypical antipsychotic medications</p>	<p>Existing pharmacotherapies for schizophrenia have limited efficacy and are associated with unwanted side effects in many patients. Additionally, available treatments inadequately address the negative and cognitive symptoms of schizophrenia. EVP-6124 is a selective compound, an alpha-7 nicotinic acetylcholine receptor co-agonist, that acts along with acetylcholine (ACh). EVP-6124 purportedly sensitizes the alpha-7 receptor, allowing smaller amounts of naturally occurring ACh to activate the alpha-7 receptor. The company purports that this mechanism could treat cognitive symptoms of schizophrenia while alleviating the potentially toxic side effects of other systemic compounds (e.g., acetylcholinesterase inhibitors). In ongoing clinical trials, 2 unspecified dose levels are being tested as a once-daily, oral adjunct treatment for patients with clinically stable schizophrenia being treated with 1 or 2 chronic atypical antipsychotic therapies.</p> <p>FORUM Pharmaceuticals (formerly EnVivo Pharmaceuticals), Watertown, MA</p> <p>Phase III trials ongoing; also under investigation for treating cognitive symptoms of mild Alzheimer's disease</p>	<p>Atypical antipsychotics</p>	<p>Improved cognitive symptoms Improved social functioning Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>NMDA receptor modulator (GLYX-13) for treatment-resistant major depressive disorder</p>	<p>Patients in whom major depressive disorder (MDD) has been diagnosed Patients in whom treatment-resistant MDD has been diagnosed</p>	<p>Fewer than half of patients with MDD achieve remission with antidepressant therapy, and available pharmacotherapies are often associated with undesirable side effects. An unmet need exists for safe, effective interventions. GLYX-13, a functional partial agonist selective modulator of the NMDA receptor (NMDAR), is an experimental oral medication purported to treat MDD using a novel mechanism, targeting glycine-site regions of the NMDAR. In clinical trials, GLYX-13 is administered at dosages of 5 or 10 mg/kg, as an adjunct therapy to a patient's current antidepressant prescription.</p> <p>Naurex, Inc., Evanston, IL</p> <p>Multiple phase II trials ongoing; Mar 2014, FDA granted fast-track status to GLYX-13 as an adjunct therapy for treatment-resistant MDD</p>	<p>Cognitive behavioral therapy Combination treatment Other NMDAR modulators (e.g., ketamine) Psychotherapy Selective serotonin reuptake inhibitors</p>	<p>Improved depression rating scale scores Reduced symptom severity Improved quality of life</p>
<p>Off-label armodafinil (Nuvigil) for treatment of binge-eating disorder</p>	<p>Adult patients in whom binge-eating disorder has been diagnosed</p>	<p>No pharmacotherapies are approved by FDA for binge-eating disorder, and off-label pharmacotherapies are associated with limited efficacy, undesirable side effects, and low patient adherence to treatment recommendations. Armodafinil (Nuvigil®) is a wakefulness-promoting drug with an unknown mechanism of action; it was approved in 2007 for treating excessive sleepiness associated with narcolepsy, obstructive sleep apnea, and shift work disorder. Some investigators have suggested that binge-eating disorder may mediate a known relationship between narcolepsy and obesity, so researchers are investigating its off-label use in patients with binge-eating disorder. In a clinical trial, the drug is administered orally, at a variable dosage of 150–250 mg/day.</p> <p>Teva Pharmaceutical Industries, Ltd., Petach Tikva, Israel (manufacturer) Lindner Center of Hope, Mason, OH (investigator)</p> <p>Phase III trial ongoing</p>	<p>Off-label pharmacotherapies (e.g., antiepileptics, norepinephrine reuptake inhibitors, serotonin-norepinephrine reuptake inhibitors)</p>	<p>Reduced binge eating disorder symptoms Reduced morbidity Reduced mortality</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label deep brain stimulation for treatment-resistant Tourette's syndrome	Patients in whom Tourette's syndrome (TS) has been diagnosed	<p>In some patients with TS, symptoms can become severe and unresponsive to adequate management with pharmacotherapy. Deep brain stimulation (DBS) involves implanting a battery-operated neurostimulator in the brain to deliver electrical stimulation to targeted areas, such as the globus pallidus internus, centromedian-parafascicular, or ventralis oralis complex of the thalamus. Studies are testing various stimulation delivery models—including unilateral or bilateral and continuous or intermittent—and targeting various areas in the brain (e.g., globus pallidus, thalamus). Although the mechanism of action is unclear, investigators hypothesize that DBS affects cortico-basal ganglia-thalamocortical circuits, which have been shown to oscillate abnormally in both models of TS and in frequency band recordings of some patients with TS. The type of DBS device being used is not indicated in all ongoing studies, but Medtronic, Inc. (Minneapolis MN), is an example of a company that makes DBS devices that have been approved for other indications, such as Parkinson's disease and obsessive-compulsive disorder.</p> <p>Johns Hopkins University, Baltimore, MD University Hospitals, Cleveland, OH University of Florida Center for Movement Disorders and Neurorestoration, Gainesville, FL Various other universities worldwide</p> <p>Phase II and III trials ongoing</p>	<p>Botulinum toxin type A injections Pharmacotherapy: Antidepressants Central adrenergic inhibitors Fluphenazine Pimozide Stimulant medications</p>	<p>Reduced symptoms Improved quality of life</p>
Off-label intranasal oxytocin for treatment of schizophrenia	Patients in whom schizophrenia has been diagnosed	<p>Existing pharmacotherapies for schizophrenia may have limited efficacy and are associated with unwanted side effects in many patients. Additionally, available treatment options inadequately address the negative and social cognitive symptoms of schizophrenia. Psychotherapeutic interventions are limited by suboptimal efficacy and availability. Release of oxytocin is associated with social bonding, empathy, and trust. Given oxytocin's importance in social behavior, researchers purport it may have utility in improving the negative symptoms of schizophrenia and their social cognition deficits. The drug is under study in varying doses (e.g., 0.6 mL) that are self administered intranasally at varying intervals (e.g., twice daily).</p> <p>Several institutions, including National Institute of Mental Health, Bethesda, MD; University of California, Los Angeles; University of Maryland, College Park; and University of North Carolina, Chapel Hill</p> <p>Phase IV trial completed; phase II and III trials ongoing</p>	<p>Other medications for negative symptoms Behavior therapy</p>	<p>Improved social cognition Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label ketamine for treatment of posttraumatic stress disorder	Patients in whom posttraumatic stress disorder (PTSD) has been diagnosed	<p>PTSD is a mental health disorder marked by experiencing recurrence (flashbacks, nightmares, and event-related negative thoughts), avoidance, and hyperarousal symptoms after a traumatic event. According to the National Institute of Mental Health, 6.8% of adult Americans will experience PTSD during their lifetimes. Many patients with PTSD do not respond adequately to prescribed drugs or psychotherapy; therefore, an unmet need exists for alternative treatments. Ketamine, an FDA-approved anesthetic with known analgesic and amnestic properties, is being investigated for treating both civilian- and combat-related PTSD and treatment-resistant PTSD. In ongoing clinical trials, ketamine is administered intravenously in a single 0.5 mg/kg dose, infused over 40 minutes.</p> <p>Mount Sinai School of Medicine, New York, NY (lead investigator) U.S. Department of Defense, Arlington, VA (collaborator)</p> <p>Phase II trial ongoing</p>	<p>Antidepressants (for PTSD and depression) Antipsychotics (for PTSD and anxiety, paranoia, or other mental health symptoms) Benzodiazepines (for PTSD and sleep or relaxation difficulty) Paroxetine Psychotherapy Sertraline</p>	<p>Reduced symptoms Improved quality of life</p>
Off-label ketamine for treatment-resistant major depressive disorder or bipolar depression	Patients in whom treatment-resistant major depressive disorder (MDD) or bipolar depression (BPD) has been diagnosed	<p>Fewer than half of patients with MDD or BPD achieve remission with approved antidepressant therapy, and available pharmacotherapies are often associated with undesirable side effects. Available options for treatment-resistant MDD or BPD are either surgically invasive (e.g., deep brain stimulation, vagus nerve stimulation) or must be performed under clinical supervision (e.g., transcranial magnetic stimulation, repetitive transcranial magnetic stimulation). Ketamine is an anesthetic under study for rapid relief of severe, treatment-resistant depression and suicidal ideation. The drug is under study in 2 formulations: intravenous administration of 0.1–1.0 mg/kg once or more weekly, and intranasal administration up to 50 mg per single dose; case studies using oral and sublingual ketamine have also been reported for this indication. Ketamine is being studied as both a monotherapy and as an augmentative therapy to electroconvulsive therapy.</p> <p>National Institute of Mental Health (NIMH), Bethesda, MD (sponsor for multiple clinical trials) Various academic and medical institutions (trial sponsors, co-sponsors, and case report publications)</p> <p>Multiple phase II, III, and IV trials ongoing</p>	<p>Deep brain stimulation Electroconvulsive therapy Psychotherapy Selective serotonin reuptake inhibitors Serotonin-norepinephrine reuptake inhibitors Transcranial magnetic stimulation Tricyclic antidepressants Vagal nerve stimulation</p>	<p>Improved depression rating scale scores Reduced symptom severity Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label riluzole (Rilutek) for treatment-resistant major depressive disorder	Patients in whom treatment-resistant depression (TRD) or major depressive disorder (MDD) has been diagnosed	<p>Fewer than half of patients with MDD achieve remission with approved antidepressant therapy, and available pharmacotherapies are often associated with undesirable side effects. Available options for treatment-resistant MDD or BPD are either surgically invasive (e.g., deep brain stimulation, vagus nerve stimulation) or must be performed under clinical supervision (e.g., transcranial magnetic stimulation and repetitive transcranial magnetic stimulation). Riluzole (Rilutek®) is a novel glutamatergic modulator purported to treat MDD by inhibiting glutamate release, enhancing glutamate reuptake, and protecting glial cells against glutamate excitotoxicity. In clinical trials, riluzole is administered at an oral dose of 50–100 mg, daily, and is being investigated as both an individual and adjunctive intervention.</p> <p>Sanofi, Paris, France (manufacturer) Investigators include: Brigham and Women's Hospital, Boston, MA National Institute of Mental Health, Bethesda, MD Yale University, New Haven, CT</p> <p>Phase II trials ongoing; several phase II trials completed; FDA approved for treating amyotrophic lateral sclerosis</p>	Deep brain stimulation Electroconvulsive therapy Psychotherapy Selective serotonin reuptake inhibitors Serotonin-norepinephrine reuptake inhibitors Transcranial magnetic stimulation Tricyclic antidepressants Vagal nerve stimulation	Improved depression rating scale scores Reduced symptom severity Improved quality of life
Off-label scopolamine (intravenous, transdermal, oral) for treatment of major depressive disorder	Patients in whom treatment-resistant depression or major depressive disorder (MDD) has been diagnosed	<p>Fewer than half of patients with MDD achieve remission with approved antidepressant therapy, and available pharmacotherapies are often associated with undesirable side effects. Depression treatments also typically take 3–6 weeks before patients experience relief, warranting the need for better, faster-acting medications. Researchers have indicated that acetylcholine-mediated activity could play a role in depression. Scopolamine is a muscarinic antagonist that blocks the muscarinic acetylcholine receptors, thus blocking the actions of acetylcholine (anticholinergic effect), and pilot study results have suggested it might yield results quickly—within days. In ongoing studies, scopolamine is being administered alone and in conjunction with other medications. It is being tested as an intravenous drug given about 3–5 days apart at varying dosages (e.g., 2, 3, or 4 mcg/kg followed by 45 minutes of saline infusion), as a transdermal patch, and as oral medication (e.g., 0.5 mg twice daily).</p> <p>Massachusetts General Hospital, Boston National Institutes of Health, Bethesda, MD</p> <p>Unphased clinical trials ongoing</p>	DBS Electroconvulsive therapy Pharmacotherapy (e.g., selective serotonin reuptake inhibitors, serotonin-norepinephrine reuptake inhibitors, tricyclic antidepressants) Psychotherapy TMS (investigational) VNS	Improved depression rating scale scores Reduced symptom severity Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Patient-centered early intervention (RAISE program) for treatment of prodromal stage schizophrenia</p>	<p>Patients in whom prodromal stage schizophrenia has been diagnosed or who are at high risk of developing schizophrenia</p>	<p>Clinical indications of prodromal (early) stage schizophrenia include dramatic changes in patterns of communication, perception, affect, and thoughts (attenuated positive symptom syndrome); short, inconsistently recurring periods of psychotic thoughts (brief intermittent psychotic syndrome); and high genetic risk of developing schizophrenia, coupled with declines in performance at work and school or inattention to regular life activities (e.g., hygiene, hobbies). Early intervention purportedly dramatically improves patient recovery and cost of in-patient services. RAISE (Recovery After an Initial Schizophrenia Episode) is a government-led, early intervention program for patients experiencing initial symptoms of schizophrenia. These patients may benefit from lower dosages of known effective antipsychotic medications and are more likely to successfully reintegrate into their previous lives. The 2 funded study arms of the program are the RAISE Early Treatment Program (ETP) and RAISE Connection. Both studies are designed for patients aged 18–35 years who have experienced initial episodes of schizophrenia, and they provide up to 2 years of multifaceted services that include individual counseling and psychiatric services, low-dosage antipsychotics, substance-abuse treatment, and job and school reintegration support.</p> <p>National Institute of Mental Health, Bethesda, MD, in collaboration with multiple research centers and State-level mental health programs</p> <p>Phase II/III clinical trials ongoing</p>	<p>Higher-dosage typical and atypical antipsychotic medications Self-help groups Talk therapy (including cognitive behavior therapy and group therapy)</p>	<p>Changed care delivery models Increased patient knowledge and awareness of disease and holistic intervention options Advanced intervention timelines Reduced but efficacious pharmaceutical dosages Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Video game-based cognitive behavior therapy for adolescents with major depressive disorder</p>	<p>Adolescent and young adult (AYA) patients in whom mild- to moderate-severity major depressive disorder (MDD) has been diagnosed or early onset major depressive disorder (eoMDD) is suspected</p>	<p>Many AYA patients with MDD or eoMDD do not have the condition diagnosed or do not respond favorably to conventional therapy, leading to potentially serious consequences. Engaging, well-received therapy options are needed for this patient population. SPARX is a fantasy-based, interactive, role-playing computer game designed to provide cognitive behavior therapy (CBT) to AYAs experiencing clinically significant symptoms of depression. SPARX guides the user through modules that feature CBT-based challenges. The user interacts in the 1st person with a guide that provides education, gauges mood, and monitors progress on the challenges. The program purportedly promotes the development of coping and life skills that reduce depression symptoms.</p> <p>University of Auckland, Auckland, New Zealand (developer) Metia International, Auckland, New Zealand (development partner) LinkedWellness, Baltimore, MD (North American market licensee)</p> <p>Unphased trials completed</p>	<p>Cognitive behavior therapy Internet-delivered psychotherapy Mobile app-delivered cognitive behavior therapy or psychotherapy therapy Psychotherapy (in person) Selective serotonin reuptake inhibitors Serotonin-norepinephrine reuptake inhibitors Tricyclic antidepressants</p>	<p>Improved depression rating scale scores Reduced symptom severity Improved quality of life</p>

Table 6. AHRQ Priority Condition: 06 Developmental Delays, Attention-Deficit Hyperactivity Disorder, and Autism: 8 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Basimglurant for treatment of fragile X syndrome	Patients in whom fragile X syndrome (FXS) has been diagnosed	<p>FXS is a neurodevelopmental disorder caused by mutations of the <i>FMR1</i> gene; it is the most common known heritable cause of cognitive and behavioral disability. No cure exists for FXS; medications and behavioral interventions alleviate individual symptoms but do not address disease cause. Normally functioning <i>FMR1</i> genes produce proteins that control protein synthesis at metabotropic glutamate receptor (mGluR5) synapses. In FXS, this protein synthesis is unregulated; investigators hypothesize that addressing this dysfunction could lead to successful treatment.</p> <p>Basimglurant (RO4917523, RG7090) is a negative allosteric mGluR5 modulator under investigation as a potential disease-modifying treatment for FXS. In clinical trials, basimglurant is administered daily as an oral tablet, in escalating doses up to 1.5 mg.</p> <p>F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>Multiple phase II trials completed; in Mar 2012, FDA granted orphan status. Basimglurant is also under development for treatment-refractory major depressive disorder.</p>	<p>Physical and behavioral interventions that address speech, language, and behavior; cognitive development; sensory integration and gross motor development; and activities of daily living</p> <p>Medications for sleep disturbances, seizures, or mood instability:</p> <ul style="list-style-type: none"> Antipsychotics Central nervous system stimulants Clonidine (Catapres) Folic acid Selective serotonin reuptake inhibitors 	<p>Improved behavioral and cognitive functioning</p> <p>Improved gross motor skill functioning</p> <p>Improved quality of life</p>
Controlled-release oral diazoxide choline (DCCR) for treatment of Prader-Willi syndrome	Patients in whom Prader-Willi syndrome (PWS) has been diagnosed	<p>PWS is a rare genetic disorder caused by random deletion or lack of expression of specific genes on the paternal copy of chromosome 15. Patients who have PWS may exhibit multiple symptoms, including mild to severe deficits in learning, attention, auditory processing, and spoken-language skills; and extreme appetite (hyperphagia), potentially leading to morbid obesity. Investigators have not found a cure for PWS, and standard treatments, such as hormone treatments and speech and occupational therapy, focus primarily on addressing patients' most severe symptoms. DCCR, a controlled-release crystalline salt formulation of diazoxide, is being investigated as a potential treatment. Diazoxide is a potassium channel activator that inhibits insulin secretion and is approved for treating hypoglycemia; as an allosteric potentiator of AMPA receptors, diazoxide may also improve or reinforce cognitive function.</p> <p>Hypothetically, a controlled form of this drug may treat both cognitive and hyperphagic PWS symptoms. In clinical trials, DCCR is administered as an oral tablet, from 1.5 to 5.1 mg/kg, titrated every 14 days.</p> <p>Essentialis, Inc., Carlsbad, CA</p> <p>Phase I study ongoing; FDA granted orphan drug status</p>	<p>Behavioral and cognitive therapy</p> <p>Dietary intervention and close management</p>	<p>Improved cognitive function</p> <p>Reduced abnormal appetite</p> <p>Reduced rate of morbid obesity</p> <p>Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Extended-release metadoxine for treatment of adult predominantly inattentive type attention-deficit/hyperactivity disorder</p>	<p>Adults in whom predominantly inattentive attention-deficit/hyperactivity disorder (ADHD) has been diagnosed</p>	<p>Among Americans, adult ADHD is a common disorder, affecting about 4.4% of the population. The most common subtype of ADHD is the predominantly inattentive type (also referred to as ADHD-I or PI-ADHD), which is marked by maladaptive levels of inattention, without hyperactivity and impulsivity. It can range in severity from well-managed to significantly debilitating. Treatments primarily include stimulants and antidepressants, but these treatments are often not well-tolerated or effective and may have significant side effects and potential for abuse. Metadoxine (MG01C1) is a nonstimulant, extended-release, ion-pair salt of pyridoxine and 2-pyrrolidone-5-carboxylate. It purportedly treats adult predominantly inattentive type ADHD by improving general cognitive performance and reducing observed ADHD symptoms, as measured by Connors' Adult ADHD Rating Scale. In a late-phase clinical trial, patients receive the drug orally, 1,400 mg, once daily, for 6 weeks. Patients receiving other medication for ADHD complete a washout period before MG01C1 administration.</p> <p>Alcobra, Ltd., Tel Aviv, Israel</p> <p>Phase II/III trial ongoing</p>	<p>Antidepressants (e.g., bupropion) Atomoxetine (Strattera) Stimulants (e.g., dextroamphetamine, dextroamphetamine-amphetamine, lisdexamfetamine)</p>	<p>Increased attentiveness Improved scores on standardized ADHD scales (e.g., Connors') Reduced risk of abuse and improved safety profile, compared with existing treatments Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Multi-family group psychoeducation program (Transitioning Together) for treatment of adolescent autism spectrum disorders</p>	<p>Adolescent patients in whom autism spectrum disorders (ASDs) have been diagnosed and their parents or primary guardians</p>	<p>According to the U.S. Centers for Disease Control and Prevention, autism spectrum disorders (ASDs) are diagnosed in about 9 of 1,000 people in the U.S; among adolescent Americans, 1 in 88 have diagnosed ASDs. Few nonpharmaceutical interventions exist for treating these adolescents, and available treatments do not adequately address the impact of these disorders on interpersonal family dynamics. Transitioning Together is a group psychoeducational intervention that purports to treat adolescents with ASD and their parents, who are often primary caregivers and subject to ASD-related stress and other adverse effects. This intervention focuses on reducing family stress and addressing ASD-related behavioral problems in an effort to improve patients' and families' daily functioning and quality of life; the multi-family aspect is also hypothesized to provide an effective venue for open, nonjudgmental exchange and interaction among those affected by ASDs. In pilot studies, patients and their families completed an 8-week program, consisting of 2 individual-family sessions and 8 multi-family group sessions, each administered by a trained facilitator.</p> <p>Waisman Center, University of Wisconsin-Madison</p> <p>Unphased clinical trials ongoing</p>	<p>Individual cognitive behavior therapy</p>	<p>Improved patient-guardian interfamily dynamics Reduced ASD-related behavioral symptoms Reduced caregiver stress Improved patient and caregiver quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label mecamsermin (Increlex) for treatment of Rett's syndrome	Children aged 2–12 years in whom Rett's syndrome has been diagnosed	<p>Rett's syndrome is a rare neurological disorder caused by mutations to the <i>MECP2</i> gene. This disorder predominantly affects females and has a prevalence of 1 in 10,000 live female births. Patients with Rett's syndrome have significant cognitive and motor impairment and many experience seizures and repetitive stereotyped hand movements; these symptoms can be mistaken for Angelman's syndrome, autism, or cerebral palsy. No cure exists for Rett's syndrome, but research has shown that recovering <i>MECP2</i> function may be a potential curative pathway.</p> <p>Mecasermin (Increlex) is a synthetic form of insulin-like growth factor-1 (IGF-1). Investigators hypothesize that mecamsermin stimulates synaptic maturation, improving cognitive function and reversing <i>MECP2</i>-mutation effects in patients with Rett's syndrome. In clinical trials, it is administered twice daily, via subcutaneous injection, in escalating doses up to 120 mcg/kg.</p> <p>Children's Hospital of Boston, Boston, MA International Rett Syndrome Foundation, Cincinnati, OH</p> <p>Phase II trial recruiting; drug has FDA approval for treating children with short stature due to IGF-1 deficiency</p>	Common palliative interventions (e.g., antidepressants and antipsychotics [for mood and behavioral issues]; beta blockers [for long-QT symptoms]; occupational, physical, and speech therapy; sleep aids)	Improved cognitive functioning Reduced behavioral symptoms Improved quality of life
Video game software for treatment of attention-deficit/hyperactivity disorder	Adolescents in whom attention-deficit/hyperactivity disorder (ADHD) has been diagnosed	<p>ADHD is the most-diagnosed behavioral disorder in children, affecting about 3% to 5% of children. ADHD can cause depression, sleeping problems, anxiety, learning disabilities, and other behavioral abnormalities. Available ADHD treatments have variable outcomes, warranting the development of more innovative treatments. Research has suggested that action video games can improve a person's cognitive abilities. Video game therapy is intended to improve concentration skills, reduce anxiety, and enforce correct and quick decisionmaking, skills lacking in patients with neurological conditions such as ADHD. Therapy is delivered online. 2 companies have petitioned FDA to have their software regulated as devices delivering therapy.</p> <p>Akili Interactive Labs, Boston, MA (developer/manufacturer) Posit Science Corp., San Francisco, CA (developer/manufacturer) Brain Plasticity, Inc., San Francisco, CA (licensee)</p> <p>Unphased clinical trial ongoing</p>	Behavior therapies Combination therapies Drug therapies	Improved attentiveness and academic performance Reduced behavioral abnormalities Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Virtual reality social cognition training for treatment of adult autism spectrum disorders</p>	<p>High-functioning adult patients in whom autism spectrum disorders (ASDs) have been diagnosed</p>	<p>According to the U.S. Centers for Disease Control and Prevention, autism spectrum disorders (ASDs) are diagnosed in about 9 of 1,000 people in the U.S. Even for high-functioning adults with these diagnoses, deficits in social and emotional cognition can inhibit their ability to successfully navigate social situations, including maintaining close friendships and interacting in work environments. Cognitive behavior therapy may improve performance in these situations, but has limited effectiveness for many patients, who are unable to functionally translate techniques outside of therapeutic sessions. Virtual reality social cognition training is a computer-based intervention that allows patients to experience dynamic, real-life social interactions in a simulated environment, purportedly allowing effective, nonthreatening opportunities to practice and improve social skills. In clinical trials, patients participate in virtual reality training for 2 hours per week, for 5 weeks.</p> <p>Yale Child Study Center, Yale University, New Haven, CT University of Texas at Dallas</p> <p>Unphased clinical trial ongoing</p>	<p>Cognitive behavior therapy</p>	<p>Improved independent functioning Increased social cognition, emotional skills, and engagement Reduced social anxiety Improved patient quality of life</p>
<p>XBox 360 musical program (Kinect audio project) for improving social skills in childhood autism</p>	<p>Children in whom autism spectrum disorder (ASD) has been diagnosed</p>	<p>According to the U.S. Centers for Disease Control and Prevention, ASDs are diagnosed in about 9 of 1,000 people in the U.S. Available therapies include behavior and communication therapies (including applied behavior analysis) and dietary, medical, and complementary interventions. Interactive therapy using XBox 360's Kinect system has been targeted by researchers attempting to improve social skills in patients with autism. The Kinect Audio Project is an XBox 360 program/system that uses the Kinect camera and motion sensor with PC software to allow children to participate in virtual music lessons by providing them with virtual gloves that allow "touching" of music notes when they place the gloves over the symbol on the screen. This allows children with autism to be included in student music activities that might have otherwise been difficult with normal instruments. This program is intended to increase mobility skills, improve understanding of movement and association, enhance unsolicited participation, and improve overall social interaction.</p> <p>South Downs Community Special School, Eastbourne, UK</p> <p>Various testing projects ongoing</p>	<p>Educational and behavior programs</p>	<p>Improved social skills and human interaction Improved activities of daily living Improved quality of life</p>

Table 7. AHRQ Priority Condition: 07 Diabetes Mellitus: 15 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Alpha-1 antitrypsin for treatment of type 1 diabetes	Patients in whom type 1 diabetes mellitus (T1DM) has been diagnosed	<p>Nearly 26 million children and adults in the U.S., or 8.3% of the population, have diabetes mellitus, and about 5% of these are cases of T1DM. In about 7.0 million of all those with diabetes, the disease remains undiagnosed. In 2010, clinicians diagnosed 1.9 million new cases of diabetes in U.S. people aged 20 years or older. Treatment requires a lifelong commitment to exercising regularly, maintaining a healthy weight, eating healthy foods, monitoring blood sugar, and for T1DM and some cases of type 2 diabetes, taking insulin. Alpha-1 antitrypsin (AAT) has shown anti-inflammatory properties, and although the level of AAT in diabetes patients is normal, its activity appears to be significantly lower. These anti-inflammatory properties are believed to have potential to interfere with or even prevent autoimmune destruction of beta cells in the pancreas. AAT is administered intravenously at 40, 60, or 80 mg per dose, in 4-week intervals.</p> <p>Kamada, Ltd., Ness Ziona, Israel National Institute of Allergy and Infectious Disease, Bethesda, MD University of Colorado, Denver, in collaboration with Omni Bio Pharmaceuticals, Inc., Greenwood Village, CO</p> <p>Phase II/III trial ongoing; FDA granted orphan drug status Aug 2011</p>	Insulin modifications Islet cell transplantation Pancreas transplantation	<p>Reduced daily insulin usage Improved glycated hemoglobin (HbA_{1c}) levels Reduced complications of diabetes Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Artificial pancreas device system for treatment of diabetes requiring exogenous insulin</p>	<p>Patients with type 1 diabetes mellitus (T1DM) or type 2 diabetes mellitus (T2DM) who require insulin and are highly motivated to use a closed system and monitor its function</p>	<p>Nearly 26 million children and adults in the U.S., or 8.3% of the population, have diabetes mellitus, and about 5% of these are cases of T1DM. In about 7.0 million of all those with diabetes, the disease remains undiagnosed. In 2010, clinicians diagnosed 1.9 million new cases of diabetes in U.S. people aged 20 years or older. Treatment requires a lifelong commitment to exercising regularly, maintaining a healthy weight, eating healthy foods, monitoring blood sugar, and for T1DM and some cases of type 2 diabetes, taking insulin. An artificial pancreas device system (APDS) is a closed-loop system consisting of an insulin pump, a real-time glucose monitor, and a sensor to detect glucose levels. Various manufacturers have made components required for the artificial pancreas; however, no single manufacturer has yet succeeded in creating a total closed-loop system. Several systems are in trials, and the 1st low-glucose suspend system, a 1st step to a total APDS, is commercially available.</p> <p>Various manufacturers in collaboration with JDRF, New York, NY</p> <p>More than 25 early and mid-phase ongoing trials; FDA placed APDSs on innovation pathway and issued final regulatory guidance on the systems Nov 2012; FDA is prioritizing review of research protocols, setting performance and safety standards, holding discussions between government and private researchers, sponsoring public forums, and finding ways to shorten study and review time. Sept 2013, FDA approved Medtronic MiniMed 530G® threshold system with Enlite®, a combined insulin pump and sensor that is considered to be the 1st step toward a fully artificial pancreas</p>	<p>Insulin modifications Islet cell transplantation Pancreas transplantation</p>	<p>Halted or delayed progression of secondary complications Reliable glycemic control at desired levels Reduced risk of acute and nighttime hypoglycemia Reduced postprandial (after meal) hyperglycemia Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Autologous dendritic cell immunotherapy (DV-0100) for treatment of type 1 diabetes	Patients in whom type 1 diabetes mellitus (T1DM) has been diagnosed	<p>Nearly 26 million children and adults in the U.S., or 8.3% of the population, have diabetes mellitus, and about 5% of these cases are T1DM. In 2010, clinicians diagnosed 1.9 million new cases of all types of diabetes in U.S. people aged 20 years or older. T1DM treatment requires a lifelong commitment to regular exercise, healthy weight, excellent nutrition, frequent monitoring of blood sugar, and taking various formulations of insulin by either injection or an infusion pump. DV-0100 is an autologous dendritic cell immunotherapy intended to treat T1DM by halting the body's autoimmune reaction against pancreatic islet cells, thus enabling the pancreas to produce insulin normally. According to the developer, dendritic cells are collected from the patient's blood, modified through use of interfering oligonucleotides to develop a "diabetes-suppressive" capability and tested for potency and sterility. The patient then is vaccinated with the cells, which are purportedly absorbed, and travel to the pancreatic lymph nodes to induce tolerance.</p> <p>DiaVacs, Inc., Edgewater, NJ</p> <p>Phase II trial ongoing; FDA granted orphan drug status</p>	<p>Insulin modifications Islet cell transplantation Pancreas transplantation</p>	<p>Increased beta cell function Improved glycemic control Reduced or eliminated need for exogenous insulin</p>
C-peptide replacement therapy (Ersatta) for treatment of diabetic peripheral neuropathy	Patients in whom diabetic peripheral neuropathy has been diagnosed	<p>According to diabetes researchers, an estimated 15% of people with diabetes develop at least 1 foot ulcer during their lifetime, and 60–70% of these ulcers are primarily neuropathic in origin. Available treatments for diabetic peripheral neuropathy involve control of secondary symptoms (i.e., pain management). In the body, c-peptide is generated during insulin processing and is secreted along with insulin. Until recently, c-peptide was not thought to possess biological activity and was used as a biomarker; however, recent studies suggest that a lack of c-peptide (which is not provided by exogenous insulin administration) may contribute to various secondary complications of diabetes. Ersatta™ is an extended-release formulation of c-peptide under study for treating various secondary complications of diabetes, including neuropathy. In trials, it is given as an injection at high dose (2.4 mg) or low dose (0.8 mg), once weekly, for up to 52 weeks.</p> <p>Cebix, Inc., La Jolla, CA</p> <p>Phase II trial ongoing; FDA granted fast-track status</p>	<p>Analgesics Antidepressants (e.g., duloxetine, selective serotonin reuptake inhibitors, serotonin-norepinephrine reuptake inhibitors, tricyclics) Anticonvulsant (pregabalin) Lidocaine patches</p>	<p>Reduced pain Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Degludec ultra-long-acting insulin (Tresiba) and degludec plus aspart (Ryzodeg) for treatment of type 1 or 2 diabetes</p>	<p>Patients with type 1 diabetes mellitus (T1DM) or type 2 diabetes mellitus (T2DM) who require insulin or insulin and oral medication</p>	<p>Nearly 26 million children and adults in the U.S., or 8.3% of the population, have diabetes mellitus, and about 5% of these are cases of T1DM. In about 7.0 million of all those with diabetes, the disease remains undiagnosed. In 2010, clinicians diagnosed 1.9 million new cases of diabetes in U.S. people aged 20 years or older. Treatment requires a lifelong commitment to exercising regularly, maintaining a healthy weight, eating healthy foods, monitoring blood sugar, and for T1DM and some cases of type 2 diabetes, taking insulin. Degludec (Tresiba®) is an ultra-long-acting insulin that releases over several days—its action extends beyond 42 hours, according to the company. The flexible dosing regimen allows 8–40 hours between dosing, which could lead to thrice-weekly dosing, or dosing once in the evening.</p> <p>Novo Nordisk a/s, Bagsværd, Denmark</p> <p>Phase III trials (BEGIN and BOOST) completed for degludec and degludec plus aspart; Nov 2012, FDA advisory committee voted 8-4 to recommend approval of both formulations; FDA panel unanimously also recommended a cardiovascular outcomes trial be conducted; approved Sept 2012 in Japan; submitted for approval in Europe; FDA issued complete response letter in Feb 2013 for both drugs requesting additional cardiovascular data from a dedicated cardiovascular outcomes trial</p>	<p>Diet and lifestyle changes Exenatide Insulin Insulin sensitizers (pioglitazone, rosiglitazone) Metformin Sitagliptin Sodium glucose co-transporter 1 and/or 2 inhibitors (in development) Sulfonylurea drugs (glimepiride)</p>	<p>Achieved target glycated hemoglobin (HbA_{1c}) levels Reduced progression of complications Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Exenatide continuous subcutaneous delivery implant (ITCA 650) for treatment of type 2 diabetes</p>	<p>Patients with type 2 diabetes mellitus (T2DM) who have not achieved desired blood glucose goals with metformin</p>	<p>Nearly 26 million children and adults in the U.S., or 8.3% of the population, have diabetes mellitus, and about 5% of these are cases of type 1 diabetes mellitus (T1DM). In about 7.0 million of all those with diabetes, the disease remains undiagnosed. In 2010, clinicians diagnosed 1.9 million new cases of diabetes in U.S. people aged 20 years or older. Treatment requires a lifelong commitment to exercising regularly, maintaining a healthy weight, eating healthy foods, monitoring blood sugar, and for T1DM and some cases of T2DM, taking insulin. Despite available treatments and blood glucose monitoring devices for T2DM, achieving adequate glycemic control remains a prominent issue for patients. ITCA 650 is a proprietary form of exenatide (a glucagon-like peptide-1 [GLP-1] mimetic) delivered subcutaneously and continuously through a tiny implanted stick-shaped pump. It is purported to remain stable at body temperature for as long as a year, according to the most recently presented data. The delivery system is a semipermeable, osmotic mini-pump that a physician or physician assistant implants into the patient's arm or abdomen during an outpatient procedure that takes about 5 minutes. The device is intended to deliver a steady dose for up to 12 months (after which it must be reimplanted), potentially providing a more convenient dosing option for patients. The system is also designed to minimize the nausea associated with twice-daily dosing.</p> <p>Amylin Pharmaceuticals subsidiary of Bristol-Myers Squibb, New York, NY (drug) Intarcia Therapeutics, Inc., Hayward, CA (device)</p> <p>Phase III trials ongoing; ITCA 650 technology FDA approved for drug delivery; exenatide formulation for use with pump is under study; Nov 2011, Eli Lilly and Co. (Indianapolis, IN) returned all development rights of exenatide to Amylin</p>	<p>Insulin Insulin sensitizers (pioglitazone, rosiglitazone) Metformin Sitagliptin Sodium glucose co-transporter 1 and/or 2 inhibitors (in development) Sulfonylurea drugs (glimepiride)</p>	<p>Delayed insulin dependence in T2DM Improved target glycated hemoglobin (HbA_{1c}) levels Reduced glycemic excursions Improved quality of life</p>
<p>Fluocinolone acetonide implant (Iluvien) for treatment of diabetic macular edema</p>	<p>Patients in whom diabetic macular edema (DME) has been diagnosed</p>	<p>DME affects an estimated 560,000 patients in the U.S. Only a single FDA-approved drug therapy (ranibizumab) is available for treating DME. Iluvien® is a tube-shaped implant that releases a steady flow of the corticosteroid fluocinolone acetonide (FAC) into the ocular space for up to 3 years. FAC is a corticosteroid that has both anti-inflammatory and anti-VEGF (vascular endothelial growth factor) activity and has a history of effectiveness in treating ocular disorders.</p> <p>Alimera Sciences, Inc., Alpharetta, GA</p> <p>FDA approved Sept 2014 for treating DME</p>	<p>Intravitreal triamcinolone acetonide with or without laser photocoagulation Laser photocoagulation Pharmacotherapy (e.g., VEGF antagonists)</p>	<p>Increased visual acuity Increased contrast sensitivity Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Implantable glucose monitoring system (GlySens system) for blood glucose monitoring	Patients with type 1 or type 2 diabetes mellitus (T1DM or T2DM) who require regular glucose monitoring	<p>Continuous glucose monitoring (CGM) systems are used by patients with diabetes to check their blood glucose levels. Because available CGM devices are reportedly not as accurate as standard blood glucose meters, patients must confirm glucose levels with a meter before changing their treatment on the basis of a CGM measurement alone. Also, traditional CGM sensors need to be replaced after several days or a week. The GlySens implantable CGM is intended as a long-term CGM purported to work continuously for up to 1 year or longer. The system consists of 2 components: a fully implantable sensor and an external receiver with monitor that displays "continuous, at-a-glance" glucose status and provides alerts if hypo- or hyperglycemic excursions occur. The sensor is implanted subcutaneously in the abdomen during a brief outpatient procedure and purportedly requires minimal calibration. The device does not need the needle insertion or skin-adhered components that other CGMs do.</p> <p>GlySens, Inc., San Diego, CA</p> <p>Pilot trial completed</p>	Conventional blood-based glucose monitors Standard blood glucose testing	Improved compliance with glucose testing Improved management of blood glucose levels Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Insulin pump integrated with low-glucose suspend monitoring system (MiniMed 530G with Enlite) for treatment of diabetes requiring exogenous insulin</p>	<p>Patients with type 1 or type 2 diabetes mellitus (T1DM or T2DM) who require insulin and are highly motivated to use a closed-loop system and monitor its function</p>	<p>Nearly 26 million children and adults in the U.S., or 8.3% of the population, have diabetes mellitus, and about 5% of these are cases of T1DM. In about 7.0 million of all those with diabetes, the disease remains undiagnosed. In 2010, clinicians diagnosed 1.9 million new cases of diabetes in U.S. people aged 20 years or older. Treatment requires a lifelong commitment to exercising regularly, maintaining a healthy weight, eating healthy foods, monitoring blood sugar, and for T1DM and some cases of type 2 diabetes, taking insulin. Patients who require daily insulin may someday benefit from a closed-loop system, termed an artificial pancreas device system (APDS). An APDS is a consists of an insulin pump, a real-time glucose monitor, and a sensor to detect glucose levels and automatically adjust and deliver appropriate insulin doses. Various manufacturers have made components required for the artificial pancreas; however, no single manufacturer has yet succeeded in creating a total closed-loop system. The MiniMed® 530G system with Enlite® sensor is a low-glucose-suspend system considered to be the 1st step towards an APDS. The system includes an insulin pump and sensor to continuously monitor glucose levels. The pump can deliver insulin constantly as well as in bolus doses to compensate for meals. The Enlite sensor is a replaceable component that detects blood glucose levels. The device features a threshold (low-glucose) suspend system that automatically stops insulin delivery when preset glucose levels are detected.</p> <p>Medtronic, Inc., Minneapolis, MN</p> <p>FDA approved Sept 2013</p>	<p>Insulin modifications Islet cell transplantation Pancreas transplantation</p>	<p>Halted or delayed progression of secondary complications Reliable glycemic control at desired levels Reduced risk of acute and nighttime hypoglycemia Reduction in postprandial (after meal) hyperglycemia Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Interactive text messaging program (Care4Life) to improve management of type 2 diabetes mellitus</p>	<p>Patients in whom type 2 diabetes mellitus (T2DM) has been diagnosed</p>	<p>Nearly 26 million children and adults in the U.S., or 8.3% of the population, have diabetes mellitus, and about 5% of these are cases of type 1 diabetes (T1DM). In about 7.0 million of all those with diabetes, the disease remains undiagnosed. In 2010, clinicians diagnosed 1.9 million new cases of diabetes in U.S. people aged 20 years or older. Treatment requires a lifelong commitment to exercising regularly, maintaining a healthy weight, eating healthy foods, monitoring blood sugar, and for T1DM and some cases of type 2 diabetes, taking insulin. Despite available treatments and blood glucose monitoring devices for T2DM, achieving adequate glycemic control remains a prominent issue for patients. Care4Life is an interactive text messaging program intended to help improve treatment adherence and achieve better glycemic control in patients with T2DM. The text messaging and online health record system is intended to deliver customized educational content based on the user's own medication plan and health goals. The system delivers messages intended to motivate a patient to keep track of blood glucose levels and his or her fitness and weight goals and improve medication adherence. Patients can enter health data via text that will be captured on a Web portal that can be made accessible to the patient's health care team. Text messages can be delivered in English and Spanish. This intervention could be especially useful for reaching underserved communities with limited access to health care providers.</p> <p>Vovixa, Inc., Washington, DC (manufacturer) HealthInsight, Salt Lake City, UT (investigator)</p> <p>Pilot trial ongoing; program launched Oct 2012</p>	<p>Diabetes behavior and lifestyle support groups Hardcopy patient education Internet-based patient education</p>	<p>Improved glycated hemoglobin (HbA_{1c}) levels Reduced secondary complications Reduced health disparities and improved access to diabetes program Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Metabolic (bariatric) surgery for resolution of type 2 diabetes in obese and nonobese patients</p>	<p>Obese and nonobese patients in whom type 2 diabetes mellitus (T2DM) has been diagnosed</p>	<p>Nearly 26 million children and adults in the U.S., or 8.3% of the population, have diabetes mellitus, and about 5% of these are cases of type 1 diabetes mellitus (T1DM). In about 7.0 million of all those with diabetes, the disease remains undiagnosed. In 2010, clinicians diagnosed 1.9 million new cases of diabetes in U.S. people aged 20 years or older. Treatment requires a lifelong commitment to exercising regularly, maintaining a healthy weight, eating healthy foods, monitoring blood sugar, and for T1DM and some cases of T2DM, taking insulin. Metabolic surgery (i.e., gastric bypass, lap banding, sleeve gastrectomy) has been observed to restore metabolic imbalances in morbidly obese patients who have undergone bariatric surgery for weight loss. This led to interest in the surgery for patients with diabetes who are not morbidly obese, but are overweight or even normal weight, because researchers have observed that metabolic abnormalities have resolved independent of weight loss, and some think weight is not the only factor contributing to the metabolic abnormalities observed in patients with T2DM. Some researchers suggest that metabolic surgery could be used to possibly “cure” T2DM regardless of body mass index and independent of weight loss.</p> <p>Multiple U.S. academic research centers</p> <p>Mid- to late-phase trials completed and ongoing</p>	<p>Behavior and lifestyle modifications Various approved drugs for treating T2DM G-protein coupled receptor 40 agonists (in development) Sitagliptin Sodium glucose co-transporter 1 and/or 2 inhibitors (in development) Sulfonylurea drugs (glimepiride)</p>	<p>Reduced use of diabetes medications Reduced secondary complications Resolution of diabetes Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Noninvasive glucose monitoring device (GlucTrack) for monitoring blood glucose levels</p>	<p>Patients with diabetes who require regular blood glucose monitoring</p>	<p>Nearly 26 million children and adults in the U.S., or 8.3% of the population, have diabetes mellitus, and about 5% of these are cases of type 1 diabetes mellitus (T1DM). In about 7.0 million of all those with diabetes, the disease remains undiagnosed. In 2010, clinicians diagnosed 1.9 million new cases of diabetes in U.S. people aged 20 years or older. Treatment requires a lifelong commitment to exercising regularly, maintaining a healthy weight, eating healthy foods, monitoring blood sugar, and for T1DM and some cases of type 2 diabetes (T2DM), taking insulin. Options to improve patients' self blood-glucose monitoring are needed to improve adherence to treatment and management of diabetes. GlucTrack is a noninvasive blood glucose monitoring device that obtains glucose measurements from an ear lobe clip. It is intended for use by patients with T1DM or T2DM. The system uses ultrasonic, electromagnetic, and thermal technology purportedly to detect glucose levels in the blood. It consists of a battery-operated main unit with display and control features. The main unit also houses a transmitter, receiver, and processor. The system includes a personal ear clip that contains sensors and calibration electronics to obtain glucose measurements in less than 1 minute.</p> <p>Integrity Applications, Inc., Ashkelon, Israel</p> <p>Pilot trials completed; has Conformité Européene (CE) mark; U.S. trials planned for 2014</p>	<p>Conventional skin-prick blood-based glucose monitors</p>	<p>Improved compliance with glucose testing Improved management of blood glucose levels Reduced monitoring costs</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Noninvasive skin measurement screening test (Diab-spot) for type 2 diabetes</p>	<p>Patients at risk of developing type 2 diabetes mellitus (T2DM)</p>	<p>Nearly 26 million children and adults in the U.S., or 8.3% of the population, have diabetes mellitus, and about 5% of these are cases of type 1 diabetes mellitus (T1DM). In about 7.0 million of all those with diabetes, the disease remains undiagnosed. Late detection typically leads to secondary complications (e.g., cardiovascular disease, nephropathy, neuropathy) that could be prevented or delayed with earlier diagnosis. Late diagnosis may occur for many reasons, including patient nonadherence with recommended screening (blood draw). The Diab-spot® device is a portable tabletop unit that measures skin fluorescence to detect biologic markers associated with cumulative glycemic exposure, oxidative stress, and microvascular changes. Using an algorithm that adjusts for skin-tone variations, skin fluorescence measurements are indicated by a color: red for increased likelihood of T2DM; orange for increased likelihood of cardiovascular pathology; or green for low risk of either T2DM or impaired glucose tolerance. This device is intended for individuals 18 years or older who are at risk of prediabetes and/or T2DM.</p> <p>DiagnOptics, B.V., Groningen, the Netherlands</p> <p>Unphased trials completed; has Conformité Européene (CE) mark and Health Canada License approval</p>	<p>Noninvasive glucose screening tests in development (i.e., GlucoTrack) Standard blood glucose testing</p>	<p>Delayed or prevented secondary complications Increased screening adherence Increased rate of early diagnosis Improved quality of life</p>
<p>Topical pexiganan acetate antimicrobial cream (Locilex) for treatment of mild diabetic foot ulcer infections</p>	<p>Patients in whom mild diabetic foot ulcer infection (DFI) has been diagnosed</p>	<p>An estimated 3 million patients with diabetes have DFIs, and about 60% of all amputations are preceded by a DFI. Antibiotic resistance in DFIs is becoming increasingly more common; thus, treatment is becoming more difficult. Additionally, because patients with DFIs have impairments in their microvascular circulation, the effectiveness of systemic anti-infectives can be compromised because only low concentrations reach the infection. Topical anti-infectives that are effective against antibiotic-resistant bacteria would be an attractive treatment option for DFIs; however, no topical anti-infectives have been proved effective in treating DFI. Pexiganan acetate cream 1% is a novel, topical, broad-spectrum antimicrobial peptide that is being investigated as a topical anti-infective agent for treating mild DFIs. Pexiganan is purportedly effective against multidrug-resistant bacteria, including methicillin-resistant <i>Staphylococcus aureus</i> and vancomycin-resistant <i>enterococcus</i>, as well as other antibiotic-resistant bacteria. In clinical trials, pexiganan acetate 1% cream is applied twice daily.</p> <p>Dipexium Pharmaceuticals, LLC, New York, NY</p> <p>2 phase III trials ongoing (OneStep 1 and OneStep2); company plans to file new drug application to FDA in 2015</p>	<p>Carbapenems Cephalosporins Clindamycin Fluoroquinolones Linezolid Lipopeptides Metronidazole Penicillins Topical antibiotics Topical antiseptics Vancomycin</p>	<p>Decreased systemic therapy–related side effects Decreased antibiotic resistance Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Ultra-rapid-acting inhaled insulin (Technosphere Insulin Inhalation System with Afrezza) for treating diabetes that requires insulin</p>	<p>Patients with type 1 or type 2 diabetes mellitus (T1DM or T2DM) who require insulin injections</p>	<p>Nearly 26 million children and adults in the U.S., or 8.3% of the population, have diabetes mellitus, and about 5% of these are cases of T1DM. In about 7.0 million of all those with diabetes, the disease remains undiagnosed. In 2010, clinicians diagnosed 1.9 million new cases of diabetes in U.S. people aged 20 years or older. Treatment requires a lifelong commitment to exercising regularly, maintaining a healthy weight, eating healthy foods, monitoring blood sugar, and for T1DM and some cases of T2DM, taking insulin. Afrezza® is a combination drug/device product that combines powdered insulin and the Technosphere Technology Platform inhaler. Premeasured, single-use insulin cartridges are inserted a pocket-size inhaler. The insulin enters systemic circulation by rapidly dissolving in the lungs after being inhaled. Afrezza is categorized as an ultra-rapid-acting insulin therapy to be taken at mealtime by individuals with T1DM or T2DM who require exogenous insulin. The inhaled insulin is said to be able to reach maximum blood insulin concentration within 12–14 minutes and has a 2–3 hour duration of action. It is purportedly cleared from the body within 12 hours. The technology would not eliminate injection therapy, but would supplement it, reducing the number of daily injections needed. The inhaler device is small and fits within the palm of the user's hand.</p> <p>MannKind Corp., Valencia, CA (manufacturer) Sanofi, Paris, France (global marketing partner)</p> <p>FDA approved Jun 2014 for improving glycemic control in adult patients with diabetes; the approval included a risk evaluation and mitigation strategy requiring a plan to inform professionals about the serious risk of acute bronchospasm associated with Afrezza</p>	<p>Other ultra-rapid-acting insulin formulations and delivery modes</p>	<p>Improved target glycosylated hemoglobin (HbA_{1c}) levels Reduced glycemic excursions related to meals Delayed insulin dependence in T2DM Improved quality of life</p>

Table 8. AHRQ Priority Condition: 08 Functional Limitations and Disability: 96 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
3-D printed bioresorbable trachea for treatment of tracheobronchomalacia	Patients in whom tracheobronchomalacia has been diagnosed	<p>Tracheobronchomalacia is a congenital condition in which babies are born with weak cartilage in the airways, making them prone to collapsing. Most children grow out of it, except for about 10% with severe cases. When breathing is seriously comprised, clinicians perform a tracheotomy; however, this requires intensive care management and increases risk of infection. Stents and surgical mesh can be inserted for additional support but may require multiple surgeries. 3-dimensional (3-D) printing has been used to create an implantable, customized, bioresorbable implant using a computer-aided design based on a computed tomographic image that shows the patient's anatomy. The implant is fabricated with the biopolymer polycaprolactone using laser-based 3-D printing, which allows health care providers to create implants that are tailored to the individual patient. The implant is designed to expand as the patient grows and provide scaffolding for the patient's own cells to grow. It dissolves about 3 years after implantation.</p> <p>University of Michigan Health System, Ann Arbor</p> <p>3 cases reported of trachea splints after FDA granted emergency use exemption</p>	Tracheobronchial airway stent Tracheobronchoplasty Tracheotomy	Improved health outcomes Increased survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Alemtuzumab (Lemtrada) for treatment of relapsing-remitting multiple sclerosis</p>	<p>Patients in whom relapsing-remitting multiple sclerosis (RRMS) has been diagnosed</p>	<p>Available treatments for multiple sclerosis may slow disease progression, but they are not effective in all patients, and the disease has no cure. An unmet need exists for additional treatment options for patients with RRMS. Alemtuzumab is a humanized monoclonal antibody targeted to the CD52 antigen (expressed on T and B lymphocytes, monocytes, macrophages, and eosinophils). The drug is intended to target antigen-carrying cells, thereby rapidly removing T cells from blood, bone marrow, and organs. Alemtuzumab is purported to effectively treat RRMS disease symptoms in patients whose disease fails to respond to other medications. It is administered by intravenous infusion at a dosage of 12 mg, daily, on 5 consecutive days; a 2nd course of 12 mg, daily, is administered on 3 consecutive days 12 months after the 1st treatment course.</p> <p>Genzyme subsidiary of Sanofi, Paris, France</p> <p>Nov 2014, FDA approved alemtuzumab for treating RRMS; because of its safety profile, alemtuzumab will be available only through a restricted distribution program, and the manufacturer recommends that it be generally reserved for 2nd- or 3rd-line treatment</p>	<p>Dimethyl fumarate (Tecfidera®) Fingolimod Glatiramer acetate Interferon beta-1a Interferon beta-1b Mitoxantrone Natalizumab</p>	<p>Reduced frequency of relapse Slowed disease progression Improved quality of life</p>
<p>Alipogene tiparovec gene therapy (Glybera) for treatment of lipoprotein lipase deficiency</p>	<p>Patients in whom lipoprotein lipase deficiency (LPLD) has been diagnosed</p>	<p>LPLD is a rare genetic disorder, affecting about 1 in 1 million individuals, in whom the development of chylomicronemia leads to hypertriglyceridemia and acute pancreatitis. Currently no treatments exist to address the underlying cause of the disease (loss of function of the lipoprotein lipase [LPL] gene). Alipogene tiparovec (Glybera) is an adeno-associated viral vector-based, gene-therapy product that encodes an LPL isoform intended to complement the genetic deficiency in patients with LPLD. Glybera is administered at a dose of 1×10^{12} genome copies per kg, in a single series of intramuscular injections.</p> <p>uniQure, Amsterdam, the Netherlands</p> <p>Phase III trial completed; granted orphan drug status in the U.S. and EU; in Nov 2012, it became the 1st approved gene-therapy drug in EU</p>	<p>Standard of care, including low-fat diet</p>	<p>Improved plasma triglyceride levels Improved chylomicron (lipoprotein particle) levels</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Allantoin cream (Zorblisa) for treatment of epidermolysis bullosa	Patients in whom epidermolysis bullosa (EB) has been diagnosed	<p>EB is an inherited skin condition caused by a mutation in 1 of 18 genes involved in collagen formation. It is characterized by extensive, chronic blisters, lesions, and pruritus. Patients with the most severe forms often die within the 1st year of life from infection in an open wound; others die from squamous cell carcinoma before they are 30 years old. Patients may experience blisters in mucosal membranes (e.g., mouth, esophagus, anus), scars, contractures, and fused digits. No treatments are available; symptom management (i.e., bandaging, antibiotics) is provided as wounds arise. Allantoin is a naturally occurring nitrogenous compound that is used in toothpaste, shampoo, and skin creams as a conditioning agent; however, it has a short half-life. Zorblisa is a topical cream with a stabilized form of allantoin at higher concentrations (3% to 6%) than those used in over-the-counter products. It purportedly speeds healing of wounds and reduces the total body surface area affected by blisters at a given time. It is applied once daily, over the whole body, topically, indefinitely.</p> <p>Scioderm, Inc., Raleigh, NC</p> <p>Phase II extension study ongoing; FDA granted breakthrough therapy and orphan drug statuses</p>	Bandaging Skin grafts	<p>Improved healing time Reduced incidence of blisters Reduced rate of infection Reduced mortality Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Antisense molecule (ISIS-SMNRx) for treatment of spinal muscular atrophy	Children in whom spinal muscular atrophy (SMA) has been diagnosed	<p>SMA is an inherited neuromuscular disorder in which muscles atrophy and weaken, often resulting in death of infants born with the most severe form of the disorder. The disorder is caused by mutations to <i>SMN1</i>, a gene that normally encodes the survival motor neuron 1 (SMN) protein; abnormally low levels of SMN protein are a hallmark of SMA. SMA occurs in an estimated 1 in 10,000 live births worldwide. Affected infants typically appear normal at birth, and symptoms develop within several months after birth. Available SMA treatments only address disease symptoms. An unmet need exists for disease-modifying therapies for this patient population. ISIS-SMNRx is an antisense molecule that purportedly boosts levels of SMN protein by addressing an RNA splicing irregularity. The ongoing trial is enrolling children aged 2–14 years who are medically stable; the drug is administered during a single injection of 1 of 4 dose levels into the spinal cord fluid.</p> <p>Biogen Idec, Weston, MA Isis Pharmaceuticals, Inc., Carlsbad, CA</p> <p>2 phase III trials ongoing; in 2011, FDA granted fast-track and orphan drug statuses</p>	<p>ChariSMA gene therapy (investigational) Supportive therapy</p>	<p>Reduced SMA symptoms Improved motor function Improved quality of life</p>
Apical sodium-dependent bile acid transporter (SHP625) for treatment of cholestatic liver diseases	Patients in whom cholestatic liver disease has been diagnosed	<p>Cholestatic liver diseases, including Alagille syndrome, progressive familial intrahepatic cholestasis, primary biliary cirrhosis, and primary sclerosing cholangitis, cause impaired bile acid flow and retention of bile acids in the liver. This can progress to severe liver damage and failure. Available treatment options have limited efficacy, and many patients eventually require surgical intervention or liver transplant. SHP625 is an apical sodium-dependent bile acid transporter inhibitor that purportedly cycles intestinal bile acids back into circulation. Trials are testing doses of 5, 10, and 20 mg, once daily, orally.</p> <p>Lumena Pharmaceuticals subsidiary of Shire, plc, Dublin, Ireland</p> <p>Phase II trials ongoing; FDA granted orphan drug status Sept 2013</p>	<p>Antipruritics Bile duct surgery Dietary changes Liver transplant Ursodeoxycholic acid</p>	<p>Improved health outcomes Improved liver function Reduced serum bile acid levels Reduced symptoms (e.g., pruritus) Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Apremilast (Otezla) for treatment of Behçet's disease	Patients in whom Behçet's disease has been diagnosed	<p>Behçet's disease is characterized by oral ulcers, genital ulcers, and eye disorders including uveitis, retinitis, and iritis. More than half of patients develop blurred vision, pain, redness, and eventually blindness. Apremilast purportedly inhibits phosphodiesterase type 4 (PDE-4), and increases intracellular cAMP, which modulates multiple inflammatory mediators and relieves the inflammatory symptoms of Behçet's disease. In clinical trials, it is administered at 30 mg, twice daily, orally.</p> <p>Celgene Corp., Summit, NJ</p> <p>Phase III trial ongoing; FDA granted orphan drug status; approved for treating psoriatic arthritis</p>	Corticosteroids	<p>Improved visual symptoms</p> <p>Reduced pain and frequency of oral/genital ulcers</p> <p>Slowed disease progression</p> <p>Improved quality of life</p>
Asfotase alfa for treatment of hypophosphatasia in infants and children	Infants and children in whom hypophosphatasia has been diagnosed	<p>Hypophosphatasia is a rare metabolic disorder caused by deficiency of the tissue-nonspecific isoenzyme of alkaline phosphatase (TNSALP). TNSALP is a phosphomonoesterase that plays a key role in regulating bone mineralization. Alterations in the <i>TNSALP</i> gene result in extracellular accumulation of inorganic pyrophosphate, leading to inhibited bone mineralization and resultant rickets or osteomalacia or both. Incidence has been estimated at 1 per 100,000 births. Asfotase alfa (ENB-0040) is an enzyme, a form of recombinant human TNSALP. This enzyme is fused to the Fc portion of human immunoglobulin G and attaches to a deca-aspartate bone-targeting peptide derived from osteopontin and bone sialoprotein. This enzyme has a high affinity for bone, allowing it to exert its effects with limited systemic effects and at a half-life 30% longer in bone than in serum. In clinical trials, asfotase alfa is administered as daily, subcutaneous injection of 0.3 or 0.5 mg/kg.</p> <p>Alexion Pharmaceuticals, Inc., Cheshire, CT</p> <p>Phase II and II/III trials ongoing, with 2 phase II trials completed; 2013, FDA granted fast-track, orphan drug, and breakthrough therapy statuses</p>	<p>Cortisone</p> <p>Nutritional supplements: Magnesium Vitamin B₆ Zinc</p>	<p>Decreased risk of rickets and osteomalacia</p> <p>Restored bone mineralization</p> <p>Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ataluren (Translarna) for treatment of nonsense mutation dystrophinopathies	Patients in whom a nonsense mutation dystrophinopathy or nonsense mutation Duchenne muscular dystrophy (DMD) has been diagnosed	<p>Dystrophinopathies are a class of muscle diseases caused by dystrophin genes that function abnormally or not at all. Dystrophinopathies have an X-linked inheritance pattern and almost exclusively affect males; of the various dystrophinopathies, the most common form is DMD, affecting 1 in 3,300 boys. Approximately 13% of DMD cases are caused by a nonsense mutation that creates premature stop codons in transcribed mRNA, leading to nonfunctional dystrophin protein products. Ataluren (Translarna™) is a small-molecule compound purported to treat dystrophinopathies, including DMD caused by nonsense mutations; the manufacturer hypothesizes that ataluren interacts directly with ribosomes, decreasing sensitivity to premature stop codons. This decreased sensitivity purportedly enables ribosomes to read through nonsense mRNA stop codons and produce functional dystrophin protein. In clinical trials, adolescent male patients are administered 40 mg/kg ataluren in 3 daily doses (10 mg/kg in the morning, 10 mg/kg at midday, and 20 mg/kg in the evening) for about 96 weeks.</p> <p>PTC Therapeutics, Inc., South Plainfield, NJ</p> <p>Phase III trial ongoing; Jan 2005, FDA granted orphan drug status; May 2014, European Medicines Agency granted conditional approval</p>	<p>Drisapersen (in development for DMD) Eteplirsen (in development for DMD) Idebenone (in development for DMD) Palliative care Physical therapy Respiratory support (respirator/ventilators) Symptom control using corticosteroids and beta-2 agonists</p>	<p>Improved 6-minute walk test scores Reduced muscle weakness Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Autologous bone marrow–derived mesenchymal stem cell therapy (NurOwn) for amyotrophic lateral sclerosis	Patients in whom amyotrophic lateral sclerosis (ALS) has been diagnosed	<p>The average life expectancy of a patient with ALS is 3–5 years after diagnosis, and only 10% of patients survive for more than 10 years. Only 1 agent (riluzole) is FDA approved for treating ALS, and it is associated with limited efficacy in improving survival time and little to no efficacy in improving motor function; novel therapies are urgently needed. NurOwn™ is a differentiated autologous adult mesenchymal stem cell (MSC) therapy intended to slow or halt ALS disease progression by regenerating damaged tissue and cells. The company terms the therapy MSC-NTF (“neuron-supporting cells”) and collects MSCs from the patient’s own bone marrow. The MSCs are processed in vitro using a proprietary process intended to differentiate the cells into astrocyte-like cells capable of releasing neurotrophic factors, including glial-derived neurotrophic factor, to repair and regenerate diseased tissue. The processed cells are reinfused through either a single intrathecal injection into the cerebrospinal fluid or multiple intramuscular injections into the patient’s biceps or triceps.</p> <p>BrainStorm Cell Therapeutics, Inc., New York, NY (manufacturer) Massachusetts General Hospital, Boston (U.S. clinical trial collaborator)</p> <p>Phase II U.S. trial ongoing; phase IIa Israeli trial ongoing; FDA granted orphan drug status Feb 2011 and fast-track status Oct 2014</p>	Physical therapy and assistive technology (e.g., speaking tubes, motored chairs) Riluzole	Slowed disease progression Maintained independence and activities of daily living Improved quality of life
Autologous cell preparation and spraying system (ReCell) for treatment of burn wounds	Patients needing therapy for skin burns	<p>About 2.4 million burn injuries are reported each year in the U.S., with 75,000 patients being hospitalized for their burns. About 1 million will sustain substantial or permanent disabilities resulting from their burn injury. Current therapies have variable degrees of efficacy, warranting development of novel treatments. The ReCell® Spray-On Skin™ is a rapid, autologous cell-harvesting, processing, and delivery technology that uses epithelial cells from the patient in a regenerative process. Clinicians spray a sheet of these cultured cells directly on the patient’s wound, which purportedly accelerates healing, minimizes scarring, eliminates tissue rejection, and rehabilitates skin pigmentation. ReCell may be used with mesh grafts.</p> <p>Avita Medical, Ltd., Cambridge, UK</p> <p>Phase III trial ongoing</p>	Cultured epithelial autograft Donor stem cell transplantation and skin printing Wound débridement	Decreased postsurgical blister and skin damage Improved skin regeneration Reduced area of donor site Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Autologous peripheral blood stem cell therapy for treatment of medically refractory inflammatory multiple sclerosis	Patients in whom an inflammatory form of multiple sclerosis (MS) has been diagnosed	<p>Available treatments for MS may slow disease progression, but they are not effective in all patients, and the disease has no cure. An unmet need exists for safe, effective treatments for patients with treatment-refractory forms of inflammatory MS. Peripheral blood stem cell therapy purportedly addresses this need by preventing motor disability symptoms associated with MS. In this treatment, autologous unmanipulated blood stem cells are obtained, conditioned with a regimen of cyclophosphamide and rabbit antithymocyte globulin (rATG), then infused back into the patient; research has suggested that this technique yields more hematopoietic stem cells than other methods, increasing treatment efficiency. In ongoing clinical trials, investigators hypothesize that this stem cell treatment will prevent further disability and may improve patients' performance on standard measures of MS symptom severity and functional limitation, including Expanded Disability Status Scale (EDSS) scores, timed walk, ambulation index, and relapse rates.</p> <p>Northwestern University, Evanston, IL (study sponsor) Rush University Medical Center, Chicago, IL (research collaborator) University of São Paulo, São Paulo, Brazil (research collaborator) Uppsala University, Uppsala, Sweden (research collaborator) Sheffield Teaching Hospitals NHS Foundation Trust, Yorkshire, England (research collaborator)</p> <p>Phase II and III trials ongoing</p>	Autologous neural stem cell therapy (under development) Dimethyl fumarate (Tecfidera®) Fingolimod Glatiramer acetate Interferon beta-1a Interferon beta-1b Mitoxantrone Natalizumab	Improved ambulation Improved EDSS scores Improved timed walk scores Reduced MS-related functional limitations Reduced MS relapse rates Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Beloranib for treatment of obesity related to Prader-Willi syndrome	Patients in whom Prader-Willi syndrome (PWS) with comorbid obesity has been diagnosed	<p>PWS is a congenital chromosomal disorder characterized by compulsive overeating and the early development of obesity. The disorder typically causes low muscle mass and function, short stature, incomplete sexual development, a chronic feeling of hunger, and metabolism that uses drastically fewer calories than normal. This leads to excessive eating and life-threatening obesity. PWS occurs in males and females equally and in all races. Worldwide prevalence estimates range from 1 in 8,000 to 1 in 50,000. Obesity is identified as the main cause of morbidity and mortality in PWS. Thus, weight reduction is important for prolonged survival. Beloranib is under development for this patient population; it inhibits methionine aminopeptidase 2 (MetAp2), which reportedly reduces hunger and blood flow to fatty tissues, starving them, and increasing metabolism of fat as an energy source. Researchers purport that this can induce weight loss. This drug is injected and administered subcutaneously at 0.9 mg/m², 3 or 6 mg, twice daily for about 1 month.</p> <p>Zafgen, Inc., Cambridge, MA</p> <p>Phase III trial ongoing; in Jan 2013, FDA granted orphan drug status for treating PWS</p>	<p>Dietary and lifestyle modifications Various obesity drugs on the market and under development Surgical interventions ZGN-433 (MetAp2 inhibitor)</p>	<p>Weight loss Decreased comorbidities Fewer adverse events Improved quality of life</p>
Bimagrumab for treatment of sporadic inclusion body myositis	Patients in whom sporadic inclusion body myositis (sIBM) has been diagnosed	<p>sIBM is the most common acquired myopathy in patients older than 50 years and accounts for 16% to 28% of inflammatory myopathies in the U.S. In sIBM, inclusion bodies accumulate in muscle tissue and cause degeneration. The primary affected muscles are the wrist, finger, thigh, and calf muscles. sIBM progresses slowly, and patients may have limited mobility requiring a cane or wheelchair. Investigators have not found a definitive treatment. Bimagrumab (BYM338) is a monoclonal antibody that purportedly binds to type II activin receptors to prevent natural ligands (including myostatin and activin) from binding, thereby stimulating muscle growth. Bimagrumab is administered by intravenous infusion.</p> <p>Novartis International AG, Basel, Switzerland</p> <p>Phase II/III trials ongoing; FDA granted breakthrough therapy status; also studied for sarcopenia and cachexia associated with chronic obstructive pulmonary disease</p>	<p>No approved therapies exist</p>	<p>Improved motor function symptoms Reduced muscle loss Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Bioartificial liver system (ELAD System) as bridge to recovery or liver transplantation	Patients in whom acute liver failure has been diagnosed	<p>Extracorporeal bioartificial liver support system (Extracorporeal Liver Assist Device [ELAD[®]]) is intended to replace lost liver functions, such as synthesis of metabolic enzymes and key proteins. The cell-based liver support system adds a “bioreactor” filter to standard liver dialysis systems that temporarily removes blood from the body to remove circulating toxins. ELAD incorporates cultured human hepatocytes in bioreactor cartridges as part of a dialysis-like system. It functions as a bridge while a transplant candidate awaits a donor liver. The device is regulated as a combination biologic by FDA’s Division of Cellular, Tissue and Gene Therapy in the Center for Biologics Evaluation and Research. Trials are testing the device in acute liver failure; fulminant hepatic failure; acute or chronic hepatitis including acute alcoholic hepatitis; and alcohol-induced liver decompensation.</p> <p>Vital Therapies, Inc., San Diego, CA</p> <p>Phase III trials ongoing for alcohol-induced liver decompensation (VT-208), acute alcoholic hepatitis (VT-210), and fulminant hepatic failure (VT-212); FDA granted orphan status for acute liver failure</p>	Antibiotics Lactulose Liver transplant	Improved rate of 30-day transplant-free survival Increased time to progression of end-stage liver disease
Blisibimod for treatment of IgA nephropathy	Patients in whom immunoglobulin A (IgA) nephropathy has been diagnosed	<p>IgA nephropathy is characterized by IgA accumulation in a patient's kidneys, which causes blood and protein to leak into urine. After 10–20 years, about 25% to 50% of adult patients and 5% to 10% of pediatric patients develop total kidney failure and require dialysis or a kidney transplant. Available treatments target symptom management and slow progression. Blisibimod (A-623) is a peptibody and selective antagonist of B-cell activating factor (BAFF) cytokine that potentially reduces production of IgA. If approved, blisibimod would be the 1st treatment intended to halt IgA nephropathy. Blisibimod is administered by subcutaneous injection.</p> <p>Anthera Pharmaceuticals, Hayward, CA</p> <p>Phase III trials (BRIGHT-SC and BRILLIANT-SC) ongoing</p>	Angiotensin-converting enzyme inhibitors Angiotensin receptor blockers Corticosteroids Dialysis Kidney transplant	Decreased creatinine levels Decreased IgA levels Decreased protein in urine Delayed or prevented end-stage renal failure Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Blood protein marker test for diagnosis of traumatic brain injury	Patients being evaluated for a suspected traumatic brain injury who are characterized as having a mild to moderate head injury (Glasgow coma scale score between 9 and 15)	<p>Mild traumatic brain injury (i.e., concussion) can be difficult to diagnose with available methods, and the lack of a quantitative diagnostic test hampers the process of identifying the condition, estimating prognosis, and tracking improvement. Research has indicated that certain brain-specific proteins may cross the blood-brain barrier when traumatic injury is present, and these proteins could serve as blood-based biomarkers for traumatic brain injury. A point-of-care diagnostic test based on 2 proteins (ubiquitin carboxy-terminal hydrolase L1 [UCHL1] and glial fibrillary acidic protein [GFAP]) is under study as a test for traumatic brain injury.</p> <p>Abbott Laboratories, Abbott Park, IL (licensee) Banyan Biomarkers, Inc., Alachua, FL (principal developer) U.S. Department of Defense, Arlington, VA (development collaborator)</p> <p>Unphased trial completed; Aug 2014, Banyan licensed its intellectual property to Abbott for validation and verification</p>	Clinical neurologic evaluation Computed tomography Magnetic resonance imaging	Improved sensitivity Improved specificity
Cholic and arachidic acid conjugate (Aramchol) for treatment of nonalcoholic steatohepatitis	Patients with nonalcoholic steatohepatitis (NASH), obesity, and glucose intolerance	<p>NASH is a liver disease characterized by fatty deposits, inflammation, and hepatocyte damage. It affects an estimated 2% to 5% of Americans, although it is asymptomatic for most patients. As NASH progresses over several years, it may lead to cirrhosis and permanent liver damage. In the most severe cases, patients require a liver transplant to survive. NASH's cause is unknown. People who are middle-aged, obese, or glucose intolerant are at higher risk of the disease, although some patients have none of these risk factors. For patients who alter their diets and exercise, NASH may be reversible. No other treatments exist. Aramchol is a synthetic conjugate of cholic acid (a bile acid) and arachidic acid (a fatty acid) that purportedly affects liver fat metabolism by inhibiting stearoyl coenzyme A desaturase 1 (SCD1) activity. SCD1 inhibition results in decreased hepatic storage of triglycerides and fatty acid esters. Aramchol is administered at a dosage of 300 mg daily, orally, for 3 months.</p> <p>Galmed Pharmaceuticals Ltd., Tel Aviv, Israel</p> <p>Phase II/III trial ongoing; FDA granted fast-track status</p>	Improved diet and exercise	Decreased liver fat Decreased liver inflammation and damage Reduced rates of cirrhosis and liver failure Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Corneal collagen cross-linking (VibeX/KXL System) for treatment of progressive keratoconus</p>	<p>Patients in whom progressive keratoconus has been diagnosed</p>	<p>Keratoconus is a degenerative disease of the eye. Progressive keratoconus requires invasive interventions, such as corneal transplants and insertion of corneal rings, and it is the leading cause in corneal transplants in the U.S. These invasive surgical interventions may present unfavorable complications, such as graft rejection, persistent visual problems, permanent vision loss, and prolonged surgical recovery. If accepted, corneal collagen-crosslinking (CCL) would provide a procedure that is less invasive, requires a shorter recovery time, and generates more optimal clinical outcomes to improve patient quality of life. CCL is performed by removing the corneal epithelium and applying riboflavin drops to the eye; the eye is then exposed to ultraviolet light, which interacts with the riboflavin. The interaction produces reactive oxygen molecules that cause chemical bonds to form between and within the corneal collagen fibrils, making them stiffer. The riboflavin soak and UV crosslinking take about 6 minutes.</p> <p>Avedro, Inc., Waltham, MA (manufacturer) Cornea and Laser Eye Institute, Teaneck, NJ (trial sponsor)</p> <p>Phase III trials completed and ongoing; FDA granted orphan drug status and priority review; FDA sent complete response letter requiring additional information Mar 2014; new drug application submitted Sept 2014; Conformité Européene (CE) marked</p>	<p>Corneal ring segment inserts Surgical therapy</p>	<p>Improved corneal structure Improved vision Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Cyclic pyranopterin monophosphate enzyme cofactor replacement therapy (ALXN1101) for treatment of molybdenum cofactor deficiency (MoCD) type A</p>	<p>Patients in whom molybdenum cofactor deficiency (MoCD) type A has been diagnosed</p>	<p>MoCD type A is a rare autosomal recessive metabolic disorder caused by homozygous or compound heterozygous mutation in the <i>MOCOS1</i> gene on chromosome 6p21, leading to a lack of molybdenum cofactor. The resulting deficiency causes toxic levels of sulphite and neurologic damage to accumulate, which can often lead to death in early infancy from a critical lack of active sulfite oxidase. MoCD type A is characterized by poor feeding in the affected infant, intractable seizures, and severe psychomotor disabilities. MoCD type A is also known as molybdenum cofactor deficiencies of complementation group A (MOCODA) to distinguish it from molybdenum cofactor deficiencies of complementation group B and group C, phenotypically similar disorders caused by mutations on 2 different genes. As of 2010, fewer than 200 patients with MoCD type A had been identified worldwide. No approved treatments exist for patients with MoCD type A. ALXN1101, a synthetic formulation of cyclic pyranopterin monophosphate (cPMP) derived from recombinant <i>Escherichia coli</i>, is under study to treat MoCD type A by alleviating molybdenum cofactor deficiencies. cPMP is a precursor of molybdenum cofactor experimentally demonstrated to be more stable than its end-product enzyme. In clinical trials, patients with MoCD type A receive daily intravenous infusions of ALXN1101, with dosages increased monthly as tolerated.</p> <p>Alexion Pharmaceuticals, Cheshire, CT</p> <p>Phase II trial ongoing; ongoing separate unphased observational followup study of patients who have received treatment; Oct 2013, FDA granted breakthrough therapy status</p>	<p>No comparators or approved treatments are available</p>	<p>Decreased mortality Increased molybdenum cofactor activity Reduced MoCD type A symptomology Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Daclizumab (Zinbryta) for treatment of multiple sclerosis</p>	<p>Patients in whom multiple sclerosis (MS) has been diagnosed</p>	<p>Available treatments for MS may slow disease progression, but they are not effective in all patients, and the disease has no cure. Daclizumab (Zenapax[®]) is a humanized monoclonal antibody against the CD25 alpha subunit of the high affinity interleukin-2 receptor. It is intended to bind the receptor and inhibit T-cell activation, thus slowing disease progression and degradation of the axon-protecting myelin sheath. In clinical trials, daclizumab is administered by subcutaneous injection, at a dose of 150 mg, once every 4 weeks.</p> <p>Biogen Idec International GmbH, Zug, Switzerland AbbVie, North Chicago, IL</p> <p>Phase III trials ongoing; the manufacturers plan to file new drug application in 1st half of 2015. FDA granted fast-track status for this indication; in Dec 1997, FDA granted marketing approval for an intravenous daclizumab formulation, as part of an immunosuppressive regimen for prevention organ transplant rejection.</p>	<p>Dimethyl fumarate (Tecfidera[®]) Fingolimod Glatiramer acetate Interferon beta-1a Interferon beta-1b Mitoxantrone Natalizumab</p>	<p>Delayed disease progression Decreased demyelination Fewer relapses Improved quality of life</p>
<p>Deferiprone (Ferriprox) for treatment of pantothenate kinase-associated neurodegeneration</p>	<p>Patients in whom pantothenate kinase-associated neurodegeneration (PKAN) has been diagnosed</p>	<p>PKAN is a form of neurodegeneration in which the brain accumulates iron. In affected persons, it usually manifests in early childhood (before age 10 years) and is characterized by progressive dystonia and basal ganglia iron deposition. Characteristics of the disorder include dysarthria, rigidity, and pigmentary retinopathy, and about 25% of affected persons have onset later than 10 years showing prominent speech defects, psychiatric disturbances, and more gradual disease progression. Investigators have not found a cure. Deferiprone (Ferriprox[®]) is purportedly an iron chelator intended to reduce the accumulation of iron in patients' brains. In a clinical trial, deferiprone is being administered as an oral solution, twice daily, for 18 months at a dosage of 5–15 mg/kg.</p> <p>ApoPharma, Inc., Toronto, Ontario, Canada (manufacturer) Ente Ospedaliero Ospedali Galliera, Genoa, Italy (clinical trial sponsor)</p> <p>Phase II and III trials ongoing</p>	<p>Iron chelators</p>	<p>Improved motor-skill functions and movement control Slowed disease progression Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Delayed-release cysteamine (Procysbi) for treatment of nephropathic cystinosis	Patients in whom nephropathic cystinosis has been diagnosed	<p>Nephropathic cystinosis is characterized by the abnormal transport of cystine out of lysosomes, which leads to renal failure, growth failure, rickets and fractures, photophobia, and blindness. Dosing frequency (4 times daily) and side effects of conventional treatment lead to poor patient adherence and subsequent complications. Procysbi® is an enteric-coated, delayed-release, microbead formulation of cysteamine bitartrate that is intended to reduce gastrointestinal adverse events associated with immediate-release cysteamine bitartrate. It requires 1/2 the number of daily doses as existing medical treatment. Cysteamine bitartrate converts cystine to cysteine and cysteamine-mixed disulfide, preventing resultant organ damage. The drug is administered orally, 75 mg, twice daily.</p> <p>Raptor Pharmaceutical Corp., Novato, CA</p> <p>Phase III trials ongoing; FDA approved Apr 2013 for managing nephropathic cystinosis in adults and children older than 6 years</p>	<p>Cystagon® Growth hormone therapy Indomethacin Renal transplant Replacement of urinary losses</p>	<p>Improved glomerular function Reduced morbidity and mortality Improved quality of life</p>
Delayed-release cysteamine (Procysbi) for treatment of Leigh syndrome and non-Friedreich's ataxia inherited mitochondrial diseases	Patients in whom Leigh syndrome (SNEM) or a non-Friedreich's ataxia inherited mitochondrial disease has been diagnosed	<p>Inherited mitochondrial diseases are a group of rare neurometabolic disorders caused by dysfunctional mitochondria inherited from 1 or both parents. In a subgroup of these diseases, including Leigh syndrome (also known as subacute necrotizing encephalomyelopathy, or SNEM), respiratory chain functioning is affected, leading to dystonia, ataxia, and failure to thrive. Many of these diseases are fatal, with the majority patients experiencing 1 or more symptoms within 10–13 years of birth. No approved treatments exist for Leigh syndrome or similar, inherited mitochondrial diseases such as non-Friedreich's ataxia. Delayed-release cysteamine (Procysbi®) is a cystine-depleting capsule that purportedly helps deplete toxic reactive oxygen species in cells. Abnormally increased levels of these oxygen species are found in patients with Leigh syndrome and similar diseases. In clinical trials, patients are administered increasing oral dosages of RP103, daily, dependent on tolerance.</p> <p>Raptor Pharmaceutical Corp., Novato, CA</p> <p>Phase II/III trial ongoing; FDA approved RP103 for managing nephropathic cystinosis in adults and children 6 years or older</p>	<p>No treatments are approved for Leigh syndrome and similar diseases Treatments for symptoms (e.g., coenzyme Q10, dichloroacetate, sodium bicarbonate or sodium citrate [for treatment of lactic acidosis]) High-fat, low carbohydrate diet Thiamine</p>	<p>Increased patient lifespan Reduced disease symptoms Improved quality of life</p>

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<p>Drisapersen for treatment of Duchenne muscular dystrophy</p>	<p>Ambulatory patients 5 years of age or older who have Duchenne muscular dystrophy (DMD) and a dystrophin gene mutation (deletions of exons 50, 52, 45–50, 48–50, and 49–50)</p>	<p>Available treatments for DMD are limited to reducing symptoms without addressing their underlying cause. Patients experience a shortened lifespan and require additional support from orthotic devices. Drisapersen (GSK-2402968, PRO-051) is an antisense oligonucleotide that induces exon skipping of exon 51. Antisense oligonucleotides skip defective exons (small RNA sequences that code for sections of protein), purportedly treating DMD by correcting the errant reading frame and allowing normal protein to be produced. In clinical trials, drisapersen is injected subcutaneously at dosages up to 9 mg/kg weekly.</p> <p>Prosensa Therapeutics, Leiden, the Netherlands</p> <p>Phase III trials ongoing; Oct 2014, Prosensa announced rolling new drug application submission; Jun 2013, FDA granted breakthrough therapy status; Jan 2013, FDA granted orphan drug status</p>	<p>Orthotic devices Pharmacotherapy (e.g., corticosteroids, beta-2 agonists) Physical therapy Respiratory support (respirator/ventilators)</p>	<p>Decreased muscle degeneration Improved symptoms Decreased need for supportive devices Increased survival Improved quality of life</p>
<p>Droxidopa (Northera) for treatment of symptomatic neurogenic orthostatic hypotension</p>	<p>Patients with Parkinson's disease, multiple system atrophy, and/or pure autonomic failure who are at risk of neurogenic orthostatic hypotension (nOH)</p>	<p>nOH is a chronic condition purportedly caused by an underlying neurogenic disorder, such as Parkinson's disease, multiple system atrophy, or pure autonomic failure. Symptoms include dizziness, lightheadedness, blurred vision, fatigue, and fainting episodes upon standing. Treatment options have included pharmacotherapy, which does not achieve an adequate response in many patients. Droxidopa (Northera™) is a norepinephrine precursor that allows reuptake of norepinephrine into peripheral nervous system neurons, stimulating receptors for vasoconstriction and providing physiologic improvement in symptomatic nOH. Dose is titrated according to symptom response from 100 to 600 mg total, daily. Administered orally, up to 3 times daily.</p> <p>Chelsea Therapeutics International, Ltd., subsidiary of H. Lundbeck a/s, Valby, Denmark</p> <p>Phase III trials completed and ongoing; FDA approved Feb 2014 for treating "symptomatic neurogenic orthostatic hypotension caused by primary autonomic failure (Parkinson's disease, multiple system atrophy, and pure autonomic failure), dopamine beta-hydroxylase deficiency, and non-diabetic autonomic neuropathy."</p>	<p>Diet and lifestyle modifications Pharmacotherapy (e.g., midodrine hydrochloride)</p>	<p>Decreased confusion from reduced cerebral circulation Decreased nOH Decreased risk of falling</p>

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Eculizumab (Soliris) for prevention of delayed graft function after kidney transplantation	Patients who have undergone kidney transplantation using a cadaveric donor with a delayed graft function (DGF) risk	<p>DGF is a form of acute renal failure most commonly defined as the use of dialysis within 1 week of kidney transplantation. It is likely due to ischemia or reperfusion injury when a cadaveric donor organ is used. DGF is associated with an inflammatory reaction that can be debilitating and life threatening, because it increases the risk of organ loss. DGF incidence has increased in recent years, likely because of increased organ donations after cardiac death instead of just brain death. Eculizumab is a monoclonal antibody directed against C5 complement protein. It inhibits complement activation, potentially preventing DGF. Eculizumab is administered by intravenous infusion over 25–45 minutes on the day of transplantation and 18–24 hours later.</p> <p>Alexion Pharmaceuticals, Inc., Cheshire, CT</p> <p>Phase II/III trial ongoing; FDA granted orphan drug status; FDA approved for treating atypical hemolytic uremic syndrome and paroxysmal nocturnal hemoglobinuria</p>	No treatments available	<p>Faster kidney function after transplantation</p> <p>Reduced risk of kidney loss</p> <p>Reduced use of dialysis</p> <p>Improved survival</p> <p>Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Eculizumab (Soliris) for treatment of myasthenia gravis	Patients in whom severe or refractory myasthenia gravis has been diagnosed	<p>Myasthenia gravis is a chronic autoimmune disease with an estimated prevalence in the U.S. of about 20 per 100,000 population. In myasthenia gravis, uncontrolled complement activation causes antibodies to block or destroy acetylcholine receptors at neuromuscular junctions. The result is decreased muscle contractions, manifesting physically as transient weakening of the skeletal muscles that peaks during activity and improves with sufficient rest. The most commonly affected muscles are in the mandibular and extraocular groups, controlling eye movement, facial expression, chewing, talking, and swallowing; in patients with severe forms of the disease, muscles involved in breathing and neck movement may also be affected. Eculizumab (Soliris) is a recombinant humanized monoclonal immunoglobulin (Ig) IgG2/IgG4 antibody that selectively binds to terminal complement component C5. This binding prevents cleavage of C5 into C5a and C5b and also disrupts downstream generation and activation of C5b-9; preventing C5b-9 generation is purported to directly affect symptoms and progression of diseases reliant on uncontrolled complement activation. In preliminary clinical trials, patients received eculizumab intravenously at dosages of 600 mg, weekly, for 4 doses, followed by 900 mg, every 2 weeks, for 7 doses.</p> <p>Alexion Pharmaceuticals, Inc., Cheshire, CT</p> <p>2 phase III trials ongoing; Jun 2014, FDA granted orphan drug status for this indication; eculizumab is FDA approved for treating both paroxysmal nocturnal hemoglobinuria and atypical hemolytic uremic syndrome</p>	<p>Anticholinesterase agents (e.g., Mestinon®) Corticosteroids (e.g., prednisone) and immunosuppressants Plasmapheresis Thymectomy</p>	<p>Improved disease severity scores Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Electrode-embedded garment (Mollii) for treatment of muscle spasms and pain from traumatic brain injury</p>	<p>Patients with muscle spasms and pain due to traumatic brain injury (TBI)</p>	<p>Patients who experience TBI can have lasting brain damage that causes involuntary muscle spasms and tension throughout the body. The muscle spasms and tension can cause severe pain and limit mobility. Available treatments include surgery and muscle relaxants. The Mollii garment is an electrode-embedded elastic garment that works as a noninvasive alternative to available medical treatments. The full-body garment has 58 electrodes that can target up to 42 muscles. It is powered by a control box worn at the waist. Patients are expected to wear the garment a few hours at a time to receive transcutaneous electrical nerve stimulation to affected muscles, 3 times a week. Relief reportedly lasts up to 2 days. The garment's estimated cost is \$7,600.</p> <p>Royal Institute of Technology (KTH), Stockholm, Sweden</p> <p>Conformité Européene (CE) marked; expanded launch in the U.S. and other countries was anticipated but not seen in 2014</p>	<p>Muscle relaxants Surgery</p>	<p>Decreased pain and muscle spasms Increased mobility Improved quality of life</p>
<p>Eliglustat tartrate (Cerdelga) for treatment of Gaucher's disease type 1</p>	<p>Patients in whom Gaucher's disease type 1 has been diagnosed</p>	<p>Gaucher's disease is caused by a hereditary deficiency of glucocerebrosidase, which leads to enlarged and malfunctioning organs, skeletal disorders, and painful neurologic complications. 1st-line treatment is intravenous therapy. Eliglustat tartrate (Cerdelga) is a glucocerebrosidase inhibitor that purportedly decreases the amount of glucocerebrosidase in major organs such as the spleen and liver by slowing production. In clinical trials, eliglustat tartrate has been administered twice daily; however, the manufacturer intends to ultimately market the drug as a once-daily treatment. Eliglustat tartrate is the 1st available 1st-line oral treatment option for patients with Gaucher's disease type 1. Eliglustat tartrate cannot be used in patients who are ultra-rapid metabolizers of the enzyme CYP2D6 because adequate levels of the drug cannot be maintained. Dosing is based on the rate at which patients metabolize CYP2D6, but most patients in trials took 84 mg, twice daily.</p> <p>Genzyme subsidiary of Sanofi, Paris, France</p> <p>Phase III trials completed and ongoing; FDA approved Aug 2014 "... for the long-term treatment of adult patients with Gaucher[']s disease type 1 who are CYP2D6 extensive metabolizers (EM), intermediate metabolizers (IM), or poor metabolizers as detected by an FDA-cleared test."</p>	<p>Blood transfusions Bone marrow transplant Enzyme replacement therapy (e.g., imiglucerase, taliglucerase alfa) Joint replacement surgery Miglustat (Zavesca®) Splenectomy</p>	<p>Decreased liver volume Decreased spleen volume Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Elosulfase alfa (Vimizim) for treatment of Morquio A syndrome	Patients in whom the genetic disorder Morquio syndrome type A has been diagnosed	<p>Morquio syndrome type A is a rare autosomal recessive genetic disorder. It results from a deficiency in N-acetylgalactosamine-6-sulfate sulfatase activity and leads to the accumulation of keratan sulfate and various developmental defects. The estimated U.S. prevalence is between 1,000 and 1,500 patients. No treatments exist to address the underlying cause of the disease; only palliative treatments are available. Elosulfase alfa (Vimizim) is an enzyme replacement therapy (N-acetylgalactosamine-6-sulfate sulfatase, encoded by the <i>GALNS</i> gene) intended to treat the underlying disorder. Elosulfase alfa is infused at a dose of 2 mg/kg over a period of about 4 hours once a week or once every other week.</p> <p>BioMarin Pharmaceutical, Inc., San Rafael, CA</p> <p>Pivotal phase III trial preliminary data completed; additional trials ongoing; FDA approved Feb 2014</p>	No other treatments are available to resolve the underlying disease	<p>Disease regression Improved bone growth as measured by radiograph Improved activities of daily living Increased physical endurance (6-minute walk test) Improved respiratory function Reduced urine keratan sulfate levels</p>
Eltrombopag (Promacta) for treatment of severe aplastic anemia	Patients with severe aplastic anemia (SAA) whose disease has not responded to immunosuppressive therapy	<p>SAA is a bone marrow disease in which bone marrow cells are damaged, resulting in deficiencies in white and red blood cells and platelets. SAA can be caused by exposure to toxins, radiation, or infection. It can also be hereditary or arise from an unknown origin. Standard treatment is immunosuppressive therapy, but about 30% of patients do not respond. Among patients who do not respond, about 40% die from infection or bleeding within 5 years. Eltrombopag (Promacta) is a thrombopoietin receptor agonist that potentially stimulates the growth of platelets to enable clotting. Dosage is 50 mg, once daily, orally. The dose is adjusted to maintain platelet count greater than $50 \times 10^9/L$, not to exceed 150 mg, daily.</p> <p>GlaxoSmithKline, Middlesex, UK</p> <p>FDA approved Aug 2014; phase II and III trials ongoing</p>	Blood transfusion for symptom relief Bone marrow transplant Immunosuppressive therapy	<p>Blood transfusion independence Improved hemoglobin levels Increased neutrophil, eosinophil, or platelet counts</p>

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Epratuzumab for treatment of systemic lupus erythematosus	Patients in whom systemic lupus erythematosus (SLE) has been diagnosed	<p>Investigators have not found a permanent cure for SLE, and available treatments provide only partial relief of symptoms. Epratuzumab is a fully humanized monoclonal antibody which purportedly binds and modulates the activity of CD22, an antigen found on B cells purported to prevent autoreactive responses. Autoreactive B cells are believed to play a major role in SLE pathogenesis. In clinical trials, the drug is administered as a monthly subcutaneous injection.</p> <p>UCB, S.A., Brussels, Belgium Immunomedics, Inc., Morris Plains, NJ</p> <p>Multiple phase III trials ongoing; Jan 2005, FDA granted fast-track status</p>	Belimumab Rituximab Rontalizumab	Delayed disease progression Reduced symptoms Reduced flares Improved quality of life
Eprodisate disodium (Kiacta) for treatment of amyloid A amyloidosis	Patients at risk of amyloid A (AA) amyloidosis, especially those who have rheumatoid arthritis or chronic infection	<p>AA amyloidosis is a disorder marked by abnormal deposits of serum amyloid A (SAA) protein in the extracellular space of tissues and organs; worldwide, it is the most common form of systemic amyloidosis. Within the U.S., the prevalence of AA amyloidosis is unknown, but it has been determined that the disorder is more common in females than males. Because SAA levels are often elevated during inflammation, AA amyloidosis can manifest in patients with a variety of inflammatory conditions, including Crohn's disease, rheumatoid arthritis, and tuberculosis. No curative treatment for AA amyloidosis is available. Eprodisate disodium (Kiacta™) is designed to interfere with the formation of AA fibrils that can accumulate in organs and tissues; specifically, it is purported that eprodisate disodium indirectly protects renal function in patients with AA amyloidosis. In clinical trials, eprodisate disodium is administered orally, at dosages of 400, 800, or 1,200 mg, twice daily.</p> <p>Bellus Health, Inc. (formerly Neurochem), Laval, Quebec, Canada Celtic Therapeutics Management LLP, St. Thomas, U.S. Virgin Islands</p> <p>Phase III trial ongoing; new drug application submitted to FDA in 2006; FDA requested more data; manufacturers initiated phase III confirmatory trial in 2010 to address this concern; company expects phase III study completion in 2016</p>	Biologics Colchicine for familial Mediterranean fever Immunosuppressants Kidney transplantation for kidney failure Supportive care Surgical excision of infected tissue and antibiotics for chronic infection	Reduced risk of organ failure (especially kidneys, liver, spleen) Reduced mortality

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Eteplirsen for treatment of Duchenne muscular dystrophy	Patients in whom Duchenne muscular dystrophy (DMD) has been diagnosed	<p>Current treatments for DMD are limited to reducing symptoms without addressing their underlying cause. Patients experience a shortened lifespan and require additional support from orthotic devices. Eteplirsen (AVI-4658) is intended for patients who have a mutation in the dystrophin gene; eteplirsen splice-switching oligomer is intended to skip exon 51 of the dystrophin gene (which codes a protein that plays a key structural role in muscle fiber function) during translation, thereby restoring the gene's ability to make a shorter (i.e., not perfect, but functional) form of dystrophin. In clinical trials, eteplirsen is intravenously infused, at dosages of 30 mg/kg or 50 mg/kg, once weekly.</p> <p>Sarepta Therapeutics, Inc. (formerly AVI BioPharma, Inc.), Cambridge, MA</p> <p>Phase III trial ongoing; manufacturer plans to file for early FDA approval by mid-2015; Oct 2007, FDA granted orphan drug status</p>	Beta-2 agonists Corticosteroids Orthotic devices Physical therapy Respiratory support devices	Delayed or halted muscle degeneration Reduced symptoms Increased survival Improved quality of life
External trigeminal nerve stimulation (Monarch) for treatment of epilepsy	Patients in whom epilepsy has been diagnosed	<p>An estimated 3 million people in the U.S. have some form of epilepsy, with about 1 million cases resistant to medical therapy. Pharmacological therapies have helped treat epilepsy, but it commonly recurs. Surgical procedures such as craniotomy may be performed, but they may leave the brain susceptible to unintended injury and resultant neurological complications. External trigeminal nerve stimulation (eTNS) using the Monarch device is a noninvasive therapy in which mild electrical signals pass through electrodes placed on the patient's forehead. eTNS is intended to transcutaneously stimulate the various branches of the trigeminal nerve (the largest cranial nerve), which projects to the amygdala. The stimulation is controlled by an external pulse generator worn by patients during sleep.</p> <p>NeuroSigma, Inc., Los Angeles, CA (manufacturer), in collaboration with Olive View-UCLA Education and Research Institute, Sylmar, CA; Boston Scientific Corp., Natick, MA; and the Epilepsy Foundation, Landover, MD (investigators)</p> <p>Phase II study completed; in Jan 2015, FDA also granted humanitarian use device approval to eTNS for treating Lennox-Gastaut syndrome (severe pediatric-onset epilepsy); eTNS is approved in Canada, Europe, and Mexico for treating various epilepsy indications</p>	Pharmacotherapy (e.g., ezogabine, lamotrigine, levetiracetam, perampanel, tiagabine, tricyclics, valproate)	Reduced frequency of seizure Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Fingolimod for treatment of chronic inflammatory demyelinating polyneuropathy	Patients in whom chronic inflammatory demyelinating polyneuropathy (CIDP) has been diagnosed	<p>CIDP is a neurologic disorder characterized by progressive weakness and impaired sensory function in the legs and arms; it is closely related to Guillain-Barré syndrome. In the U.S., about 40,000 people have CIDP. It is caused by damage to the myelin sheath of peripheral nerves. CIDP is most common in young adult men, with symptoms including tingling or numbness in appendages, weakness of the arms and legs, areflexia, and fatigue. Treatments for CIDP, including immunoglobulin medications, attempt to alleviate symptoms or prevent further loss of peripheral nerve myelin. However, about 20% of CIDP cases do not respond to available treatments. Fingolimod (Gilenya®), an immunomodulating drug, is purportedly an effective treatment for CIDP, possibly acting by decreasing demyelination of sciatic nerves. In planned trials, patients with CIDP will receive daily oral administrations of 0.5 mg.</p> <p>Novartis International AG, Basel, Switzerland Mitsubishi Tanabe Pharma Corp., a subsidiary of Mitsubishi Chemical Holdings Corp., Tokyo, Japan</p> <p>Phase III trial ongoing and new phase III trials planned; Apr 2010, FDA granted orphan drug status for treating CIDP; FDA approved for treating multiple sclerosis</p>	<p>Corticosteroids (e.g., prednisone), alone or with immunosuppressant drugs Lower-dosage intravenous immunoglobulin (IVIg) therapy (e.g. 10% formulations) Physiotherapy Plasmapheresis</p>	<p>Decreased demyelination Improved symptoms Improved quality of life</p>

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<p>Focused ultrasound (ExAblate Neuro) for treatment of essential tremor</p>	<p>Patients in whom essential tremor (ET) has been diagnosed</p>	<p>ET is a slowly progressive neurologic disorder that affects approximately 10 million people in the U.S. and has no cure. This disease is characterized by a tremor of the arm during voluntary movements. Existing treatments are invasive and often ineffective. The ExAblate Neuro focused ultrasound device consists of a unique helmet-like apparatus containing phased array focused ultrasound transducers. Computed tomography images can be used to reconstruct the skull and configure the ultrasound beams to focus on the targeted area (the ventral intermediate nucleus of the thalamus). Magnetic resonance (MR) imaging or MR thermography can be used to track the delivery of ultrasound beams. Purported benefits of focused ultrasound therapy include noninvasive transcranial treatment; absence of ionizing radiation, allowing for repeated treatment without long-term toxicity; immediate bio-physical tissue response from thermal ablation; and precise tissue targeting with 1 mm accuracy.</p> <p>University of Virginia (UVA) Focused Ultrasound Center, Charlottesville (partnership of UVA, Charlottesville; Commonwealth of Virginia; Focused Ultrasound Foundation, Charlottesville; and InSightec, Ltd., Tirat Carmel, Israel)</p> <p>Phase III trial ongoing; Conformité Européene (CE) marked Jun 2010</p>	<p>Antiepileptics Beta blockers Deep brain stimulation Stereotactic thalamotomy</p>	<p>Improved contralateral tremor as assessed on the Clinical Rating Scale for Tremor (CRST) Improved functional activities score as assessed on disabilities section of CRST Improved quality of life</p>
<p>Fostamatinib for treatment of chronic immune thrombocytopenia</p>	<p>Patients in whom chronic immune thrombocytopenic purpura (ITP) has been diagnosed</p>	<p>Chronic ITP is an autoimmune disease affecting otherwise healthy adults, in which the platelets are destroyed. The age-adjusted prevalence is estimated to be 9.5 per 100,000 persons in the U.S. Platelet destruction can cause chronic bleeding and potentially fatal intracranial hemorrhage. ITP has no cure, and relapses can occur years after seemingly successful medical or surgical management. Patients with chronic ITP may need to undergo splenectomy, thus increasing the risk for further complications. Fostamatinib disodium, previously called R788, is a spleen tyrosine kinase inhibitor that interrupts lymphocyte signaling involved in platelet destruction in ITP. It is intended for treating patients with chronic ITP whose disease does not respond to 1st-line medical therapy. In clinical trials, the dosage is 100 or 150 mg, twice daily, for 24 weeks; administered orally.</p> <p>Rigel Pharmaceuticals, Inc., South San Francisco, CA</p> <p>Phase III trials ongoing</p>	<p>Corticosteroids Immunosuppressants Intravenous immune globulin <i>Helicobacter pylori</i> treatment Rituximab Splenectomy Thrombopoietin receptor agonists</p>	<p>Improved blood clotting Increased platelet count Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Human embryonic stem cell–derived retinal pigment epithelium cells for treatment of Stargardt macular dystrophy	Patients in whom Stargardt macular dystrophy has been diagnosed	<p>Stargardt macular dystrophy is a genetic eye disorder affecting a small area near the center of the retina, called the macula. It causes progressive vision loss. Disease prevalence is an estimated 1 in 8,000–10,000 individuals, and no treatment is available. Subretinal transplantation of retinal pigment epithelial cells derived from human embryonic stem cells (also called MA09-hRPE) to replace damaged cells is under study to determine its safety and tolerability for halting or preventing the disease. Treatment is administered by subretinal injection of 50,000, 100,000, 150,000, or 200,000 cells.</p> <p>Ocata Therapeutics, Inc., Marlborough, MA</p> <p>Phase I/II trials ongoing; FDA granted orphan drug status</p>	No treatment is available	<p>Improved functional status</p> <p>Improved vision</p> <p>Reversed loss of central vision</p> <p>Improved quality of life</p>
Human spinal cord–derived neural stem cells for treatment of amyotrophic lateral sclerosis	Patients in whom amyotrophic lateral sclerosis (ALS) has been diagnosed	<p>The average life expectancy of a patient with ALS is 3–5 years after diagnosis, and only 10% of patients survive for more than 10 years. Only a single agent (riluzole) is FDA approved for treating ALS, and it is associated with limited efficacy in improving survival time and little to no efficacy in improving motor function; novel therapies for ALS are urgently needed. Stem cell therapy can potentially repair neurologic damage, including damage associated with ALS. Human spinal cord–derived neural stem cells (NSI-566RSC) is an investigational therapy, developed from human spinal cord–derived neural stem cells. In clinical trials, NSI-566RSC is injected into a patient's lumbar spinal cord.</p> <p>Neuralstem, Inc., Rockville, MD</p> <p>1 phase II trial ongoing, 1 phase II trial completed; FDA granted orphan drug status; May 2012, FDA approved a trial enabling administration of a 2nd dose in the cervical spine of 3 patients</p>	Riluzole Supportive care	<p>Reduced symptoms</p> <p>Slowed or halted disease progression</p> <p>Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Humanized monoclonal antibody (NKTT120) for treatment of sickle cell disease	Patients in whom sickle cell disease (SCD) has been diagnosed	<p>SCD is an autosomal recessive disorder that affects about 100,000 people in the U.S. and Europe and can present as sickle cell anemia or sickle beta-0 thalassemia. Increased disease prevalence is seen in people of African and Mediterranean descent; about 1 in 500 African-American children born have sickle cell anemia. In SCD, sickled red blood cells are more susceptible to oxidative damage and inappropriate adhesion, which can lead to vaso-occlusion crisis (VOC). VOC causes severe pain by obstructing vasculature; it requires hospitalization. Patients may progress to thromboembolic events, stroke, organ failure, or early death. The only FDA-approved treatment for SCD, hydroxyurea, can reduce VOC incidence but is not effective in about 1/3 of adult patients with SCD. A humanized monoclonal antibody that specifically depletes invariant natural killer T cells, a mediator of organ damage in SCD, is in development. Appropriate dosing is under study. Administered intravenously.</p> <p>NKT Therapeutics, Waltham, MA</p> <p>Phase Ib trial ongoing; FDA granted orphan drug and fast-track statuses</p>	Blood transfusion Bone marrow transplant Hydroxyurea	Decreased pain Decreased hospitalizations Reduced organ damage Reduced mortality Improved quality of life
Hypercaloric diet for treatment of amyotrophic lateral sclerosis	Patients in whom amyotrophic lateral sclerosis (ALS) has been diagnosed	<p>The average life expectancy of a patient with ALS is 3–5 years after diagnosis, and only 10% of patients survive for more than 10 years. Only a single agent (riluzole) is approved for treating ALS, and it is associated with limited efficacy in improving survival time; additional effective therapies are needed. Research in human and animal models suggests that high-calorie diets may improve survival among patients with ALS. Controlled hypercaloric diets purportedly provide a potential nonpharmaceutical treatment that delays ALS disease progression; in clinical trials, patients were tube-fed diets consisting of 125% of their daily energy requirements, with excess calories provided by either Jevity 1.5 (high-carbohydrate hypercaloric diet) or Oxepa (high-fat hypercaloric diet).</p> <p>Harvard NeuroDiscovery Center, Cambridge, MA (cosponsor and primary investigator affiliation) Massachusetts General Hospital, Boston (clinical trial sponsor) Muscular Dystrophy Association, Chicago, IL (advertising and recruiting coordinator) National Institutes of Health, Bethesda, MD (cosponsor)</p> <p>Multicenter phase II trial completed</p>	Fingolimod (Gilenya®; experimental) Riluzole (Rilutek®)	Delayed disease progression Decreased mortality rate Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Idebenone (Catena) for treatment of Duchenne muscular dystrophy	Patients in whom Duchenne muscular dystrophy (DMD) has been diagnosed	<p>Available treatments for DMD are limited to reducing symptoms without addressing their underlying cause. Patients experience a shortened lifespan and require additional support from orthotic devices. Idebenone is a small molecule that purportedly facilitates electron transport within mitochondria. The developer asserts that maintaining correct electron balance is essential for normal energy metabolism, particularly in nerve and muscle cells, which demand more energy, making them more prone to rapid cell damage or death from mitochondrial dysfunction. Preserving mitochondrial function and protecting cells from oxidative stress might prevent cell damage and increase energy production within impaired nerve and muscle tissue in patients with DMD. In clinical trials, idebenone was administered 900 mg daily, as two 150 mg tablets taken 3 times a day with meals.</p> <p>Santhera Pharmaceuticals Holding AG, Liestal, Switzerland</p> <p>Phase III trial completed, with results reported in Oct 2014. In Feb 2007, FDA granted orphan drug status. Manufacturer plans to discuss accelerated approval with FDA and the European Medicines Agency</p>	<p>Eteplirsen, AVI-4658 (in development) Orthotic devices Physical therapy Respiratory support (respirator/ventilators) Symptom control using corticosteroids and beta-2 agonists</p>	<p>Delayed or halted muscle degeneration Reduced symptoms Increased survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Intraoral tongue-drive computerized system to maneuver electric wheelchairs</p>	<p>Patients with quadriplegia</p>	<p>The Tongue Drive System (TDS) is a computerized, tongue-operated, assistive neurotechnology. It consists of a lentil-sized, magnetic, tracer-stud that is affixed to the tongue, most commonly by piercing. In spinal cord injuries, the tongue is generally spared from injury because it is innervated by nerves from the brain and not the spinal cord. The tongue is also strong and does not fatigue easily. The magnetic tracer-stud creates a magnetic field around the pierced glossal area detected by a wireless headset. The headset transmits information to a smartphone carried by the patient. The smartphone can then transmit information to a wheelchair or computer, commanding these devices to perform tasks such as wheelchair movement or daily computer tasks (e.g., email). This system can be recharged via a USB after 2 days of continuous use. A standby mechanism allows patients to perform daily tasks, such as eating, sleeping, and conversing, without unnecessary TDS use. Patients must undergo training with the TDS for the computer program to appropriately interpret and calibrate tongue movement, allowing proper control of the patient wheelchair and computer device. The TDS will likely cost between \$6,000 and \$7,000 in addition to an electric wheelchair.</p> <p>Georgia Institute of Technology, Atlanta</p> <p>Pilot trial and unphased trials completed; developer predicts TDS ready for market in 2016</p>	<p>Comparators depend on severity of spinal cord paralysis Chin control wheelchair Head control wheelchair "Sip and puff" wheelchair Speech control wheelchair Tongue keyboard controller wheelchair</p>	<p>Improved aesthetics of device Improved communication speed Improved mobility Improved wheelchair function and control Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Intravenous transthyretin RNAi (patisiran) for treatment of transthyretin familial amyloid polyneuropathy</p>	<p>Patients in whom transthyretin familial amyloid polyneuropathy (TTR-FAP) has been diagnosed</p>	<p>TTR-FAP is a genetic neurodegenerative disease, which can also affect the heart and kidneys. TTR-FAP is usually fatal within a decade in the absence of a liver transplant. Transthyretin (TTR) is a transport protein for thyroxine and retinol which can be amyloidogenic. Mutation of the <i>TTR</i> gene can lead to the development of unstable TTR, which form amyloid fibrils that are deposited in various organs. Patisiran (ALN-TTR02) is an RNAi therapeutic that targets and inhibits the expression of the mutated <i>TTR</i> gene. Patisiran is purported to treat TTR-FAP by silencing the <i>TTR</i> gene and serum levels of TTR; it is hypothesized that this action prevents pathogenic TTR deposits in peripheral tissues, including dorsal root ganglia, sciatic nerve, stomach, and intestines. In clinical trials, patisiran is intravenously infused for up to 18 months; dosages may be titrated upward based on patient tolerance.</p> <p>Alnylam Pharmaceuticals, Inc., Cambridge, MA</p> <p>Phase III and long-term dosage phase II trials recruiting patients; FDA granted orphan drug status in Jun 2012</p>	<p>ALN-TTR01 (investigational) ISIS-TTRRx (investigational) Supportive therapy Tafamidis (investigational)</p>	<p>Improvement in Neuropathy Impairment Score TTR stabilization Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Ixazomib in combination with oral dexamethasone for treatment of relapsed or refractory systemic light chain (AL) amyloidosis</p>	<p>Patients with relapsed or refractory systemic light chain (AL) amyloidosis after 1 or 2 1st-line chemotherapy treatments</p>	<p>AL amyloidosis is the most common form of a group of plasma cell disorders characterized by abnormal amyloid deposits in body tissues. Among Americans, 1,200–3,200 new cases of AL amyloidosis are diagnosed each year; approximately 2/3 of cases occur in males, and 95% of patients with AL amyloidosis are older than 40 years. In AL amyloidosis, amyloid deposits are comprised of excess amyloidogenic monoclonal immunoglobulin light chains produced by the bone marrow clonal plasma cell population. Severe symptoms of AL amyloidosis include congestive cardiomyopathy, sensorimotor or autonomic peripheral neuropathy, and nephritic syndrome. In 20% of cases, plasma cells replicate more aggressively and can lead to myeloma. Various chemotherapy regimens targeting the underlying bone marrow disorder are 1st-line treatments for AL amyloidosis, but an unmet need exists for effective interventions for patients who do not respond to chemotherapy or who experience relapsing symptoms. Ixazomib is a small-molecule, 2nd-generation proteasome inhibitor purported to induce apoptosis in cancerous cells by disrupting essential protein synthesis. In clinical trials, 4 mg ixazomib is administered in oral tablet form, once every 7 days, in combination with alternating 4-day cycles of 20 or 40 mg dexamethasone; this combination can also be administered with cycles of melphalan, cyclophosphamide, thalidomide, or lenalidomide, based on a primary clinician's recommendation.</p> <p>Millennium Pharmaceuticals, Inc., Cambridge, MA, a subsidiary of Takeda Pharmaceutical Co., Ltd., Osaka, Japan</p> <p>Phase III trial ongoing; FDA granted breakthrough status in 2014 and orphan drug status in 2012 for this indication; the European Medicines Agency also granted orphan drug status for this indication</p>	<p>Additional chemotherapy regimens NEOD001 (investigational)</p>	<p>Reduced amyloid deposition Reduced disease progression Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Levoketoconazole (NormoCort) for treatment of endogenous Cushing's syndrome	Patients in whom endogenous Cushing's syndrome has been diagnosed	<p>Endogenous Cushing's syndrome is caused by the body's production of high levels of cortisol or a cortisol precursor, adrenocorticotropic hormone (ACTH), typically by pituitary, adrenal, or ectopic endocrine tumors. ACTH stimulates the production and release of the stress hormone cortisol, which controls the body's use of carbohydrates, fats, and proteins and helps reduce inflammatory responses. Too much ACTH results in too much cortisol. Not all patients respond to surgery or radiotherapy and limited medical treatments are available. Levoketoconazole (NormoCort) is being developed as single 2S, 4R enantiomer of ketoconazole for treating endogenous Cushing's syndrome. It purportedly affects the downregulation of cortisol synthesis by targeting multiple points in the synthetic pathway. Clinical trial using dose titration to determine minimum and maximum effective doses.</p> <p>Cortendo AB, Partille, Sweden</p> <p>Phase III trial (SONICS) ongoing; Mar 2012, FDA granted orphan drug status</p>	<p>Mifepristone (Korlym) Off-label pharmacotherapy agents (ketoconazole, mitotane) Radiotherapy Surgery</p>	<p>Improved symptoms Reduced ACTH levels Reduced morbidity from excess cortisol Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>L-glutamine (pharmaceutical grade) for treatment of sickle cell disease</p>	<p>Patients in whom sickle cell anemia or sickle beta-0 thalassemia has been diagnosed</p>	<p>Sickle cell disease (SCD) is an autosomal recessive disorder that affects about 100,000 people in the U.S. and Europe and can present as sickle cell anemia and sickle beta-0 thalassemia. Increased disease prevalence is seen in people of African and Mediterranean descent; about 1 in 500 African-American children born have sickle cell anemia. In SCD, sickled red blood cells are more susceptible to oxidative damage and inappropriate adhesion, which can lead to vaso-occlusive crisis (VOC). VOC causes severe pain by obstructing vasculature and requires hospitalization. Patients may progress to thromboembolic events, stroke, organ failure, or early death. VOC is typically managed with hydration and pain medication but cannot be halted. The only FDA-approved treatment for SCD, hydroxyurea, can reduce VOC incidence but is not effective in about 1/3 of adult patients with SCD. Pharmaceutical grade L-glutamine (PGLG) might have a role in managing SCD because it is a precursor of natural antioxidants in red blood cells, which may be deficient in SCD. In clinical trials, PGLG is mixed in with food or beverage at 0.3 g/kg in 5 g increments, up to 30 g, daily.</p> <p>Emmaus Medical, Inc., Torrance, CA</p> <p>Phase III trial completed; FDA granted orphan drug and fast-track statuses; manufacturer intended to submit new drug application mid-2014</p>	<p>Allogeneic hematopoietic stem cell transplantation Analgesics Blood transfusion Hydroxyurea Statins Supplemental oxygen</p>	<p>Fewer hospitalizations Reduced frequency of VOCs Reduced health disparities (African Americans) Improved quality of life</p>
<p>Macrophage regulator (NP001) for treatment of amyotrophic lateral sclerosis</p>	<p>Patients in whom amyotrophic lateral sclerosis (ALS) has been diagnosed</p>	<p>The average life expectancy of a patient with ALS is 3–5 years after diagnosis, and only 10% of patients survive for more than 10 years. Only a single agent (riluzole) is FDA approved for treating ALS, and it is associated with limited efficacy in improving survival time and little to no efficacy in improving motor function; novel therapies for ALS are urgently needed. NP001 is a small-molecule regulator of macrophage activation; aberrant macrophage activation is believed to be a primary contributor to the pathology underlying ALS and other neurodegenerative diseases. NP001 is intended to restore normal functioning of macrophages in central nervous system, reducing inflammation and normalizing the cellular environment. Administered intravenously, 1 or 2 mg/kg for 6 months.</p> <p>Neuraltus Pharmaceuticals, Inc., Palo Alto, CA</p> <p>Phase II trial completed; phase III trial planned for Q2 2015; FDA granted fast-track and orphan drug statuses Aug 2011</p>	<p>Riluzole Supportive care</p>	<p>Improved biomarker levels Restoration of macrophages to their neuroprotective state Improved activities of daily living Delayed disease progression Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Masitinib for treatment of multiple sclerosis	Patients in whom multiple sclerosis (MS) has been diagnosed	<p>Treatments for MS may slow disease progression, but they are not effective in all patients, and the disease has no cure. Masitinib is a tyrosine kinase inhibitor purportedly targets the activity of mast cells, which are involved in triggering local inflammatory reactions in tissues. Masitinib purportedly selectively inhibits KIT, platelet-derived growth factor receptor, Lyn, and to a lesser extent, fibroblast growth factor receptor 3. In clinical trials, masitinib is administered orally at a daily dosage of 6 mg/kg.</p> <p>AB Science S.A., Paris, France</p> <p>Phase IIb/III trial ongoing</p>	<p>Dimethyl fumarate (Tecfidera®) Fingolimod Glatiramer acetate Interferon beta-1a Interferon beta-1b Mitoxantrone Natalizumab</p>	<p>Delayed disease progression Reduced symptoms Improved quality of life</p>
Mepolizumab (Bosatria) for treatment of Churg-Strauss syndrome	Patients in whom Churg-Strauss syndrome has been diagnosed	<p>Churg-Strauss syndrome is a rare (1 to 3 cases per million population), currently incurable, autoimmune disorder marked by blood vessel inflammation, new or worsening asthma symptoms, hypereosinophilia, and vasculitis. Disease severity in patients can range from mild, with only skin lesions and polyps, to severe, with life-threatening heart disease, often caused by eosinophilic myocarditis. In the 2nd and 3rd stages of disease, patients may also present with peripheral nerve damage, skin scarring, and kidney damage. Churg-Strauss syndrome is also known as allergic granulomatosis or eosinophilic granulomatosis with polyangiitis (EGPA), in part due to the abnormally high number of eosinophils and elevated interleukin-5 (IL-5) levels during the 2nd stage of the disease. Interventions to treat primary symptoms include systemic corticosteroids, such as prednisone; immunosuppressive drugs, including azathioprine and methotrexate; and immune globulin, administered monthly. Each of these treatments has side effects and limited efficacy in all patients. Mepolizumab, a humanized monoclonal antibody targeting IL-5, that may improve symptoms of Churg-Strauss syndrome and reduce reliance on corticosteroids by reducing eosinophil levels in patients. In a late-phase clinical trial, mepolizumab is administered to patients as a 300 mg subcutaneous injection, every 4 weeks.</p> <p>GlaxoSmithKline, Middlesex, UK</p> <p>Phase III trials ongoing; 2 completed feasibility studies in 8 patients reported positive results. In Jul 2011, FDA granted orphan drug status</p>	<p>Corticosteroids (e.g., prednisone) Immune globulin Immunosuppressants (e.g., azathioprine, methotrexate)</p>	<p>Improved disease course (reduced hypereosinophilia in 2nd disease stage) Reduced corticosteroid reliance Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Methacetin breath test (BreathID) to monitor liver function in acute liver failure	Patients in whom acute liver failure has been diagnosed	<p>BreathID® Methacetin Breath Test (MBT) is intended to monitor liver function in patients with acute liver failure by working in conjunction with a marker targeted to challenge hepatic metabolism. The marker purportedly can be measured in the breath of the patient and thus inform clinical decisionmaking regarding need for liver transplantation. The breath test could give additional liver function assessment information not available with blood tests. The company purports to provide a novel diagnostic option for this population. The test requires a patient to breathe into a device and is administered in a physician's office. A physician gives 75 mg of 13C-labeled methacetin to the patient, orally in a small volume of water, and measures expired 13C-labeled carbon dioxide with a nasal cannula.</p> <p>Exalenz Bioscience, Inc., Modi'in, Israel (manufacturer) Virginia Commonwealth University, Richmond (investigator)</p> <p>Phase III trial completed; in Sept 2011, FDA granted humanitarian use device exemption for monitoring hepatic metabolism in patients with acute liver failure; Exalenz obtained a patent for BreathID use in assessing liver function Aug 2013; also under study for assessing liver function in chronic liver disease, non-alcoholic steatohepatitis, clinically significant portal hypertension, and hepatocellular carcinoma</p>	Liver function blood tests	<p>Earlier detection of liver function problems Improved patient comfort Increased adherence with liver function testing</p>
Migalastat hydrochloride for treatment of Fabry disease	Patients with Fabry disease who either have migalastat-responsive mutations in alpha-galactosidase A or are receiving enzyme replacement therapy	<p>Fabry disease is a genetic disorder characterized by cellular buildup of globotriaosylceramide, a type of fat, that causes a wide range of symptoms and can lead to heart attack, stroke, and kidney damage. Current enzyme replacement therapies for the disease are expensive and have been subject to recent shortages. Migalastat hydrochloride (AT1001) is a small-molecule drug that enhances the activity of alpha-galactosidase A, the enzyme that is deficient in Fabry disease. The drug could be used to enhance the activity of exogenously provided enzyme replacement therapy or to enhance the endogenous activity of certain alpha-galactosidase mutant isoforms that have been shown to be responsive to it. In trials, it is being tested as an oral monotherapy and in combination with enzyme replacement therapy. Dosage is 150 mg, every other day, orally.</p> <p>Amicus Therapeutics, Inc., Cranbury, NJ</p> <p>Phase III trials completed and ongoing; FDA granted orphan drug status</p>	Enzyme replacement therapy Palliative treatment	<p>Decreased globotriaosylceramide (GL-3) levels Improved cardiac outcomes Improved renal function (e.g., glomerular filtration rate) Reduced mortality Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Mobile phone monitoring application (MyVisionTrack) for age-related macular degeneration</p>	<p>Patients in whom age-related macular degeneration (AMD) has been diagnosed</p>	<p>According to the National Eye Institute, an estimated 1.75 million people in the U.S. have received a diagnosis of AMD. The standard for monitoring AMD consists of a complete eye exam including the Amsler grid test. MyVisionTrack has the potential to fulfill an unmet need brought about by a lack of self-monitoring diagnostics for AMD. It is a mobile application provided via hand-held digital devices such as smartphones and tracks changes in the ability to distinguish shapes. The prescription-only application purportedly enables patients with retinal eye diseases to self-monitor their vision status at home, helping them notice changes or a decline in vision that could indicate a need for medical attention. Test results are stored and automatically compared with earlier results. Results may be sent to a physician's office or a central monitoring service when a statistically significant change occurs.</p> <p>Vital Art and Science, Inc., Richardson, TX (manufacturer) National Eye Institute, Bethesda, MD; Retina Foundation of the Southwest, Dallas, TX; University of Texas Southwestern Medical Center, Dallas; Texas Retina Associates, Dallas (investigators in collaboration with Vital Art and Science)</p> <p>Unphased trial ongoing; FDA cleared Mar 2013; available by prescription; also under study for diabetic retinopathy and diabetic macular edema</p>	<p>Complete eye exam with Amsler grid test Optical coherence tomography</p>	<p>Earlier intervention for vision decline Slowed vision decline Improved quality of life</p>
<p>Mu-opioid agonist with small-molecule polymer conjugate technology (NKTR-181) for treatment of chronic pain</p>	<p>Patients experiencing chronic pain</p>	<p>Chronic use of opioid analgesics can lead to abuse and may increase risk of dangerous suppression of central nervous system (CNS) activity leading to sedation or respiratory distress. NKTR-181 is a novel mu-opioid agonist formulation that modifies the opioid by pegylation. Pegylation is intended to reduce the rate at which the drug enters the brain, thereby limiting high CNS concentrations that could lead to feelings of euphoria or respiratory distress. In clinical trials, NKTR-181 is administered at a dose of 100–400 mg, twice daily, orally.</p> <p>Nektar Therapeutics, San Francisco, CA</p> <p>Phase II trial completed and missed primary endpoint; manufacturer indicated phase III trial being planned for 2015; FDA granted fast-track status</p>	<p>Conventional mu-opioid agonists Opioids with abuse-deterrent properties (e.g., crush-resistant or agonist-antagonist combined formulations)</p>	<p>Improved pain relief Reduced abuse liability Reduced adverse effects Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Nabiximols oromucosal spray (Sativex) for treatment of multiple sclerosis spasticity and neuropathic pain</p>	<p>Patients in whom multiple sclerosis (MS) has been diagnosed</p>	<p>Current treatments for MS may slow disease progression, but they are not effective in all patients, and the disease has no cure. Sativex® is a whole-plant medicinal cannabis extract that contains Tetraabinex® and Nabidiolx® (cannabidiol) as its main components. Delta-9-tetrahydrocannabinol (THC) in the extract acts as a partial agonist at both cannabinoid receptors, CB1 and CB2, mimicking the effects of the endocannabinoids, which may modulate the effects of neurotransmitters (e.g., reduce effects of excitatory neurotransmitters such as glutamate) to improve symptoms. Sativex is sprayed under the tongue, 100 mcL/dose, which contains 2.5 mg cannabidiol and 2.7 mg THC. Sativex is intended for use as an add-on treatment to current MS therapies.</p> <p>GW Pharmaceuticals, plc, Salisbury, UK Otsuka Pharmaceutical Co., Ltd., Tokyo, Japan</p> <p>Phase III joint U.S./UK trial ongoing, with multiple international phase III trials completed. Sativex is approved in UK, New Zealand, and Canada for treating MS spasticity and approved in Canada for relief of MS-related neuropathic pain.</p>	<p>Pharmacotherapy (e.g., nonsteroidal anti-inflammatory drugs, opioids)</p>	<p>Reduced pain Reduced spasticity Improved quality of life</p>
<p>Obeticholic acid for treatment of primary biliary cirrhosis</p>	<p>Patients in whom primary biliary cirrhosis (PBC) has been diagnosed</p>	<p>PBC is a chronic and progressive cholestatic liver disease, which results in destruction of small-to-medium bile ducts. Cirrhosis develops with disease progression and results in death unless a patient receives a liver transplant. Even after transplantation, PBC has a high recurrence rate. The standard care for earlier disease stages is to delay progression by using ursodeoxycholic acid, which is ineffective in up to 50% of patients. Obeticholic acid (OCA) is a 1st-in-class, bile acid–analogue agonist of the farnesoid X receptor (FXR), which is a negative feedback regulator of bile acid levels. OCA activation of FXR may delay progression in patients whose disease does not respond to ursodeoxycholic acid. In clinical trials, OCA is administered orally, at doses of 5–25 mg.</p> <p>Intercept Pharmaceuticals, New York, NY</p> <p>Phase III trials ongoing; rolling new drug application submission initiated under accelerated approval pathway Dec 2014; FDA granted orphan drug and fast-track statuses</p>	<p>Antipruritic therapy Colchicine Corticosteroids Cyclosporine Immunosuppressive therapy Liver transplant Methotrexate Ursodeoxycholic acid</p>	<p>Decreased risk of liver transplant or death Improved high-density lipoprotein metabolism Reduced bilirubin levels Reduced serum alkaline phosphatase levels Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ocrelizumab for treatment of relapsing-remitting and primary progressive multiple sclerosis	Patients in whom relapsing-remitting multiple sclerosis (RRMS) or primary progressive multiple sclerosis (PPMS) has been diagnosed	<p>Current therapy for RRMS and PPMS provides unsatisfactory results for many patients. Ocrelizumab (RG1594) represents a novel mechanism of action for this disease state. It is a human monoclonal antibody intended to target CD20-positive B cells (believed to play a role in multiple sclerosis), then interact with immune system to eliminate these CD20-positive B cells. In clinical trials, ocrelizumab is administered via infusion, once every 6 months.</p> <p>Genentech subsidiary of F. Hoffmann-La Roche, Ltd., Basel, Switzerland Biogen Idec International GmbH, Zug, Switzerland</p> <p>Phase III trials ongoing; company expects to file new drug application in 2015</p>	<p>Dimethyl fumarate (Tecfidera®) Fingolimod Glatiramer acetate Interferon beta-1a Interferon beta-1b Mitoxantrone Natalizumab</p>	<p>Decreased frequency of relapse Slowed disease progression Improved quality of life</p>
Off-label etanercept (Enbrel) as an adjunctive therapy for treatment of Kawasaki disease	Patients in whom Kawasaki disease (KD) has been diagnosed	<p>KD is the most common cause of acquired heart disease in U.S. children. In many patients, the disease is refractory to current standard of care; new treatment options are needed for refractory disease. Etanercept (Enbrel®) is a soluble, dimeric form of the p75 tumor necrosis factor (TNF) receptor purported to bind TNF alpha and beta molecules, thus inhibiting the binding of TNF molecules to cell surface receptors and preventing inflammation associated with KD. Etanercept may be administered immediately after intravenous immunoglobulin (IVIG) infusion, 0.8 mg/kg per dose, 2 times weekly. In ongoing clinical trials, etanercept is administered subcutaneously as an adjunct therapy to IVIG and aspirin, at a dosage of 0.8 mg/kg (with a maximum dosage of 50 mg) once weekly for 3 weeks.</p> <p>Amgen, Inc., Thousand Oaks, CA (manufacturer) Seattle Children's Hospital, Seattle, WA (clinical trial sponsor)</p> <p>Phase II trial ongoing; FDA approved in 1998 for treating moderate to severe rheumatoid arthritis and other inflammatory conditions</p>	<p>Corticosteroids High-dose aspirin IVIG</p>	<p>Improved survival Prevented increase in coronary artery diameter Prevented new coronary artery dilation/cardiac dysfunction Reduced fever</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label isradipine for treatment of Parkinson's disease	Patients in whom Parkinson's disease (PD) has been diagnosed	<p>Up to 1 million Americans have diagnosed PD, and about 60,000 new cases are diagnosed yearly. Worldwide, 7 million to 10 million patients have PD. The most frequently prescribed intervention for PD is L-dopa, which can be an effective treatment, but it can also have severe side effects such as dyskinesia and must have dosages consistently monitored and adjusted. Other pharmaceuticals, including pramipexole and rasagiline mesylate, have been prescribed but have demonstrated poor efficacy at low dosages. An unmet need exists for well-tolerated PD treatments that have fewer adverse side effects. Isradipine, a calcium channel blocker, is being investigated as a potential PD therapy. Isradipine purportedly prevents damage to calcium channels located in dopamine-producing brain cells; experts hypothesize that this neuroprotective activity can delay or prevent PD symptoms and disease progression. In clinical trials, isradipine is orally administered as a 5 mg tablet, taken twice daily for up to 36 months.</p> <p>Multiple universities including the University of Rochester, Rochester, NY (lead study sponsor) Michael J. Fox Foundation for Parkinson's Research, New York, NY (collaborator) National Institute of Neurological Disorders and Stroke, Bethesda, MD (collaborator)</p> <p>Phase III trial ongoing; approved for treating high blood pressure to reduce risk of stroke and heart attack</p>	Adenosine A2A receptor antagonist (in development) Dopamine agonists Glutamate receptor 5 modulators (in development) Levodopa/carbidopa Monoamine oxidase-B inhibitors Nicotinic receptor agonist (in development) Tozadenant (in development)	Delayed disease progression Improved cognitive function Improved motor function Improved quality of life
Off-label naltrexone for treatment of fibromyalgia	Patients in whom fibromyalgia (FM) has been diagnosed	<p>FM is poorly understood and current treatment options are not effective for many patients. Naltrexone is an opiate antagonist that purportedly blocks the inflammatory effects of the toll-like receptor 4 (TLR-4) on glial cells. TLR-4 is purported by investigators to be involved in pain felt by patients with FM. In clinical trials, naltrexone is administered orally at doses between 3 and 4.5 mg, once daily.</p> <p>Stanford University, Stanford, CA</p> <p>Unphased trial ongoing; pilot study and small extension trial completed</p>	Behavior and lifestyle modification Pharmacotherapy (e.g., duloxetine, fluoxetine, gabapentin, lorazepam, milnacipran, pregabalin, tricyclic antidepressants)	Improved ability to perform daily activities Reduced symptoms Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Off-label phosphodiesterase type 5 (PDE-5) inhibitors for treatment of muscular dystrophinopathies</p>	<p>Patients in whom Duchenne muscular dystrophy (DMD) or muscular dystrophinopathies have been diagnosed</p>	<p>Dystrophinopathies are a class of muscle diseases caused by dystrophin genes that function abnormally or not at all. DMD and Becker muscular dystrophies are among the more severe forms. Current treatments for these 2 diseases reduce symptoms but do not address their underlying cause. Research in human and mouse models has demonstrated that various proteins, including neuronal nitric oxide synthase, normally targeted by dystrophin may underlie the most pronounced muscular symptoms observed in severe dystrophies. Increased nitric oxide signaling by phosphodiesterase type 5 (PDE-5) inhibitor-class drugs, including tadalafil and sildenafil, is purported to effectively treat significant symptoms of muscular dystrophy, particularly muscle ischemia. In clinical trials, PDE-5 inhibitors are administered at various stable or escalating doses for up to 48 weeks.</p> <p>Cedars-Sinai Medical Center, Los Angeles, CA Eli Lilly and Co., Indianapolis, IN Parent Project Muscular Dystrophy, Hackensack, NJ National Institutes of Health's National Center for Advancing Translational Sciences, Bethesda, MD</p> <p>Phase III trial ongoing; results reported from unphased trial (tadalafil and sildenafil for treating Duchenne muscular dystrophy) and phase IV trial (tadalafil for treating Becker muscular dystrophy)</p>	<p>Drisapersen (in development) Eteplirsen (in development) Idebenone (in development) Physical therapy Respiratory support (respirators/ventilators) Symptom control using corticosteroids and beta-2 agonists</p>	<p>Decreased mortality rate Delayed or halted muscle degeneration Reduced dystrophy-related symptoms Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label rituximab for treatment of pediatric nephrotic syndrome	Patients in whom pediatric nephrotic syndrome has been diagnosed	<p>According to the National Kidney Foundation™, pediatric nephrotic syndrome affects an estimated 2–7 of 100,000 children in the U.S. It is characterized by massive renal losses of protein and is due to any number of diseases (e.g., postinfection glomerulonephritis, focal segmental glomerulosclerosis, congenital syphilis, systemic lupus erythematosus, malignancy, toxin exposure, diabetes mellitus). 1st-line treatment includes corticosteroids, to which some patients may develop resistance. Other treatment options are diuretic and antihypertensive therapies. Rituximab is a monoclonal antibody against CD20 antibody, which results in depletion of B cells. This drug therapy purportedly reduces the frequency of refractory cases of pediatric nephrotic syndrome. In clinical trials, rituximab is administered by infusion at a dose of 375 mg/m² up to 500 mg/day. 2nd and 3rd doses may be given at 1–3 week intervals if CD19 cells are not depleted.</p> <p>University of Tokyo, Japan (investigator) University Hospital, Limoges, France, (investigator) in collaboration with F. Hoffmann-La Roche, Ltd., Basel, Switzerland (manufacturer) Seoul National University Children's Hospital, South Korea (investigator)</p> <p>Phase III trial completed; FDA approved for treating non-Hodgkin's lymphoma and rheumatoid arthritis</p>	Antihypertensives Corticosteroids Diuretics	Proteinuria with relapse of nephrotic syndrome Remission of refractory nephrotic syndrome Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Pasireotide for treatment of gastrointestinal injuries from acute radiation syndrome	Patients with gastrointestinal (GI) injuries from acute radiation syndrome (ARS)	<p>ARS is a disease caused by harmful exposure to high doses of ionizing radiation, resulting in bone marrow, cardiovascular, GI, respiratory, and skin complications. Few treatments exist for irradiated bone marrow, and none exist for irradiated GI organs. Additionally, FDA has not approved any treatments as medical radiation countermeasures for preventing or treating ARS. Pasireotide is a cyclohexapeptide engineered to bind to multiple somatostatin receptor subtypes to mimic the actions of natural somatostatin. For ARS, pasireotide is intended to reduce pancreatic secretions known to invade the irradiated intestinal wall and induce an inflammatory response.</p> <p>Novartis International AG, Basel, Switzerland (manufacturer) University of Arkansas for Medical Sciences, Little Rock (investigator)</p> <p>Clinical trial (phase not reported) appears to be supported by a grant but not registered at the National Clinical Trials database; in Sept 2011, U.S. Department of Health and Human Services' Biomedical Advanced Research and Development Authority (BARDA) awarded \$56.3 million in grants to 4 companies and University of Arkansas to develop ARS treatments; FDA approved for treating Cushing's disease</p>	Pharmacotherapy (e.g., antibiotics, hematopoiesis-stimulating agents) Stem cell therapy	Decreased mortality Prevented or reduced GI flora

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Pediatric Vision Scanner for screening strabismus and amblyopia</p>	<p>Pediatric patients older than 2 years</p>	<p>The leading causes of preventable monocular vision loss in children are amblyopia ("lazy eye") and strabismus (misaligned eyes). Early detection of these conditions can be difficult because standard screening methods lack sufficient sensitivity and specificity, thereby missing cases of children who should be referred for further evaluation and possible treatment. If found early, amblyopia and strabismus are fully treatable, but as many as half of affected children are not identified until school age. The Pediatric Vision Scanner (PVS) purportedly improves screening for these conditions because it can be used in younger children, is easy to use, and is portable. It is intended as a screening tool for use in a pediatrician's office to identify children who should be referred to a specialist for further evaluation. The device uses proprietary technology called retinal birefringence scanning that detects eye fixation in screening for amblyopia and strabismus. The PVS scan takes about 2.5 seconds and can be performed in children older than 2 years.</p> <p>REBIScan, Inc., Cambridge, MA</p> <p>FDA classifies as nonsignificant risk device (Class I) which is not subject to marketing clearance regulations; partnered with nonprofit organization VisionQuest 20/20 (Phoenix, AZ) to bring devices to pediatric offices and preschools nationwide</p>	<p>Photoscreening Standard vision examination</p>	<p>More appropriate referrals to ophthalmologists Reduced vision loss Improved quality of life</p>
<p>Pegylated recombinant phenylalanine ammonia lyase (PEG-PAL) enzyme replacement therapy for treatment of phenylketonuria</p>	<p>Patients in whom phenylketonuria has been diagnosed</p>	<p>Phenylketonuria is an inherited disorder in which an enzyme, phenylalanine hydroxylase (PAH), that is needed to break down the essential amino acid phenylalanine is dysfunctional. Accumulated phenylalanine can damage the brain and lead to intellectual disabilities, behavioral abnormalities, seizures, and other neurologic complications. A drug that increases PAH activity (Kuvan[®]) is available to slow the progression of phenylketonuria for some patients, although its long-term efficacy is under study. PEG-PAL, also called BMN 165, might be a novel enzyme replacement; the drug is intended to reduce levels of phenylalanine in patients whose disease is unresponsive to Kuvan. Administered by self injection, daily. Trials are testing doses titrated up to 20 or 40 mg/day.</p> <p>BioMarin Pharma, Inc., Novato, CA</p> <p>Phase II and III trials ongoing; FDA granted orphan drug status</p>	<p>Kuvan (tetrahydrobiopterin or BH4) Specialized diet with limited phenylalanine</p>	<p>Decreased phenylalanine levels Fewer diet restrictions Improved cognitive and mood symptoms Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Phosphodiesterase 10 inhibitor (OMS824) for treatment of Huntington's disease	Patients in whom Huntington's disease (HD) has been diagnosed	<p>More than 15,000 Americans have HD and another 150,000 persons have a 50% risk of developing the disease. As a genetic, inherited disorder, HD arises from genetically programmed degeneration of neurons in the brain. The degeneration results in uncontrolled movements, loss of cognitive abilities, and emotional disturbance. Affected cells include the basal ganglia, which coordinate movement. Also affected is the brain's cortex, which controls thought, perception, and memory. No cure exists for HD, and current therapies help only to manage emotional and motor symptoms associated with the disease. OMS824, a proprietary compound, purportedly treats the motor and psychiatric symptoms associated with HD by selective inhibiting phosphodiesterase 10. The drug is being administered orally for 28 days at 3 different dosages (not specified) in a phase II trial.</p> <p>Omeros Corp., Seattle, WA</p> <p>Phase II trial registered, but halted in Oct 2014 after abnormal medication blood concentrations were observed in a separate long-term mouse model study; in Feb 2014, FDA granted fast-track status</p>	<p>No FDA-approved treatments exist to simultaneously treat multiple symptoms of HD. Existing treatments for various HD symptoms include: Nonpharmaceutical interventions (e.g., occupational therapy, physical therapy, psychotherapy, speech therapy) Treatments for motor dysfunction: Antipsychotic drugs (e.g., haloperidol and clozapine) Antiseizure drugs (e.g., clonazepam and diazepam) Tetrabenazine (Xenazine) (FDA approved to suppress chorea associated with HD) Treatments for psychiatric disorders: Antidepressants (e.g., escitalopram, fluoxetine and sertraline) Antipsychotic drugs Mood-stabilizing drugs</p>	<p>Reduced HD-associated motor and psychiatric symptoms Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Porcine extracellular matrix implant for treatment of volumetric muscle loss</p>	<p>Patients who have volumetric muscle loss in a leg after trauma</p>	<p>Patients who have experienced a severe trauma (e.g., improvised explosive device, skiing accident) to a leg may be debilitated from lost muscle. While some muscle regrowth is possible, it does not occur on a large scale. Researchers have developed a procedure that combines intensive physical therapy with a commercially available implanted porcine extracellular matrix (ECM) scaffold in the damaged muscle. As the ECM degrades over several months, it releases biochemical signals that recruit stem cells. Physical therapy puts tension on the spot where stem cells are growing to help form muscle cells instead of scar tissue. Patients undergo intensive physical therapy before and after surgery to implant the ECM.</p> <p>University of Pittsburgh Medical Center, PA, with funding from U.S. Department of Defense</p> <p>5 patients received implants</p>	<p>Physical therapy</p>	<p>Improved function Muscle regrowth Improved quality of life</p>
<p>Prosthetic arm with body-machine interface (DEKA Arm System) to restore natural arm functions after amputation</p>	<p>Patients with trauma-induced amputations of the upper limbs</p>	<p>The DEKA Arm System, an advanced prosthetic technology, comprises 2 major components, a prosthetic arm and a body-machine interface. The prosthetic arm is intended to produce near-normal movement, dexterity, and function; provide effortless and intuitive function via simple thoughts; and restore tactile sensation. Electromyogram electrodes implanted in the muscles are designed to improve the number of control sites available to manipulate the arms. Myoelectric and manual inputs control up to 10 powered movements.</p> <p>DEKA Integrated Solutions, Manchester, NH, in collaboration with Next Step Bionics & Prosthetics, Inc., Manchester, NH; Biodesigns, Inc., Westlake Village, CA; U.S. Defense Advanced Research Projects Agency, Arlington, VA; U.S. Department of Defense, Washington, DC; and U.S. Department of Veterans Affairs, Washington, DC</p> <p>FDA approved May 2014 under innovative device pathway, which is intended to move innovative devices to market within 4 years of start of trials; unphased trial ongoing; developers in search of manufacturing partner</p>	<p>Conventional prosthetic arms</p>	<p>Significant restoration of limb function compared with function of current prosthetic devices Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Purified plant-derived cannabidiol (Epidiolex) for treatment of Lennox-Gastaut and Dravet syndromes</p>	<p>Patients in whom Lennox-Gastaut syndrome (LGS) or Dravet syndrome has been diagnosed</p>	<p>LGS and Dravet syndrome are severe forms of epilepsy; seizures manifest early in life, often before age 5 years. Patients may experience multiple seizure types, including tonic, atonic, myoclonic, and atypical absence. Patients with Dravet syndrome, also known as severe myoclonic epilepsy of infancy (SMEI), experience frequent fever-related (febrile) seizures in the 1st year of life, followed by myoclonic seizures later in childhood. Both epilepsy forms result in developmental delays, socio-emotional difficulties, and cognitive impairments that may necessitate permanent caregiver interventions. Investigators have not found cures for LGS or Dravet syndrome, although anticonvulsant drugs and ketogenic diets may provide some temporary relief from seizures. Patients who are treated with anticonvulsants may develop tolerances to medications, limiting treatment options. Up to 70% of LGS cases are caused by brain malformations, perinatal asphyxia, central nervous system infection, or inherited degenerative conditions; genetic defects cause a similar percentage of Dravet syndrome cases. An unmet need exists for effective, long-term treatments. Epidiolex®, a purified plant-derived cannabidiol drug, is under study as an anticonvulsant for patients with LGS or Dravet syndrome. As of Apr 2014, Epidiolex clinical trial administration dosages had not been reported.</p> <p>GW Pharmaceuticals, plc, Wiltshire, UK</p> <p>Multiple phase III trials ongoing, with top-line data for Dravet syndrome study expected in late 2015; FDA granted orphan drug status for treating LGS and Dravet syndrome indications, and fast-track status for Dravet syndrome</p>	<p>Anticonvulsants Ketogenic diet</p>	<p>Fewer seizure symptoms Reduced cognitive and developmental delays Reduced reliance on caregiver interventions Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Quantitative susceptibility-based magnetic resonance imaging for early diagnosis and progression tracking of multiple sclerosis</p>	<p>Patients in whom multiple sclerosis (MS) has been diagnosed Patients in whom early MS is suspected</p>	<p>Standard magnetic resonance imaging (MRI) techniques, including R2* mapping, are often used to identify and localize white matter lesions indicative of MS. These techniques, however, depend on transient visualization of lesions and do not provide information that correlates well to patients' clinical symptoms or predicts disease progression. This limitation prevents clinicians from rapidly addressing asymptomatic advances in disease state and from initiating early treatment. Quantitative susceptibility-based (QS) MRI is a technique that purportedly more accurately identifies areas of damaged white and gray matter, providing better MS progression tracking and advancing clinical early diagnostic capabilities. Additionally, QS MRI can be paired with standard MR imaging for supplemental patient analyses. In reported studies, QS MRI was conducted using a standard Siemens 3 tesla MRI system and is potentially reproducible in any clinical environment with similar equipment.</p> <p>University of Western Ontario, London, Canada</p> <p>Pilot study completed</p>	<p>Standard MRI white matter visualization</p>	<p>Potential advanced MS diagnosis Increased disease-progression monitoring accuracy</p>
<p>Real-time MRI-guided laser interstitial thermal therapy for epilepsy</p>	<p>Patients in whom medically-refractory epilepsy has been diagnosed Patients with epilepsy who have lesions identified by MRI</p>	<p>More than 2 million people in the U.S. have epilepsy, with nearly 1 million cases resistant to medical therapy. Pharmacological therapies have helped treat epilepsy, but it commonly recurs. Surgical procedures such as craniotomy may be performed, but they may leave the brain susceptible to unintended injury and resultant neurological complications. Laser ablation therapy would provide a minimally invasive, potentially curative therapy for patients who have epilepsy. Laser ablation surgery involves using MRI-guided laser technology to ablate lesions in specific and nearly inaccessible regions of the brain. The laser probe is inserted through a hole (diameter of a pen) created in the skull to map the brain and then ablate the confirmed affected area. To protect surrounding neurological tissue, an automatic system shuts the laser down when approaching such areas. In published reports, MRI-guided laser ablation surgery is associated with significant reductions in seizure frequency and shorter patient recovery times.</p> <p>Texas Children's Hospital, Houston Washington University School of Medicine, St. Louis, MO Mayo Clinic, Rochester, MN</p> <p>Phase I trial ongoing</p>	<p>Pharmacotherapy: Lamotrigine Levetiracetam Tiagabine Tricyclics Valproate Surgical procedures: Craniotomy Gamma Knife radiosurgery</p>	<p>Reduced or eliminated seizures</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Retinal implant (Alpha IMS) to restore visual function in retinitis pigmentosa	Patients in whom retinitis pigmentosa (RP) has been diagnosed	<p>No medications or devices can restore lost vision or halt progression of vision loss that occurs with the inherited disorder RP. 1 device (Argus II) recently became available in the U.S. to assist in some aspects of visual perception for RP, and another device is in development. The Alpha IMS system consists of a 3-by-3 mm wireless microchip implant containing an array of electrodes. The developer indicates that the system uses light captured by the eye to stimulate the optic nerve, which delivers visual information to the brain. The developer notes that unlike the recently FDA-approved retinal prosthetic device implant, Argus II, the Alpha IMS system does not rely on an external camera. The purported benefit of this system is that it enables wearers to look around by moving their eyes rather than their heads; it purportedly has a higher resolution grid and is implanted under the retina to enable the middle layer of the retina to process the input before it is sent to the visual cortex.</p> <p>Retina Implant AG, Reutlingen, Germany</p> <p>Unphased trials ongoing; Conformité Européene (CE) marked Jul 2013</p>	Argus II retinal prosthesis system	Improved visual acuity Improved quality of life and independence
Retinal prosthesis system (Argus II) to restore visual function in retinitis pigmentosa	Patients with retinitis pigmentosa (RP) who have a functioning optic nerve	<p>No medications or devices are available to restore lost vision or halt progression of vision loss that occurs with the inherited disorder RP. The Argus™ II implant consists of an array of electrodes that is surgically inserted into the retina of 1 eye and used in conjunction with an external camera and video processing system to provide a rudimentary form of sight. By electrically stimulating the retina, visual perception is enabled for blind people with severe to profound RP. The device is intended to restore a level of vision that improves patients' ability to function more independently.</p> <p>Second Sight® Medical Products, Inc., Sylmar, CA</p> <p>Implants continue in new patients; observational studies ongoing; FDA approved Feb 2013; Conformité Européene (CE) marked 2011</p>	Alpha IMS system (in development, received CE mark Jul 2013)	Improved visual acuity Improved quality of life and independence

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Rhopressa for treatment of glaucoma	Patients in whom glaucoma or ocular hypertension has been diagnosed	<p>No cure exists for glaucoma, and if untreated or refractory to treatment, it leads to blindness. Available pharmaceuticals lower intraocular pressure (IOP) by redirecting aqueous outflow away from the diseased trabecular meshwork or by inhibiting fluid production. No pharmaceuticals target the underlying cause of IOP, which is an insufficiently permeable trabecular meshwork. Rhopressa™ is a rho kinase and norepinephrine transporter (ROCK/NET) inhibitor that purportedly increases outflow through the trabecular meshwork by promoting actomyosin contraction and relaxing cells in the trabecular meshwork. It has 3 effects: increased outflow through the trabecular meshwork, decreased fluid production, and reduced episcleral venous pressure. The drug is administered as a 0.02% ophthalmic solution, topically, once daily.</p> <p>Aerie Pharmaceuticals, Inc., Bedminster, NJ</p> <p>Phase III trials ongoing</p>	<p>Microstents Prostaglandin analogues Trabectome</p>	<p>Decreased IOP Reduced risk of progression Improved quality of life</p>
Rigerimod (Lupuzor) for treatment of systemic lupus erythematosus	Patients in whom systemic lupus erythematosus (SLE) has been diagnosed	<p>Investigators have not found a cure for SLE, and current treatments provide only partial relief of symptoms. Rigerimod (Lupuzor, P140), an investigational small peptide derived from the spliceosomal small nuclear ribonucleoprotein U1-70K, purportedly treats SLE via a unique mechanism of action, interfering with the chaperone-mediated autophagy pathway. Rigerimod is an injectable powder that is administered subcutaneously. In clinical trials, adult patients were administered rigerimod at dosages of 0.2 mg, once every 4 weeks for 48 or 72 weeks.</p> <p>ImmuPharma, plc, London, UK</p> <p>Phase IIa and IIb trials completed, with phase IIb trial results published in 2013; FDA granted fast-track status and approved start of phase III trials with a special protocol assessment</p>	<p>Belimumab Epratuzumab (investigational) Rituximab Rontalizumab</p>	<p>Improved biologic markers of SLE disease activity Reduced cutaneous manifestations of SLE Reduced SLE disease flare incidences Improved SLE responder index scores Reduced SLE-associated arthritic symptoms Reduced steroid administration frequency or dosage Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Rivipansel for treatment of vaso-occlusive crisis in sickle cell disease	Patients with sickle cell disease (SCD) who are experiencing a vaso-occlusive crisis (VOC)	<p>SCD is an autosomal recessive disorder that affects about 100,000 people in the U.S. and Europe and can present as sickle cell anemia or sickle beta-0 thalassemia. Increased disease prevalence is seen in people of African and Mediterranean descent; about 1 in 500 African-American children born have sickle cell anemia. In SCD, sickled red blood cells are more susceptible to oxidative damage and inappropriate adhesion, which can lead to VOC. VOC causes severe pain by obstructing vasculature and requires hospitalization. Patients may progress to thromboembolic events, stroke, organ failure, or early death. VOC is typically managed with hydration and pain medication but cannot be halted. The only FDA-approved treatment for SCD, hydroxyurea, can reduce VOC incidence but is not effective in about 1/3 of adult patients with SCD. Rivipansel (GMI-1070) is a synthetic glycomimetic, pan-selectin inhibitor that targets inflammatory and adhesion processes that may have a role in VOC. Rivipansel is intended to reduce the duration of VOC and hospital stays. It is infused intravenously every 12 hours for up to 15 doses. For patients older than 12 years and heavier than 40 kg, the 1st dose is 1,680 mg and subsequent doses are 840 mg. For patients 6–12 years or any patient weighing less than 40 kg, the 1st dose is 40 mg/kg up to 1,680 mg and subsequent doses are 20 mg/kg up to 840 mg.</p> <p>GlycoMimetics, Inc., Gaithersburg, MD, in partnership with Pfizer, Inc., New York, NY</p> <p>Phase III trial delayed because of a manufacturing issue; FDA granted orphan drug and fast-track statuses</p>	<p>Analgesia (e.g., morphine, nonsteroidal anti-inflammatory drugs [NSAIDs], paracetamol) Hydration</p>	<p>Decreased amount and length of intravenous opioid use Decreased length of hospital stay Fewer rehospitalizations within 3 days of discharge Reduced health disparities (e.g., African Americans) Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Roxadustat for treatment of anemia from chronic kidney disease	Patients with anemia due to chronic kidney disease (CKD)	<p>Anemia, defined as low levels of erythrocytes or hemoglobin in the blood, impacts quality of life for more than 10% of patients with CKD. It can cause fatigue, depression, appetite loss, headaches, rapid heartbeat, and shortness of breath. Anemia is caused by low production of erythropoietin (EPO), which may result from damage to the kidney cells that produce EPO. Available treatments are given intravenously and can increase blood pressure and the risk of cardiovascular events. Roxadustat is a 1st-in-class hypoxia-inducible factor prolyl hydroxylase inhibitor. It purportedly increases hemoglobin using the body's own iron stores by stimulating EPO. Roxadustat is administered orally, 3 times a week, to achieve and maintain a hemoglobin level of 11 g/dL.</p> <p>AstraZeneca, London, UK in collaboration with FibroGen, Inc., San Francisco, CA</p> <p>Phase III trials ongoing</p>	<p>EPO replacement therapy with erythropoiesis-stimulating agents Iron supplementation</p>	<p>Resolution of anemia Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p><i>RPE65</i> gene therapy (SPK-RPE65) for treatment of Leber congenital amaurosis</p>	<p>Patients with RPE65-associated Leber congenital amaurosis (LCA) who have nyctalopia</p>	<p>LCA is an early onset, inherited eye disorder with estimated prevalence of 2–3 cases per 100,000 births. It is marked by pronounced retinal dystrophy leading to severe visual impairment. LCA is the most common cause of inherited blindness in childhood and is the primary cause of blindness in more than 20% of children who attend schools for the blind. Symptoms include photophobia, nystagmus, and extreme farsightedness (hyperopia). Patients' pupils are unresponsive to light, and retinal tissues have little to no function, evidenced by electroretinogram readings. Untreated, all patients with LCA progress to total blindness from loss of retinal photoreceptor cells. To date, mutations in at least 17 different genes are known to cause LCA, including <i>RPE65</i>, a gene on locus LCA2 that may cause 16% of LCA cases. No cure is available, and supportive treatment focuses on lifestyle management to address the impact of vision limitations. Adeno-associated viral vector gene therapy is a treatment that purportedly can cure LCA or significantly improve visual impairment caused by LCA, through delivery of nonmutated <i>RPE65</i> gene copies to patients' retinas. The functional gene is delivered to surviving photoreceptor cells. In clinical trials, patients with LCA receive a single subretinal, surgical administration of gene therapy vector AAV2-hRPE65v2, at a dosage of 1.5×10^{11} vector genomes per eye; eyes are dosed on separate days.</p> <p>Spark Therapeutics, LLC, Philadelphia, PA, collaborating with Children's Hospital of Philadelphia, PA</p> <p>Phase III trial ongoing; FDA granted breakthrough therapy status Nov 2014</p>	<p>Corrective vision equipment (e.g., glasses, contact lenses) and low-vision aids Lifestyle modifications Other accommodative equipment for low vision</p>	<p>Reduced need for caregiver interventions Restored or improved visual functioning Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Ruconest for treatment of acute hereditary angioedema</p>	<p>Patients in whom acute hereditary angioedema (HAE) has been diagnosed</p>	<p>HAE is a genetic disorder caused by dysfunction or deficiency of the plasma protein C1 inhibitor (C1INH). C1INH inhibits the C1 protease that is responsible for activating the complement pathway in the immune system. If C1INH is deficient, the immune system reacts with an inflammatory response that leads to swelling. Ruconest® is purportedly the 1st recombinant replacement therapy for C1INH deficiency. It consists of human recombinant C1-esterase inhibitor purified from the milk of transgenic rabbits, and it is intended to treat acute attacks of swelling by restoring functional plasma levels. The drug is administered by self injection.</p> <p>Pharming Group NV, Leiden, the Netherlands (manufacturer) Salix Pharmaceuticals, Inc., Raleigh, NC (distributor)</p> <p>FDA approved Jul 2014 for treating acute HAE attacks; phase III trials completed and registry trial ongoing</p>	<p>Antihistamines C1INH (concentrate from donor blood) Danazol Fresh-frozen plasma Icatibant Pain relievers and fluids given intravenously</p>	<p>Reduced symptom severity Reduced mortality Improved quality of life</p>
<p>Sebelipase alfa (Kanuma) for treatment of late-onset lysosomal acid lipase deficiency</p>	<p>Patients in whom late-onset lysosomal acid lipase (LAL) deficiency has been diagnosed</p>	<p>LAL deficiency is a rare genetic syndrome for which no treatment is FDA approved. The LAL enzyme breaks down cholesteryl esters and triglycerides; when it is lacking, these materials build up in the liver, the gut, other organs, and blood vessel walls. The deficiency occurs less often in infants than in children, adolescents, or adults, but the early onset form, also known as Wolman disease, is rapidly fatal, usually within the 1st year. Late-onset LAL is also known as cholesteryl ester storage disease and can lead to liver fibrosis, cirrhosis, liver failure, cardiovascular events, and premature death. Sebelipase alfa (Kanuma™) is a recombinant protein enzyme replacement therapy. If approved, it would be the 1st treatment cleared for use in LAL deficiency. In ongoing trials, it has been given in 4 once-weekly infusions (0.35, 1.0, or 3.0 mg/kg), followed by an infusion every other week (1 or 3 mg/kg) as part of a long-term, open-label extension study.</p> <p>Synageva BioPharma, Lexington, MA</p> <p>Phase III trials ongoing in infants, children, and adults; FDA granted orphan drug status; FDA granted fast-track and breakthrough therapy status for infants; Synageva submitted biologics license application to FDA Dec 2014</p>	<p>Bone marrow transplant Palliative treatments</p>	<p>Normalized alanine aminotransferase, cholesteryl, and triglyceride levels Reduced mortality Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Smartpatch peripheral nerve stimulator for treatment of shoulder pain after stroke	Patients experiencing shoulder pain after stroke	<p>Approximately 10% of stroke survivors experience mild to severe pain after the stroke. The pain can be acute or chronic. The Smartpatch peripheral nerve stimulation system is proposed as a minimally invasive therapy for shoulder pain in which a fine wire from the patch is placed on the skin near the selected nerves to deliver electrical stimulation, purportedly relieving pain. It differs from existing electrical stimulation modalities because it is not an implanted stimulator device and is placed near nerves rather than touching them. The Smartpatch is intended to be used for up to 30 days.</p> <p>SPR Therapeutics, LLC, Cleveland, OH</p> <p>Pivotal unphased trial ongoing; Conformité Européene (CE) marked Jan 2013</p>	<p>Anticonvulsants Antidepressants Corticosteroids Nonsteroidal anti-inflammatory drugs</p>	<p>Reduced pain Improved quality of life</p>
Tafamidis (Vyndaqel) for treatment of various hereditary transthyretin-related amyloidoses	<p>Patients in whom transthyretin familial amyloidoses have been diagnosed Patients in whom familial amyloid cardiomyopathy (FAC) has been diagnosed</p>	<p>Transthyretin (TTR) is a transport protein for thyroxine and retinol. Mutation of the <i>TTR</i> gene can lead to unstable TTR and generate amyloid fibrils that are deposited in various organs, causing organ failure. TTR-related amyloidosis is a genetic neurodegenerative disease that can affect the heart and kidneys. It is a systemic disorder resulting in polyneuropathy, autonomic neuropathy and cardiomyopathy. The disease is usually fatal within a decade in the absence of a liver transplant; patients diagnosed with FAC require combined heart and liver transplants. Tafamidis (Vyndaqel®) is a purported TTR stabilizer that binds to the TTR protein to promote the stabilization of functional tetrameric molecules. This binding is hypothesized to slow formation of misfolded amyloid fibrils and their deposit in organs. In clinical trials, patients with transthyretin familial amyloidoses and familial polyneuropathy are administered 20 mg oral tafamidis tablets, daily, for up to 18 months. In clinical trials investigating tafamidis for treating familial amyloid cardiomyopathy, patients are administered 20 or 80 mg oral tafamidis tablets, daily, for up to 30 months.</p> <p>Pfizer, Inc., New York, NY</p> <p>Phase III trials completed (familial amyloid polyneuropathy); as of Dec 2014, phase IV trial ongoing by invitation only; global phase III trial ongoing for treating familial amyloid cardiomyopathy; FDA granted orphan drug status. Tafamidis is approved for marketing in Europe and Japan; FDA did not approve Pfizer's new drug application for treating familial amyloid polyneuropathy when submitted in 2012</p>	<p>ALN-TTR01 (investigational) ALN-TTR02 (investigational) ISIS-TTRx (investigational) Organ transplantation Supportive therapy</p>	<p>Decreased organ failure Increased TTR stabilization Reduced transthyretin amyloidoses patient transplant rate Improved patient quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Tasimelteon (Hetlioz) for treatment of non-24-hour sleep-wake disorder	Patients who are blind and have non-24-hour sleep-wake disorder	<p>About 50% of patients with total blindness are affected by non-24-hour sleep-wake disorder, because they lack the light sensitivity necessary to synchronize the internal body clock with the day-night cycle. The disorder, also called <i>hypnrychthemeral syndrome</i>, can cause disrupted nighttime sleep and excessive daytime sleep to a potentially debilitating degree. It affects between 65,000 and 95,000 people. Over-the-counter melatonin dietary supplement is sometimes used, though published data on efficacy are very limited. Tasimelteon (Hetlioz) is a melatonin receptor agonist thought to reset the internal body clock in a way similar to normal light-dependent resetting. The drug is taken before bedtime, at the same time every night, 20 mg, orally.</p> <p>Vanda Pharmaceuticals, Inc., Washington, DC</p> <p>FDA approved Jan 2014 with a requirement for postmarket followup studies</p>	Melatonin Ramelteon	Higher quality uninterrupted nighttime sleep Less daytime sleep Improved quality of life
T-cell receptor peptide vaccine (NeuroVax) for treatment of secondary progressive multiple sclerosis	Patients in whom secondary progressive multiple sclerosis (MS) has been diagnosed	<p>Available treatments for MS may slow disease progression, but are not effective in all patients, and the disease has no cure. Previous research has suggested that during the inflammatory phase of MS, an increase in pathogenic T cells directly contributes to disease progression. Also, researchers hypothesize that the increase in pathogenic T cells is caused by reduced suppression, normally mediated by a combination of T regulatory and T suppressor cells (including interleukin-10-secreting T regulatory 1 cells, CD4+ CD25+ regulatory T cells [Treg], and CD8+ T suppressor cells). NeuroVax™, a trivalent T-cell receptor (TCR) peptide vaccine, purportedly treats MS by inducing high frequencies of TCR-reactive T cells, subsequently inducing Foxp3+ Treg cells that can target pathogenic T cells. In clinical trials, patients with MS receive monthly injections of NeuroVax into the deltoid muscle, alternating arms each month; each dose of NeuroVax is a prepared in a mixture of the 3 peptides in aqueous solution in a 1:1 ratio with incomplete Freund's adjuvant, containing 100 mcg/mL of each peptide, with a nominal volume of 1.1±0.2 mL.</p> <p>Immune Response BioPharma, Inc., Atlantic City, NJ, in collaboration with Oregon Health and Science University, Portland</p> <p>Phase II/III trials ongoing; FDA granted fast-track status for treating MS, and orphan drug status for treating pediatric MS</p>	Dimethyl fumarate (Tecfidera®) Fingolimod (Gilenya®) Interferon beta-1a Interferon beta-1b Mitoxantrone Natalizumab	Decreased demyelination Decreased relapse rate Delayed disease progression Fewer MS-related lesions Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Tirasemtiv for treatment of amyotrophic lateral sclerosis	Patients in whom amyotrophic lateral sclerosis (ALS) has been diagnosed	<p>The average life expectancy of a patient with ALS is 3–5 years after diagnosis, and only 10% of patients survive for more than 10 years. Only a single agent (riluzole) is FDA approved for treating ALS, and it is associated with limited efficacy in improving survival time and little to no efficacy in improving motor function; novel therapies for ALS are urgently needed. Tirasemtiv (CK-2017357) is purportedly a fast skeletal muscle troponin activator. It selectively activates the fast skeletal muscle troponin complex by increasing its sensitivity to calcium, leading to an increase in skeletal muscle force. In clinical trials, tirasemtiv is administered orally in 125 mg tablet form, in dosages of 125, 250, or 375 mg, daily for 14 days, alone or in combination with 50 mg riluzole.</p> <p>Cytokinetics, Inc., South San Francisco, CA</p> <p>Phase II trial completed; Mar 2010, FDA granted orphan drug status</p>	Riluzole (Rilutek®)	Improved symptoms

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Tocilizumab (Actrema/RoActrema) for treatment of giant cell arteritis</p>	<p>Patients in whom giant cell arteritis (GCA) is suspected or has been diagnosed</p>	<p>GCA, a generalized granulomatous arterial inflammation, is the most common primary vasculitis in adults. Based on U.S. census data from 2000, the prevalence is approximately 160,000. GCA most commonly affects head arteries, particularly in the temples. Patients with GCA often experience headaches, jaw pain, or vision problems from inflammation. In severe cases, GCA can cause blood clots or arterial swelling leading to blindness, aortic aneurysm, or stroke. It is treated with high-dose corticosteroids to reduce the likelihood of severe symptoms; however, high doses of corticosteroids have side effects, including risk of osteoporosis, high blood pressure, glaucoma, and cataracts. Patients with GCA who have been placed on tapered doses of corticosteroids also often experience relapses. An unmet need exists for effective interventions. Tocilizumab (Actrema) is a humanized monoclonal antibody that targets interleukin-6 (IL-6) receptor. Elevated levels of IL-6 are hypothesized to indicate GCA. Tocilizumab purportedly reduces the dosage of corticosteroids needed to treat GCA and may reduce relapse rates in patients who are receiving tapered corticosteroid doses. In clinical trials, tocilizumab is given as an add-on treatment at monthly dosages of either 8 mg/kg or 162 mg for 12 months, along with corticosteroids; tocilizumab dosages are either consistent throughout the study or tapered.</p> <p>F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>Phase III trials ongoing; 2 phase II trials studying effectiveness of tocilizumab for treating polymyalgia rheumatica are also ongoing</p>	<p>Corticosteroids</p>	<p>Reduced corticosteroid doses Reduced corticosteroid-related side effects Reduced GCA relapse rates Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Transthyretin antisense inhibitor (ISIS-TTRRx) for treatment of transthyretin familial amyloid polyneuropathy</p>	<p>Patients in whom transthyretin familial amyloid polyneuropathy (TTR-FAP) has been diagnosed</p>	<p>TTR-FAP is a genetic neurodegenerative disease that can also affect the heart and kidneys. The disease is usually fatal by age 10 years if no liver transplant is available. Transthyretin (TTR) is a transport protein for thyroxine and retinol. It can be amyloidogenic: mutation of the <i>TTR</i> gene can lead to the development of unstable TTR, which forms amyloid fibrils that are deposited in various organs. ISIS-TTRRx, a <i>TTR</i> antisense inhibitor, is under study to treat TTR-FAP by inactivating mutated <i>TTR</i> in patients with TTR-FAP. In clinical trials, patients with TTR-FAP are administered 300 mg of ISIS-TTRRx subcutaneously, once daily, on 3 alternating days during the 1st week of treatment, followed by once-weekly treatments for 64 weeks.</p> <p>Isis Pharmaceuticals, Carlsbad, CA, in collaboration with GlaxoSmithKline, Middlesex, UK</p> <p>2 phase III trials ongoing; FDA granted fast-track and orphan drug statuses; ISIS-TTRRx also has orphan drug status in Europe</p>	<p>ALN-TTR01 (investigational) ALN-TTR02 (investigational) Supportive therapy Tafamidis (investigational)</p>	<p>Improved neuropathy impairment score Improved quality of life TTR stabilization</p>
<p>Vasoactive compound (MC-1101) for treatment of dry age-related macular degeneration</p>	<p>Patients in whom early stage, dry, age-related macular degeneration (AMD) has been diagnosed</p>	<p>Dry AMD is an inherited autosomal dominant disease affected by nutrition and environmental factors (e.g., smoking). It may slowly progress to central vision loss over decades; however, no treatments are available to halt progression or restore lost vision. If neovascularization develops (i.e., wet AMD), vision loss occurs more rapidly over months. Dry AMD is the most common cause of vision loss in the developed world. Vitamin and mineral supplements may prevent later progression in some people, but no treatments are available. MC-1101 is a 1% vasoactive compound that purportedly increases choroidal flow to the macula, reduces inflammation, and prevents rupture of the Bruch's membrane. It is applied topically, twice daily. Studies reportedly show that the active compound reaches the back of the eye through this administration route.</p> <p>MacuCLEAR, Inc., Plano, TX</p> <p>Phase II/III trial ongoing; FDA granted fast-track status</p>	<p>Vitamin and mineral supplementation</p>	<p>Improved choroidal flow Reduced inflammation Slowed progression of visual loss Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Vatiquinone for treatment of inherited mitochondrial diseases</p>	<p>Patients in whom Friedreich's ataxia or Leigh syndrome has been diagnosed</p>	<p>Inherited mitochondrial diseases are a group of rare neurometabolic disorders caused by dysfunctional mitochondria inherited from 1 or both parents; Friedreich's ataxia and Leigh syndrome are among the more severe types. Friedreich's ataxia is an autosomal recessive disorder caused by a defect in the frataxin gene, leading to symptoms including ataxia, diabetes, sensorimotor deficiencies, muscle weakness, and heart failure. Leigh syndrome has a primarily autosomal recessive inheritance pattern, but can also display mitochondrial, or maternal, inheritance in 20% to 25% of cases; it can be caused by any of more than 30 DNA mutations and is marked by progressive loss of sensorimotor function, along with respiratory dysfunction. These diseases are increasingly debilitating, severely limiting patients' ability to function independently; disease-related symptoms, particularly cardiac and respiratory symptoms, are often fatal. FDA-approved interventions for these diseases do not exist; consequently there, is an unmet need for effective treatments. Vatiquinone (EPI-743) is a parabenzoquinone drug purported to treat symptoms of inherited mitochondrial diseases by augmenting endogenous glutathione biosynthesis, an essential biological process for controlling oxidative stress, an identified biomarker of Friedreich's ataxia and related inherited mitochondrial diseases. In ongoing clinical trials, vatiquinone is administered orally, in dosages up to 400 mg daily.</p> <p>Edison Pharmaceuticals, Inc., Mountain View, CA</p> <p>Phase IIb (Friedreich's ataxia), phase II/III (Leigh syndrome), and phase II (general inherited mitochondrial diseases) trials ongoing; Feb 2014, FDA granted orphan status for treating Friedrich's ataxia; Jun 2014, FDA granted orphan status for treating Leigh syndrome</p>	<p>Interferon gamma-1b (investigational; limited to Friedreich's ataxia) Physical therapy (palliative care only) Speech therapy (palliative care only) Wheelchair use (palliative care only)</p>	<p>Delayed disease progression Improved visual and hearing acuity Improved quality of life Reduced reliance on wheelchairs Reduced risk of diabetes and heart failure</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Vepoloxamer for treatment of sickle cell disease	Patients in whom sickle cell disease (SCD) has been diagnosed	<p>SCD is an autosomal recessive disorder that affects about 100,000 people in the U.S. and Europe and can present as sickle cell anemia and sickle beta-0 thalassemia. Increased disease prevalence is seen in people of African and Mediterranean descent; about 1 in 500 African-American children have sickle cell anemia. In SCD, sickled red blood cells are more susceptible to oxidative damage and inappropriate adhesion, which can lead to vaso-occlusive crisis (VOC). VOC causes severe pain by obstructing vasculature and requires hospitalization. Patients may progress to thromboembolic events, stroke, organ failure, or early death. VOC is typically managed with hydration and pain medication but cannot be halted. The only FDA-approved treatment for SCD, hydroxyurea, can reduce VOC incidence but is not effective in about 1/3 of adult patients with SCD. Vepoloxamer (MST-188) is a surfactant-containing, hydrophilic poloxamer that limits adhesion of sickled cells to each other and vascular endothelium, actions responsible for VOC. Vepoloxamer may shorten duration of painful VOC and may not lead to adverse effects associated with available treatments for SCD. In clinical trials, vepoloxamer is administered intravenously by continuous infusion of 100 mg/kg/hour for 1 hour followed by 30 mg/kg for up to 48 hours.</p> <p>Mast Therapeutics, Inc., San Diego, CA</p> <p>Phase III trial ongoing; FDA granted orphan drug status</p>	<p>Allogeneic hematopoietic stem cell transplantation Analgesics Blood transfusion Hydroxyurea Statins Supplemental oxygen</p>	<p>Fewer hospitalizations and rehospitalizations Reduced health disparities in African Americans Reduced occurrence of acute chest syndrome Reduced severity and duration of VOCs Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Vesicular monoamine transporter type 2 inhibitor (NBI-98854) for treatment of tardive dyskinesia</p>	<p>Patients in whom tardive dyskinesia has been diagnosed</p>	<p>Tardive dyskinesia, involuntary movement of face or trunk muscles, can develop in patients taking long-term dopaminergic antagonist medications and is potentially debilitating. Lowered doses of dopamine antagonists or alternative antipsychotic drugs may reduce or stop the symptoms of tardive dyskinesia. For some patients, the movements are permanent and may worsen when medications are altered. No standard treatment exists. NBI-98854 is a vesicular monoamine transporter type 2 inhibitor that regulates levels of dopamine released during nerve communication while reducing the likelihood of "off-target" side effects. This compound provides sustained plasma and brain concentrations of the active drug to minimize side effects associated with excessive dopamine depletion. Trials tested 25, 50, 75, and 100 mg doses, taken orally, every morning.</p> <p>Neurocrine Biosciences, Inc., San Diego, CA</p> <p>Phase III trial ongoing; FDA granted fast-track and breakthrough therapy statuses</p>	<p>Anticholinergics (e.g., benztropine) Benzodiazepines (e.g., clonazepam, lorazepam) Botulinum toxin injection Cessation of dopamine antagonists Clozapine Deep brain stimulation Dopamine-depleting agents Stress reduction (e.g., psychotherapy) Supplements (e.g., ginkgo biloba, vitamin E)</p>	<p>Reduced abnormal involuntary movement Improved quality of life</p>
<p>Vonapanitase for prevention of arteriovenous access dysfunction</p>	<p>Patients with chronic kidney disease who have an arteriovenous fistula (AVF) or arteriovenous graft (AVG) for hemodialysis access</p>	<p>Vascular access grafts for chronic hemodialysis often have high failure rates and poor outcomes. After surgery, blood flow to an access might drastically reduce or stop due to tissue growth inside the blood vessel. Further surgical intervention or alternative prolonged catheter dialysis is associated with increased morbidity and mortality. The recombinant, human, pancreatic elastase drug called vonapanitase (PRT-201) might increase longevity of AVFs or AVGs by preventing tissue growth in the blood vessels to which it is applied. The drug is applied topically during AVF or AVG surgery.</p> <p>Proteon Therapeutics, Inc., Waltham, MA</p> <p>Phase III trial ongoing; FDA granted orphan drug and fast-track statuses; also under study for symptomatic peripheral artery disease</p>	<p>Catheter dialysis Surgery to restore blood flow to access</p>	<p>Decreased access failure (e.g., thrombosis, loss of unassisted patent access) Decreased morbidity and mortality Unassisted maturation of access</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Wearable artificial kidney for managing end-stage renal disease	Patients in whom end-stage renal disease has been diagnosed	<p>Conventional dialysis requires that most patients receive dialysis 3 times a week, for several hours each session, at home or in a clinic. In peritoneal dialysis, dialysate is infused into the abdomen through a permanent indwelling catheter to remove toxins. Peritoneal lining acts as a filter, as spent dialysate solution is drained from the peritoneal cavity. With wearable artificial kidneys (WAKs), dialysate is cleaned and reinfused through external pumps and filtration components that are attached to the front of a vest or waist belt worn by the patient. WAKs are used under medical supervision in clinical trials, but patients might be trained to use them independently in any setting, because WAKs are portable and weigh about 10 lb. WAKs can potentially work at all times like a regular kidney.</p> <p>AWAK Technologies, Inc., Burbank, CA, with Debiotech S.A., Lausanne, Switzerland, and Neokidney Development bv, Bussum, the Netherlands Fresenius Medical Care Holdings AG & Co. KGaA, Bad Homburg, Germany (acquired developer Xcorporeal, Inc.) Blood Purification Technologies, Inc., Beverly Hills, CA</p> <p>Unphased trial ongoing (Blood Purification Technologies); pilot trial completed (Fresenius Medical Care); AWAK and partners expect to start clinical trials in 2017; FDA selected the WAK as 1 of 3 technologies for its new innovation pathway in Apr 2012</p>	Conventional home dialysis systems Kidney transplantation	Adequate filtration of toxins from kidneys Improved mobility Reduced infection rates Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Wearable battery-powered exoskeleton (ReWalk Personal) to enable mobility in community or home setting for patients with paraplegia</p>	<p>Patients with spinal cord injury resulting in paraplegia</p>	<p>Conventional manual and powered wheelchairs are the primary assistive devices used to restore some degree of mobility in people who have had a spinal cord injury resulting in paraplegia. However, long-term wheelchair use is associated with thinning bones, pressure sores, and problems with urinary, cardiovascular, and digestive systems. These devices also do not help users walk or climb stairs. A wearable powered exoskeleton in development, such as the ReWalk-Personal™, could provide greater mobility and freedom to individuals with paraplegia from spinal cord injury. The ReWalk-Personal system comprises a set of computer-controlled, motorized leg braces that restore the ability to walk with crutches to patients with paraplegia who are able to use their hands and shoulders and who have good bone density and cardiovascular health. Exoskeletons generally move at a rate of 1 mph and have a battery life of about 2–4 hours. The ReWalk-Personal is intended for use at home or in a community setting.</p> <p>Argo Medical Technologies, Ltd., Yokneam Ilit, Israel (manufacturer of ReWalk-Personal) distributed in the U.S. by Bionics Research, Inc., Mt. Laurel, NJ</p> <p>FDA cleared ReWalk-Personal under de novo pathway Jun 2014; FDA required postmarket studies; available in Europe since late 2012; ReWalk-Personal study for home and community use ongoing; commercialization of a competing device, Indego, planned for 2015</p>	<p>Weight-supported standing systems Wheelchairs</p>	<p>Decreased complications from being wheelchair bound Improved independence Improved mobility Improved quality of life</p>

Table 9. AHRQ Priority Condition: 09 Infectious Disease, Including HIV-AIDS: 40 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Alisporivir for treatment of chronic hepatitis C virus infection	Patients in whom chronic hepatitis C virus (HCV) infection has been diagnosed	<p>Interferon (IFN)-based treatments for HCV are not effective in all patients. Available treatments are also associated with frequent adverse events and a long duration of therapy; effective treatments that improve clinical outcomes and safety in a shorter period of time are needed. Cyclophilin A is a host-cell protein involved in protein folding and transport, and it has been shown to be essential in HCV replication; cyclosporine A inhibits cyclophilin activity but is immunosuppressive. Alisporivir (Debio-025) is a modified form of cyclosporin A that purportedly acts as a host-targeted antiviral with enhanced cyclophilin binding but no immunosuppressive activity, which might be due to the inability of the alisporivir-cyclophilin complex to bind calcineurin, which modulates proinflammatory lymphocyte signaling. Administered orally, 400 mg, twice daily in combination with the standard-of-care pegylated IFN plus ribavirin (RBV).</p> <p>Debiopharm, S.A., Lausanne, Switzerland</p> <p>Phase III trials completed; FDA granted fast-track status</p>	Boceprevir IFN/RBV Simeprevir Ledipasvir/sofosbuvir Viekira Pak	Slowed or halted disease progression (fibrosis and cirrhosis) Sustained virologic response (defined as undetectable virus at 12 weeks) Decreased need for liver transplant Improved quality of life
Antitoxin monoclonal antibody combination (actoxumab/bezlotoxumab; MK-3415A) for treatment of <i>Clostridium difficile</i> -associated diarrhea	Patients in whom <i>Clostridium difficile</i> -associated diarrhea has been diagnosed	<p>Recurrent <i>C. difficile</i> infection (CDI) is responsible for significant morbidity, mortality, and costs; recurrent CDI can be extremely resistant to treatment, and up to 60% of patients previously treated for recurrent CDI with antibiotics develop further recurrence after therapy is stopped. Options to relieve acute symptoms are needed. Actoxumab/bezlotoxumab is a combination of 2 monoclonal antibodies designed to block the activity of <i>C. difficile</i> toxins A and B, which are purportedly involved in CDI pathogenesis. In a clinical trial, actoxumab/bezlotoxumab was administered as a single intravenous infusion of 10 mg/kg.</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase III trial ongoing</p>	Fecal microbiota transplant Fidaxomicin Metronidazole Vancomycin	Increased clinical cure rates Reduced CDI recurrence

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Brincidofovir for prevention of BK virus reactivation after kidney transplantation	Patients who recently received a kidney transplant	<p>About 1/3 of people have latent BK virus in the in the urogenital tract, which can result in kidney complications when patients are immunosuppressed after receiving a kidney transplant. No therapies are available to prevent BK virus reactivation. Brincidofovir (CMX001) is purportedly a broad spectrum antiviral for treating or preventing life-threatening double-stranded DNA (dsDNA) viral diseases. Brincidofovir combines the manufacturer's PIM (phospholipid intramembrane microfluidization) conjugate technology with cidofovir, a selective inhibitor of viral DNA polymerase and an approved antiviral agent for treating cytomegalovirus infection. PIM technology covalently modifies the cidofovir molecule so that it mimics a naturally occurring phospholipid metabolite that can use natural uptake pathways to achieve oral availability. Additionally, brincidofovir is purported to be significantly more potent in inhibiting viral DNA synthesis than cidofovir. In clinical trials, brincidofovir is being administered orally, 100 mg, twice weekly, for up to 24 weeks.</p> <p>Chimerix, Inc., Durham, NC</p> <p>Phase III trial ongoing; FDA granted fast-track status; ; also under study in treating Ebola virus disease and preventing cytomegalovirus infection after hematopoietic stem cell transplant</p>	Standard immunosuppression followed by low-dose immunosuppression	Reduced rate of BK virus nephropathy Reduced rate of post-transplant complications

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Brincidofovir for prevention of cytomegalovirus infection after hematopoietic stem cell transplant	Patients who have recently received a hematopoietic stem cell transplant (HSCT)	<p>Cytomegalovirus (CMV) infections are recognized as a significant cause of morbidity and mortality in immunocompromised patients, such as those who have undergone HSCT. Immunocompromised pediatric HSCT patients are particularly susceptible to serious and/or fatal CMV infections, for which no treatments are approved. Brincidofovir (CMX001) purportedly is a broad spectrum antiviral for treating or preventing life-threatening double-stranded DNA (dsDNA) viral diseases. Brincidofovir combines the manufacturer's PIM (phospholipid intramembrane microfluidization) conjugate technology with cidofovir, a selective inhibitor of viral DNA polymerase and an approved antiviral agent for treating CMV infection. PIM technology covalently modifies the cidofovir molecule so that it mimics a naturally occurring phospholipid metabolite that can use natural uptake pathways to achieve oral availability. Additionally, brincidofovir is purported to be significantly more potent in inhibiting viral DNA synthesis than cidofovir. Administered orally, twice weekly, for up to 3 months not to exceed 4 mg/kg in pediatric or adult patients.</p> <p>Chimerix, Inc., Durham, NC</p> <p>Phase III trial ongoing; FDA granted fast-track status; also under study in treating Ebola virus disease and for preventing BK virus reactivation after kidney transplantation</p>	Cidofovir (off label) Ganciclovir	Decreased rate of organ rejection Increased time to organ rejection Reduced CMV load

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Brincidofovir for treatment of Ebola virus infection	Patients who have been exposed to Ebola virus	<p>Ebola virus disease (EVD) has a 50% mortality rate. It is caused by a virus of the family <i>Filoviridae</i>, genus <i>ebolavirus</i>. Of 5 identified Ebola virus species, 4 are known to cause disease in humans: Ebola virus (<i>Zaire ebolavirus</i>); Sudan virus (<i>Sudan ebolavirus</i>); Taï Forest virus (<i>Taï Forest ebolavirus</i>, formerly <i>Côte d'Ivoire ebolavirus</i>); and Bundibugyo virus (<i>Bundibugyo ebolavirus</i>). Treatment is optimal supportive care. No FDA-approved treatments exist for EVD, but several agents are being given through FDA's compassionate use program, depending on availability. Brincidofovir (CMX001) combines the manufacturer's PIM (phospholipid intramembrane microfluidization) conjugate technology with cidofovir, a selective inhibitor of viral DNA polymerase and an approved antiviral agent for treating cytomegalovirus infection. PIM technology covalently modifies the cidofovir molecule so that it mimics a naturally occurring phospholipid metabolite that can use natural uptake pathways to achieve oral availability. Brincidofovir is purported to have in vitro activity against the Ebola virus, which has prompted clinical development.</p> <p>Chimerix, Inc., Durham, NC</p> <p>Phase II trial planned; FDA granted emergency investigational new drug application for treating EVD; also under study in preventing BK virus reactivation after kidney transplant and preventing cytomegalovirus infection after hematopoietic stem cell transplant</p>	<p>Convalescent serum (plasma from patients who have recovered from EVD) Supportive care</p>	<p>Increased symptom resolution Reduced mortality</p>
<i>Clostridium difficile</i> vaccine (ACAM-CDIFF) for prophylaxis before obtaining treatment in a health care facility	At-risk individuals, including adults facing imminent hospitalization or current or impending residence in a long-term care or rehabilitation facility	<p><i>Clostridium difficile</i> is a common source of hospital-acquired infection that can lead to significant morbidity, mortality, lengthened hospital stays, and increased cost. More options to prevent <i>C. difficile</i> infection are needed. <i>C. difficile</i> vaccine (ACAM-CDIFF™) consists of a toxoid from the bacterium intended to induce protective antibody responses. In clinical trials, the vaccine was administered as an intramuscular injection at weeks 0, 1, and 4.</p> <p>Sanofi, Paris, France</p> <p>Phase III trial ongoing; FDA granted fast-track status</p>	Hospital infection control programs	<p>Reduced <i>C. difficile</i> infection rates Reduced use of antibacterial drugs Reduced hospitalization time Reduced isolation</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Daclatasvir (Daklinza) for treatment of chronic hepatitis C virus infection	Patients in whom chronic hepatitis C virus (HCV) infection has been diagnosed	<p>HCV treatment options are not effective in all patients and are associated with frequent adverse events, a long duration of therapy, and low patient adherence. Effective treatments that improve clinical outcomes and safety in a shorter time are needed. Daclatasvir (Daklinza[®]) is a 1st-in-class inhibitor of HCV NS5A, which is a multifunctional, nonenzymatic endoplasmic reticulum (ER) membrane-associated phosphoprotein. This protein regulates multiple steps of the HCV life cycle, including viral RNA replication and virion maturation. Although the role of the protein is poorly understood, NS5A is known to be required for viral replication. Researchers propose that daclatasvir destabilizes the association of NS5A with the ER membrane, thus inhibiting functional virions from forming. It may be used in combination with pegylated interferon (IFN) and ribavirin (RBV) or with sofosbuvir. Administered orally, 60 mg, once daily.</p> <p>Bristol-Myers Squibb, New York, NY</p> <p>Phase III trials ongoing; Apr 2104, new drug application submitted to FDA; Oct 2014, the company retracted submission for daclatasvir in combination with asunaprevir for treating patients with HCV genotype 1b but continues to pursue an indication for daclatasvir in combination with other direct-acting antivirals, such as sofosbuvir, for treating various HCV genotypes; Nov 2014, FDA issued complete response letter requesting more efficacy data; in 2013, FDA granted a regimen containing daclatasvir, asunaprevir, and BMS-791325 breakthrough therapy status</p>	Boceprevir IFN/RBV Ledipasvir/sofosbuvir Simeprevir Viekira Pak	Slowed or halted disease progression (fibrosis and cirrhosis) Sustained virologic response (defined as undetectable virus at 12 weeks) Decreased need for liver transplant Improved quality of life
Delamanid (Delyba) for treatment of tuberculosis	Patients in whom tuberculosis (TB) has been diagnosed	<p>TB has developed resistance to existing antibiotic therapies and treatment is further complicated by a lengthy regimen. Treatments that can improve outcomes in antibiotic-resistant infections and shorten treatment duration are needed. Delamanid (Delyba[™]) purportedly addresses these unmet needs. As a nitro-dihydro-imidazooxazole derivative, it purportedly inhibits the synthesis of mycolic acid, which is a component of the TB bacteria cell wall. Delamanid is administered orally, 100 mg, twice daily, for 2 months and 200 mg, once daily, for 4 months, in addition to standard TB regimens.</p> <p>Otsuka Pharmaceutical Co., Ltd., Tokyo, Japan</p> <p>Phase III trial ongoing</p>	Ethambutol Ethionamide Isoniazid Kanamycin Ofloxacin Pyrazinamide Rifampicin	Improved patient adherence with therapy Reduced spread of infection Reduced time to clinical response Resolution of active TB infection Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
DNA vaccine (via SynCon platform) for treatment or prevention of Ebola virus disease	Patients at risk of contracting Ebola virus disease (EVD) or who are infected with the virus	<p>EVD has a 50% mortality rate. It is caused by a virus of the family <i>Filoviridae</i>, genus <i>ebolavirus</i>. Of 5 identified Ebola virus species, 4 are known to cause disease in humans: Ebola virus (<i>Zaire ebolavirus</i>); Sudan virus (<i>Sudan ebolavirus</i>); Taï Forest virus (<i>Taï Forest ebolavirus</i>, formerly <i>Côte d'Ivoire ebolavirus</i>); and Bundibugyo virus (<i>Bundibugyo ebolavirus</i>). Treatment is optimal supportive care. No FDA-approved treatments exist for EVD, but several agents are being given through FDA's compassionate use program, depending on availability. SynCon® immunotherapy is a DNA vaccine or immunotherapy comprised of multiple immunogenic sequences derived from antigens from multiple strains of Ebola virus. SynCon immunotherapy uses an electroporation device (Celectra®) to deliver the vaccine—which purportedly facilitates vaccine uptake by local antigen-presenting cells—and to induce protective antibody and T-cell responses against Ebola antigens. The vaccine could be used for prophylaxis or as immunotherapy in infected individuals.</p> <p>Inovio Pharmaceuticals, Inc., Plymouth Meeting, PA</p> <p>Phase I trial planned</p>	<p>Convalescent serum (plasma from patients who have recovered from EVD) Supportive care</p>	<p>Increased symptom resolution Reduced mortality</p>
Engineered low-dose imatinib-based protein kinase inhibitor (IkT-001Pro) for treatment of progressive multifocal leukoencephalopathy	Patients in whom progressive multifocal leukoencephalopathy (PML) has been diagnosed	<p>PML is a rare, potentially fatal, demyelinating viral brain disease that leads to severe motor disability and cognitive decline. PML is thought to be caused by JC virus (JCV) activation when patients are immunosuppressed as a result of HIV, chemotherapy, organ transplantation, or immunosuppressive therapies. No cure is available for PML or underlying pathogenic JCV. IkT-001Pro is an engineered medication whose active ingredient, imatinib, is a host-directed protein kinase inhibitor shown to disrupt JCV replication. Although imatinib use for cancer treatment has resulted in poor tolerability, IkT-001Pro purportedly treats PML with a safer, lower dose of imatinib.</p> <p>Inhibikase Therapeutics, Inc., Atlanta, GA</p> <p>No clinical trials are registered; May 2014, FDA granted orphan drug status</p>	<p>Antiviral medications (experimental) Highly active antiretroviral therapy</p>	<p>Increased use of primary prescribed immunomodulating medication Reduced PML-related mortality Improved quality of life</p>

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Eravacycline for treatment of life-threatening infections	Patients in whom life-threatening infections have been diagnosed	<p>Eravacycline is fully synthetic antibiotic derived from tetracycline purported to have very-broad-spectrum activity against multidrug-resistant gram positive, gram negative, atypical, or anaerobic infections. Eravacycline is intended to treat the majority of patients as a 1st-line empiric oral monotherapy or for use as an intravenous-to-oral step-down therapy. The drug has shown potency against <i>Acinetobacter baumannii</i>, <i>Enterobacteriaceae</i> expressing extended spectrum beta-lactamases, methicillin-resistant <i>Staphylococcus aureus</i>, vancomycin-resistant <i>Enterococcus faecium</i>, <i>Enterococcus faecalis</i>, and penicillin-resistant strains of <i>Streptococcus pneumoniae</i>. Additionally, eravacycline is being evaluated as an empiric countermeasure for inhalation disease caused by <i>Bacillus anthracis</i>, <i>Francisella tularensis</i>, or <i>Yersinia pestis</i>. In clinical trials, eravacycline was administered intravenously, 1 mg/kg, twice daily; or 1.5 mg/kg, intravenously, once daily, plus 200–250 mg orally, twice daily, as monotherapy.</p> <p>Tetraphase Pharmaceuticals, Watertown, MA</p> <p>Phase III trials ongoing</p>	Carbapenems Levofloxacin Tigecycline	Improved clinical response Reduced mortality
Fidaxomicin (Difcid) to prevent <i>Clostridium difficile</i> infection after bone marrow or stem cell transplantation	Patients undergoing bone marrow or hematopoietic stem cell transplantation	<p>Patients who undergo bone marrow transplantation or hematopoietic stem cell transplantation are placed on immunosuppressive therapy, which places them at risk for serious infections, including <i>Clostridium difficile</i> infection. Infection can result in significant morbidity, mortality, and costs. Fidaxomicin (Difcid®) is a 1st-in-class macrocyclic antibiotic that inhibits bacterial RNA polymerase. Fidaxomicin has a narrow spectrum and selectively eradicates <i>C. difficile</i> infection with minimal disruption to the normal intestinal flora, which could facilitate prophylactic use. Administered orally, 200 mg, once daily with fluoroquinolone therapy.</p> <p>Optimer Pharmaceuticals, Inc., San Diego, CA</p> <p>Phase IIIb trial ongoing (DEFLECT-1); FDA approved May 2011 for treating recurrent <i>C. difficile</i>-associated diarrhea</p>	Prophylactic antifungal and quinolone antibiotic	Reduced <i>C. difficile</i> infection rate Reduced mortality

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Hemoperfusion adsorption column (Toraymyxin) for treatment of sepsis	Patients in whom severe sepsis has been diagnosed	<p>Patients with severe sepsis have a mortality rate of 40% to 60%; novel treatments to improve outcomes are needed. Toraymyxin® is an extracorporeal direct hemoperfusion adsorption column packed with polystyrene fibers and coated with the antibiotic polymyxin B; it is purported to bind and remove endotoxin from the bloodstream of patients with sepsis. Endotoxin is responsible for triggering systemic immune responses leading to sepsis. Patients are treated with 2 columns over a 24-hour period.</p> <p>Spectral Diagnostics, Inc., Toronto, Ontario, Canada</p> <p>Phase III trial ongoing</p>	Intravenous antibiotics Supportive therapy	Improved hemodynamics and organ function Reduced 28-day mortality
Ibalizumab for treatment of HIV infection	Patients in whom HIV has been diagnosed	<p>HIV infection remains a chronic illness resulting in high morbidity and mortality. HIV drug resistance, poor tolerance to existing treatments, and high lifelong costs of therapy indicated a need for improved therapeutic options. Ibalizumab is purported to be a nonimmunosuppressive monoclonal antibody that binds CD4, the major HIV receptor expressed on the surface of T cells and macrophages. Ibalizumab purportedly competes with HIV for CD4-binding sites, thereby slowing the HIV infectious cycle. Administered intravenously at a dose of 800 mg every 2 weeks or 2,000 mg every 4 weeks in combination with the optimized background regimen.</p> <p>TaiMed Biologics, Inc., Tapei, Taiwan</p> <p>Phase III compassionate use trial ongoing</p>	Antiretroviral therapy Enfuvirtide Maraviroc	Decreased viral load Decreased morbidity Increased survival Slower development of resistance

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Intestinally derived microbiota suspension (RBX2660) for treatment of recurrent <i>Clostridium difficile</i> infection	Patients in whom recurrent <i>Clostridium difficile</i> infection (CDI) has been diagnosed	<p>Fecal microbiota transplantation has been reported to show high efficacy against recurrent CDI in case series and small number of controlled trials. However, fecal transplantation requires identifying and screening appropriate donors, which can be labor intensive and limits the diffusion of the procedure to a small number of specialty facilities. RBX2660 is a microbiota restoration therapy being developed as an off-the-shelf, standardized preparation of intestinally derived microbes. It is intended to be more palatable to patients and more convenient for physicians than fecal microbiota transplantation. It is administered as a rectal enema.</p> <p>Rebiotix, Inc., Roseville, MN</p> <p>Phase II trial ongoing; FDA granted fast-track status</p>	Fecal microbiota transplant Fidaxomicin Metronidazole Vancomycin	Increased clinical cure rates Reduced CDI recurrence
Ledipasvir and sofosbuvir (Harvoni) for treating chronic hepatitis C virus infection	Patients in whom chronic hepatitis C virus (HCV) infection has been diagnosed	<p>Interferon (IFN)-based treatments for HCV are not effective in all patients. Available treatments are also associated with frequent adverse events and a long duration of therapy; effective treatments that improve clinical outcomes and safety in a shorter period of time are needed. NS5A is a multifunctional, nonenzymatic endoplasmic reticulum (ER) membrane-associated phosphoprotein, which regulates multiple steps of the HCV life cycle, including viral RNA replication and virion maturation. Although the role of the protein is poorly understood, NS5A is required for viral replication. Ledipasvir is an oral NS5A inhibitor purported to block the ability of the viral NS5A protein to attach to the ER of infected hepatocytes, which is thought to be required for forming functional virions. Ledipasvir was approved as a fixed-dose combination tablet with sofosbuvir (Harvoni®). Administered as a single tablet (90 mg ledipasvir and 400 mg sofosbuvir) taken orally, once daily, with or without food.</p> <p>Gilead Sciences, Inc., Foster City, CA</p> <p>Phase III trials ongoing; FDA approved Oct 2014 for treating chronic HCV genotype 1 infection</p>	Boceprevir IFN/RBV Simeprevir Viekira Pak	Slowed or halted disease progression (fibrosis and cirrhosis) Sustained virologic response (defined as undetectable virus at 12 weeks) Decreased need for liver transplant Improved quality of life

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<p>Letermovir (AIC246) for prevention of human cytomegalovirus reactivation after organ transplantation</p>	<p>Patients undergoing organ transplantation who could be at risk of reactivation of human cytomegalovirus (HCMV)</p>	<p>HCMV is the primary cause of morbidity and mortality during the 1st 6 months after a patient receives an organ transplant. Ganciclovir is considered expensive and not appropriate or effective in preventing HCMV reactivation in many patients. Letermovir is a quinazoline that purportedly targets the HCMV terminase enzyme. The terminase enzyme is crucial for concatemeric HCMV DNA cleavage during the replication process and its subsequent packaging into the HCMV virions. This is purported to be a novel mechanism of action that should remain effective against strains resistant to current therapy targeting the HCMV DNA polymerase. In a clinical trial, letermovir was administered orally, 120 or 240 mg, once daily.</p> <p>AiCuris GmbH & Co. KG, Wuppertal, Germany Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase III trial ongoing; FDA granted orphan drug and fast-track statuses</p>	<p>Cidofovir (off label) Ganciclovir</p>	<p>Decreased rate of organ rejection Increased time to organ rejection Reduced HCMV load</p>
<p>Nitazoxanide for treatment of influenza</p>	<p>Patients in whom viral influenza has been diagnosed</p>	<p>Influenza continues to cause significant morbidity and mortality in susceptible patients. Resistance to existing antiviral agents and the need for broad coverage against different strains of influenza present a significant unmet medical need. Nitazoxanide (NT-300) is a thiazolide with a broad spectrum of anti-infective activity. It may interfere with protease activity and the maturation and intracellular transport of the viral hemagglutinin protein (other drugs inhibit neuraminidase), leading to a reduction in viral replication. In trials, the drug is being administered orally, 600 mg, twice a day, for 5 days as monotherapy or in combination with oseltamivir.</p> <p>Romark Laboratories, L.C., Tampa, FL</p> <p>Phase III trial ongoing</p>	<p>Oseltamivir Zanamivir</p>	<p>Reduced complications of influenza infection Shorter duration of symptoms</p>

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Nitroimidazole (PA-824) for treatment of pulmonary tuberculosis	Patients in whom multidrug-resistant/drug-susceptible tuberculosis (TB) has been diagnosed	<p>TB has developed resistance to existing antibiotic therapies and treatment is further complicated by a lengthy regimen. Treatments that can improve outcomes in antibiotic-resistant infections and shorten treatment duration are needed. PA-824 is a nitroimidazole, a class of antibacterial agents that has activity in vitro against all tested drug-resistant clinical isolates. It is intended to shorten treatment time and simplify treatment. In clinical trials, PA-824 is given at a dose of 200 mg, orally, once daily as part of an anti-tuberculosis drug regimen.</p> <p>Novartis International AG, Basel, Switzerland Bayer AG, Leverkusen, Germany</p> <p>Phase III trial ongoing; FDA granted orphan drug and fast-track statuses</p>	Ethambutol Ethionamide Isoniazid Kanamycin Ofloxacin Pyrazinamide Rifampicin	<p>Reduced duration of therapy Simplified dosing Improved adherence Reduced adverse events Reduced overall cost of treatment</p>
NS5A inhibitor elbasvir (MK-8742) for treating chronic hepatitis C virus infection	Patients in whom chronic hepatitis C virus (HCV) infection has been diagnosed	<p>Interferon (IFN)-based treatments for HCV are not effective in all patients. Available treatments are also associated with frequent adverse events and a long duration of therapy; effective treatments that improve clinical outcomes and safety in a shorter period of time are needed. Elbasvir inhibits HCV NS5A; NS5A is a multifunctional, nonenzymatic endoplasmic reticulum (ER) membrane-associated phosphoprotein that regulates multiple steps of the HCV life cycle, including viral RNA replication and virion maturation. Although the role of the protein is poorly understood, NS5A is required for viral replication; investigators propose that elbasvir destabilizes the NS5A association with the ER membrane, thus inhibiting functional virions from forming. In clinical trials, elbasvir is administered orally, 20 or 50 mg, once daily, in combination with grazoprevir, with or without ribavirin (RBV).</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase III trials ongoing; FDA granted breakthrough status for treating HCV genotype 1 in combination with grazoprevir</p>	Boceprevir IFN/RBV Simeprevir Ledipasvir/sofosbuvir Viekira Pak	<p>Slowed or halted disease progression (fibrosis and cirrhosis) Sustained virologic response (defined as undetectable virus at 12 weeks) Decreased need for liver transplant Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ombitasvir/paritaprevir/ritonavir and dasabuvir (Viekira Pak) for treatment of chronic hepatitis C virus infection	Patients in whom chronic hepatitis C virus (HCV) infection has been diagnosed	<p>Interferon (IFN)-based treatments for HCV are not effective in all patients. Available treatments are also associated with frequent adverse events and a long duration of therapy; effective treatments that improve clinical outcomes and safety in a shorter period of time are needed. The Viekira Pak™ is an IFN-free option intended to improve treatment success and tolerability in patients chronically infected with HCV. The regimen consists of paritaprevir, an NS3/4A HCV protease inhibitor, co-administered with ritonavir; dasabuvir, a nonnucleoside NS5B polymerase inhibitor intended to bind HCV RNA-dependent RNA polymerase and inhibit replication of the viral genome; and ombitasvir, an NS5A inhibitor purported to block viral NS5A protein attachment to the endoplasmic reticulum of infected hepatocytes, which is thought to be required for functional virions to form. 2 ombitasvir/paritaprevir/ritonavir (12.5/75/50 mg) tablets are taken once daily (in the morning) and 1 dasabuvir (250 mg) tablet is taken twice daily (morning and evening) for 12 weeks with ribavirin (RBV). Patients with HCV genotype 1a infection with cirrhosis require 24 weeks of therapy. Patients with HCV genotype 1b infection without cirrhosis do not require RBV. The Viekira Pak can also be used off-label for treating chronic HCV genotype 4 infections.</p> <p>AbbVie, North Chicago, IL Enanta Pharmaceuticals, Inc., Watertown, MA</p> <p>FDA approved Dec 2014 for treating patients with chronic HCV genotype 1 infection</p>	Boceprevir IFN/RBV Ledipasvir/sofosbuvir Simeprevir	Slowed or halted disease progression (fibrosis and cirrhosis) Sustained virologic response (defined as undetectable virus at 12 weeks) Decreased need for liver transplant Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ozonated water disinfectant to prevent health care–acquired infections	Patients in a hospital or other health care facility where hospital-acquired infections (HAIs) are a concern	<p>HAIs are a major cause of death in the U.S. About 1 in 20 hospitalized U.S. patients acquires an HAI, resulting in 100,000 deaths each year. Bacteria on surfaces in intensive care units are said to be responsible for 35% to 80% of HAIs. Cleaning surfaces with ozonated water purportedly cleans as effectively as using other chemicals for terminal cleaning, but ozonated water is said to be less harsh on hospital staff and patients. Additionally, ozonated water is thought to leave no harmful residue after cleaning. Ozone is a highly active form of oxygen that purportedly reacts with microorganisms leading to efficient killing. After reacting, elemental oxygen is thought to remain.</p> <p>Windsor Regional Hospital, Windsor, Ontario, Canada Medizone International, Inc., Sausalito, CA</p> <p>Manufacturer is in discussions with the U.S. Environmental Protection Agency for marketing clearance as a disinfection system</p>	<p>Antimicrobial copper touch surfaces Terminal cleaning procedures using bleach and cleaning of visibly soiled surfaces as necessary Ultraviolet light</p>	<p>Reduced costs associated with HAIs Reduced bacteria isolated from surfaces Reduced infection rates Reduced HAI morbidity and mortality</p>
Polymerase inhibitor (BMS-791325) for treatment of chronic hepatitis C virus infection	Patients in whom chronic hepatitis C virus (HCV) infection has been diagnosed	<p>Interferon (IFN)-based treatments for HCV are not effective in all patients. Available treatments are also associated with frequent adverse events and a long duration of therapy; effective treatments that improve clinical outcomes and safety in a shorter period of time are needed. BMS-791325 is an HCV nonnucleoside, NS5B polymerase inhibitor intended to limit viral replication when used in combination with other investigational agents, including asunaprevir and daclatasvir. Administered orally, 75–150 mg, twice daily.</p> <p>Bristol-Myers Squibb, New York, NY</p> <p>Phase III trials ongoing; FDA granted breakthrough status for treating HCV in combination with daclatasvir and asunaprevir</p>	<p>Boceprevir IFN/RBV Ledipasvir/sofosbuvir Simeprevir Viekira Pak</p>	<p>Slowed or halted disease progression (fibrosis and cirrhosis) Sustained virologic response (defined as undetectable virus at 12 weeks) Decreased need for liver transplant Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Prime boost vaccine regimen (AdVac and MVA-BN-based) for prevention of Ebola virus infection</p>	<p>Patients at risk of contracting Ebola virus infection</p>	<p>Ebola virus disease (EVD) has a 50% mortality rate. It is caused by a virus of the family <i>Filoviridae</i>, genus <i>ebolavirus</i>. Of 5 identified Ebola virus species, 4 are known to cause disease in humans: Ebola virus (<i>Zaire ebolavirus</i>); Sudan virus (<i>Sudan ebolavirus</i>); Taï Forest virus (<i>Taï Forest ebolavirus</i>, formerly <i>Côte d'Ivoire ebolavirus</i>); and Bundibugyo virus (<i>Bundibugyo ebolavirus</i>). Treatment is optimal supportive care. No FDA-approved treatments exist for EVD, but several agents are being given through FDA's compassionate use program, depending on availability. This intervention uses a prime-boost regimen to induce protective immunity against infection with the Ebola virus Zaire strain. The vaccine is delivered by administering AdVac® technology, a recombinant adenovirus vector used to deliver Ebola antigens as a priming vaccine, followed by a booster immunization with the MVA-BN® vaccinia vector, which is also used to deliver Ebola antigens. Combined use of the vaccines was initially intended for protection against Ebola Zaire, Ebola Sudan, and Marburg viruses. However, the manufacturers decided to focus on the Ebola Zaire strain to expedite clinical development.</p> <p>Janssen Biotech unit of Johnson & Johnson, New Brunswick, NJ (AdVac) Bavarian Nordic A/S, Kvistgaard, Denmark (MVA-BN)</p> <p>Phase I trial ongoing</p>	<p>Convalescent serum (plasma from patients who have recovered from EVD) Supportive care</p>	<p>Increased symptom resolution Reduced mortality</p>
<p>Protease inhibitor grazoprevir (MK-5172) for treatment of chronic hepatitis C infection</p>	<p>Patients in whom chronic hepatitis C virus (HCV) infection has been diagnosed</p>	<p>Interferon (IFN)-based treatments for HCV are not effective in all patients. Available treatments are also associated with frequent adverse events and a long duration of therapy; effective treatments that improve clinical outcomes and safety in a shorter period of time are needed. Grazoprevir is an oral NS3/4a protease inhibitor intended to block the activity of HCV protease from genotypes 1b, 2a, 2b, and 3a, preventing the cleavage and maturation of functional viral particles. In clinical trials, grazoprevir is administered orally, 100 mg, once daily, in combination with elbasvir with or without ribavirin (RBV).</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase III trials ongoing; FDA granted breakthrough status for treating HCV genotype 1 in combination with elbasvir</p>	<p>Boceprevir IFN/RBV Ledipasvir/sofosbuvir Simeprevir Viekira Pak</p>	<p>Slowed or halted disease progression (fibrosis and cirrhosis) Sustained virologic response (defined as undetectable virus at 12 weeks) Decreased need for liver transplant Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Rapid molecular detection test (Xpert MTB/RIF) for <i>Mycobacterium tuberculosis</i> infection with rifampin resistance</p>	<p>Patients suspected of having <i>Mycobacterium tuberculosis</i> infection</p>	<p>According to the World Health Organization, tuberculosis (TB) is highly underdiagnosed. Current TB testing methods require weeks to deliver a definitive result. During that time, patients can be left untreated or placed on ineffective therapies, which could allow TB to continue to spread to others in the community. The automated molecular test (Xpert® MTB/RIF) for detecting <i>M. tuberculosis</i> infection is a nucleic acid test that runs on the manufacturer's GeneXpert® real-time polymerase chain reaction (PCR) system. The test detects the presence of <i>M. tuberculosis</i> complex species in a sputum sample and simultaneously determines whether the identified bacterium is susceptible to the 1st-line antibiotic rifampicin. The assay is intended to yield results for both the presence of TB and antibiotic resistance for positive samples in about 2 hours. Traditional susceptibility testing is still required for antibiotics other than rifampicin.</p> <p>Cepheid, Sunnyvale, CA</p> <p>FDA granted marketing approval Jul 2013 through the de novo pathway for rapid molecular detection of TB and rifampin resistance associated mutations of the <i>rpoB</i> gene</p>	<p>Microscopy Tuberculin skin test (Mantoux test) Ziehl-Neelsen microscopy</p>	<p>Less lab staff training time Rapid detection Improved treatment Better control of antibacterial resistance</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Recombinant chimpanzee adenovirus type 3–based vaccine for prevention of Ebola virus disease</p>	<p>Patients at risk for Ebola virus disease (EVD)</p>	<p>EVD has a 50% mortality rate. It is caused by a virus of the family <i>Filoviridae</i>, genus <i>ebolavirus</i>. Of 5 identified Ebola virus species, 4 are known to cause disease in humans: Ebola virus (<i>Zaire ebolavirus</i>); Sudan virus (<i>Sudan ebolavirus</i>); Taï Forest virus (<i>Taï Forest ebolavirus</i>, formerly <i>Côte d'Ivoire ebolavirus</i>); and Bundibugyo virus (<i>Bundibugyo ebolavirus</i>). Treatment is optimal supportive care. No FDA-approved treatments exist for EVD, but several agents are being given through FDA's compassionate use program, depending on availability. Recombinant chimpanzee adenovirus type 3 (ChAd3) is used to deliver the glycoprotein antigens from the Ebola Zaire and Sudan strains. The vaccine vector purportedly delivers the Ebola genetic material into human cells to induce protective immune responses without the ability to replicate or produce infectious virus. The vaccine will be administered as a single intramuscular injection containing 2×10^{10} or 2×10^{11} particle units in 1 mL.</p> <p>GlaxoSmithKline, Middlesex, UK The National Institute of Allergy and Infectious Diseases, Bethesda, MD</p> <p>Phase I/II trial ongoing</p>	<p>Convalescent serum (plasma from patients who have recovered from EVD) Supportive care</p>	<p>Increased symptom resolution Reduced mortality</p>
<p>Recomodulin for treating severe sepsis with coagulopathy</p>	<p>Patients in whom severe sepsis with coagulopathy has been diagnosed</p>	<p>Patients with sepsis with coagulopathy exhibit disseminated microthrombi that can cause organ dysfunction and death. About 30% of patients with sepsis develop disseminated intravascular coagulation, which doubles the risk of mortality. ART-123 (Recomodulin®) is recombinant, human soluble, thrombomodulin alpha. Thrombomodulin purportedly modulates fibrinolysis, which is impaired by the inflammation and endothelial injury that occur during sepsis. It also purportedly activates protein C, which modifies the inflammatory and coagulant response at several different levels. Treatment with exogenous thrombomodulin could help relieve signs of sepsis with coagulopathy. In clinical trials, ART-123 has been administered intravenously, 0.06 mg/kg/day, up to a maximum dose of 6 mg/day for 6 days.</p> <p>Asahi Kasei Corp., Tokyo, Japan</p> <p>Phase III trial ongoing</p>	<p>Coagulation factor concentrates or cryoprecipitate Plasma</p>	<p>Reduced episodes of life-threatening bleeding Reduced mortality</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>rVSV-ZEBOV-GP (BPSC1001) for prevention of Ebola virus disease</p>	<p>Patients at risk for Ebola virus disease (EVD)</p>	<p>EVD has a 50% mortality rate. It is caused by a virus of the family <i>Filoviridae</i>, genus <i>ebolavirus</i>. Of 5 identified Ebola virus species, 4 are known to cause disease in humans: Ebola virus (<i>Zaire ebolavirus</i>); Sudan virus (<i>Sudan ebolavirus</i>); Taï Forest virus (<i>Taï Forest ebolavirus</i>, formerly <i>Côte d'Ivoire ebolavirus</i>); and Bundibugyo virus (<i>Bundibugyo ebolavirus</i>). Treatment is optimal supportive care. No FDA-approved treatments exist for EVD, but several agents are being given through FDA's compassionate use program, depending on availability. rVSV-ZEBOV-GP (BPSC1001) comprises an attenuated strain of vesicular stomatitis virus modified to express the Ebola virus glycoprotein, which purportedly induces neutralizing antibodies against the Ebola virus Zaire strain capable of preventing infection.</p> <p>NewLink Genetics Corp., Ames, IA Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase I trials ongoing</p>	<p>Convalescent serum (plasma from patients who have recovered from EVD) Supportive care</p>	<p>Increased symptom resolution Reduced mortality</p>
<p>Silicone-based condom (ORIGAMI Anal Condom) to prevent HIV infection during receptive anal intercourse</p>	<p>Individuals engaging in anal intercourse</p>	<p>HIV remains a chronic illness associated with high morbidity and mortality in the absence of effective treatments. HIV-drug resistance, high lifelong cost of therapy, and adverse events suggest that prophylactic HIV measures to prevent infection should be pursued for individuals at high risk of infection. The ORIGAMI Anal Condom™ is purportedly the 1st silicone-based condom designed for receptive anal intercourse. The condom is made of medical grade silicone, which is intended to improve the safety of receptive anal sex with respect to the transmission of HIV. The manufacturer purports latex condoms are not designed for the vigor of anal intercourse. Silicone is also purported to have a novel and improved feel compared with the feel of latex condoms and might increase condom use. The condom is intended to be inserted into the anus similar to female condoms.</p> <p>Origami Condoms of California, Culver City, CA</p> <p>Manufacturer projects regulatory approval by late 2015</p>	<p>Latex condoms Harm reduction campaigns Preexposure prophylaxis (tenofovir/emtricitabine)</p>	<p>Reduced transmission and incidence of HIV Increased patient satisfaction Increased use of condoms during receptive anal intercourse</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Sofosbuvir (Sovaldi) for treatment of chronic hepatitis C virus infection	Patients in whom chronic hepatitis C virus (HCV) infection has been diagnosed	<p>Interferon (IFN)-based treatments for HCV are not effective in all patients. Available treatments are also associated with frequent adverse events and a long duration of therapy; effective treatments that improve clinical outcomes and safety in a shorter period of time are needed. Sofosbuvir (Sovaldi™) is a uridine nucleotide analog intended to inhibit HCV NS5B polymerase activity, which may limit viral replication by inhibiting viral genome replication. Sofosbuvir is administered in conjunction with IFN and/or ribavirin (RBV) or simeprevir, or it is given in a fixed-dose combination with ledipasvir. Administered orally, 400 mg, once daily.</p> <p>Gilead Sciences, Inc., Foster City, CA</p> <p>FDA approved Dec 2013 for treating HCV genotype 1, 2, 3, or 4 infection, including patients co-infected with HIV or with hepatocellular carcinoma awaiting liver transplantation</p>	Boceprevir IFN/RBV Ledipasvir/sofosbuvir Simeprevir Viekira Pak	Slowed or halted disease progression (fibrosis and cirrhosis) Sustained virologic response (defined as undetectable virus at 12 weeks) Decreased need for liver transplant Improved quality of life
Sovaprevir for treatment of chronic hepatitis C virus infection	Patients in whom chronic hepatitis C virus (HCV) infection has been diagnosed	<p>Interferon (IFN)-based treatments for HCV are not effective in all patients. Available treatments are also associated with frequent adverse events and a long duration of therapy; effective treatments that improve clinical outcomes and safety in a shorter period of time are needed. Sovaprevir is a NS3 protease inhibitor intended to block the activity of HCV protease, preventing the cleavage and maturation of functional viral particles. Sovaprevir is purported to have broad genotypic coverage and to induce high rates of rapid virologic responses irrespective of interleukin-28 genotype. In a clinical trial, sovalprevir is being administered 200 or 400 mg, once daily, in combination with ACH-3102 (NS5A inhibitor) and ribavirin (RBV) as an IFN-free regimen.</p> <p>Achillion Pharmaceuticals, Inc., New Haven, CT</p> <p>Phase II trials completed; FDA granted fast-track status; FDA placed sovalprevir on clinical hold Jul 2013 because of safety concerns when the drug was administered with ritonavir-boosted atazanavir, but removed the clinical hold Jun 2014</p>	Boceprevir IFN/RBV Ledipasvir/sofosbuvir Simeprevir Viekira Pak	Slowed or halted disease progression (fibrosis and cirrhosis) Sustained virologic response (defined as undetectable virus at 12 weeks) Decreased need for liver transplant Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Surotomycin for treatment of recurrent <i>Clostridium difficile</i> infection	Patients in whom recurrent <i>Clostridium difficile</i> infection (CDI) has been diagnosed	<p>Recurrent CDI is responsible for significant morbidity, mortality, and costs; recurrent CDI can be extremely resistant to treatment. Up to 60% of patients treated for recurrent CDI with antibiotics develop further recurrence after therapy is stopped, which suggests that other therapeutic options are needed. Surotomycin is a novel cyclic lipopeptide, which purportedly disrupts bacterial membrane potential, inhibiting bacterial metabolism. Administered orally, 250 mg, twice daily, for 10 days.</p> <p>Cubist Pharmaceuticals, Inc., Lexington, MA</p> <p>Phase III trials ongoing; FDA granted qualified infectious disease product and fast-track statuses</p>	Fidaxomicin Metronidazole Vancomycin	Reduced CDI recurrence rate Reduced length of hospital stay Improved time to resolution of diarrhea
Tafenoquine for treatment of <i>Plasmodium vivax</i> infection	Patients in whom <i>Plasmodium vivax</i> infection has been diagnosed	<p>Malaria caused by <i>P. vivax</i> is the 2nd leading cause of malaria deaths and is difficult to treat because of the presence of a dormant, liver stage of the parasite (hypnozoites) causing relapses that can occur any time between 3 weeks and several years after initial infection. Better treatment options are needed. Tafenoquine is an 8-aminoquinoline for treating <i>P. vivax</i> (relapsing) malaria. Current standard of care for treating hypnozoites is primaquine, also an 8-aminoquinoline; it requires 14-day treatment and is associated with hemolytic anemia in some patients. Tafenoquine can be administered in a single dose, and is purported to be effective against hypnozoites.</p> <p>GlaxoSmithKline, Middlesex, UK</p> <p>Phase III trial planned; FDA granted breakthrough status</p>	Chloroquine phosphate Mosquito nets Primaquine	Reduced incidence of malaria infection Relapse efficacy Increased overall survival

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
TKM-Ebola for treatment of Ebola virus disease	Patients infected with Ebola virus	<p>Ebola virus disease (EVD) has an 50% mortality rate. It is caused by a virus of the family <i>Filoviridae</i>, genus <i>ebolavirus</i>. Of 5 identified Ebola virus species, 4 are known to cause disease in humans: Ebola virus (<i>Zaire ebolavirus</i>); Sudan virus (<i>Sudan ebolavirus</i>); Taï Forest virus (<i>Taï Forest ebolavirus</i>, formerly <i>Côte d'Ivoire ebolavirus</i>); and Bundibugyo virus (<i>Bundibugyo ebolavirus</i>). Treatment is optimal supportive care. No FDA-approved treatments exist for EVD, but several agents are being given through FDA's compassionate use program, depending on availability. TKM-Ebola comprises a cocktail of modified siRNAs targeting the Zaire Ebola virus L polymerase, viral protein 24, and viral protein 35. It is delivered in proprietary lipid nanoparticles, which purportedly inhibits expression of these proteins, which are essential for viral replication. The drug is administered as an intravenous infusion.</p> <p>Tekmira Pharmaceuticals Corp., Burnaby, British Columbia, Canada</p> <p>Phase I trial suspended; FDA authorized use for Ebola treatment under expanded access protocols Aug 2014; FDA granted fast-track status</p>	<p>Convalescent serum (plasma from patients who have recovered from EVD) Supportive care</p>	<p>Increased survival rate Reduced mortality Symptom resolution</p>
TransVax for prevention of cytomegalovirus reactivation in hematopoietic cell transplant recipients	Patients who have received a stem cell transplant	<p>Human cytomegalovirus (HCMV) infection can lead to organ transplant rejection and is the primary cause of morbidity and mortality during the 1st 6 months after a patient receives an organ transplant. Ganciclovir is considered expensive and not appropriate or effective in preventing HCMV reactivation in many patients. TransVax™ (ASP0113) is a DNA vaccine designed to induce adaptive immune responses capable of preventing reactivation of latent cytomegalovirus or introduction of the virus through donor cells or tissues in transplant recipients. Administered as an intramuscular injection.</p> <p>Vical, Inc., San Diego, CA Astellas Pharma, Inc., Tokyo, Japan</p> <p>Phase III trial ongoing</p>	<p>Cidofovir (off label) Ganciclovir</p>	<p>Decreased rate of organ rejection Increased time to organ rejection Reduced HCMV load</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Vaccine (PF-06425090) for prevention of <i>Clostridium difficile</i> infection	At-risk individuals, including adults facing imminent hospitalization or current or impending residence in a long-term care or rehabilitation facility	<p><i>Clostridium difficile</i> is a common source of hospital-acquired infection that can lead to significant morbidity and mortality, lengthened hospital stays, and increased cost. More options to prevent <i>C. difficile</i> infection are needed. <i>C. difficile</i> vaccine (PF-06425090) consists of modified protein subunits of the <i>C. difficile</i> toxins A and B, which are intended to induce protective antibody responses to ameliorate symptoms. In clinical trials, the vaccine was administered as an intramuscular injection at weeks 0, 1, and 4.</p> <p>Pfizer, Inc., New York, NY</p> <p>Phase II trial ongoing; FDA granted fast-track status</p>	Hospital infection-control programs	<p>Reduced <i>C. difficile</i> infection rates</p> <p>Reduced use of antibacterial drugs</p> <p>Shorter hospitalizations</p> <p>Reduced isolation protocols</p>
Vaginal ring (dapivirine) for prevention of HIV infection	Women at high risk of contracting HIV infection	<p>Although behavior-change programs have resulted in dramatic reductions in HIV transmission in the U.S., there remains no truly effective means to prevent HIV infection among populations at high risk of such an infection. A latex ring that can be placed in the vagina, slowly releasing an antiretroviral drug—similar to birth-control rings—could help reduce the rate of HIV transmission. The vaginal ring contains the nonnucleoside reverse transcriptase inhibitor dapivirine. Dapivirine is not used to treat HIV, so developers expect the prevalence of HIV strains resistant to the drug to be low. The ring contains dapivirine 25 mg, inserted intravaginally, once monthly.</p> <p>International Partnership for Microbicides, Silver Spring, MD</p> <p>Phase III trials ongoing</p>	<p>Condoms</p> <p>Harm reduction campaigns</p> <p>Preexposure prophylaxis (tenofovir/ emtricitabine)</p>	Reduced transmission and incidence of HIV
Viral RNA polymerase inhibitor (favipiravir) for treatment of influenza	Patients in whom influenza has been diagnosed or is suspected	<p>Influenza continues to cause significant morbidity and mortality in susceptible patients; better treatments are needed because of the development of resistance to existing agents. Favipiravir purportedly inhibits the influenza virus RNA polymerase, inhibiting viral replication. The drug is purported to be effective against highly pathogenic or drug-resistant influenza strains. Administered orally, 1,800 mg, twice daily, for 1 day, and 800 mg, twice daily, on days 2 through 5.</p> <p>FujiFilm Pharmaceuticals U.S.A., Inc., Boston, MA MediVector, Inc., Boston, MA</p> <p>Phase III trials ongoing</p>	Oseltamivir Zanamivir	<p>Shorter hospitalization time</p> <p>Reduced virus titers</p> <p>Relieved symptoms</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Zmapp for treatment of Ebola virus infection	Patients in whom Ebola virus disease (EVD) has been diagnosed	<p>EVD has a 50% mortality rate. It is caused by a virus of the family <i>Filoviridae</i>, genus <i>ebolavirus</i>. Of 5 identified Ebola virus species, 4 are known to cause disease in humans: Ebola virus (<i>Zaire ebolavirus</i>); Sudan virus (<i>Sudan ebolavirus</i>); Taï Forest virus (<i>Taï Forest ebolavirus</i>, formerly <i>Côte d'Ivoire ebolavirus</i>); and Bundibugyo virus (<i>Bundibugyo ebolavirus</i>). Treatment is optimal supportive care. No FDA-approved treatments exist for EVD, but several agents are being given through FDA's compassionate use program, depending on availability. Zmapp is a passive immunotherapy that is a combination of 3 humanized monoclonal antibodies against the Ebola virus Zaire strain produced in a tobacco leaf-based expression system. The antibodies are intended to help the patient's immune system resolve the infection. Administered intravenously.</p> <p>Mapp Biopharmaceutical, Inc., San Diego, CA</p> <p>Preclinical trials completed; FDA authorized use for treating EVD under expanded access protocols; FDA granted fast-track status</p>	<p>Convalescent serum (plasma from patients who have recovered from EVD) Supportive care</p>	<p>Increased survival Increased symptom resolution Reduced mortality</p>

Table 10. AHRQ Priority Condition: 10 Obesity: 7 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Deep brain stimulation for treatment of obesity	Patients classified as overweight or obese on the basis of body mass index	<p>In the U.S., 34.9% of adults are obese. Among children and adolescents aged 2–19 years, 32.9 million are overweight or obese and 12.7 million are obese. Available pharmacologic and surgical options can have serious side effects or adverse events, warranting the need for more novel approaches for treating obesity. Deep brain stimulation (DBS) involves implanting a battery-operated medical device (neurostimulator) in the brain to deliver electrical stimulation to targeted areas that control the brain's reward system (i.e., frontal cortex, nucleus accumbens, ventral tegmental area). The type of DBS device being used was not disclosed.</p> <p>Allegheny Singer Research Institute, Pittsburgh, PA Ohio State University, Columbus University of Southern California, Los Angeles</p> <p>Unphased trials completed</p>	<p>Aspiration therapy system (in development) Endoluminal sleeve (EndoBarrier) Gastric banding surgery Gastric pacemaker (in development) Intragastric balloons (in development) Pharmacotherapy Roux en Y bypass surgery Sleeve gastrectomy surgery Vagus nerve blocking</p>	<p>Decreased food cravings Decreased obesity-associated comorbidities (e.g., prediabetes, high blood pressure) Increased weight loss Improved quality of life</p>
Fecal microbiota therapy for metabolic syndrome in obese patients	Obese patients in whom metabolic syndrome has been diagnosed	<p>The prevalence of metabolic syndrome is increasing in the U.S., warranting the need for effective therapies aimed at reducing coronary artery disease, stroke, and diabetes mellitus. Obese patients are thought to have an imbalance in the flora of their lower intestinal tract that could be contributing to insulin resistance. A transplant of healthy flora from another person's fecal matter has been suggested as a way to treat metabolic syndrome. In an effort to treat insulin resistance and obesity, fecal matter is harvested from healthy, lean donors, processed, and transferred via enema into obese patients who have metabolic syndrome.</p> <p>Catholic University of the Sacred Heart, Milan, Italy Academic Medical Centre at the University of Amsterdam, the Netherlands</p> <p>Phase III trial ongoing; fecal microbiota therapy has also been used to treat other conditions, such as recurrent <i>Clostridium difficile</i> infection</p>	<p>Antiobesity pharmacotherapy Diet and behavior changes Surgical intervention (e.g., bariatric surgery)</p>	<p>Improved fecal flora composition Resolution of metabolic syndrome Weight loss</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Food-based polymer (Gelesis100) for treatment of obesity	Overweight adults with body mass index (BMI) >30 kg/m ²	<p>In the U.S., 34.9% of adults are obese. Among children and adolescents aged 2–19 years, 32.9 million are overweight or obese and 12.7 million are obese. Pharmacologic options have expanded with new drug approvals since 2012; however, the competing drugs have significant potential side effects and work in only a proportion of patients taking them. Additional pharmacologic options are needed. Gelesis100 is a polymer that may promote weight loss without central nervous system effects. Gelesis100 is a highly absorbent hydrogel containing polymer particles of food materials that expand when in contact with liquid in the stomach. The polymer expands into numerous hydrogel beads in the stomach, giving a “full” feeling to suppress hunger. The hydrogel keeps food in the stomach longer, giving stomach acid more time to break down both the food and the hydrogel, which begins to release its water; everything then moves to the small intestine where the gel can re-expand to some extent, slowing the absorption of fatty materials and sugars. Gelesis100 capsules may be taken orally, after meals.</p> <p>Gelesis, Inc., Boston, MA</p> <p>Pilot study completed; pivotal study projected to be completed in the 4th quarter of 2016</p>	<p>Aspiration therapy system (in development) Deep brain stimulation Endoluminal sleeve (EndoBarrier) Gastric banding surgery Gastric pacemaker (in development) Pharmacotherapy Roux en Y bypass surgery Sleeve gastrectomy surgery Vagus nerve blocking</p>	<p>Decreased comorbidities Total weight loss Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Intragastric dual balloon (ReShape Duo) for treatment of obesity</p>	<p>Patients with a body mass index (BMI) between 30 and 40 kg/m² who wish to lose weight</p>	<p>Available pharmacologic and surgical options can have serious side effects or adverse events, warranting the need for more novel approaches for treating obesity. ReShape Duo is a nonsurgical, intragastric, dual balloon that is endoscopically inserted into the stomach in an uninflated state using a guidewire. After the clinician positions the dual balloons appropriately with the guidewire, they are inflated with a total of 900 cc of saline, occupying stomach space with the intended purpose of increasing satiety while avoiding overdistention. The dual-balloon design purportedly reduces device displacement. Endoscopic placement takes 15–30 minutes. The device can stay in the stomach for up to 6 months, and then it must be removed endoscopically using a snare to deflate and remove the balloon through the patient’s mouth.</p> <p>ReShape Medical, Inc., San Clemente, CA</p> <p>Pivotal U.S. trial ongoing; Conformité Européene (CE) marked in 2007; Nov 2013, company announced device met primary efficacy endpoints in ongoing pivotal trial; Jul 2014, company submitted premarket approval application to FDA</p>	<p>Aspiration therapy system (in development) Deep brain stimulation Endoluminal sleeve (EndoBarrier) Gastric banding surgery Gastric pacemaker (in development) Pharmacotherapy Roux en Y bypass surgery Sleeve gastrectomy surgery Vagus nerve blocking</p>	<p>Decreased comorbidities Total weight loss Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Liraglutide (Saxenda) for treatment of obesity	Patients at risk of developing diabetes with a body mass index (BMI) greater than 30 kg/m ² or between 27 and 30 kg/m ² with an associated comorbidity	<p>In the U.S., 34.9% of adults are obese. Among children and adolescents aged 2–19 years, 32.9 million are overweight or obese and 12.7 million are obese. Pharmacologic options have expanded with new drug approvals since 2012; however, the competing drugs have significant potential side effects and work in only a proportion of patients taking them. Additional pharmacologic options are needed. Liraglutide (Saxenda[®]) is approved for treating type 2 diabetes mellitus and acts as a glucagon-like peptide 1 analog; the drug reduces blood glucose levels by increasing insulin secretion, which delays gastric emptying and suppresses glucagon secretion, potentially leading to weight loss. This treatment showed potential in preclinical studies and studies in overweight patients without diabetes to reduce food intake and induce weight loss. In a clinical trial, liraglutide was administered as a once-daily, subcutaneous injection of 3 mg.</p> <p>Novo Nordisk a/s, Bagsværd, Denmark</p> <p>FDA approved Dec 2014 as "an adjunct to a reduced-calorie diet and increased physical activity for chronic weight management in adults with obesity (BMI ≥30 kg/m²) or who are overweight (BMI ≥27 kg/m²) in the presence of at least one weight-related comorbid condition"</p>	<p>5-HT_{2C} receptor agonist (Belviq[®]) Behavior and lifestyle modifications Combination appetite suppressant/stimulant and anticonvulsant (Qsymia[®]) Combination norepinephrine/dopamine reuptake inhibitor and opioid receptor antagonist (Contrave[®]) Pancreatic lipase inhibitor (orlistat, Xenical[®]) Surgical therapy (e.g., bariatric surgery)</p>	<p>Decreased comorbidities Total weight loss Improved quality of life</p>
Off-label exenatide for treatment of pediatric obesity	Children and adolescents receiving a diagnosis of "extreme" obesity (body mass index [BMI] ≥1.2 times the 95th percentile or BMI ≥35 kg/m ²)	<p>In the U.S., 34.9% of adults are obese. Among children and adolescents aged 2–19 years, 32.9 million are overweight or obese and 12.7 million are obese. A single weight-loss pharmacotherapy is available for adolescents older than 12 years of age: orlistat (Xenical[®]). However, prescription medications are not recommended for child or adolescent use. Exenatide is a glucagon-like peptide-1 receptor agonist approved for treating type 2 diabetes mellitus that purportedly reduces BMI, waist circumference, and body weight in addition to improving the glycemic index. Exenatide purportedly increases satiety and suppresses appetite. In trials, exenatide was administered subcutaneously, twice daily, 5 mcg per dose for the 1st month and then 10 mcg per dose for 2 months.</p> <p>University of Minnesota, Minneapolis</p> <p>Phase II trial completed</p>	<p>5-HT_{2C} receptor agonist (Belviq[®]) Behavior and lifestyle modifications Combination appetite suppressant/stimulant and anticonvulsant (Qsymia[®]) Glucagon-like peptide 1 analog liraglutide (Saxenda[®]) Pancreatic lipase inhibitor (orlistat, Xenical[®]) Surgical therapy (e.g., bariatric surgery)</p>	<p>Decreased comorbidities Total weight loss Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Vagus nerve blocking (Maestro system VBLOC) for treatment of obesity	Adults with body mass index (BMI) between 40 and 45 kg/m ² or 35 kg/m ² or more with comorbidities	<p>In the U.S., 34.9% of adults are obese. Among children and adolescents aged 2–19 years, 32.9 million are overweight or obese and 12.7 million are obese. Available pharmacologic and surgical options can have serious side effects or adverse events, warranting the need for more novel approaches for treating obesity. The VBLOC™ system is an implanted device that emits high-frequency, low-energy electrical impulses, which are intended to block the vagus nerve in an effort to inhibit gastric motility and increase feelings of fullness. Electrical impulses are delivered by the implanted neuroregulator, which is powered either by an external controller (Maestro™ RF System) or an integrated rechargeable battery (Maestro RC System). It is implanted laparoscopically.</p> <p>EnteroMedics, Inc., St. Paul, MN</p> <p>FDA approved Jan 2015 for treating "adult patients with obesity who have a Body Mass Index (BMI) of at least 40 to 45 kg/m², or a BMI of at least 35 to 39.9 kg/m² with a related health condition such as high blood pressure or high cholesterol levels, and who have tried to lose weight in a supervised weight management program within the past five years."</p>	<p>Aspiration therapy system (in development) Deep brain stimulation Endoluminal sleeve (EndoBarrier) Gastric banding surgery Gastric pacemaker (in development) Intra-gastric balloons (in development) Pharmacotherapy Roux en Y bypass surgery Sleeve gastrectomy surgery</p>	<p>Decreased comorbidities Total weight loss Improved quality of life</p>

Table 11. AHRQ Priority Condition: 11 Peptic Ulcer Disease and Dyspepsia: 8 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Alicaforsen for treatment of ulcerative colitis</p>	<p>Patients in whom ulcerative colitis (UC) has been diagnosed</p>	<p>Patients with UC have abnormally and chronically activated immune systems in the absence of any known invader, leading to periodic bouts of abdominal pain, diarrhea, and rectal bleeding. UC is typically treated with anti-inflammatory drugs with varied success, and investigators have not found a long-term cure or strategy besides surgery to prevent periodic disease flares. Alicaforsen is an antisense ICAM-1 (intercellular adhesion molecule) inhibitor intended to treat UC. The drug purportedly targets the overexpressed intracellular adhesion protein associated with inflammation. In clinical trials, alicaforsen has been administered by enema.</p> <p>Atlantic Healthcare plc, Essex, UK, in collaboration with Isis Pharmaceuticals, Carlsbad, CA</p> <p>Phase III trials ongoing; FDA granted orphan drug status</p>	<p>Aminosalicylates (mesalazine) Antibiotics (for acute flares) Corticosteroids (e.g., prednisone) Immunomodulators (e.g., azathioprine) Monoclonal antibodies (e.g., natalizumab, infliximab)</p>	<p>Improved clinical response Improved quality of life Reduced systemic absorption</p>
<p>Eluxadoline (MuDelta) for treatment of diarrhea-predominant irritable bowel syndrome</p>	<p>Patients in whom diarrhea-predominant irritable bowel syndrome (IBS-D) has been diagnosed</p>	<p>IBS is a functional gastrointestinal disorder of unclear etiology with no known cure. Approximately 30% of diagnosed IBS cases can be attributed to IBS-D. Available treatments are purported to be ineffective in many patients, and no new treatment options have been available for decades. The only approved treatment in the U.S. for IBS-D is alosetron, and this intervention is associated with safety issues. Eluxadoline is a mu-opioid receptor agonist and delta-opioid receptor antagonist that may provide relief for both pain and diarrheal symptoms of IBS-D without the constipating effects typically seen with mu-receptor agonists. Pharmacology data suggest that eluxadoline acts locally in the digestive tract, thus having a low potential for systemic side effects. In clinical trials, eluxadoline has been administered as an oral tablet, 75 or 100 mg, twice daily.</p> <p>Actavis plc, Dublin, Ireland, acquired developer Furiex Pharmaceuticals, Inc., Morrisville, NC, Jul 2014</p> <p>Pivotal phase III trials completed; 1 phase III trial ongoing; FDA granted fast-track status Jan 2011; Actavis announced FDA had accepted new drug application with priority review status; the manufacturer anticipates Prescription Drug User Fee Act date in 2nd quarter of 2015</p>	<p>Antispasmodic drugs Opioids Serotonin agonists Tricyclic antidepressants</p>	<p>Reduced abdominal pain and bloating symptoms Long-term relief</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Fecal microbiota transplantation for treatment of ulcerative colitis	Patients in whom ulcerative colitis (UC) has been diagnosed	<p>Patients with UC have abnormally and chronically activated immune systems in the absence of any known invader, leading to periodic bouts of abdominal pain, diarrhea, and rectal bleeding. UC is typically treated with anti-inflammatory drugs with varied success, and investigators have not found a long-term cure or strategy besides surgery to prevent periodic disease flares. Fecal microbiota transplantation is a procedure designed to restore balance to the microbiota of the bowel after it has been disturbed by antibiotics or other environmental changes in the colon, changes that lead to the dominance of toxin-producing strains that can cause disease. Fecal matter from a healthy donor is collected and mixed with a solution and transplanted into the recipient via colonoscopy.</p> <p>Multiple institutions worldwide, including Montefiore Medical Center, Bronx, NY, and the Medical Center for Digestive Diseases at The Second Affiliated Hospital of Nanjing Medical University, Nanjing, China</p> <p>Phase II/III trial ongoing; procedure might be adopted by gastroenterologists who are using the procedure for treating recurrent <i>Clostridium difficile</i> infection</p>	<p>Aminosalicylates (mesalazine) Antibiotics (for acute flares) Corticosteroids (e.g., prednisone) Immunomodulators (e.g., azathioprine) Monoclonal antibodies (e.g., natalizumab, infliximab)</p>	<p>Reduced relapse frequency Reduced use of medications Reduced symptoms Reduced or postponed need for surgery Improved quality of life</p>
Remestemcel-L (Prochymal) for treatment of Crohn's disease	Patients in whom Crohn's disease has been diagnosed	<p>Investigators have not found a cure for Crohn's disease, which causes inflammation of the gastrointestinal tract, most often at the end of the small intestine, leading to pain and diarrhea. Treatments are aimed at symptomatic relief. Patients with Crohn's disease frequently experience damage to their bowels and require surgery; no regenerative therapies are approved. Remestemcel-L (Prochymal®) consists of allogeneic, bone marrow-derived human mesenchymal stem cells (MSCs), which purportedly reduce inflammation and promote crypt regeneration in damaged intestine. The manufacturer has developed a specific "expansion" process for these cells, which are intended to be used off the shelf and delivered as an intravenous infusion. In clinical trials, administered 3 times, 200 million cells per infusion, 42 days apart.</p> <p>Mesoblast, Ltd., Melbourne, Australia</p> <p>Phase III trials ongoing; FDA granted orphan and fast-track statuses</p>	<p>Aminosalicylates (mesalazine) Antibiotics (for acute flares) Corticosteroids (e.g., prednisone) Immunomodulators (e.g., azathioprine) Monoclonal antibodies (e.g., natalizumab, infliximab)</p>	<p>Increased disease remission Improved disease symptoms Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Rifaximin (Xifaxan) for treatment of nonconstipating irritable bowel syndrome	Patients in whom nonconstipating irritable bowel syndrome (IBS) has been diagnosed	<p>IBS is a functional gastrointestinal disorder of unclear cause with no known cure. Rifaximin (Xifaxan®) is a nonabsorbable antibiotic approved for treating traveler's diarrhea and under study for IBS with diarrhea. Rifaximin is purported to reduce abdominal bloating by treating bacterial overgrowth in the small intestine. In an ongoing clinical trial, investigators are studying repeat treatment of patients who had an initial response after 14 days of rifaximin. The medication is being given at 550 mg, orally, 3 times a day.</p> <p>Salix Pharmaceuticals, Inc., Morrisville, NC</p> <p>Phase III trial completed (TARGET3); FDA assigned a Prescription Drug User Fee Act goal date of May 27, 2015</p>	<p>Antispasmodic drugs Opioids Serotonin agonists Tricyclic antidepressants</p>	<p>Reduced abdominal pain and bloating symptoms Long-term relief</p>
Tofacitinib (Xeljanz) for treatment of ulcerative colitis	Patients in whom ulcerative colitis (UC) has been diagnosed	<p>Patients with UC have abnormally and chronically activated immune systems in the absence of any known invader, leading to periodic bouts of abdominal pain, diarrhea, and rectal bleeding. UC is typically treated with anti-inflammatory drugs with varied success, and investigators have not found a long-term cure or strategy besides surgery to prevent periodic disease flares. Tofacitinib (Xeljanz®) is a tyrosine kinase inhibitor specifically targeting the Janus kinase-3 (JAK 3) signaling pathway believed to mediate several processes involved in chronic inflammatory diseases, such as antibody production by B cells, production of rheumatic factor, and activation of T cells. By inhibiting the JAK 3 pathway, tofacitinib might suppress the inflammatory reactions that are the basis of UC. In clinical trials, tofacitinib has been administered twice daily, orally, in 0.5, 1, 3, 5, 10, or 15 mg doses.</p> <p>Pfizer, Inc., New York, NY</p> <p>Phase III trials ongoing</p>	<p>Aminosalicylates (mesalazine) Antibiotics (for acute flares) Corticosteroids (e.g., prednisone) Immunomodulators (e.g., azathioprine) Monoclonal antibodies (e.g., natalizumab, infliximab)</p>	<p>Improved clinical response Reduced flare symptoms Reduced or postponed need for surgery Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Vedolizumab (Entyvio) for treatment of moderate to severe ulcerative colitis and Crohn's disease	Patients in whom moderate to severe ulcerative colitis (UC) or Crohn's disease has been diagnosed	<p>Patients with inflammatory bowel disease (IBD), such as UC or Crohn's disease, have an abnormally and chronically activated immune systems in the absence of any known invader, leading to periodic bouts of abdominal pain, diarrhea, and rectal bleeding. IBD is typically treated with anti-inflammatory drugs with varied success, and investigators have not found a long-term cure or strategy besides surgery to prevent periodic disease flares. Vedolizumab (Entyvio) is an infused monoclonal antibody purported to inhibit the binding of intestinal mucosal cell molecules thought to play a role in the inflammatory process. Vedolizumab is administered via intravenous infusion in doses of 300 mg at 0, 2, and 6 weeks, followed by 300 mg intravenous infusions every 8 weeks.</p> <p>Millennium Pharmaceuticals unit of Takeda Pharmaceutical Co., Ltd., Osaka, Japan</p> <p>Phase III trial completed; FDA approved May 2014 for treating adults with moderate to severe UC or Crohn's disease</p>	<p>Aminosalicylates (mesalazine) Antibiotics (for acute flares) Corticosteroids (e.g., prednisone) Immunomodulators (e.g., azathioprine) Monoclonal antibodies (e.g., natalizumab, infliximab)</p>	<p>Reduced flare symptoms Maintained remission Reduced or postponed need for surgery Improved quality of life</p>
Vercirnon (Traficet-EN) for treatment of Crohn's disease	Patients in whom moderate to severe Crohn's disease has been diagnosed	<p>Investigators have not found a cure for Crohn's disease, which causes inflammation of the gastrointestinal tract, most often at the end of the small intestine, leading to pain and diarrhea. Treatments are aimed at symptomatic relief. Vercirnon (Traficet-EN™, GSK1605786) is an oral CCR9 antagonist. CCR9 is a chemokine receptor that plays a central role in the inappropriate inflammatory response thought to underlie Crohn's disease. By blocking CCR9, vercirnon selectively impairs the movement of activated T cells that are involved in causing inflammation of the digestive tract. In phase III trials, it was administered in a 500 mg dose, twice daily.</p> <p>Chemocentryx, Inc., Mountain Valley, CA</p> <p>1 phase III trial completed, 3 phase III trials terminated; GlaxoSmithKline returned all rights to Chemocentryx following failed clinical trials</p>	<p>Aminosalicylates (mesalazine) Antibiotics (for acute flares) Corticosteroids (e.g., prednisone) Immunomodulators (e.g., azathioprine) Monoclonal antibodies (e.g., natalizumab, infliximab)</p>	<p>Delayed or avoided surgery Reduced flares Reduced side effects Disease remission Symptom improvement Improved quality of life</p>

Table 12. AHRQ Priority Condition: 12 Pregnancy, Including Preterm Birth: 4 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Bi-directional communication for management of weight (SmartMoms) in pregnant women</p>	<p>Pregnant women who have a body mass index of 25 kg/m² or more</p>	<p>Pregnant women in the U.S. are at increased risk of exceeding pregnancy weight goals at term as recommended by Institute of Medicine guidelines, leaving mother and child susceptible to poor postpartum health outcomes. SmartMoms is a pregnancy weight-management program consisting of screening visits, weight management advice, 2nd and 3rd trimester health testing, and postnatal followup. The most recent SmartMoms intervention involves weekly delivery of weight-management strategies from a counselor via a smartphone. Patients will also be asked to submit weight data (using a provided scale) and nutritional information via smartphones.</p> <p>Pennington Biomedical Research Center, Baton Rouge, LA, in collaboration with the National Institute of Diabetes and Digestive and Kidney Diseases and Children's Hospital of Eastern Ontario Research Institute, Ottawa, Canada</p> <p>Phase III trial ongoing</p>	<p>Other perinatal weight-management strategies</p>	<p>Improved maternal and fetal health outcomes Improved perinatal weight management Reduced morbidity Improved quality of life</p>
<p>Gonadotropin-releasing hormone antagonist (Elagolix) for treatment of endometriosis</p>	<p>Patients in whom endometriosis has been diagnosed</p>	<p>Endometriosis is a painful disorder in which endometrium grows outside the uterus, commonly in ovaries, bowel, or tissue lining the pelvis. Injectable gonadotropin-releasing hormone (GnRH) agonists can take up to several weeks to suppress symptoms for patients with endometriosis. Elagolix is a nonpeptide GnRH antagonist that has a rapid onset in suppressing hormones (stops ovulation and endometriosis symptoms) without a hormonal flare or injection-site reactions. Elagolix suppresses GnRH secretion from the pituitary gland, which lessens hormone-dependent symptoms. Titration might make it possible to maintain appropriate levels of estrogen, thus preventing menopausal-like hormonal levels and bone loss. In clinical trials, the drug is taken at a variable dose, daily, orally.</p> <p>AbbVie, North Chicago, IL, in collaboration with Neurocrine Biosciences, Inc., San Diego, CA</p> <p>Phase III trials ongoing; also under study for uterine fibroids</p>	<p>Endometrial growth and scar tissue excision Hormonal contraceptives (e.g., depot medroxyprogesterone acetate) Hysterectomy Steroids</p>	<p>Improved composite pelvic signs and symptoms score (measures dysmenorrhea, nonmenstrual pelvic pain, dyspareunia, pelvic tenderness, and induration) Improved patient global impression of change Less pain (visual analog scale) Maintained bone mineral density</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Proteomic panel (PreTRM) to predict spontaneous preterm birth	Women who are pregnant	<p>About 1 in 10 pregnant women has a spontaneous preterm birth in the U.S. each year; however, no screening or diagnostic test is available to identify women at risk of preterm birth early in pregnancy. Clinicians and their patients could use test results to plan preterm-birth prevention strategies. PreTRM™ is a panel of proteomic markers that purportedly indicates the likelihood of spontaneous preterm birth. The proteomic assay is performed on a blood sample taken as early as 24 weeks of pregnancy.</p> <p>Sera Prognostics, Salt Lake City, UT</p> <p>Validation study ongoing; study completed enrollment of 5,500 patients</p>	<p>Assessment of cervical length Detection of bacterial vaginosis Fetal fibronectin levels Home uterine activity monitoring Salivary estriol testing</p>	<p>Earlier intervention for women at risk of preterm birth Reduced incidence of preterm birth Reduced neonatal complications Reduced use of neonatal intensive care services</p>
Recombinant antithrombin (ATryn) for treatment of preterm preeclampsia	Pregnant women in whom very early preterm preeclampsia (before 28 weeks' gestation) has been diagnosed	<p>Preeclampsia is a condition that occurs only during pregnancy and affects the placenta. It is characterized by abnormal development of blood vessels from the uterus to the placenta and can cause prematurity, fetal abnormality, and fetal death. Women with preeclampsia experience systemic inflammation and high blood pressure, which can potentially lead to stroke, seizure, organ failure, or death. Preeclampsia that does not result in death resolves after birth. If labor has to be induced early because of preeclampsia, preterm fetuses (before 37 weeks' gestation) are underdeveloped and at risk of complications. Conversely, pregnant women with preeclampsia have better outcomes with earlier delivery. Antihypertensive drugs may lower maternal blood pressure. ATryn is a recombinant antithrombin with anticoagulant effects. It is approved for preventing thromboembolic events in perioperative and peripartum patients with hereditary antithrombin deficiency. The manufacturer is seeking to expand ATryn's approved indication for treating preeclampsia. ATryn is administered by continuous infusion. Initial loading dose is 250 mg over 15 minutes followed by 2,000 mg over 24 hours for 7–14 days.</p> <p>rEVO Biologics, Inc., a subsidiary of LFB S.A., Les Ulis, France</p> <p>Phase III trial ongoing</p>	<p>Antihypertensive medication Induced labor Magnesium sulfate to temporarily stop seizures</p>	<p>Increased gestational age at delivery Reduced fetal morbidity Reduced fetal mortality Reduced maternal morbidity Reduced maternal mortality</p>

Table 13. AHRQ Priority Condition: 13 Pulmonary Disease, Asthma: 16 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Adipose-derived mesenchymal stem cells for treatment of chronic obstructive pulmonary disease	Patients in whom chronic obstructive pulmonary disease (COPD) has been diagnosed	<p>Patients with COPD develop progressive deterioration of lung function that often results in respiratory failure and death. Treatment options only reduce the frequency and severity of exacerbations and slow the rate of deterioration. Treatments to improve the respiratory status of patients with COPD are needed. Autologous, adipose-derived mesenchymal stem cells purportedly adhere to damaged and inflamed areas in the lung. The cells purportedly secrete proangiogenic and antiapoptotic growth factors, such as vascular endothelial growth factor and hepatocyte growth factor, which could promote anti-inflammatory processes and vascular and tissue regeneration and could improve symptoms. Administered as an intravenous injection.</p> <p>Repair Stem Cells Institute (RSCI), LLC, Dallas, TX</p> <p>Unphased trial ongoing; same-day procedures offered by RSCI</p>	<p>Glucocorticoids Long-acting anticholinergic agents Long-acting beta-2 agonists Prophylactic azithromycin Roflumilast</p>	<p>Improved lung function Reduced cost from exacerbations Reduced incidence of exacerbations Increased survival Improved quality of life</p>
Ataluren (Translarna) for treatment of nonsense mutation cystic fibrosis	Patients in whom cystic fibrosis (CF) due to a nonsense mutation (nmCF) has been diagnosed	<p>No curative treatments exist for CF. Molecular treatments are being developed to reduce the mucus buildup and exacerbations that are hallmarks of the disease. Patients are also treated with antibiotics to manage infections. Treatments providing improved CF symptom management are needed. Ataluren (Translarna™) is a protein-restoration therapy designed to form full-length, functional cystic fibrosis transmembrane regulator (CFTR) protein in patients with nmCF. Nonsense mutations are the cause of CF in an estimated 10% of cases in the U.S. and Europe and more than 50% of CF cases in Israel. The drug is intended to improve lung function and in clinical trials is given orally, 10 mg/kg, 3 times daily.</p> <p>PTC Therapeutics, Inc., South Plainfield, NJ</p> <p>Phase III trials ongoing; FDA granted orphan drug status</p>	<p>Antibiotics Bilevel positive airway pressure ventilators Chest physiotherapy Gene therapies (viral vector or liposome delivery of normal CFTR) Lung transplant</p>	<p>Improved lung function Reduced need for additional therapies Increased survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Endobronchial valve system (Zephyr) for treatment of heterogeneous emphysema	Patients in whom heterogeneous emphysema has been diagnosed	<p>Treatment for advanced emphysema involves lung volume-reduction surgery, which has risk of serious complications; less invasive treatment options are needed. This implanted endobronchial valve system (Zephyr®) is intended as a minimally invasive treatment of hyperinflation in the lungs, using devices that purportedly reduce a patient’s diseased lung volume without surgery. According to the company, the procedure involves placing “small, 1-way valves in targeted airways to direct the flow of air out of diseased portions of the lung.” Clinicians typically place 3–4 valves per lobe during a procedure, and the total procedural time purportedly takes 15–30 minutes, depending on the number of valves placed. The valves are coated with medical-grade silicone to prevent tissue growth through the nitinol retainer.</p> <p>Pulmonx, Inc. (formerly Emphasys), Redwood City, CA</p> <p>Pivotal investigational device exemption clinical trial ongoing</p>	<p>Antibiotics Bronchodilators Corticosteroids Oxygen Pulmonary rehabilitation program Surgery (lung-reduction volume surgery, bullectomy, lung transplantation)</p>	<p>Improved lung function Improved activities of daily living Improved quality of life</p>
Inhaled amikacin (Arikayce) for treatment of nontuberculous <i>Mycobacteria</i> infection	Patients in whom pulmonary nontuberculous mycobacterial (NTM) lung infection has been diagnosed	<p>Most NTM infections are resistant to many common antibiotics, and NTM infection requires treatment with lengthy multidrug regimens; few effective treatments exist. Amikacin (Arikayce®), an approved antibiotic against a variety of NTM, is a semisynthetic aminoglycoside derived from kanamycin. Arikayce is being developed as a sustained-release formulation of amikacin encapsulated inside small fat particles using an optimized, investigational eFlow® Nebulizer System. Arikayce is intended to deliver higher levels of drug to the lungs than previously possible through existing formulations of amikacin while minimizing systemic exposure to the drug. Administration is via inhalation, 560 mg over 13 minutes, once daily.</p> <p>Insmmed, Inc., Monmouth Junction, NJ</p> <p>Phase II trial ongoing; phase III scheduled to start Jan 2015; FDA granted orphan drug, fast-track, and breakthrough therapy status. Arikayce is approved for other indications and sometimes used off label for treating NTM, but existing formulation is not intended for that use and trials are ongoing for the NTM indication</p>	<p>Amikacin (injectable) Amoxicillin/clavulanate Capreomycin Clarithromycin Clofazimine Ethionamide Fluoroquinolones Imipenem/cilastatin Isoniazid Kanamycin Linezolid Pyrazinamide Streptomycin Terizidone Thioacetazone</p>	<p>Resolved abnormalities as seen on computed tomographic scan Improved rate of culture conversion to negative Improved 6-minute walk distance and oxygen saturation Extended time before need for rescue antimycobacterial drugs</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Lumacaftor for treatment of cystic fibrosis	Patients with cystic fibrosis (CF) who have the delta <i>F508-CFTR</i> gene mutation	<p>No curative treatments exist for CF. Molecular treatments are being developed to reduce the mucus buildup and exacerbations that are hallmarks of the disease. Patients are also treated with antibiotics to manage infections. Treatments providing improved CF symptom management are needed. Lumacaftor (VX-809) is considered a corrector of the cystic fibrosis transmembrane regulator (<i>CFTR</i>) gene mutation; it is intended to increase <i>CFTR</i> protein regulator function by increasing its movement to the cell surface. Given as a fixed-dose combination with ivacaftor (Vertex's other CF drug). Administered orally, lumacaftor (400 mg)/ivacaftor (250 mg), twice daily in clinical trials.</p> <p>Vertex Pharmaceuticals, Inc., Cambridge, MA</p> <p>Phase III trial ongoing; Nov 2014, company submitted new drug application to FDA for treating patients with 2 copies of the F508del mutation; FDA granted breakthrough, orphan drug, and fast-track statuses</p>	<p>Antibiotics Bilevel positive airway pressure ventilators Chest physiotherapy Gene therapies (viral vector or liposome delivery of normal <i>CFTR</i>) Lung transplant</p>	<p>Improved lung function Increased survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Lung volume-reduction coil (RePneu) for treatment of emphysema	Patients with upper and/or lower lobe heterogeneous emphysema and/or multiple emphysematous lobes with focal tissue defects	<p>Treatment for advanced emphysema involves lung volume-reduction surgery, which has risk of serious complications; less invasive treatment options are needed. RePneu™ is a minimally invasive procedure intended to reduce lung volume by implanting devices that compress the volume of diseased hyperinflated lung tissue to make room for healthier lung tissue to function. RePneu is a wirelike device described as a lung-volume nitinol preformed coil; it is intended to compress the volume of lung tissue where deployed and is delivered to the lung uncoiled (in a straight line) using a bronchoscope and fluoroscopic visualization (with patient under conscious sedation or general anesthesia). About 10 coils are delivered during a procedure; once deployed in the desired locations of the diseased alveolar tissue, the catheter is retracted and the coils regain their original curved shape, pulling and compressing diseased hyperinflated tissue to reduce the lung volume and enable healthy lung tissue to expand and contract, improving breathing.</p> <p>PneumRx, Inc., Mountain View, CA</p> <p>Pivotal investigational device exemption trial ongoing; Conformité Européene (CE) marked in Europe</p>	<p>Antibiotics Bronchodilators Corticosteroids Oxygen Pulmonary rehabilitation program Surgery (lung volume reduction surgery, bullectomy, lung transplantation)</p>	<p>Improved lung function, physical endurance, and activities of daily living Improved scores in St. George's Respiratory Questionnaire (which measures impaired health and perceived well-being in airways diseases)</p>
Masitinib for treatment of severe asthma	Patients in whom severe, persistent asthma has been diagnosed	<p>About 10% of patients with asthma do not respond to high doses of inhaled corticosteroids and long-acting beta-2 antagonists. Uncontrolled asthma can lead to hospitalization or death. Patients with severe asthma must take systemic corticosteroids that can lead to adverse events. Masitinib is an orally administered tyrosine kinase inhibitor that purportedly targets the activity of mast cells, which are involved in triggering asthma attacks. Masitinib purportedly targets mast cells through selectively inhibiting KIT, platelet-derived growth factor receptor, Lyn, and, to a lesser extent, fibroblast growth factor receptor 3. Masitinib is administered orally, 6 mg/kg, daily, in clinical trials.</p> <p>AB Science S.A., Paris, France</p> <p>Phase III trial ongoing</p>	<p>Bronchial thermoplasty Inhaled corticosteroids Ipratropium (Atrovent) Leukotriene modifiers Long- or short-acting beta agonists Omalizumab (Xolair®) Theophylline</p>	<p>Improved asthma control Improved asthma exacerbation rate Fewer emergency room visits Reduced hospitalization Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Mepolizumab (Bosatria) for treatment of COPD	Patients in whom chronic obstructive pulmonary disease (COPD) has been diagnosed	<p>Patients experiencing severe acute exacerbations of COPD have a greater 30-day mortality rate than patients experiencing acute myocardial infarction. Acute exacerbations of COPD dramatically change the course of the disease and are associated with a rapid decline in lung function and worsening quality of life; better treatments for COPD management are needed. Mepolizumab (Bosatria®) is a humanized monoclonal antibody designed to bind and inhibit the activity of interleukin-5 (IL-5). IL-5 purportedly plays a crucial role in the maturation, growth, and chemotaxis (movement) of eosinophils, inflammatory white blood cells implicated in COPD exacerbations. In clinical trials, it is administered subcutaneously, 100 mg or 300 mg, once every 4 weeks.</p> <p>GlaxoSmithKline, Middlesex, UK</p> <p>Phase III trials ongoing</p>	<p>Azithromycin (off label) Glucocorticoids Long-acting anticholinergic agents Long-acting beta-2 agonists Roflumilast</p>	<p>Reduced cost due to exacerbations Reduced incidence or duration of exacerbations Increased survival Improved quality of life</p>
Mepolizumab (Bosatria) for treatment of eosinophilic asthma	Patients in whom eosinophilic asthma has been diagnosed	<p>Eosinophilic asthma occurs in about 30% of patients with severe uncontrolled asthma. Uncontrolled asthma can lead to hospitalization or death. Patients with severe asthma must take systemic corticosteroids that can lead to adverse events. Mepolizumab (Bosatria®) is a humanized monoclonal antibody designed to bind and inhibit the activity of interleukin-5 (IL-5). IL-5 purportedly plays a crucial role in the maturation, growth, and chemotaxis (movement) of eosinophils, inflammatory white blood cells implicated in asthma and not found in the lungs under normal circumstances. Administered intravenously, 75 mg, or subcutaneously, 100 mg, every 4 weeks.</p> <p>GlaxoSmithKline, Middlesex, UK</p> <p>Phase III trials ongoing; NDA submitted to FDA Nov 2014 for treating severe eosinophilic asthma</p>	<p>Bronchial thermoplasty Inhaled corticosteroids Ipratropium (Atrovent) Leukotriene modifiers Long-acting beta agonists Omalizumab (Xolair®) Short-acting beta agonists Theophylline</p>	<p>Improved asthma control Improved asthma exacerbation rate Fewer emergency room visits Reduced hospitalization Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Monoclonal antibody (KB001-A) for treatment of <i>Pseudomonas aeruginosa</i> infection</p>	<p>Patients in whom cystic fibrosis (CF) and <i>Pseudomonas aeruginosa</i> infection has been diagnosed</p>	<p>Patients with CF are susceptible to lung infections—by bacteria such as <i>P. aeruginosa</i>—that are difficult to treat with antibiotics. Better treatment options are needed for long-term management of CF. KB001-A is a pegylated monoclonal antibody fragment targeting the PcrV gene product of <i>P. aeruginosa</i>. PcrV is purported to be part of the bacterium's type III secretion system, which is involved in releasing toxins resulting in destruction of the host's immune cells and contributing to pathogenesis. Blocking PcrV is purported to prevent immune cell destruction and reduce inflammation, preserving immune and lung epithelial cell function. Bacteria are believed to be unlikely to develop resistance to KB001-A because loss of PcrV leads to a loss in <i>P. aeruginosa</i> pathogenicity. In a clinical trial, KB001-A is being administered intravenously, 10 mg/kg up to a maximum dose of 800 mg per dose, up to 5 times over 6 weeks.</p> <p>KaloBios Pharmaceuticals, Inc., South San Francisco, CA</p> <p>Phase II trial ongoing; FDA granted orphan drug status</p>	<p>Antibiotics</p>	<p>Improved lung function Improved quality of life Increased survival Reduced need for antibiotics</p>
<p>Nintedanib (Ofev) for treatment of idiopathic pulmonary fibrosis</p>	<p>Patients in whom idiopathic pulmonary fibrosis (IPF) has been diagnosed</p>	<p>IPF is a progressive, debilitating disease characterized by inflammation and scarring (fibrosis) in the lungs, with a median survival time from diagnosis of 2–5 years; 5-year survival rate is about 20%. Few approved treatments are available. Nintedanib is a tyrosine kinase inhibitor that has activity against vascular endothelial growth factor receptor, platelet-derived growth factor receptor, and fibroblast growth factor receptor tyrosine kinases, which are thought to play a role in IPF pathogenesis. Nintedanib is intended for treating IPF and slowing of disease progression and symptoms. Administered orally, 150 mg, twice daily.</p> <p>Boehringer Ingelheim GmbH, Ingelheim, Germany</p> <p>FDA approved Oct 2014 treating IPF</p>	<p>Azathioprine Bosentan Corticosteroids Cyclophosphamide Cyclosporine Methotrexate Penicillamine Pirfenidone Pulmonary rehabilitation Supplemental oxygen</p>	<p>Improved lung function measured by forced vital capacity Improved ability to perform activities of daily living Slowed disease progression Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Pirfenidone (Esbriet) for treatment of idiopathic pulmonary fibrosis	Patients in whom idiopathic pulmonary fibrosis (IPF) has been diagnosed	<p>IPF is a progressive, debilitating disease characterized by inflammation and scarring (fibrosis) in the lungs, with a median survival time from diagnosis of 2–5 years; 5-year survival rate is about 20%. Few approved treatments are available. Pirfenidone (Esbriet®) is a small molecule that inhibits the synthesis of transforming growth factor–beta, which purportedly is involved in fibrosis, and tumor necrosis factor–alpha, which is involved in mediating inflammation. The drug is administered orally, 801 mg, 3 times daily.</p> <p>InterMune subsidiary of F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>FDA approved Oct 2014 for treating IPF</p>	<p>Azathioprine Bosentan Corticosteroids Cyclophosphamide Cyclosporine Methotrexate Nintedanib Penicillamine Pulmonary rehabilitation Supplemental oxygen</p>	<p>Improved lung function measured by forced vital capacity Improved ability to perform activities of daily living Slowed disease progression Improved quality of life</p>
Portable warm blood perfusion system (Organ Care System) for normothermic lung transplantation	Patients who require a lung transplant	<p>About 1,750 lung transplantations were performed in the U.S. in 2012, with about 1,600 patients remaining on the national waiting list for lung transplants. Current methods of organ preservation during transplantation leave the organ susceptible to significant damage. Only 10% to 30% of available donor lungs are being used for transplant, and in 10% to 20% of patients who have undergone lung transplantation, the lungs are so severely damaged, the patient requires additional support therapies (i.e., ventilation, pharmacologic interventions). The development of new strategies to better preserve or improve the quality of donor lungs could affect the number of lungs available for transplantation. The Organ Care System (OCS) is designed to maintain the organ in a warm, functioning state outside of the body to optimize organ health and allow for continuous clinical evaluation. Through an internal gas supply, internal monitor, and pulsatile pumping system, OCS purportedly provides blood oxygenation and flow, warms the lung as necessary, maintains humidity, and protects the lung from contamination from the time of removal from the donor to implantation in the recipient.</p> <p>TransMedics, Inc., Andover, MA</p> <p>Phase III FDA investigational device exemption trial ongoing</p>	<p>Cold-storage preservation X-VIVO Lung Perfusion System</p>	<p>Increased graft survival Decreased graft dysfunction Increased use of available organs Reduced total cost of care Improved patient outcomes</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Reslizumab (Cinquil) for treatment of eosinophilic asthma	Patients in whom eosinophilic asthma has been diagnosed	<p>Eosinophilic asthma occurs in about 30% of patients with severe uncontrolled asthma. Uncontrolled asthma can lead to hospitalization or death. Patients with severe asthma must take systemic corticosteroids that can lead to adverse events. Reslizumab (Cinquil™) is a humanized monoclonal antibody designed to bind and inhibit the activity of interleukin-5 (IL-5). IL-5 purportedly plays a crucial role in the maturation, growth, and chemotaxis (movement) of eosinophils, inflammatory white blood cells implicated in asthma and not found in the lungs under normal circumstances. Administered intravenously, 0.3 mg/kg or 3 mg/kg, once every 4 weeks for a total of 4 doses.</p> <p>Teva Pharmaceutical Industries, Ltd., Petach Tikva, Israel (acquired developer Cephalon, Inc., Oct 2011)</p> <p>Phase III trial ongoing</p>	<p>Bronchial thermoplasty Inhaled corticosteroids Ipratropium (Atrovent) Leukotriene modifiers Long-acting beta agonists Omalizumab Short-acting beta agonists Theophylline</p>	<p>Improved asthma control Improved asthma exacerbation rate Fewer emergency room visits Reduced hospitalization Improved quality of life</p>
School-based preventive asthma care technology (SB-PACT) program for management of asthma in school children	School children in whom asthma has been diagnosed	<p>Children in inner city areas are more likely to have their asthma poorly controlled. The School-Based Preventive Asthma Care Technology (SB-PACT) program is comprised of directly observed administration of preventive asthma treatments in school, combined with the use of a Web-based technology that helps coordinate systematic symptom screening, electronic report generation, and medication authorization from providers.</p> <p>University of Rochester School of Medicine and Dentistry, Rochester, NY</p> <p>Pilot study completed; SB-TEAM followup study (n=400) recruiting</p>	Standard care	<p>Fewer days missed from school Increased symptom-free days Reduced symptoms at night Reduced rescue medication use Reduced exhaled nitric oxide (inflammation)</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Xvivo (XPS) lung perfusion with Steen solution to increase viable donor lungs</p>	<p>Patients awaiting lung transplant</p>	<p>About 1,750 lung transplantations were performed in the U.S. in 2012, with about 1,600 patients remaining on the national waiting list for lung transplants. Current methods of organ preservation during transportation from donor to recipient leave the organ susceptible to significant damage. Only 10% to 30% of available donor lungs are being used for transplantation, and in 10% to 20% of patients who have undergone lung transplantation, the lungs are so severely damaged, the patient requires additional support therapies (i.e., ventilation, pharmacologic interventions). The development of new strategies to better preserve or improve the quality of donor lungs could increase the number of lungs available for transplantation. Donor lungs that might otherwise not be usable are housed in the Xvivo (XPS™) perfusion system, which is a sterile, normothermic, perfusion system that uses mechanical ventilation with controlled perfusion flows and pressures in the pulmonary vasculature, with the restorative Steen Solution™. The XPS is purported to recondition donor lungs and increase the pool of lungs suitable for transplantation.</p> <p>XVIVO Perfusion AB, Göteborg, Sweden</p> <p>FDA approved Aug 2014</p>	<p>Cold-storage preservation Organ Care System</p>	<p>Increased graft survival Decreased graft dysfunction Increased use of available organs Reduced total cost of care Improved patient outcomes</p>

Table 14. AHRQ Priority Condition: 14 Substance Abuse: 12 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Buprenorphine implants (Probuphine) for treatment of opioid dependence	Patients in whom opioid dependence has been diagnosed	<p>Many patients with opioid dependence attempt abstinence, but relapse rates remain high. This intervention uses subdermal buprenorphine implants, administered either alone or after sublingual buprenorphine-naloxone tablet induction. Buprenorphine is a partial agonist of opioid receptors; it binds more strongly to receptors in the brain than other opioids and may reduce reaction of opioids when in system. In clinical trials, patients received four 80 mg buprenorphine implants simultaneously, intended to remain implanted for 6 months.</p> <p>Titan Pharmaceuticals, Inc., South San Francisco, CA (manufacturer) Braeburn Pharmaceuticals subsidiary of Apple Tree Partners, Princeton, NJ (licensee)</p> <p>Phase III confirmatory trial completed; Apr 2013, FDA issued complete response letter stating that it could not grant approval and requested more efficacy data; manufacturer expects to complete additional trial and resubmit new drug application in 2015</p>	Opioid maintenance/ replacement therapy (e.g., buprenorphine, methadone, naltrexone) Psychotherapy (e.g., cognitive behavior therapy)	Resolution of problems with adherence, diversion Reduced illicit use of opioids Improved health outcomes associated with abstinence Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Evzio for emergency treatment of opioid overdose by nonclinicians</p>	<p>Patients in whom an opioid overdose is known or suspected</p>	<p>According to recent data from the U.S. Centers for Disease Control and Prevention, more than 16,000 deaths a year are attributable to opioid analgesics; this total is estimated to represent almost 75% of all pharmaceutical-overdose deaths. Most fatal opioid overdose events occur outside of controlled health care environments, in the presence of lay persons who may not be equipped with or trained to use emergency intervention tools and medications commonly used by professionals. An unmet need exists for simple, safe, and effective interventions for use in treating opioid overdoses in these situations. Evzio™ is a naloxone auto-injector device approved for emergency use in suspected cases of opioid overdose. Each device is equipped with a battery-powered electronic voice instruction system to direct laypersons in its use. Each Evzio device contains a single dose of 0.4 mg naloxone, delivered as a 0.4 mg / 0.4 mL naloxone hydrochloride injection; in the event of electronic voice instruction system failure, the injection can still be delivered. The device is also available in "trainer" version, identical to the full model, but without an injection needle component or naloxone dose. Retail packages include 2 single-dose devices and 1 trainer device.</p> <p>kaléo, Richmond, VA</p> <p>In Apr 2014, FDA approved Evzio for emergency treatment of known or suspected opioid overdose</p>	<p>Immediate professional medical care Intranasally delivered naloxone for nonclinician use (investigational) Naloxone emergency kits</p>	<p>Reduced opioid overdose mortality rate</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Handheld, portable fingerprinting device (Intelligent Fingerprinting Technology) to detect substance abuse</p>	<p>Individuals suspected of illicit drug use</p>	<p>Detection of drugs and their metabolites in body fluids (e.g., blood, urine, saliva) is limited by invasiveness, biohazard risks, cross reactivity with other substances in the samples, a requirement for cold or frozen sample transport and storage, susceptibility to contamination leading to false positives, and the potential for a person to undermine the test. To address these limitations, a manufacturer has developed Intelligent Fingerprinting Technology, a handheld fingerprint drug testing device that analyzes the minute traces of sweat deposited in subjects' fingerprints. According to the manufacturer, the technology detects drug metabolites, not the drug itself. Additionally, the company purports that samples are quick and easy to collect, are impossible to cheat, are stable at room temperature, and do not require additional sample preparation. The company is positioning this product for use by law enforcement, and in workplaces and institutions (e.g., prisons, the military).</p> <p>Intelligent Fingerprinting, Norwich, UK (developer) SmartStart, Inc., Grapevine, TX (U.S. development partner) Addoz Oy, Forssa, Finland (clinical trial partner) University of Eastern Finland, Joensuu, Finland (clinical trial partner)</p> <p>Unregistered clinical trial (announced by Intelligent Fingerprinting) initiated in 2014</p>	<p>Other body fluid testing (urine, saliva, blood) Field sobriety tests</p>	<p>Improved detection of illicit substances Reduced invasiveness of drug testing Reduced turnaround time for drug testing Reduced biohazard risk Reduced risk of cross reactivity Improved health outcomes</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Interactive text messaging program for prevention of hazardous alcohol use	Adolescents and young adults at risk for hazardous alcohol consumption or in whom high-risk alcohol consumption behaviors have been diagnosed	<p>According to the U.S. Centers for Disease Control and Prevention and the National Institute on Alcohol Abuse and Alcoholism, hazardous alcohol use accounts for nearly 80,000 deaths and an economic cost of over \$220 billion. The most common form of hazardous alcohol use, binge drinking, was the direct cause of more than half of those deaths and is also a risk factor for many other adverse health outcomes, including motor-vehicle crashes, suicides, and fetal alcohol syndrome. Binge drinking also encompasses half of the total alcohol consumption in the U.S., and 90% of alcohol consumed by underage youths and young adults. An unmet need exists for effective interventions and delivery methods, addressing these populations, that effectively prevent hazardous drinking behaviors and promote responsible attitudes towards alcohol consumption. This intervention, a targeted program based around 3 established health behavior models, uses an interactive text message system cued to high-risk binge drinking periods and includes followup messages to promote positive alcohol use behavior (e.g., motivational messages, abstinence support, and passive positive reinforcement) and redirect negative alcohol use behavior (e.g., goal support, goal setting, and resistance support). In an ongoing clinical trial, high-risk young adults admitted to emergency departments received regular messages and real-time response-based feedback on Thursdays, to promote positive behaviors over weekends, with followup messages and queries on Sundays.</p> <p>Brown University, Providence, RI University of Pittsburgh, PA University of Pittsburgh School of Medicine, PA</p> <p>Phase III trial ongoing</p>	In-person behavioral therapy In-person educational and informational sessions	Increased responsible alcohol consumption attitudes Reduced alcohol consumption-related hospitalizations Reduced alcohol consumption-related adverse patient outcomes Reduced hazardous alcohol consumption Improved patient quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Noninvasive trimethylamine test (TMA SIFT-MS breath analysis) for diagnosis of acute alcoholic hepatitis</p>	<p>Patients suspected of having acute alcoholic hepatitis or chronic or nonchronic liver disease</p>	<p>Acute alcoholic hepatitis is an inflammatory liver disease caused by excessive alcohol consumption. Symptoms of acute alcoholic hepatitis include general discomfort, liver enlargement, and elevated liver enzyme levels; these symptoms are also present in other liver diseases, complicating diagnosis. Concentrations of various volatile organic compounds (VOCs) also are elevated in the breath of patients with acute alcoholic hepatitis and other liver diseases. The only available, methods of differentiating acute alcoholic hepatitis from other diseases involve invasive blood assays and liver biopsies. Trimethylamine (TMA) has been identified as a VOC whose distinctly elevated concentration in patients with acute alcoholic hepatitis may make it a diagnostic marker. In a prospective clinical trial, noninvasive breath analyses of TMA concentrations via selected-ion flow-tube mass spectrometry (SIFT-MS) were successfully used to distinguish patients with acute alcoholic hepatitis from healthy patients and patients with other liver diseases, and a combined TMA plus pentane (TAP) score accurately predicted a diagnosis of alcoholic hepatitis.</p> <p>Cleveland Clinic, Cleveland, OH (investigators)</p> <p>Clinical trial completed; Cleveland Clinic may undertake additional clinical trials to study larger patient populations, patients without comorbid cirrhosis, and smokers</p>	<p>Blood assay Liver biopsy (to conduct liver enzyme function tests)</p>	<p>Faster diagnosis of disease Reduced cost of care Improved quality of life (by advancing appropriate treatment)</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label baclofen for treatment of alcohol use disorder	Patients in whom alcohol use disorder has been diagnosed	<p>Only 36% of patients with alcohol use disorder experience full remission using available therapy options. Improved options to promote abstinence in alcohol-dependent individuals are needed. Baclofen is a derivative of gamma-aminobutyric acid (GABA) that acts as an agonist at GABA-B receptors. In alcohol-dependent individuals, data suggest that baclofen may decrease alcohol intake, enhance abstinence time, reduce alcohol craving, and minimize the signs of alcohol withdrawal syndrome. It also may not be habit forming. Some studies also suggest that this agent may be effective in patients with liver disease. In clinical trials, oral baclofen has been tested at oral doses of 5–200 mg, daily.</p> <p>Numerous investigators, including the National Institute on Alcohol Abuse and Alcoholism, Bethesda, MD, as well as Ethypharm, Saint-Cloud, France</p> <p>Multiple phase II, III, and IV trials ongoing; FDA approved for treating muscle spasticity associated with multiple sclerosis</p>	<p>Acamprosate Benzodiazepines Cognitive behavior therapy Disulfiram Gabapentin Naltrexone Psychotherapy</p>	<p>Reduced alcohol consumption Increased abstinence rates Decreased alcohol craving Decreased alcohol withdrawal symptoms</p>
Off-label baclofen for treatment of cocaine dependence	Patients in whom a cocaine dependence has been diagnosed	<p>The National Survey on Drug Use and Health estimated that in 2008, 1.9 million people had used cocaine within the past month. Similar surveys have estimated that up to 34 million Americans have tried cocaine at least once. Regular cocaine use can lead to dependence, which has been demonstrated to lead multiple adverse effects, including stroke, heart attack, rhabdomyolysis, sexual dysfunction, and fatal overdose. Investigators have not found a universally effective medication for treating cocaine dependence. Baclofen is a gamma-aminobutyric acid (GABA) derivative that acts as an agonist at GABA-B receptors. In cocaine-dependent patients, baclofen may decrease cocaine consumption, increase duration of abstinence, and reduce cravings for cocaine. In clinical trials, patients are administered baclofen orally at dosages up to 60 mg, daily, for up to 7 weeks.</p> <p>Multiple investigators, including the National Institute on Drug Abuse, Bethesda, MD, and the University of Pennsylvania, Philadelphia</p> <p>Phase II trial ongoing; multiple phase II trials completed with results reported</p>	<p>Cognitive behavior therapy Off-label pharmacotherapy (e.g., disulfiram) Psychotherapy Modafinil Other GABAergic medications: Baclofen Tiagabine</p>	<p>Reduced reward associated with cocaine use Reduced cocaine consumption Reduced relapse Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label mifepristone (Mifeprex) for treatment of alcohol use disorder	Patients in whom alcohol use disorder has been diagnosed	<p>Only 36% of patients with alcohol use disorder experience full remission using available therapy options. Improved options to promote abstinence in alcohol-dependent individuals are needed. Research has suggested that pharmacotherapy efficacy is linked to the protracted abstinence phase, a phase in which impaired glucocorticoid receptor feedback and other central nervous system dysregulation can influence alcohol relapse. Mifepristone (Mifeprex®) is a glucocorticoid receptor antagonist. Because alcohol dependence has been associated with glucocorticoid hormone hyperactivity and because glucocorticoid receptors have been found to mediate adaptation to environmental challenges and stress, mifepristone may have a use in reducing alcohol dependence. In a clinical trial, mifepristone was orally administered at a dosage of 600 mg/day for 1 week.</p> <p>The Scripps Research Institute, La Jolla, CA</p> <p>Phase II trial ongoing; preliminary results available; mifepristone is FDA approved to end early pregnancy, marketed under the brand name Mifeprex® (Danco Laboratories, New York, NY), and approved for treatment of hypoglycemia in patients in whom Cushing's syndrome has been diagnosed, marketed as Korlym® (Corcept Therapeutics, Inc., Menlo Park, CA)</p>	<p>Acamprosate Benzodiazepines Cognitive behavior therapy Disulfiram Gabapentin Naltrexone Psychotherapy</p>	<p>Reduced alcohol consumption Reduced relapse Improved health outcomes associated with abstinence Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Off-label mifepristone (Mifeprex) for treatment of cocaine dependence</p>	<p>Patients in whom cocaine dependence has been diagnosed</p>	<p>The National Survey on Drug Use and Health estimated that in 2008 there were 1.9 million current (past-month) cocaine users; similar surveys have estimated that up to 34 million Americans have tried cocaine at least once. Regular cocaine use can lead to dependence, which has been demonstrated to lead multiple adverse effects, including stroke, heart attack, rhabdomyolysis, sexual dysfunction, and fatal overdose. Investigators have not found a universally effective medication for treating cocaine dependence. Mifepristone (Mifeprex®) is a glucocorticoid receptor antagonist. Because cocaine dependence has been associated with glucocorticoid hormone hyperactivity and because the glucocorticoid receptor has been found to mediate adaptation to environmental challenges and stress, mifepristone may have utility in reducing cocaine dependence. In clinical trials, mifepristone is administered orally, at a dosage of 600 mg, 3 times weekly for 4 weeks.</p> <p>New York State Psychiatric Institute, New York The Scripps Research Institute, La Jolla, CA</p> <p>Phase II/III trial ongoing. Mifepristone is FDA approved to end early pregnancy and is marketed under the brand name Mifeprex (Danco Laboratories, New York, NY)</p>	<p>Cognitive behavior therapy GABAergic medications (e.g., baclofen, tiagabine) Modafinil Off-label pharmacotherapy (e.g., disulfiram) Psychotherapy</p>	<p>Reduced reward associated with cocaine use Reduced cocaine consumption Reduced relapse Improved health outcomes associated with abstinence Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label ondansetron for treatment of alcohol use disorder	Patients in whom alcohol use disorder has been diagnosed	<p>Only 36% of patients with alcohol use disorder experience full remission using available therapy options. Serotonin 5-HT₃ receptors are a novel therapeutic target for this population. Ondansetron is a serotonin 5-HT₃ receptor antagonist and is intended to exert its effects on alcohol dependency through cortico-mesolimbic dopamine system modulation. The 5-HT system has been found to be a major regulator of alcohol-consumption severity, which underpins the hypothesis that medications that affect the function of the 5-HT transporter may be viable treatments for this population. In clinical trials, ondansetron is administered to patients in oral tablets at various dosages, up to 16 mcg/kg, twice daily.</p> <p>Adial Pharmaceuticals, LLC, Charlottesville, VA (indication-specific manufacturer) Johns Hopkins University, Baltimore, MD; National Institute on Alcohol Abuse and Alcoholism, Bethesda, MD; University of Virginia, Charlottesville; and Medical University of South Carolina, Charleston (investigators)</p> <p>Phase III trials completed; phase II, III, and IV trials ongoing; approved for treating chemotherapy-induced nausea and vomiting and marketed by GlaxoSmithKline (Middlesex, UK) as Zofran®</p>	Acamprosate Benzodiazepines Cognitive behavior therapy Disulfiram Gabapentin Naltrexone Psychotherapy	Improved health outcomes associated with abstinence Reduced alcohol consumption Reduced alcohol cravings Reduced relapse Improved patient quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label topiramate (Topamax) for treatment of cocaine dependence	Patients in whom cocaine dependence has been diagnosed	<p>The National Survey on Drug Use and Health estimated that in 2008, there were 1.9 million current (past-month) cocaine users; similar surveys have estimated that up to 34 million Americans have tried cocaine at least once. Regular cocaine use can lead to dependence, which can lead to adverse effects including stroke, heart attack, rhabdomyolysis, sexual dysfunction, and fatal overdose. Investigators have not found a universally effective medication for treating cocaine dependence. Topiramate (Topamax) is a GABAergic anticonvulsant and mood stabilizer that has been purported to be an effective treatment for reducing cocaine use in patients with cocaine dependence. In clinical trials, patients received topiramate, administered in tablet form, at fixed or escalating dosages of 50, 100, 200, or 300 mg daily, alone or with Adderall XR[®], an amphetamine psychostimulant.</p> <p>Ortho-McNeil-Janssen unit of Johnson & Johnson, New Brunswick, NJ</p> <p>Phase II/III and III trials ongoing; FDA approved as monotherapy for treating epilepsy and Lennox-Gastaut syndrome and in combination with phentermine for treating obesity</p>	<p>Modafinil Other GABAergic medications (e.g., baclofen, tiagabine) Talk therapy</p>	<p>Reduction in cocaine abuse relapse rates, as measured by patients' number of cocaine non-use days and cocaine-free weeks Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Off-label topiramate (Topamax) for treatment of alcohol use disorder</p>	<p>Patients in whom alcohol use disorder has been diagnosed</p>	<p>Only 36% of patients with alcohol use disorder experience full remission using available therapy options. Additionally, these patients often have comorbid substance abuse and mental health disorders. GABA receptors offer a novel therapeutic target for these patients. Topiramate (Topamax) is a GABAergic anticonvulsant and mood stabilizer that purportedly is an effective treatment for reducing alcohol consumption in patients with heavy drinking behaviors or alcohol use disorder, including those with comorbid bipolar disorder, post-traumatic stress disorder, and traumatic brain injury. Topiramate is also hypothesized to have increased efficacy in reducing alcohol consumption in patients with heavy drinking behaviors who have certain genetic markers. In completed and ongoing clinical trials, topiramate is administered orally, at dosages up to 250 mg, daily, either alone, in combination with other drugs, or in combination with behavioral therapy.</p> <p>Investigators include U.S. Department of Veterans Affairs, Washington, DC; National Institute on Alcohol Abuse and Alcoholism, Bethesda, MD; University of California, San Diego; University of California, San Francisco; University of Cincinnati, Cincinnati, OH; University of Connecticut, Storrs; University of Pennsylvania, Philadelphia; and University of Virginia, Charlottesville</p> <p>Phase II, II/III, III, and IV trials ongoing</p>	<p>Pharmacotherapy (e.g., acamprosate, disulfiram, naltrexone) Psychotherapy (e.g., cognitive behavior therapy)</p>	<p>Improved health outcomes associated with abstinence Reduced alcohol consumption Reduced alcohol cravings Reduced relapse Improved quality of life</p>

Table 15. AHRQ Priority Condition: 15 Cross-Cutting: 4 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Computer-assisted system (Sedasys) for automated propofol sedation during gastrointestinal endoscopy procedures	Patients who are undergoing propofol-induced sedation during colonoscopy or upper gastrointestinal (GI) procedures	<p>Propofol-induced sedation is associated with risks of oversedation and decreased oxygen saturation. The Sedasys® system integrates physiologic patient monitoring (i.e., oxygen saturation, respiratory rate, heart rate, blood pressure, end-tidal carbon dioxide, patient responsiveness) with personalized drug delivery (system automatically responds to signs of oversedation) for delivering propofol. The system is intended to enable physicians or nurses who are not anesthesiologists to administer sedation for endoscopic GI procedures.</p> <p>Ethicon Endo-Surgery unit of Johnson & Johnson, New Brunswick, NJ</p> <p>FDA approved May 2013; initial market launch Oct 2014; limited rollout to continue through 2015</p>	Propofol sedation administered and monitored by an anesthesiologist	Successful and safe propofol sedation without need for an anesthesiologist
Digital medicines (Proteus Digital Health Feedback System) for chronic conditions requiring long-term drug therapy	Patients in whom long-term drug therapy is needed for chronic conditions	<p>According to the World Health Organization, the average medication adherence rate among patients with chronic diseases in developed nations is only 50%. The Proteus Digital Health System™ (formerly the Raisin System), a form of smart-pill technology now called “digital medicine,” is being used in an attempt to improve medication adherence by patients requiring ongoing medication for chronic diseases, such as tuberculosis, diabetes, heart failure, HIV, hepatitis C virus infection, and mental health disorders. This is an edible microchip affixed to oral tablets to monitor patient adherence; a wearable data recorder in the form of a skin patch captures drug consumption and vital statistics, reminds patients of missed doses, and transmits patient data to clinicians through a mobile device. Patients ingest the sensor with medication in a separate tablet or with sensor and medication co-encapsulated. Medication with embedded sensors must obtain individual FDA regulatory approval. Sensors are being ingested separately from oral medications in ongoing trials using the device to track medication adherence.</p> <p>Proteus Digital Health, Inc., Redwood City, CA</p> <p>FDA granted marketing clearance for the monitoring device Mar 2010; Jul 2012, the company also received marketing clearance for the ingestible sensor; expected to come to market late 2014 or early 2015; phase IV trial ongoing</p>	Conventional oral drug therapy Patient medication reminders via telephone, text message, and/or email	Improved disease management by maintaining consistent oral drug dosing and reducing missed doses

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
High-throughput DNA sequencers for genetic testing	Patients in need of genetic testing for diagnosis, pharmacogenetics, and treatment selection	<p>Using genetic information in making diagnoses and treatment decisions has become increasingly common; however, the work-intensive and costly nature of traditional nucleic acid sequencing methods has limited the widespread implementation of methods that need large amounts of sequence data. Recent years have seen substantial improvements in the technologies used to sequence nucleic acids, potentially allowing more widespread use of approaches such as whole-genome sequencing. According to the National Human Genome Research Institute, the cost of generating a full human genomic sequence dropped from about \$1 million in 2008 to about \$6,000 in 2013.</p> <p>Illumina, Inc., San Diego, CA</p> <p>Nov 2013, the Illumina MiSeqDx DNA sequencer and Universal Kit reagents became the 1st high-throughput sequencing system cleared by FDA; the system was cleared through the agency's de novo classification process (a regulatory pathway for some novel low- to moderate-risk medical devices not substantially equivalent to an already marketed device)</p>	1st-generation sequencing methods Single-gene assays	Improved diagnosis Improved treatment planning Improved pharmacogenetics
Web-based integrated monitoring platform (T3) for early-warning detection in critically ill patients	Patients who require hospitalization in an intensive care unit (ICU)	<p>Patients in an ICU may be connected to 10 or more monitoring systems at any given time, which medical professionals rely on to assess the progress and status of each patient. However, the multitude of monitoring platforms may lead to information overload. T3, which stands for "Tracking, Trajectory, Trigger," links and synthesizes data from these systems and presents the information on a single screen. The system also stores the information indefinitely. This information can be readily accessed remotely via a portable, Internet-enabled device. T3 purportedly allows for better decisionmaking, care-plan adjustment, and real-time, regular analysis.</p> <p>Boston Children's Hospital, Boston, MA, working with software developer Arcadia Solutions, Burlington, MA; licensed software to Etiometry, Inc., Boston, MA</p> <p>Installed in multiple academic hospitals; novel risk-analysis algorithms under development by Etiometry</p>	Multiple monitoring platforms	Improved care-plan adjustment Improved decisionmaking Improved patient outcomes

Section 2. Interventions Added Since Last Update: 38 Interventions

Table 16. AHRQ Priority Condition: 01 Arthritis and Nontraumatic Joint Disease: 0 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts

Table 17. AHRQ Priority Condition: 02 Cancer: 10 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Anti-CD19 monoclonal antibody (MOR208) for treatment of diffuse large B-cell lymphoma	Patients in whom diffuse large B-cell lymphoma (DLBCL) has been diagnosed	<p>Although the majority of patients with DLBCL respond to standard 1st-line chemotherapy, some patients' disease is resistant to this therapy and a significant number of patients experience relapse after an initial response. MOR208 is an Fc-optimized, humanized monoclonal antibody specific for CD19, a protein expressed by cells of the B-cell lineage including malignant DLBCL cells. MOR208 purportedly leads to antibody-dependent cell-mediated cytotoxicity (ADCC) of DLBCL cells, and the Fc region of the antibody has been modified to optimize the ADCC activity of the antibody. In clinical trials, MOR208 is administered intravenously in 8 weekly doses of 12 mg/kg.</p> <p>Morphosys AG, Planegg-Martinsried, Germany</p> <p>Phase II trial ongoing; FDA granted fast-track status</p>	Various combination chemotherapy regimens with or without rituximab	<p>Increased overall survival</p> <p>Increased progression-free survival</p> <p>Improved quality of life</p>
Aurora A/ angiogenic kinase inhibitor (ENMD-2076) for treatment of fibrolamellar hepatocellular carcinoma	Patients with advanced fibrolamellar hepatocellular carcinoma (FLHCC) whose disease has not been treated with locoregional therapy or has recurred after surgical resection	<p>FLHCC is a rare form of liver cancer that affects about 200 people each year. Although patients respond well to surgery, the disease usually recurs and the lack of treatment options leads to a poor prognosis. ENMD-2076 is a small-molecule kinase inhibitor that targets the mitotic kinase Aurora A as well as VEGFR, Flt-3, and FGFR3 kinases, which are involved in cell-cycle regulation, cell survival, angiogenesis, and cell proliferation. ENMD-2076 purportedly improves patient outcomes by inhibiting the activity of these pathways, which are deregulated in FLHCC. In a phase I pharmacokinetic and pharmacodynamic study, patients were treated daily with oral ENMD-2076 at a dose ranging from 60 to 200 mg/m².</p> <p>CASI Pharmaceuticals, Inc., Rockville, MD</p> <p>Phase II trial ongoing; FDA granted orphan drug status</p>	<p>5-fluorouracil plus interferon-alpha</p> <p>Cisplatin plus doxorubicin</p> <p>Gemcitabine plus oxaliplatin</p> <p>Locoregional treatment</p> <p>Regorafenib</p> <p>Sorafenib</p> <p>Surgical resection</p>	<p>Increased overall survival</p> <p>Increased progression-free survival</p> <p>Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Chimeric antigen receptor gene therapy (CTL019) for treatment of chronic lymphocytic leukemia	Patients in whom relapsed or refractory chronic lymphocytic leukemia (CLL) has been diagnosed	<p>CLL can typically be controlled for many years with current chemotherapy options; however, these treatments are not curative and disease typically recurs. A treatment option under study is the use of chimeric antigen receptor (CAR) gene therapy to genetically modify autologous T lymphocytes to promote T-cell activation, T-cell proliferation, and immune memory. To generate CTL019, a lentiviral vector is used to transfect autologous T cells with a CAR transgene that consists of 4 parts: (1) an extracellular domain consisting of an antibody variable chain specific for CD19 (a cell surface marker expressed by CLLs); (2) a hinge region; (3) a costimulatory domain (in this case a portion of CD137); and (4) CD3-zeta (a signal transduction component of the T-cell receptor). Binding of the extracellular domain of this recombinant protein to CD19 on target cells activates the pathways typically downstream of major histocompatibility complex activation and CD137 stimulation, activating a persistent immune response against CD19.</p> <p>Novartis International AG, Basel, Switzerland, in collaboration with University of Pennsylvania, Philadelphia</p> <p>Phase II trial ongoing; FDA granted orphan drug status</p>	Various chemotherapy regimens	Increased progression-free survival Increased overall survival Improved quality of life
Chimeric antigen receptor gene therapy (JCAR015) for treatment of acute lymphoblastic leukemia	Patients with CD19-positive B-cell acute lymphoblastic leukemia (ALL) who have relapsed/refractory disease or residual disease after treatment with allogeneic hematopoietic progenitor cell transplantation	<p>5-year survival for patients with relapsed or refractory ALL is about 7%. A treatment option under study is chimeric antigen receptor (CAR) gene therapy to genetically modify autologous T lymphocytes to promote T-cell activation, T-cell proliferation, and immune memory. JCAR015 is produced by using a viral vector to transfect autologous T cells with a CAR transgene encoding a protein with both an extracellular antigen binding domain specific for CD19 and an intracellular signaling domain possessing both activating and co-stimulatory activities. Binding of the extracellular domain of this recombinant protein to CD19 on target cells activates the intracellular signaling domain, purportedly promoting a persistent immune response against CD19-expressing cells. JCAR015 T cells are administered by intravenous infusion.</p> <p>Juno Therapeutics, Seattle, WA, in collaboration with Memorial Sloan Kettering Cancer Center, New York, NY</p> <p>Phase I trial ongoing; FDA granted orphan drug and breakthrough therapy statuses</p>	Various cytotoxic chemotherapy regimens	Increased overall survival Increased progression-free survival Improved quality of life

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Entrectinib for treatment of pediatric neuroblastoma	Pediatric patients in whom neuroblastoma has been diagnosed	<p>Neuroblastoma is the most common pediatric solid tumor, with about 800 new cases each year. Despite current treatment, children with high-risk neuroblastoma have an expected survival rate of 45%. Entrectinib (RXDX-101) is a selective tyrosine multikinase inhibitor of the proteins TrkA, TrkB, TrkC, ROS1 and ALK, all of which have been reported to have activating alterations in different types of cancer, including neuroblastoma. In a phase I clinical trial, a dose escalation of oral entrectinib (100, 200, 400, 800, and 1,200 mg/m²) has been well tolerated among patients with advanced tumors.</p> <p>Ignyta, Inc., San Diego, CA, licensed by Nerviano Medical Sciences, Nerviano, Italy</p> <p>Phase I/II trials (STARTRK-1 and ALKA-372-001) ongoing; Dec 2014, FDA granted orphan drug and rare pediatric disease statuses</p>	Isotretinoin	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Erythrocyte-encapsulated L-asparaginase (GRASPA) for treatment of acute lymphoblastic leukemia	Patients in whom acute lymphoblastic leukemia (ALL) has been diagnosed	<p>L-asparaginase has been used for decades for treating ALL; however, its use is limited by substantial toxicity, including the potential for the drug to elicit allergic reactions in patients. Use of the drug is generally limited to pediatric patient populations who are more tolerant of L-asparaginase treatment than older or frailer patients. GRASPA[®] is a formulation of L-asparaginase that encapsulates the drug in red blood cells (erythrocytes). It purportedly exhibits reduced toxicity and improved pharmacodynamics, potentially allowing treatment of more patients. In clinical trials, erythrocyte-encapsulated L-asparaginase is used in combination with multiple chemotherapy agents. The drug is administered by injection at a dose of 150 IU/kg per treatment cycle.</p> <p>Erytech Pharma, Lyon, France</p> <p>Phase I trial ongoing; phase III trials completed in Europe; FDA granted orphan drug status</p>	Native L-asparaginase Pegylated asparaginase	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
MV Neuro vaccine for treatment of pediatric neuroblastoma	Pediatric patients in whom neuroblastoma has been diagnosed	<p>Neuroblastoma is the most common pediatric solid tumor, with about 800 new cases each year. Despite current treatment, children with high-risk neuroblastoma have an expected survival rate of 45%. MV Neuro (OPT-821) is an adjuvant vaccine containing 2 neuroblastoma-associated antigens (GD2 and GD3) purported to prime the immune system to target neuroblastoma cells overexpressing the gangliosides GD2 and GD3. In a phase I clinical trial, children were inoculated with 7 subcutaneous injections (150 mcg/m²) over the course of 52 weeks. Treatment also included beta-glucan, which was administered orally (40 mg/kg/day, 2 weeks on, 2 weeks off, up to 1 cycle after the last vaccination) starting on week 6.</p> <p>MabVax Therapeutics, San Diego, CA, in collaboration with Memorial Sloan Kettering Cancer Center, New York, NY</p> <p>Phase I/II trial ongoing; Sept 2014, FDA granted orphan drug status</p>	Isotretinoin	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
Necuparanib for treatment of advanced pancreatic cancer	Patients in whom primary metastatic pancreatic cancer has been diagnosed	<p>Only about 5% of patients with pancreatic cancers respond to the standard of care (gemcitabine chemotherapy), and the prognosis for these patients is poor. A need exists for therapeutic options for patients with recurrent pancreatic cancer after standard treatment. Necuparanib (M402) is a heparin-based drug purported to have a broad range of antitumor activity, with the potential to improve patient health outcomes in combination with nab-paclitaxel and gemcitabine. The antitumor activity of heparin is masked by its blood-thinning properties; therefore, necuparanib was developed from unfractionated heparin to reduce anticoagulant activity while preserving antitumor activity. In a phase I/II clinical trial, necuparanib is administered at an unspecified dose on day 1, 8, and 15 of a 28-day cycle in combination with nab-paclitaxel and gemcitabine.</p> <p>Momenta Pharmaceuticals, Cambridge, MA</p> <p>Phase I/II trial ongoing; Dec 2014, FDA granted fast-track status after granting orphan drug status in Jun 2014</p>	<p>Various chemotherapies including 1 or more of the following: 5-fluorouracil Cisplatin Capecitabine Erlotinib Gemcitabine Leucovorin Nab-paclitaxel Oxaliplatin</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>PD-1L antibody (MPDL3280A) for treatment of urothelial bladder cancer</p>	<p>Patients with locally advanced or metastatic urothelial bladder cancer (UBC) whose disease has progressed after treatment with platinum-based chemotherapy</p>	<p>UBC includes disease of the ureters, urinary bladder, and urethra. About 90% of urothelial cancers begin in the bladder and have a 5-year survival rate of 85% when detected early. In contrast, the survival rate of advanced urothelial cancer is 14% for patients with lymph node–positive and metastatic disease. A hallmark of cancer is its ability to evade an immune response. MPDL3280A is a novel therapeutic that is intended to prevent immune tolerance of tumor cells. The drug’s target is the programmed death-1 receptor ligand (PD-1L), which is frequently expressed in tumor microenvironments and purportedly downregulates T-cell activity by activating the programmed death-1 immune checkpoint. MPDL3280A is a monoclonal antibody specific for PD-1L and is intended to prevent an interaction between the ligand and its receptor, potentially limiting activation of the immune checkpoint. In clinical trials, MPDL3280A is administered as a 1,200 mg intravenous infusion on day 1 of each 21-day cycle.</p> <p>F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>Phase III trial ongoing; May 2014, FDA granted breakthrough therapy status</p>	<p>Radiotherapy combined with 1 or more chemotherapy agents (i.e., 5-fluorouracil, cisplatin, gemcitabine, paclitaxel) Surgery (cystectomy)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>
<p>Trabectedin (Yondelis) for treatment of soft tissue sarcoma</p>	<p>Patients with surgically unresectable soft tissue sarcoma (STS), excluding L-type STS, that has progressed after standard treatment</p>	<p>Worldwide, more than 12,000 cases of STS are reported each year, and about 4,700 die of STS. The high mortality rate is associated with limited therapeutic options for patients whose disease has recurred after treatment. Agents are needed for treating patients who have disease recurrence. Trabectedin (Yondelis®) has a unique mechanism of action that targets the minor groove of DNA. The interaction between trabectedin and DNA purportedly disrupts proliferation of cancer cells by interfering with gene transcription, cell division, and DNA repair. In phase III clinical trials, trabectedin is tested as a single agent for treating STS, administered intravenously, 1.5 mg/m², once every 3 weeks.</p> <p>Janssen Pharmaceuticals unit of Johnson & Johnson, New Brunswick, NJ</p> <p>Phase III trials ongoing; Nov 2014, company submitted a new drug application to FDA</p>	<p>Combination or single agent chemotherapy with 1 or more of the following: Alkylating agents (e.g., dacarbazine, ifosfamide) Anthracyclines (e.g., doxorubicin) Antimetabolites (e.g., gemcitabine, methotrexate) Platinum-based drugs (e.g., cisplatin, oxaliplatin) Taxanes (e.g., docetaxel, paclitaxel) Tyrosine kinase inhibitors (e.g., imatinib, pazopanib) Vinca alkaloids (e.g., vincristine, vinorelbine)</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>

Table 18. AHRQ Priority Condition: 03 Cardiovascular Disease: 2 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
APOCIII Rx for treatment of hypertriglyceridemia	Patients in whom hypertriglyceridemia has been diagnosed	<p>Patients with hypertriglyceridemia, a condition often caused or exacerbated by diabetes mellitus and obesity, are at risk for coronary artery disease. The primary treatment strategy consists of dietary changes, which are often unsuccessful because strict adherence is required. APOCIII Rx is an antisense drug that inhibits production of apolipoprotein C-III (apoC-III) in the liver. Lower production of apoC-III is linked to reduced levels of triglycerides and low-density lipoprotein-cholesterol levels and increased levels of high-density lipoprotein-cholesterol, thus reducing the risk of cardiovascular disease. The drug is intended to avoid side effects of current triglyceride-lowering medications. In clinical trials, APOCIII Rx is being administered subcutaneously as a once-weekly injection of 300 mg.</p> <p>Isis Pharmaceuticals, Inc., Carlsbad, CA</p> <p>Phase III trial (COMPASS) ongoing</p>	<p>Bile acid sequestrants Diet and exercise Fibrates Niacin Omega acids Statins</p>	<p>Lower triglyceride levels Reduced cardiovascular risk Improved metabolic syndrome</p>
Median nerve stimulation for treatment-resistant hypertension	Patients in whom uncontrolled hypertension has been diagnosed	<p>Many pharmacotherapies are available for treating hypertension, and typically 3 types of drugs are used in conjunction to try to lower blood pressure. Yet, many cases of hypertension are not controlled with these interventions, and because such treatment-resistant hypertension is associated with high morbidity (e.g., end-organ damage) and mortality, novel interventions are warranted. Median nerve stimulation with a subcutaneous neuromodulation system (SNS) purportedly affects multiple signal pathways in the brain that control blood pressure. The SNS device is an implantable, coin-sized nerve stimulator intended to lower treatment-resistant hypertension. Clinicians implant SNS devices in both forearms of patients during a 20-minute outpatient procedure. The device uses low-powered electric current to stimulate the median nerve for 30 minutes per week.</p> <p>Valencia Technologies Corp., Valencia, CA</p> <p>Pilot trial completed</p>	<p>Pharmacotherapy (e.g., angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, beta blockers) Renal denervation</p>	<p>Controlled hypertension with fewer or no medications Reduced rates of heart attack, kidney failure, and stroke</p>

Table 19. AHRQ Priority Condition: 04 Dementia (including Alzheimer's): 2 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Beta-amyloid precursor protein site–cleaving enzyme (BACE) inhibitor (AZD3293, LY3314814) for treatment of Alzheimer's disease</p>	<p>Patients in whom probable Alzheimer's disease (AD) has been diagnosed</p>	<p>No approved disease-modifying agents are available for treating AD; therapy is limited to managing symptoms. AZD3293 is a beta-amyloid precursor protein site–cleaving enzyme (BACE) inhibitor being investigated for treating AD and prodromal AD. The drug is intended to inhibit BACE, an enzyme known to play a role in initiating synthesis of amyloid beta peptide. Abnormal accumulation of amyloid beta peptide is thought to play a role in the progression of AD, and it is hypothesized that BACE inhibitors may improve AD patient outcomes by reducing peptide aggregation. In the ongoing clinical trial, AZD3293 is administered orally, once daily, at a dose of 20 or 50 mg.</p> <p>AstraZeneca, London, UK (manufacturer and codeveloper) Eli Lilly and Co., Indianapolis, IN (lead development partner)</p> <p>Phase II/III trial ongoing</p>	<p>Behavior therapy Deep brain stimulation (investigational) Nutrition therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)</p>	<p>Reduced amyloid beta load in brain Regressed or slowed disease progression Reduced morbidity and mortality Improved quality of life</p>
<p>Noninvasive brain-computer interface cognitive training system for treatment of cognitive decline in elderly adults</p>	<p>Patients in whom age-related cognitive decline, dementia, mild cognitive impairment (MCI), or probable Alzheimer's disease (AD) has been diagnosed</p>	<p>Patients with deterioration in general or specific forms of cognitive function are classified as experiencing cognitive decline. Although various neurodegenerative conditions, including dementia, MCI, and AD, are closely associated with cognitive decline, many healthy adults advancing towards old age also naturally experience cognitive decline. Investigators hypothesize that tasks that use mental resources can help maintain cognitive functioning, and many noninvasive techniques and tools purportedly address this goal. However, these tools' efficacy is inconsistent across patients, and few have been robustly demonstrated to prevent decline in patients whose cognitive functioning has already decreased. Brain-computer interface (BCI) systems provide a potential noninvasive tool to reinforce cognitive functioning in healthy older adults and potentially reduce or prevent cognitive decline in patients with dementia, MCI, AD, or age-related deterioration. These systems directly communicate between patients' brains and a computer training system, via electroencephalograph (EEG) recordings. EEG recordings are processed by the computer to determine patients' attention states and incorporated into training paradigms. In registered clinical trials, adults with normal and deteriorating cognitive functioning complete 24, 30-minute training sessions, conducted over 8 weeks.</p> <p>Duke University, Durham, NC Duke-National University of Singapore, Singapore</p> <p>Phase II/III trial ongoing</p>	<p>Nonautomated cognitive training tools</p>	<p>Increased patient independence Reduced or prevented cognitive decline Improved quality of life</p>

Table 20. AHRQ Priority Condition: 05 Depression and Other Mental Health Disorders: 3 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Multi-family integrative therapy group for treatment of anorexia nervosa	Patients in whom anorexia nervosa (AN) has been diagnosed	<p>AN is a psychiatric eating disorder characterized by distorted body image, disturbed eating behavior, and abnormal preoccupation with losing weight. In the U.S., AN has the 3rd-highest lifetime prevalence among eating disorders and has the highest mortality rate among psychiatric illnesses. Epidemiologic studies have also shown that AN is more prevalent in women than men and is the 3rd most common chronic illness among adolescents. Neuroimaging research has demonstrated that patients with AN display deficits in cognitive control, central coherence, and emotional processing. Consequently, many experts consider individual behavior therapy as the standard treatment for AN, although its long-term efficacy has not been established. An unmet need exists for alternative interventions that promote sustained AN symptom management and reduction. The multi-family therapy group (MFTG) approach uses a relational-motivational treatment approach that purportedly addresses intra- and interpersonal disconnections underlying patients' AN symptoms. Within a group treatment environment, therapists can engage patients and their relatives in an integrated effort to develop positive connections and reduce AN symptoms. MFTG consists of sixteen 90-minute therapy sessions involving patients and family members, conducted over 26 weeks. A proposed clinical trial design also includes followup assessments conducted 6 months after completion of MFTG sessions.</p> <p>Golisano Children's Hospital, Division of Adolescent Medicine, Rochester, NY Western NY Comprehensive Care Center for Eating Disorders, Rochester, NY University of Rochester School of Nursing, Rochester, NY</p> <p>No clinical trials ongoing</p>	<p>Combination cognitive behavior therapy and medical therapy Group behavior therapy (without relational/motivational and disconnection management components) Individual cognitive behavior therapy</p>	<p>Increased intra- and interpersonal connection between patients and families Reduced symptoms Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Off-label nitrous oxide for treatment-resistant major depressive disorder	Patients in whom treatment-resistant major depressive disorder (MDD) has been diagnosed	<p>Fewer than half of patients with MDD achieve remission with antidepressant therapy, and available pharmacotherapies are often associated with undesirable side effects. An unmet need exists for additional interventions for these patients. Nitrous oxide (laughing gas) is a NMDA inhibitor, commonly used as an anesthetic and analgesic and approved for treating pediatric respiratory illness. Researchers hypothesize that, like ketamine, which is another intervention under study, nitrous oxide's NMDA inhibitory properties may make it a safe, rapidly-acting antidepressant. In clinical trials, patients are administered nitrous oxide, in a 1:1 mixture with pure oxygen, at two 1-hour sessions, separated by 1 week.</p> <p>Washington University School of Medicine, St. Louis, MO</p> <p>Phase II trial ongoing</p>	<p>Deep brain stimulation Electroconvulsive therapy Ketamine (investigational) Psychotherapy Scopolamine (investigational) Selective serotonin reuptake inhibitors Serotonin-norepinephrine reuptake inhibitors Transcranial magnetic stimulation Tricyclic antidepressants Vagal nerve stimulation</p>	<p>Rapid improvement in depression symptoms Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Telemedicine-facilitated psychotherapy for treatment of post-traumatic stress disorder</p>	<p>Patients in whom post-traumatic stress disorder (PTSD) has been diagnosed</p> <p>Rurally-residing patients in whom combat-related PTSD has been diagnosed</p>	<p>PTSD is a mental health disorder marked by an individual experiencing recurrence (flashbacks, nightmares, and event-related negative thoughts), avoidance, and hyperarousal symptoms after a traumatic event. According to the National Institute of Mental Health, 6.8% of adult Americans will experience PTSD during their lifetimes; 9% of military veterans (nearly 500,000 Americans) have received a diagnosis of PTSD. Although many patients reside in areas with access to expansive PTSD treatment, a disproportionate number of patients, particularly veterans—more than 40%—live in rural or remote areas with limited services. An unmet need exists for interventions that can be employed to treat rurally located patients who have PTSD. Telemedicine (telepsychiatry)-based collaborative care enables remote delivery of psychiatric and psychological care, clinician consultation and pharmacotherapy prescription, and patient management by trained professionals. Using this model, patients in rural locales receive comprehensive, cost-effective, evidence-based mental health services, similar to their more urban-residing counterparts. Telemedicine can also facilitate improved patient adherence and function as an adjunct to face-to-face treatment. In clinical trials, telemedicine is used to deliver 1 of several standard PTSD psychotherapies (e.g., cognitive processing therapy, cognitive behavior therapy, prolonged exposure); psychotherapy is delivered on the same schedule as standard in-person therapy.</p> <p>Veterans Affairs Puget Sound Health Care System, Seattle, WA (lead study investigator site) Charleston Research Institute, Charleston, SC (study sponsor) University of Wisconsin, Madison (study sponsor) Veterans Affairs Boston Healthcare System, Boston, MA (study sponsor) Veterans Medical Research Foundation, San Diego, CA (study sponsor) U.S. Department of Defense, Arlington, VA (collaborator) U.S. Department of Veterans Affairs, Washington, DC (collaborator) University of Pennsylvania, Philadelphia (collaborator)</p> <p>Phase III and IV trials completed; multiple clinical trials ongoing</p>	<p>In-person clinical evaluation and psychotherapy</p>	<p>Reduced symptoms and comorbidities Reduced geographically based mental health care disparities Reduced secondary health care burden on local and national Veterans Affairs systems Improved health care resource management Improved quality of life</p>

Table 21. AHRQ Priority Condition: 06 Developmental Delays, Attention-Deficit Hyperactivity Disorder, and Autism: 1 Intervention

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Dasotraline for treatment of adult attention-deficit/hyperactivity disorder	Adults in whom attention-deficit/hyperactivity disorder (ADHD) has been diagnosed	<p>Among Americans, adult ADHD is a common disorder, affecting about 4.4% of the population. Treatments primarily include stimulants and antidepressants, but these treatments are often not effective and may have significant side effects and potential for abuse. Dasotraline (SEP-225289) is an antidepressant derivative of sibutramine (an appetite suppressant voluntarily withdrawn from the market because of increased risk of cardiovascular events in clinical trials) that functions as a reuptake inhibitor of serotonin, norepinephrine, and dopamine. Because it maintains a stable level in the bloodstream throughout a full day, single dasotraline doses are purported to effectively treat ADHD symptoms daily. In clinical trials, patients are administered dasotraline orally, once daily, in flexible doses of 4, 6, or 8 mg for up to 12 months.</p> <p>Sunovion division of Dainippon Sumitomo Pharma Co., Ltd., Osaka, Japan</p> <p>Phase III trial ongoing</p>	<p>Antidepressants (e.g., bupropion) Atomoxetine (Strattera) Extended-release metadoxine (experimental) Stimulants (e.g., dextroamphetamine, dextroamphetamine-amphetamine, lisdexamfetamine)</p>	<p>Increased attentiveness Improved scores on standardized ADHD scales (e.g., Sheehan Disability Scale, Behavior Rating Inventory of Executive Function®-Adult Version) Reduced risk of abuse and improved safety profile, compared with existing treatments Improved quality of life</p>

Table 22. AHRQ Priority Condition: 07 Diabetes Mellitus: 0 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts

Table 23. AHRQ Priority Condition: 08 Functional Limitations and Disability: 7 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Allosteric GABA-A receptor modulator (SAGE-547) for adjunctive treatment of super-refractory status epilepticus</p>	<p>Patients in whom super-refractory status epilepticus (SRSE) has been diagnosed</p>	<p>Status epilepticus (SE) is a rare, potentially fatal condition in which patients' brains are in an acute, prolonged seizure state. In the U.S., SE has a prevalence of approximately 40 cases per 100,000 persons; an estimated 42,000 of these patients die within 30 days of their 1st SE seizure. Clinically, 2 types of SE are recognized; both can be diagnosed using blood tests, electroencephalography, imaging, and urinalysis. Standard SE treatment involves aggressively applying benzodiazepine, anticonvulsants, barbiturates, or anesthetics; 1 or more of these medications is often successful in eliminating seizures. However, in unresponsive patients with SRSE, continuously administered general anesthesia is required, and these patients face increased risks of infection and death. An unmet need exists for effective interventions for patients with this condition. SAGE-547 is an allosteric GABA-A receptor modulator that purportedly reduces seizures in patients with SRSE. In clinical trials, SAGE-547 is administered intravenously, as an adjunct to current therapies.</p> <p>SAGE Therapeutics, Cambridge, MA</p> <p>Phase I/II trial ongoing; Jul 2014, FDA granted fast-track status</p>	<p>Continuous intravenous general anesthesia (medically induced coma)</p>	<p>Reduced treatment-related infection rate Reduced mortality Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Deutetrabenazine for treatment of Huntington's disease chorea	Patients in whom Huntington's disease (HD) has been diagnosed	<p>More than 15,000 Americans have HD and another 150,000 people have a 50% risk of developing the disease. As an inherited disorder, HD arises from genetically programmed degeneration of neurons in the brain. Neuronal degeneration results in symptoms including uncontrolled movements, known as chorea. Chorea is observed in up to 90% of HD patients and is thought to arise from basal ganglia cell degeneration. No cure exists for HD, and only 1 medication, tetrabenazine, is FDA approved for treating chorea; additional pharmacotherapies are needed for this indication. The drug deutetrabenazine (SD-809) purportedly functions as a vesicular monoamine transporter type 2 (VMAT-2) inhibitor. Investigators hypothesize that deutetrabenazine, which is synthesized by substituting deuterium at specific positions of tetrabenazine's structure, regulates dopamine levels underlying involuntary movement disorders. This compound potentially will provide symptom relief with minimal side effects and reduced drug-drug interactions. In clinical trials, deutetrabenazine tablets are administered orally for up to 8 weeks, 6–12 mg, daily.</p> <p>Auspex Pharmaceuticals, Inc., La Jolla, CA</p> <p>Phase III trial ongoing; manufacturer plans to submit new drug application by mid-2015; Nov 2014, FDA granted orphan drug status; deutetrabenazine is also under investigation for treating tardive dyskinesia</p>	<p>Off-label antipsychotic drugs (e.g., haloperidol, clozapine) Off-label antiseizure drugs (e.g., clonazepam, diazepam) Tetrabenazine (Xenazine; FDA approved to suppress chorea associated with HD)</p>	<p>Reduced symptoms Improved quality of life</p>
IGF-2 peptide conjugated alpha-glucosidase (BMN 701) enzyme replacement therapy for Pompe disease	Patients in whom late-onset Pompe disease has been diagnosed	<p>Late-onset Pompe disease results from a partial deficiency in alpha-glucosidase activity, which causes excessive amounts of lysosomal glycogen to accumulate everywhere. It can cause muscle weakness and respiratory failure. Available enzyme replacement therapy (alglucosidase alfa) may have poor uptake in skeletal muscle, potentially due to low skeletal muscle expression of the key transporter required for cellular entry of the enzyme. IGF-2 peptide conjugated alpha-glucosidase (BMN 701) is an alternative enzyme replacement therapy. BMN 701 purports to circumvent low skeletal muscle uptake by adding the IGF-2 peptide, which directs the drug to lysosomes to degrade glycogen. BMN 701 is administered at a dose of 20 mg/kg every 2 weeks by intravenous infusion.</p> <p>BioMarin Pharmaceuticals Inc., Novato, CA</p> <p>Phase III trial (INSPIRE) ongoing</p>	<p>Alpha-glucosidase enzyme replacement therapy (Lumizyme®)</p>	<p>Improved muscle strength, functional status, pulmonary function, and/or ventilation Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Implanted electrical nerve block system (Altius) for treatment of chronic amputation pain</p>	<p>Patients who have had an amputation and experience ongoing chronic amputation pain</p>	<p>No treatment is approved for chronic amputation pain, and many patients do not experience pain relief with available treatment options. The Altius system uses very high-frequency stimulation of peripheral nerves to prevent transmission of pain signals to the central nervous system. The system consists of a pacemaker-like implanted device that transmits electrical pulses through an electrode attached to a peripheral nerve. The device delivers the current at 10,000 Hz per second for 30 minutes.</p> <p>Neuros Medical, Inc., Willoughby, OH</p> <p>Pivotal trial ongoing</p>	<p>Medications (e.g., tricyclic antidepressants, anticonvulsants, narcotics) Minimally invasive therapies (e.g., narcotic injections, electrical spinal cord stimulation, intrathecal catheter delivered drugs) Noninvasive therapies (e.g., transcutaneous electrical nerve stimulation, mirror box visual therapy, acupuncture) Surgery (e.g., deep brain stimulation, stump revision/neurectomy)</p>	<p>Reduced pain Reduced pain-medication use Improved quality of life</p>
<p>Olesoxime for treatment of spinal muscular atrophy</p>	<p>Patients in whom spinal muscular atrophy (SMA) has been diagnosed</p>	<p>SMA is an inherited neuromuscular disease in which muscles atrophy and weaken, often resulting in death of infants born with the most severe form of the disorder. SMA occurs in an estimated 1 in 10,000 live births worldwide. Affected infants typically appear normal at birth, and symptoms develop within several months after birth. Available treatments address only disease symptoms. Treatments are needed that address the underlying cause of disease. Olesoxime (TRO19622) potentially promotes neuroaxonal repair and remyelination and the function and survival of neurons and other cell types under disease-relevant stress conditions through interactions with the mitochondrial mPTP; this compound potentially promotes remyelination and provides neuroprotection. It is administered in a 100 mg/mL liquid suspension at an oral dose of 10 mg/kg, once daily, with food, at dinner.</p> <p>TROPHOS SA, Marseille, France</p> <p>Phase II pivotal trial completed; company is pursuing regulatory pathway; FDA granted orphan drug status Feb 2009</p>	<p>Supportive therapy (e.g., respiratory and nutrition support, physical therapy)</p>	<p>Improved motor function Increased survival Increased progression-free survival Improved quality of life</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Revusiran for treatment of transthyretin-mediated familial amyloid cardiomyopathy</p>	<p>Patients in whom transthyretin-mediated familial amyloid cardiomyopathy (FAC) has been diagnosed</p>	<p>FAC is characterized by a buildup of abnormal proteins in the heart and other tissues. It is a progressive disease caused by an inherited mutation in the transthyretin gene (<i>TTR</i>). FAC is often fatal. Patients may recover after a heart transplant, but that option is not available for many patients. An effective pharmacologic treatment could reduce or postpone the need for transplantation. Revusiran (ALN-TTRsc) is an infused RNAi therapeutic that purportedly targets <i>TTR</i>. It purportedly prevents pathogenic <i>TTR</i> deposits in peripheral tissues, including dorsal root ganglia, sciatic nerve, stomach, and intestines, by silencing the <i>TTR</i> gene and reducing <i>TTR</i> serum levels. In clinical trials, revusiran is administered by subcutaneous injection.</p> <p>Alnylam Pharmaceuticals, Inc., Cambridge, MA</p> <p>Phase III trial ongoing</p>	<p>Diuretics Heart transplantation</p>	<p>Improved function of cardiac and nervous tissues Reduced need for heart transplant Reduced symptoms of amyloidosis (variable) Reduced <i>TTR</i> deposits Increased survival Improved quality of life</p>
<p>Smad-pathway activating peptide (THR-184) for treatment of acute kidney injury after cardiac surgery</p>	<p>Patients at risk of acute kidney injury (AKI) after cardiac surgery</p>	<p>AKI is characterized by a rapid, temporary loss of kidney function resulting in a failure to maintain fluid, electrolyte, and acid-base homeostasis. About 1 million patients receive an AKI diagnosis each year in the U.S., all of whom experience some permanent loss of kidney function. Causal factors for AKI include cardiac and/or vascular surgery, inflammatory disease, trauma, or the administration of contrast dye for imaging. AKI is common in hospitalized patients and also has a poor prognosis, with mortality ranging from 10% to 80%. Treatment options for AKI are limited, with no pharmacological therapy approved for its treatment. THR-184 is a small peptide that selectively activates the bone morphogenetic protein (BMP) type II receptor and Smad (small mothers against decapentaplegic) proteins (a family of signal transducers), responsible for regulating growth, differentiation, chemotaxis, and apoptosis of various cell types such as epithelial, mesenchymal, hematopoietic, and neuronal cells. By activating these receptors, this therapy may serve as a preventive and therapeutic option for patients in whom AKI has been diagnosed. THR-184 does not have bone morphogenetic activity. It is given by intravenous infusion at a high dose before surgery and a lower dose after surgery. Exact dosage is still under study.</p> <p>Thrasos, Inc., Montreal, Quebec, Canada</p> <p>Phase II trial ongoing; FDA granted fast-track status Feb 2014</p>	<p>Dialysis</p>	<p>Improved renal function Reduced incidence of AKI Reduced use of dialysis Reduced mortality Improved quality of life</p>

Table 24. AHRQ Priority Condition: 09 Infectious Disease, Including HIV-AIDS: 4 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Bacterial spores (SER-109) for treatment of recurrent <i>Clostridium difficile</i> infection	Patients in whom recurrent <i>Clostridium difficile</i> infection (CDI) has been diagnosed	<p>Fecal microbiota transplantation has demonstrated high efficacy against recurrent CDI, in limited studies. However, fecal transplantation requires identifying and screening appropriate donors, which can be labor intensive and limits the diffusion of the procedure to a small number of specialty facilities. SER-109 is a combination of spores from pure bacterial strains identified using the manufacturer's proprietary Microbiome Therapeutics™ platform technology. It is thought to induce environmental changes in the gut microbiota that restore a healthy state in patients with recurrent CDI. SER-109 also purportedly induces sustained changes in the gut flora that could prevent CDI recurrence.</p> <p>Seres Health, Inc., Cambridge, MA</p> <p>Phase III trial planned; FDA granted orphan drug status</p>	Fecal microbiota transplant Fidaxomicin Metronidazole Vancomycin	Increased clinical cure rates Reduced CDI recurrence
Lonafarnib for treatment of hepatitis D virus infection	Patients in whom hepatitis D virus infection has been diagnosed	<p>Hepatitis D virus (HDV) occurs only as a co-infection in individuals with hepatitis B virus (HBV) infection. HDV infection leads to more severe liver disease than HBV alone and is associated with accelerated fibrosis, cancer, and liver failure. No treatments exist for HDV infection. Lonafarnib purportedly inhibits farnesyl transferase, a host-cell enzyme involved in a process called prenylation, which is essential to HDV replication. Because prenylation is a host-cell process, lonafarnib is thought to have a higher barrier to resistance than direct-acting antiviral agents. Lonafarnib is administered orally, 100–200 mg daily, for other indications.</p> <p>Eiger BioPharmaceuticals, Inc., San Carlos, CA</p> <p>Phase II trial ongoing; FDA granted orphan drug status</p>	HBV treatment Supportive care	Reduced HDV RNA levels Improved liver function
Tetravalent vaccine (CYD-TDV) for prevention of dengue virus infection	People who are at risk of contracting dengue virus infection	<p>Dengue virus is a mosquito-borne agent that causes severe fever as well as head and body aches in more than half of people infected. No effective treatments or vaccines are available. Tetravalent dengue virus vaccine (CYD-TDV) is comprised of the backbone of the yellow fever virus vaccine with genes from the 4 dengue serotypes inserted to provide broad protection against all dengue virus serotypes. CYD-TDV is administered as a subcutaneous injection at 0, 6, and 12 months.</p> <p>Sanofi, Paris, France</p> <p>Phase III trials ongoing</p>	Blood transfusion (for significant active bleeding) Supportive therapy to prevent circulatory shock	Reduced dengue virus infection rate Reduced hospitalizations Reduced morbidity Reduced mortality

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Viral RNA polymerase inhibitor (BCX4430) for treatment of Ebola virus infection</p>	<p>Patients infected with Ebola virus</p>	<p>Ebola virus disease (EVD) has a 50% mortality rate. It is caused by a virus of the family <i>Filoviridae</i>, genus <i>ebolavirus</i>. Of 5 identified Ebola virus species, 4 are known to cause disease in humans: Ebola virus (<i>Zaire ebolavirus</i>); Sudan virus (<i>Sudan ebolavirus</i>); Taï Forest virus (<i>Taï Forest ebolavirus</i>, formerly <i>Côte d'Ivoire ebolavirus</i>); and Bundibugyo virus (<i>Bundibugyo ebolavirus</i>). Treatment is optimal supportive care. No FDA-approved treatments exist for EVD, but several agents are being given through FDA's compassionate use program, depending on availability. BCX4430 is a nucleotide analog that purportedly inhibits the active site of the viral RNA-dependent RNA polymerase required for Ebola virus replication. The drug was administered as an intramuscular injection in a phase I trial, but it may also be suitable for intravenous or oral administration.</p> <p>BioCryst Pharmaceuticals, Inc., Durham, NC</p> <p>Phase I trial ongoing</p>	<p>Convalescent serum (plasma from patients who have recovered from EVD) Supportive care</p>	<p>Reduced mortality Symptom resolution</p>

Table 25. AHRQ Priority Condition: 10 Obesity: 2 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Bariatric embolization of abdominal arteries for treatment of severe obesity	Adults with body mass index (BMI) of more than 40 kg/m ²	<p>In the U.S., 34.9% of adults are obese. Available pharmacologic and surgical options can have serious side effects or adverse events, warranting the need for novel approaches for treating severe obesity. Bariatric embolization of arteries is a minimally invasive technique that uses a catheter to deliver tiny polymer beads that restrict blood flow in specific blood vessels of the stomach to suppress some of the body's signals for feeling hungry, leading to weight loss. This action is thought to decrease ghrelin, a hormone associated with appetite, which in turn induces weight loss. This intervention is reportedly the 1st catheter-based procedure intended to directly address morbid obesity. In clinical trials, various embolic beads are being used, including BeadBlock™ 300-500 Micron and Embosphere Microspheres. Clinical trial participants must have BMI of 40 kg/m² or higher.</p> <p>Dayton Interventional Radiology, Dayton, OH The Ohio State University Wexner Medical Center, Columbus, OH Johns Hopkins Hospital, Baltimore, MD</p> <p>2 trials ongoing (GET LEAN and BEAT Obesity); FDA granted investigational device exemption status for GET LEAN trial</p>	<p>Aspiration therapy system (in development) Deep brain stimulation Endoluminal sleeve (EndoBarrier) Gastric banding surgery Gastric pacemaker (in development) Intragastric balloons (in development) Pharmacotherapy Roux en Y bypass surgery Sleeve gastrectomy surgery</p>	<p>Decreased comorbidities Total weight loss Improved quality of life</p>
Endoluminal sleeve (EndoBarrier) for preoperative weight loss or treatment of obesity	Patients with body mass index (BMI) of more than 35 kg/m ² who need to lose weight before bariatric surgery	<p>Available pharmacologic and surgical options for obesity can have serious side effects or adverse events, warranting the need for more novel approaches for treating both obesity and type 2 diabetes mellitus. EndoBarrier® is a nonsurgical, endoluminal sleeve that is endoscopically inserted into the stomach using a guidewire. The device is a duodenal–jejunal bypass liner designed to mimic Roux-en-Y gastric bypass. Surgeons deploy the sleeve in the duodenal bulb, where it can stay in place for up to 12 months. The liner of the device consists of a 60 cm impermeable sleeve intended to move partially digested food through the gastrointestinal tract without allowing nutrients to be absorbed, to achieve weight loss. Surgeons can remove the device with an endoscopic retrieval system.</p> <p>GI Dynamics, Inc., Lexington, MA</p> <p>Pivotal trial ongoing</p>	<p>Aspiration therapy system (in development) Deep brain stimulation Gastric banding surgery Gastric pacemaker (in development) Intragastric dual balloon Pharmacotherapy Roux en Y bypass surgery Sleeve gastrectomy surgery Vagus nerve blocking</p>	<p>Preoperative weight loss Improved patient safety Reduced side effects Reduced morbidity</p>

Table 26. AHRQ Priority Condition: 11 Peptic Ulcer Disease and Dyspepsia: 1 Intervention

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Ibodontant for treatment of diarrhea-predominant irritable bowel syndrome	Patients in whom diarrhea-predominant irritable bowel syndrome (IBS-D) has been diagnosed	<p>IBS is a functional gastrointestinal disorder of unclear etiology with no known cure. About 30% of diagnosed IBS cases can be attributed to IBS-D. Available treatments are purportedly ineffective in many patients, and no new treatment options have been available for decades. The only approved treatment in the U.S. for IBS-D is alosetron, and this intervention is associated with safety issues. Ibodontant is a tachykinin NK2 receptor antagonist that may reduce bowel muscle contraction frequently associated with hypersensitivity to stimuli. Clinical data suggest that NK2 receptor blockage affects intestinal motility and pain sensation without affecting normal gut motor function. In clinical trials, ibodontant has been administered as an oral tablet, 10 mg, once daily.</p> <p>The Menarini Group, Florence, Italy</p> <p>Phase III trials ongoing</p>	Antispasmodic drugs Bile acid sequestrants Tricyclic antidepressants	Reduced abdominal pain and bloating symptoms Long-term relief

Table 27. AHRQ Priority Condition: 12 Pregnancy, Including Preterm Birth: 1 Intervention

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Retosiban for prevention or delay of preterm birth	Pregnant women who are experiencing preterm labor between 24 and 34 weeks' gestation	<p>Preterm birth occurring before 37 weeks' gestation is a leading cause of infant morbidity and mortality. Available tocolytic agents to try to halt or delay preterm labor are not effective in many women and reportedly may delay birth by little as 48 hours. For women who can safely delay labor and birth (i.e., those who do not have preeclampsia or uterine infections), treatment is needed to halt preterm labor and delay preterm birth. Retosiban is an oxytocin receptor antagonist that may be able to halt or delay preterm labor and birth by blocking oxytocin receptors in the placenta and inhibiting intracellular signaling pathways that lead to uterine contraction. It is administered by intravenous infusion at a dosage of 6 mg over 5 minutes followed by 6–12 mg/hour, depending on patient response, for 48 hours.</p> <p>GlaxoSmithKline, Middlesex, UK</p> <p>Phase III trial ongoing</p>	Bed rest Hydration Tocolytic agents (e.g., beta-receptor agonist, calcium-channel blockers, COX-2 inhibitors, magnesium sulfate, nitric oxide donors)	Prolonged time to delivery Improved neonatal outcomes Reduced neonatal hospital stays Reduced neonatal intensive care unit use

Table 28. AHRQ Priority Condition: 13 Pulmonary Disease, Asthma: 1 Intervention

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Cysteamine (Lynovex) for adjunctive treatment of cystic fibrosis	Patients in whom cystic fibrosis (CF) has been diagnosed	<p>No curative treatments exist for CF. Molecular treatments are being developed to reduce the mucus buildup and exacerbations that are hallmarks of the disease. Patients are also treated with antibiotics to manage infections. Treatments providing improved CF symptom management are needed. Cysteamine (Lynovex®) is a novel molecule purported to have mucolytic activity. It also purportedly improves lung function with broad-spectrum antibacterial activity that can penetrate biofilms to treat drug-resistant bacteria. In clinical trials, cysteamine was orally administered in gel capsule form; an inhalable dry powder is also being developed for chronic use.</p> <p>NovaBiotics, Ltd., Aberdeen, UK</p> <p>Phase IIa trial announced; FDA granted orphan drug status Sept 2014</p>	Antibiotics Mucolytics	Improved lung function Improved quality of life

Table 29. AHRQ Priority Condition: 14 Substance Abuse: 1 Intervention

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
Intranasal naloxone spray for emergency treatment of opioid overdose by nonclinicians	Patients in whom an opioid overdose is known or suspected	<p>According to recent data from the U.S. Centers for Disease Control and Prevention, more than 16,000 deaths a year are attributable to opioid analgesics; this total is estimated to represent almost 75% of all pharmaceutical-overdose deaths. Most fatal opioid overdoses occur outside of controlled health care environments, in the presence of laypeople who may not be equipped with or trained to use emergency intervention tools and medications commonly used by professionals. An unmet need exists for simple, safe, and effective interventions for treating opioid overdoses in these situations. Naloxone nasal spray is a single-use intervention intended for emergency use in suspected opioid overdoses. The device purportedly provides a unit dose (0.4 mg) of naloxone, via a safe, disposable, intranasal delivery system.</p> <p>AntiOp, Inc., Lexington, KY (principal developer) Reckitt Benckiser, plc, Slough, UK (marketing and development partner)</p> <p>No registered trials; manufacturer indicates this intervention is in late-stage clinical trials; in 2013, FDA granted fast-track status</p>	Evzio Immediate professional medical care Naloxone emergency kits	Reduced mortality

Table 30. AHRQ Priority Condition: 15 Cross-Cutting: 3 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Induced hypothermia (emergency preservation and resuscitation) for cardiac arrest after trauma-induced blood loss</p>	<p>Patients who have been in cardiac arrest for less than 5 minutes due to blood loss from penetrating trauma (e.g., gunshot wound, knife wound, explosion injury)</p>	<p>Patients who are in cardiac arrest due to blood loss from trauma survive only about 10% of the time. Clinicians often have insufficient time to repair an injury and stop the bleeding before the patient has gone too long without oxygen. Induced hypothermia is a well-established tool to preserve function during procedures in which a patient's oxygen supply is interrupted. A new procedure under study, called emergency preservation and resuscitation (EPR), uses this concept for trauma victims. The patient's body is flushed with ice-cold 0.9% sodium chloride through an arterial catheter in the descending thoracic aorta and cooled to about 50 °F (10 °C). The patient can be maintained in this state for about 1 hour while surgeons repair the injury. Using a cardiopulmonary bypass machine with a heat exchanger, blood is reintroduced to the patient gradually to prevent ischemia-reperfusion injuries.</p> <p>University of Pittsburg Medical Center, PA, in collaboration with University of Maryland, College Park; University of Pennsylvania, Philadelphia; Massachusetts General Hospital, Boston; University of Arizona, Tucson; and Oregon Health and Science University, Portland</p> <p>Phase II trial ongoing</p>	<p>Cardiopulmonary resuscitation Emergency thoracotomy</p>	<p>Reduced mortality</p>
<p>Mobile platform (Triton Fluid Management System) to monitor blood loss during surgery</p>	<p>Patients undergoing surgery</p>	<p>Methods for monitoring a patient's blood loss during surgery include visual estimation, which can be inaccurate, and catheter-based monitoring, which is invasive and also can be inaccurate. Inaccurate estimations of blood loss during surgery can lead to patient complications, morbidity, mortality, and increased costs. Also, blood used for transfusions (as a result of inaccurately estimating a large amount of blood lost during surgery) is scarce and expensive. To address this limitation, a developer has created a mobile medical platform that is intended to be used with the iPad during surgery. Using the program and iPad camera, an OR team member scans surgical surfaces (e.g., surgical sponges) that are covered in blood, then sends the image to the "cloud." Once the image is on the cloud server, the application's algorithms (similar to those used in facial recognition software) determine and estimate the amount of blood present in that sample, thereby potentially offering clinicians a more accurate assessment of the amount of blood the patient has lost. The device estimates total blood and hemoglobin losses and counts sponges.</p> <p>Gauss Surgical, Inc., Palo Alto, CA</p> <p>FDA cleared through the 510(k) de novo pathway May 2014</p>	<p>Catheter-based measurement Visual estimation Weight-based measurement (e.g., blood-filled sponges)</p>	<p>Improved accuracy of estimated blood loss More appropriate transfusion decisionmaking Reduced costs by avoiding inappropriate transfusion Reduced morbidity and mortality</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts
<p>Noninvasive acoustic device (HS-1000) for monitoring intracranial pressure</p>	<p>Patients who may be experiencing increased intracranial pressure (ICP) due to brain surgery, infection, stroke, or trauma</p>	<p>Increased ICP may cause swelling, stroke, brain damage, or death. Methods for monitoring ICP are invasive—a surgeon must drill a hole in the patient's skull and insert an epidural sensor, intraventricular catheter, or subdural screw. These methods are used only when necessary because patients may develop secondary infections or bleeding. A noninvasive, acoustic monitor is under development. It is composed of disposable earbuds connected to an Android-based tablet for display. 1 earbud emits a tone at a specified frequency; the other detects the sound waves after they travel through the cranium. Proprietary software calculates the intracranial pressure in mm Hg based on the received transmission. The HS-1000 can be used continuously and can take up to 4 measurements per minute.</p> <p>Head Sense Medical, Ltd., Netanya, Israel</p> <p>Unphased trial ongoing; pilot trial completed</p>	<p>Epidural sensor Intraventricular catheter Subdural screw</p>	<p>Reduced ICP Reduced morbidity and mortality Improved quality of life</p>

Section 3. Interventions Tracked but Archived Since Last Update: 34 Interventions

Table 31. AHRQ Priority Condition: 01 Arthritis and Nontraumatic Joint: 0 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason

Table 32. AHRQ Priority Condition: 02 Cancer: 9 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Cabozantinib (Cometriq) for treatment of castration-resistant prostate cancer	Patients with castration-resistant prostate cancer (CRPC) that may include bone metastases	<p>Median overall survival for patients with CRPC is only about 18 months after diagnosis. No treatments for CRPC are available that target MET, which may be responsible for prostate cancer drug resistance in patients treated with current receptor tyrosine kinase inhibitors. Cabozantinib (Cometriq®) is an oral, small-molecule, receptor tyrosine kinase inhibitor that targets MET and vascular endothelial growth factor (VEGF) receptor 2 (VEGFR2). MET plays key roles in cell proliferation, migration, invasion, and angiogenesis. Overexpression of the hepatocyte growth factor ligand of MET and activation of the MET pathway supports tumors. Additionally, VEGFR2 and MET allow tumors to overcome hypoxia and stimulate angiogenesis. Finally, VEGF and MET also appear to stimulate osteoclasts and osteoblasts, thus showing potential for treating bone metastasis. Selective anti-VEGF therapies do not inhibit MET, which may be responsible for tumor evasiveness and drug resistance in patients who receive VEGF tyrosine kinase inhibitors, making MET/VEGF co-inhibition an emerging target in cancer therapy. In trials, cabozantinib is administered at a 100 mg dose, once daily.</p> <p>Exelixis, Inc., South San Francisco, CA</p> <p>Phase III trials (COMET-1 and COMET-2) complete</p>	<p>Abiraterone Cabazitaxel Denosumab Docetaxel Enzalutamide Radium-223</p>	<p>Reduced bone metastasis Reduced bone pain Increased overall survival Increased progression-free survival Improved quality of life</p>	<p>Development halted for this indication after the drug failed to meet the primary endpoint in 2 phase III clinical trials (COMET-1 and COMET-2).</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Endoscopy training in primary care program for prevention of colorectal cancer	Patients eligible to receive colonoscopy	<p>Research suggests that disparities exist in colorectal cancer (CRC) incidence and mortality for individuals who live in rural areas or otherwise medically underserved areas. This disparity may be attributable to the limited access that rural residents have to CRC prevention tools. To address this unmet need, researchers have begun investigating the feasibility and efficacy of training primary care physicians in rural areas to perform colonoscopies. According to its developers, the Endoscopy Training in Primary Care (ETPC) program involves the following: (1) an online didactic seminar, (2) an endoscopy simulator to provide the opportunity for basic and advanced skill acquisition, and (3) proctored endoscopy with an endoscopist.</p> <p>Colorado Area Health Education Center, Department of Family Medicine, University of Colorado, Denver</p> <p>Trials completed</p>	Colonoscopy performed by gastrointestinal specialists	Increased screening rates Earlier diagnosis of CRC	In 2 years of tracking, we found no similar programs to that offered by the University of Colorado. Additionally, the university has not offered the endoscopy training since at least May 2014.
Magnetic resonance image-guided focused ultrasound (ExAblate system) for treatment of pain from bone metastases	Patients experiencing pain from bone metastases	<p>Bone metastases occur in late stages of the majority of solid tumors and are associated with significant morbidity and mortality; however, few treatments targeting bone metastases are available. Pain is a common symptom of bone metastases and significantly hinders quality of life. Nonnarcotic treatments for the pain from bone metastases are needed, particularly in those ineligible to receive radiation therapy. The ExAblate system is a noninvasive, magnetic resonance image-guided focused ultrasound device that provides targeted treatment to sites of bone metastases. High-intensity ultrasound waves are used to try to ablate the pain-causing nerves with the intention of providing rapid, extended relief.</p> <p>InSightec Ltd., Tirat Carmel, Israel</p> <p>FDA approved Oct 2012 for “pain palliation of metastatic bone cancer in patients 18 years of age or older who are suffering from bone pain due to metastatic disease and who are failures of standard radiation therapy, or not candidates for, or refused radiation therapy”; phase IV postapproval trial required by FDA is ongoing</p>	Opiates and other analgesics Palliative radiation therapy Radiopharmaceuticals	Decreased pain Improved quality of life	Tracked for 2 years after FDA approval; no longer meets horizon scanning criteria for tracking. Additionally, the manufacturer indicates no additional health facilities have adopted this intervention since Jan 2014.

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
MarginProbe System for intraoperative identification of positive margins during breast cancer lumpectomy	Patients undergoing breast lumpectomy	<p>Successful breast lumpectomy requires that the margins of a resected tumor be free of cancerous tissue; however, with current standard of care, up to 30% of patients undergo a 2nd lumpectomy because cancer-positive margins are identified by pathology results several days after the initial operation. The MarginProbe® System purportedly enables intraoperative identification of cancer-positive margins in excised tissues, allowing the surgeon to resect additional tissue during the same surgical procedure; the system uses radiofrequency spectroscopy to discern differences in the electromagnetic signature of cancerous cells relative to normal tissue.</p> <p>Dune Medical Devices, Inc., Framingham, MA</p> <p>FDA approved Jan 2013 for intraoperative tissue assessment of surgical margins during surgery for early stage breast cancer; system has been available in Europe since 2008</p>	No marketed comparator in the U.S.	Reduced number of reexcision surgeries performed Improved rate of complete surgical resection (e.g., no positive margins)	Tracked for 2 years after FDA approval; no longer meets horizon scanning criteria for tracking; Very little adoption has occurred in almost 2 years on the market, in part due to lack of 3rd-party payer reimbursement.
Onartuzumab (MetMab) for treatment of advanced nonsmall cell lung cancer	Patients with MET-positive advanced nonsmall cell lung cancer (NSCLC)	<p>Patients with advanced/metastatic NSCLC that has progressed after 1st-line therapy have a poor prognosis and few treatment options. MET (also known as hepatocyte growth factor receptor) is a receptor tyrosine kinase that regulates cell growth and survival. MET has been implicated in the development of tumor resistance to epidermal growth factor receptor (EGFR) inhibition. Onartuzumab (MetMab) is a single-armed monoclonal antibody that blocks ligand-mediated activation of the MET receptor tyrosine kinase. In late-stage trials, it is being studied in combination with the EGFR inhibitor erlotinib.). Patients may have newly diagnosed NSCLC harboring an activating mutation in <i>EGFR</i> or have disease that has progressed after 1st-line cytotoxic therapy. Onartuzumab is administered at a dosage of 1 mg/kg, intravenously, on day 1 of each 3-week cycle.</p> <p>Genentech subsidiary of F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>Phase III trials (MetLung, YO28345, and GO28758) ongoing in combination with erlotinib in multiple treatment settings; Mar 2014, the independent data monitoring committee for the phase III METLung study recommended that the trial be stopped because of a lack of clinically meaningful efficacy</p>	Afatinib Docetaxel Erlotinib monotherapy Pemetrexed	Increased overall survival Increased progression-free survival Improved quality of life	Development halted after phase III trial failed to meet primary endpoints.

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Pomalidomide (Pomalyst) for treatment-refractory multiple myeloma	Patients with treatment-resistant (i.e., lenalidomide and bortezomib) multiple myeloma	<p>Treatments for multiple myeloma have improved, but the median life expectancy for patients in whom it is diagnosed is only 5–7 years. Additionally, as several newer treatments for multiple myeloma have moved to the 1st-line setting as combination therapies, additional salvage treatments are needed in cases in which the disease no longer responds to treatment. Pomalidomide (Pomalyst®) is a novel thalidomide derivative that has modulatory effects on angiogenesis, inflammation, and immune cell costimulation. In clinical trials for treating multiple myeloma, pomalidomide is administered orally, at a daily dose of 4 mg, in combination with low-dose dexamethasone.</p> <p>Celgene Corp., Summit, NJ</p> <p>Phase III trials ongoing; Feb 2013, FDA granted accelerated approval based on phase II data and required a boxed warning and risk evaluation and mitigation strategy certification for prescribers</p>	<p>Combination chemotherapy including 1 or more of the following: Bendamustine Bortezomib Cisplatin Cyclophosphamide (including high dose) Dexamethasone Doxorubicin Etoposide Thalidomide</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>	<p>Tracked 2 years after FDA approval; no longer meets horizon scanning criteria for tracking.</p>
Ponatinib (Iclusig) for treatment of chronic myelogenous leukemia or Philadelphia chromosome–positive acute lymphoblastic leukemia	<p>Adult patients with T3151-positive chronic myeloid leukemia (CML) (chronic phase, accelerated phase, or blast phase) or T3151-positive Philadelphia chromosome–positive acute lymphoblastic leukemia (Ph+ ALL) and adult patients with these diseases for whom no other tyrosine kinase inhibitor therapy is indicated</p>	<p>Patients with treatment-refractory CML or ALL generally have a poor prognosis, rapidly progressing disease, and few treatment options. New therapies are needed. The translocation leading to the Philadelphia-chromosome mutation is a hallmark of CML and activates several proteins and enzymes that accelerate cell division and destabilize the genome; some ALL cells also carry this mutation (more frequently in adults, whose disease is harder to treat). Ponatinib (Iclusig™) is a next-generation BCR-ABL tyrosine kinase inhibitor rationally designed to be effective against common mutations conferring resistance to current BCR-ABL tyrosine kinase inhibitors. Administered orally, 45 mg, once daily.</p> <p>Ariad Pharmaceuticals, Inc., Cambridge, MA</p> <p>FDA granted accelerated approval in Dec 2012 for patients with CML or Ph+ ALL that is resistant or intolerant to available tyrosine kinase inhibitors. Ariad's phase III trial in the 1st-line setting was terminated Oct 2013 after reports of arterial thrombotic events in patients treated with ponatinib; in Oct 2013, U.S. marketing of ponatinib was suspended pending further investigation of vascular adverse events. In Dec 2013, distribution resumed under a risk evaluation and mitigation strategy informing health care providers of revised indications, new safety information about serious risk of vascular occlusion, and new dosing considerations</p>	<p>Bosutinib Dasatinib Imatinib Nilotinib</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>	<p>Tracked 2 years after FDA approval; no longer meets horizon scanning criteria for tracking.</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Rilotumumab for treatment of gastric cancer	Patients with previously untreated, unresectable, locally advanced, or metastatic gastric cancer that expresses high levels of MET	<p>Patients with locally advanced or metastatic gastric cancer have a poor prognosis with available treatment options. MET is a receptor tyrosine kinase that can promote cell proliferation, survival, motility, and invasion. MET overexpression has been reported in gastric cancers and correlates with a poor prognosis. Rilotumumab (AMG 102) is a monoclonal antibody that binds to the MET ligand hepatocyte growth factor (HGF). By neutralizing HGF, rilotumumab may inhibit MET activity, potentially having an antineoplastic effect. In clinical trials, it is being used in combination with a chemotherapy regimen consisting of epirubicin, cisplatin, and capecitabine. Rilotumumab is administered intravenously at a dose of 15 mg/kg, once every 21 days.</p> <p>Amgen, Inc., Thousand Oaks, CA</p> <p>Phase III trial ongoing</p>	<p>Various chemotherapy regimens, including 1 or more of the following:</p> <ul style="list-style-type: none"> 5-Fluorouracil Capecitabine Carboplatin Cisplatin Docetaxel Epirubicin Fluoropyrimidine Irinotecan Oxaliplatin Paclitaxel 	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>	<p>The independent data monitoring committee assessing safety in the RILOMET-1 trial identified more deaths from treatment with rilotumumab plus chemotherapy than with chemotherapy alone; Amgen terminated all its rilotumumab studies.</p>
Tabalumab for treatment of multiple myeloma	Patients in whom recurrent or refractory multiple myeloma has been diagnosed	<p>Although treatments for multiple myeloma have improved, the median life expectancy for these patients is only 5–7 years after diagnosis. Tabalumab is a monoclonal antibody specific for the cytokine B-cell activating factor (BAFF). Researchers have observed elevated serum levels of BAFF in patients with multiple myeloma, and BAFF is thought to stimulate multiple myeloma cell growth and promote multiple myeloma cell survival. In clinical trials, tabalumab (LY-2127399) is being administered 100 mg, intravenously over 30 minutes, on day 1 of every 21-day cycle for 8 cycles, in combination with dexamethasone and bortezomib.</p> <p>Eli Lilly and Co., Indianapolis, IN</p> <p>Phase II trial complete; FDA granted orphan drug status for treating multiple myeloma</p>	<p>Carfilzomib Pomalidomide</p>	<p>Increased overall survival Increased progression-free survival Improved quality of life</p>	<p>Manufacturer has halted development in the U.S.</p>

Table 33. AHRQ Priority Condition: 03 Cardiovascular Disease: 2 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Desmoteplase for treatment of ischemic stroke	Patients in whom acute stroke has been diagnosed	<p>Although stroke is a leading cause of death in the U.S., only a single drug, tissue plasminogen activator (tPA), is FDA approved for neuroprotection. It is effective only when administered within a narrow window of symptom onset, and only a very small percentage of patients experiencing an acute ischemic stroke receive tPA, because most do not present for treatment within the necessary time frame. Desmoteplase, a fibrin-specific plasminogen activator, is a chemical derived from the saliva of vampire bats that catalyzes the conversion of plasminogen to plasmin, the enzyme responsible for breaking down fibrin blood clots. Structurally, the chemical is similar to tPA, but it has much higher fibrin selectivity and, therefore, does not cause systemic plasminogen activation and fibrinogen depletion.</p> <p>H. Lundbeck a/s, Valby, Denmark</p> <p>2 phase III trials completed; other phase III trial ongoing (DIAS 4); FDA granted fast-track status; Jun 2014, company announced that 2 phase III trials did not meet primary efficacy endpoints but met safety endpoints; company reported "efficacy signals" in per protocol group and further development is under consideration pending discussions with FDA and others</p>	Anticoagulant therapy (e.g., tPA [alteplase], aspirin) as indicated by patient history and time of presentation for care	Increased blood flow to the brain Reversed damage Improved stroke-related outcomes	Manufacturer has halted development.

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Lomitapide (Juxtapid) for treatment of homozygous familial hypercholesterolemia	Patients in whom homozygous familial hypercholesterolemia (HoFH) has been diagnosed	<p>Outcomes with current medications for HoFH are suboptimal. Lomitapide represents a novel class of medication, a microsomal triglyceride transfer protein inhibitor (MTP-I) that is intended to lower both cholesterol and triglycerides. MTP is a lipid transfer protein that is required for moving lipid molecules from their site of synthesis, so inhibiting MTP prevents both hepatic very-low-density lipoproteins and intestinal chylomicron secretion (from food) that, in turn, lowers plasma lipids. Lomitapide is intended to replace statins. It is given orally. Labeling states "initiate treatment at 5 mg once daily. Titrate dose based on acceptable safety/tolerability: increase to 10 mg daily after at least 2 weeks; and then, at a minimum of 4-week intervals, to 20 mg, 40 mg, and up to the maximum recommended dose of 60 mg daily."</p> <p>Aegerion Pharmaceuticals, Inc., Cambridge, MA</p> <p>FDA approved Dec 2012 as "an adjunct to a low-fat diet and other lipid-lowering treatments, including LDL apheresis where available, to reduce low-density lipoprotein cholesterol (LDL-C), total cholesterol (TC), apolipoprotein B (apo B), and non-high-density lipoprotein cholesterol (non-HDL-C) in patients with homozygous familial hypercholesterolemia (HoFH)"; labeling includes boxed warning about risk of hepatotoxicity</p>	<p>Extracorporeal apheresis Liver transplant Mipomersen Pharmacotherapy (e.g., statins)</p>	<p>Reduced low-density lipoprotein levels Improved cardiovascular outcomes Improved long-term health outcomes Improved quality of life</p>	<p>Tracked for 2 years after FDA approval; no longer meets horizon scanning criteria for tracking.</p>

Table 34. AHRQ Priority Condition: 04 Dementia (including Alzheimer’s): 1 Intervention

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Gantenerumab for treatment of prodromal Alzheimer’s disease	Patients in whom prodromal Alzheimer’s disease (AD) has been diagnosed, aged 50–85 years	<p>No approved disease-modifying agents are available for treating AD; therapy is limited to managing symptoms. Gantenerumab is a fully human anti–beta-amyloid antibody. It has been shown to pass the blood-brain barrier purportedly with a high capacity to bind to beta-amyloid plaques in the brain. This binding purportedly clears amyloid plaques by a process called phagocytosis. In clinical trials, gantenerumab is given as a subcutaneous dose of 105 or 225 mg, every 4 weeks, for 104 weeks.</p> <p>F. Hoffmann-La Roche, Ltd., Basel, Switzerland</p> <p>Phase III trial discontinued Dec 2014</p>	<p>Behavioral therapy Deep brain stimulation (investigational) Nutritional therapy Pharmacotherapy (approved; i.e., donepezil, galantamine, memantine, rivastigmine)</p>	<p>Slowed AD disease progression or AD symptom regression Reduced morbidity Improved quality of life</p>	<p>Dec 2014, manufacturer announced that it had stopped the phase III trial after it failed to meet efficacy endpoints.</p>

Table 35. AHRQ Priority Condition: 05 Depression and Other Mental Health Disorders: 1 Intervention

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Amitifadine for treatment of major depressive disorder	Patients in whom treatment-resistant depression or major depressive disorder (MDD) has been diagnosed	<p>Fewer than half of patients with MDD achieve remission with approved antidepressant therapy, and available pharmacotherapies are often associated with undesirable side effects. Amitifadine (EB-1010) is a novel, unbalanced, triple serotonin-norepinephrine-dopamine reuptake inhibitor antidepressant that acts simultaneously as a reuptake inhibitor for the 3 monoamines. It demonstrates greatest affinity for transporters that inhibit serotonin reuptake, 1/2 as much against norepinephrine reuptake, and 1/8 as much against dopamine reuptake. In clinical trials, amitifadine is administered as an oral dose of 25–50 mg, twice daily.</p> <p>Euthymics Biosciences, Inc., Cambridge, MA</p> <p>Phase II/III trial completed; May 2013 company reported top-line results failed to meet primary endpoint</p>	<p>Deep brain stimulation Electroconvulsive therapy Psychotherapy Selective serotonin reuptake inhibitors Serotonin-norepinephrine reuptake inhibitors Transcranial magnetic stimulation Tricyclic antidepressants Vagal nerve stimulation</p>	<p>Improved depression rating scale scores Reduced symptom severity Improved quality of life</p>	<p>Development appears to be halted; this intervention has been tracked since 2011, and no developments have been reported since May 2013, when negative top-line results were reported.</p>

Table 36. AHRQ Priority Condition: 06 Developmental Delays, Attention-Deficit Hyperactivity Disorder, and Autism: 1 Intervention

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Cyclocreatine for treatment of creatine transporter deficiency	Patients in whom creatine transporter deficiency (CTD) has been diagnosed	<p>CTD (also called <i>SLC6A8</i> deficiency or CRTR) is a rare x-linked, recessive, inherited inborn error of creatine metabolism. CTD is classified as an autism spectrum disorder and a form of x-linked mental retardation; it is also 1 of 3 general cerebral creatine deficiency syndromes. CTD is caused by a defect in the <i>SLC6A8</i> gene that encodes the transporter protein necessary for transporting creatine across cell membranes and the blood-brain barrier. This defect results in deficient creatine levels in the brain. Male patients with CTD exhibit autistic behavior, epilepsy, and severe developmental delays, including speech delays and intellectual disability. Female CTD patients may be asymptomatic or exhibit mild behavioral problems and learning problems. CTD also represents the 2nd-largest cause of autism, after fragile X syndrome. No approved treatments exist for CTD. Cyclocreatine (LUM-001), a repurposed small-molecule analogue of creatine, purportedly treats CTD by providing a source of biofunctional creatine capable of crossing the blood-brain barrier. The drug was previously studied under an investigational new drug application for intravenous use in a solid tumor indication. Cyclocreatine is administered orally to patients with CTD.</p> <p>Lumos Pharma, Austin, TX</p> <p>FDA granted orphan drug status Jul 2012; company has not registered clinical trials yet; Lumos Pharma is required to repeat some preclinical studies in an oral formulation</p>	No approved or investigational treatments have been demonstrated effective in treating patients with CTD	<p>Increased cerebral creatine levels</p> <p>Reduced autistic behaviors</p> <p>Reduced intellectual and speech disabilities</p> <p>Improved patient quality of life</p>	Further searches by the horizon scanning team found that although this agent has FDA orphan drug status, human clinical trials have not yet begun; thus, it does not meet criteria for tracking in the horizon scanning system.

Table 37. AHRQ Priority Condition: 07 Diabetes Mellitus: 0 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason

Table 38. AHRQ Priority Condition: 08 Functional Limitations and Disability: 7 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Balloon angioplasty and/or stenting of azygos and internal jugular vein for treatment of multiple sclerosis	Patients with multiple sclerosis (MS) who exhibit evidence of chronic cerebrospinal venous insufficiency (CCSVI)	<p>Current treatments for MS may slow disease progression, but they are not effective in all patients, and the disease has no cure. CCSVI, in particular stenotic and occlusive lesions in the azygos and internal jugular veins, is hypothesized to play a role in the cause, disease progression, and pathogenesis of MS. Image-guided interventional endovascular management is a procedure in which an interventional radiologist performs percutaneous transluminal angioplasty using an angioplasty balloon and/or stent to improve circulation and reduce hypoperfusion of brain parenchyma to relieve MS symptoms.</p> <p>1st reported by University of Ferrara, Italy University of British Columbia, Canada</p> <p>Procedure uses existing technologies; in early diffusion in Europe and U.S.; 1 phase II Canadian and 1 phase III Italian trial recruiting; other trials ongoing; FDA issued safety warning in May 2012 about performing procedure outside of clinical trial setting</p>	Dimethyl fumarate (Tecfidera®) Fingolimod Glatiramer acetate Interferon beta-1a Interferon beta-1b Mitoxantrone Natalizumab	Improved cognitive and motor function Reduced relapse Reduced lesions on imaging Improved quality of life	Tracked more than 2 years; diffusion in U.S. has not occurred because of FDA warning about not using this procedure; development/progress appears minimal.
Dimethyl fumarate (Tecfidera) for treatment of relapsing multiple sclerosis	Patients in whom relapsing forms of multiple sclerosis (MS) have been diagnosed	<p>Current treatments for MS may slow disease progression, but they are not effective in all patients, and the disease has no cure. Dimethyl fumarate (BG-12, Tecfidera®) is a fumaric acid ester (FAE) that purportedly reduces peripheral CD4+ and CD8+ T lymphocytes because FAE can induce apoptosis. Dimethyl fumarate purportedly represents a novel mechanism of action through modulating the Nrf-2 pathway and mediating neuroprotective and anti-inflammatory effects. Reported results suggest that the safety profile of dimethyl fumarate may allow combination dosing. In clinical trials, dimethyl fumarate is administered orally, 120 mg, twice daily for 7 days followed by a maintenance dosage of 240 mg, twice daily.</p> <p>Biogen Idec International GmbH, Zug, Switzerland</p> <p>FDA approved Mar 2013 for treating relapsing forms of MS; phase IV trials ongoing</p>	Fingolimod Glatiramer acetate Interferon beta-1a Interferon beta-1b Mitoxantrone Natalizumab	Reduced frequency of relapse Reduced symptom severity Slowed disease progression Improved quality of life	Tracked 2 years after FDA approval; has diffused widely and is a market-share leader for this indication; no longer meets horizon scanning criteria for tracking.

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
<p>Intensive voice and speech therapy program (LSVT LOUD) for treatment of speech and voice disorders in Parkinson's disease</p>	<p>Patients in whom Parkinson's disease (PD) has been diagnosed</p>	<p>Up to 1 million Americans have PD, and about 60,000 new cases are diagnosed yearly. Studies have shown that as many as 90% of patients with PD will develop dysarthria or another vocalization disorder (including hypophonia, or "soft speech") during the course of the disease; symptoms of dysarthria include abnormal vocal levels and tones, along with articulation and fluency issues. Severe forms of dysarthria can cause significant functional limitations, as patients may be unintelligible in social and caregiving environments. Noninvasive approaches to treating PD-related speech and voice disorders are ideal, but evidence for consistent efficacy, even among existing interventions, is often lacking. LSVT LOUD® therapy is an intensive, noninvasive, voice and speech therapy program that treats speech and voice disorders in PD by focusing on vocal amplitude training and self-perceived loudness recalibration using multiple speech tasks. In clinical trials, LSVT LOUD therapy is conducted by experienced therapists across 1-hour sessions, administered 4 times a week for 4 weeks.</p> <p>LSVT Global, Inc., Tucson, AZ</p> <p>No registered clinical trials ongoing</p>	<p>Alternative intensive voice therapy Standard speech and language therapy (SLT)</p>	<p>Increased speech volume Improved vocalization and articulation Reduced dysarthria-related functional limitations Improved quality of life</p>	<p>Further searches by the horizon scanning team found that LSVT LOUD is diffused and was developed over the past 20 years.</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Off-label oral ketotifen for treatment of fibromyalgia	Patients in whom fibromyalgia (FM) has been diagnosed	<p>FM is poorly understood and current treatment options are not effective for many patients. Increased numbers of mast cells have been observed in the skin biopsies of patients with FM. Mast cells are powerful inflammatory cells that can release chemokines and other chemical mediators, triggering inflammation and pain in the local area. Elevated levels of these mediators can be observed in the serum of patients with FM. Available FM treatments target only centrally acting pain pathways and neglect the potential for immunologic involvement in symptoms. Ketotifen is purportedly an antihistamine and mast cell stabilizer, which prevents mast cell degranulation (release of inflammatory mediators) and might improve FM symptoms. In clinical trials, ketotifen is administered orally as a 1 mg tablet, once or twice daily.</p> <p>Indiana University, Indianapolis, IN</p> <p>Phase III trial registered, but status unknown; approved for preventing asthma attacks and as eye drops for allergic pinkeye</p>	<p>Behavior and lifestyle modification Drugs: Duloxetine Fluoxetine Gabapentin Lorazepam Milnacipran Pregabalin Tricyclic antidepressants</p>	<p>Improved ability to perform daily activities Reduced pain symptoms Improved quality of life</p>	<p>After tracking more than 18 months, development appears to be halted: searches of trial sponsor's Web site and clinicaltrials.gov found no development since mid-2012 or published literature and abstracts of any results from the registered pilot trial.</p>
Off-label simvastatin for treatment of multiple sclerosis	Patients in whom secondary progressive multiple sclerosis (SPMS) has been diagnosed	<p>Current treatments for SPMS may slow disease progression, but they are not effective in all patients, and the disease has no cure. Simvastatin is a statin purported to have anti-inflammatory and neuroprotective effects on the nervous system, including increased endothelial nitric oxide synthase activity, reduced excitotoxicity, and augmented remyelination, which could counter the effects of autoreactive lymphocytes in patients with SPMS. In clinical trials, simvastatin is administered orally at a dosage of 80 mg, daily, as a monotherapy (for treating SPMS) or an adjunct to interferon beta-1a (for treating relapsing remitting MS [RRMS]).</p> <p>AstraZeneca, London, UK (branded simvastatin manufacturer) Imperial College London, London, England (clinical trial sponsor) University of North Carolina, Chapel Hill, NC (clinical trial sponsor)</p> <p>Phase II (SPMS) and phase IV trial (RMMS) completed</p>	<p>Interferon beta-1a Interferon beta-1b Mitoxantrone Natalizumab</p>	<p>Delayed disease progression Reduced symptoms Improved quality of life</p>	<p>Tracked 18 months; registered trials for treating SPMS and RRMS were completed in 2011; a 2013 meta-analysis reported simvastatin had limited efficacy for treating MS; no further developments have been evident since 2011. Additionally, no manufacturers appear to be pursuing expanded indications.</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Progesterone infusion (BHR-100) for treatment of acute traumatic brain injury	Patients in whom acute traumatic brain injury (TBI) has been diagnosed	<p>Acute TBI can cause inflammation, excitotoxicity, apoptosis, and vasogenic and cytotoxic edema. No pharmacologic agent exists to improve outcomes of acute TBI. The standard care for acute TBI is managing intracranial pressure, often with surgery to reduce pressure. BHR-100 is progesterone in a 6% lipid emulsion. It reportedly upregulates several neurotrophic factors and promotes remyelination. It is intended for 1st-line, acute treatment of severe TBI. BHR-100 is administered as a continuous intravenous infusion for 120 hours, starting within 8 hours of injury. Initial loading dose is 0.71 mg/kg for 1 hour followed by 0.5 mg/kg/hr.</p> <p>BHR Pharma, an affiliate of Besins Healthcare, Bangkok, Thailand (manufacturer) EmZory University, Atlanta, GA (investigator), in collaboration with National Institute of Neurological Disorders and Stroke, Bethesda, MD</p> <p>Phase III trial ongoing; FDA granted orphan drug and fast-track statuses; EU granted orphan drug status</p>	Neurosurgery to relieve pressure on the brain	<p>Decreased brain swelling and need for surgery Downregulated inflammatory cascade Improved function Reduced cellular necrosis and apoptosis Improved quality of life</p>	Phase III trial halted due to futility when treatment showed no effect on patient outcomes compared with placebo.
Terlipressin (Lucassin) for reversal of hepatorenal syndrome type 1	Patients in whom hepatorenal syndrome type 1 (HRS-1) has been diagnosed	<p>HRS-1 is a rapid, progressive renal impairment with more than 80% mortality within 3 months. No U.S.-approved drugs for HRS-1 are available. Terlipressin is a synthetic vasopressin analog that acts as a systemic vasoconstrictor, mainly in abdominal circulation, which may improve renal blood flow and renal function in patients with HRS-1. Cumulative daily doses between 3 and 12 mg are under study. Given intravenously, in combination with albumin.</p> <p>Ikaria, Inc., Hampton, NJ, acquired by Madison Dearborn Partners, LLC, Chicago, IL</p> <p>Phase III completed; phase IV and unphased trials ongoing; FDA granted orphan drug, priority review, and fast-track statuses</p>	Liver transplantation Pharmacotherapy (e.g., dopamine, misoprostol, vasoconstrictors)	<p>Confirmed HRS-1 reversal Increased survival to time of transplantation Increased rates of transplant-free survival up to 90 days</p>	Phase III trial failed to meet primary endpoint; status unclear after sale of company.

Table 39. AHRQ Priority Condition: 09 Infectious Disease, Including HIV-AIDS: 8 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Anthrax antitoxin monoclonal antibody raxibacumab (ABthrax) for treatment of inhalation anthrax	Patients suspected of having inhaled anthrax spores	<p>Patients can be unaware that they have inhaled anthrax spores, leading to late treatment that may render antibiotics ineffective; treatments for later-stage inhalation anthrax are needed. Raxibacumab (ABthrax™) is a fully human, antitoxin, monoclonal antibody purported to treat inhalation anthrax by inhibiting the activity of the protective antigen of anthrax toxin, inhibiting the protein's ability to facilitate pathogenesis. In a clinical trial, raxibacumab was administered intravenously, 40 mg/kg, on days 0 and 14.</p> <p>Human Genome Sciences, Rockville, MD</p> <p>FDA approved Dec 2012 for treating adult and pediatric patients with inhalational anthrax infection due to <i>Bacillus anthracis</i> in combination with appropriate antibacterials and for prevention of inhalational anthrax when other therapies are not available or not appropriate</p>	Anthrax vaccine Antibiotics	Protection against inhalation anthrax Rapid resolution of symptoms	The U.S. Department of Defense has stockpiled the drug for use against bioterrorism acts; the topic no longer meeting horizon scanning criteria for tracking.
Antitoxin monoclonal antibody (MK-3415) for treatment of <i>Clostridium difficile</i> -associated diarrhea	Patients in whom <i>Clostridium difficile</i> -associated diarrhea has been diagnosed	<p>Recurrent <i>C. difficile</i> infection (CDI) is responsible for significant morbidity, mortality, and costs; recurrent CDI can be extremely resistant to treatment, and up to 60% of patients treated for recurrent CDI with antibiotics develop further recurrence after therapy is stopped. Options to relieve acute symptoms are needed. MK-3415 is a monoclonal antibody designed to block the activity of <i>C. difficile</i> toxin A, which is purportedly involved in CDI pathogenesis. In a clinical trial, MK-3415 was administered as a single intravenous infusion of 10 mg/kg.</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase III trial ongoing</p>	Fecal microbiota transplant Fidaxomicin Metronidazole Vancomycin	Increased clinical cure rates Reduced CDI recurrence	Manufacturer changed its plans and is now developing a combination actoxumab/bezlotoxumab (MK-3415A) for this indication and abandoning development of MK-3415.

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
<p>Antitoxin monoclonal antibody (MK-6072) for treatment of <i>Clostridium difficile</i>-associated diarrhea</p>	<p>Patients in whom <i>Clostridium difficile</i>-associated diarrhea has been diagnosed</p>	<p>Recurrent <i>C. difficile</i> infection (CDI) is responsible for significant morbidity, mortality, and costs; recurrent CDI can be extremely resistant to treatment, and up to 60% of patients treated for recurrent CDI with antibiotics develop further recurrence after therapy is stopped. Options to relieve acute symptoms are needed. MK-6072 is a monoclonal antibody designed to block the activity of <i>C. difficile</i> toxin B, which is purportedly involved in CDI pathogenesis. In a clinical trial, MK-6072 was administered as a single intravenous infusion of 10 mg/kg.</p> <p>Merck & Co., Inc., Whitehouse Station, NJ</p> <p>Phase III trials ongoing</p>	<p>Fecal microbiota transplant Fidaxomicin Metronidazole Vancomycin</p>	<p>Increased clinical cure rates Reduced CDI recurrence</p>	<p>Manufacturer is developing combination therapy actoxumab/bezlotoxumab (MK-3415A) for this indication and has abandoned development of MK-6072.</p>
<p>Hand washing monitoring system (Biovigil) to reduce health care-associated infections</p>	<p>Patients attending health care facilities</p>	<p>Hospital-acquired infections (HAIs) are the 4th leading cause of death in the U.S., behind heart disease, stroke, and cancer; nearly 1 in every 20 hospitalized U.S. patients acquires an HAI, resulting in 100,000 deaths each year. Hand-washing adherence by health care workers is only about 40% in many health care settings, leading to transmission of dangerous and costly infections. Many health care workers have purportedly expressed the opinion that because they are frequently exposed to infections, they are more immune and, thus, do not wash their hands. The Biovigil hand hygiene system reminds, records, reassures, and reports: It reminds the health care worker to wash his or her hands, records the presence of hand sanitizer, reassures the patient of proper hand hygiene with a visual cue, and reports the data to a base station.</p> <p>BIOVIGIL Hygiene Technologies, LLC, Ann Arbor, MI</p> <p>System is available for use</p>	<p>Radiofrequency identification hand-washing systems Standard hand-washing practices</p>	<p>Increased hand hygiene compliance Reduced HAI incidence Reduced HAI morbidity and mortality Reduced health care costs associated with HAIs</p>	<p>Further searches by horizon scanning team determined Biovigil has only incremental potential benefit relative to other RFID systems for this indication; no trials have been performed to evaluate effect of Biovigil on HAI rate.</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Invariant chain-Key-based hybrid technology vaccine for prevention of Ebola virus infection	Patients at risk of contracting Ebola virus disease (EVD)	<p>EVD has a 50% mortality rate. It is caused by a virus of the family <i>Filoviridae</i>, genus <i>ebolavirus</i>. Of 5 identified Ebola virus species, 4 are known to cause disease in humans: Ebola virus (<i>Zaire ebolavirus</i>); Sudan virus (<i>Sudan ebolavirus</i>); Taï Forest virus (<i>Taï Forest ebolavirus</i>, formerly <i>Côte d'Ivoire ebolavirus</i>); and Bundibugyo virus (<i>Bundibugyo ebolavirus</i>). Treatment is optimal supportive care. No FDA-approved treatments exist for EVD, but several agents are being given through FDA's compassionate use program, depending on availability. The manufacturer produces vaccines with proprietary li-Key hybrid technology that uses a peptide fragment derived from the invariant chain (li) linked to CD4+ T-cell epitopes from the Ebola virus. These hybrid peptides purportedly induce efficient antigen presentation and strong CD4+ T-cell responses, which are purportedly required for developing protective antibody responses against Ebola virus. The vaccine could be delivered as an oral mist and may be administered with other vaccines designed to induce antibodies against the Ebola virus.</p> <p>Generex Biotechnology Corp., Toronto, Ontario, Canada Antigen Express, Inc., Worcester, MA</p> <p>In preclinical development</p>	Convalescent serum (plasma from patients who have recovered from EVD) Supportive care	Increased symptom resolution Reduced mortality	Although the company stated its technology could be used to develop an Ebola vaccine, it does not appear to be pursuing such a vaccine.

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
<p>Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry device (MALDI Biotyper) for detection of microbial infections</p>	<p>Patients in whom bacterial infection is suspected</p>	<p>Often patients with suspected infection pose challenges for clinicians, including deciding when to provide or withhold therapy and length of treatment course, distinguishing infectious from noninfectious illness, identifying the etiologic agent, and assessing disease severity and response to therapy. Better methods to diagnose and guide judicious therapy are needed. The MALDI Biotyper™ purportedly uses high throughput matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) mass spectrometry to guide infection diagnosis and monitoring. It purportedly takes less time than conventional culture and biochemical testing to identify bacteria. The MALDI Biotyper system is purported to be capable of identifying more than 4,600 microbial isolates from gram-negative or gram-positive bacteria, yeasts, multicellular fungi, and mycobacteria. For sample preparation, a portion of an isolated colony is placed onto a target plate, covered with a chemical matrix, and loaded into the instrument. The sample is pulsed by a laser, converting the sample into an ionic gas composed of small proteins, peptides, and other molecules. In the ionization chamber, positively charged molecules move through an electric field at a rate based on their mass-to-charge ratios. Each organism has a unique rate signature, which can be compared by the device with reference spectra in the MALDI Biotyper library, leading to rapid identification. Additionally, the device allows users to generate their own database entries to include regional isolates. The device is purportedly capable of running high-throughput workflow and could be automated. Once the instrument is loaded, identifications can typically be performed in less than 1 minute, compared with hours to days for conventional methods. The device requires minimal sample preparation and offers low consumables cost.</p> <p>Bruker Corp., Billerica, MA</p> <p>Nov 2013, FDA granted 510(k) marketing approval for MALDI Biotyper CA system for identifying gram negative bacteria</p>	<p>Culture methods Microscopy Polymerase chain reaction</p>	<p>Rapid disease detection Fewer cases of antibacterial resistance Improved treatment outcomes</p>	<p>MALDI Biotyper is intended to be used in clinical microbiology laboratories and not as a point-of-care test. Additionally, the test is used in combination with existing testing methods to identify pathogenic organisms, so offers only incremental difference. Topic no longer meets horizon scanning criteria for tracking.</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Off-label maraviroc (Selzentry) for prevention of HIV infection	People at high risk of contracting HIV infection	<p>HIV remains a chronic illness resulting in high morbidity and mortality in the absence of curative treatments. HIV-drug resistance, high lifelong cost of therapy, and adverse events continue to suggest that prophylactic HIV measures be pursued for individuals at high risk of contracting such an infection. Maraviroc (Selzentry®) is a chemokine (C-C motif) receptor-5 (CCR-5) antagonist. CCR-5 is expressed on the surface of T cells and has been identified as 1 of the 2 co-receptors needed for HIV to enter host cells. By preventing HIV from entering T cells, maraviroc could prevent HIV infection; thus, the drug is considered an entry inhibitor. For this indication, it is intended to be used as preexposure prophylaxis for people at high risk of contracting an HIV infection. Administered orally, 300 mg, once daily.</p> <p>ViiV Healthcare, Middlesex, UK</p> <p>Phase II trial ongoing; FDA approved for treating CCR-5-tropic HIV-1 infection in combination with other antiretroviral agents</p>	Condoms Harm-reduction campaigns Preexposure prophylaxis (tenofovir/emtricitabine)	Reduced transmission and incidence of HIV Reduced morbidity and mortality	Maraviroc is incremental to FDA-approved emtricitabine/tenofovir for pre-exposure prophylaxis for HIV infection; no longer meets horizon scanning criteria for tracking.
Tenofovir gel 1% for prevention of HIV transmission	Women who are sexually active	<p>HIV remains a chronic illness resulting in high morbidity and mortality in the absence of effective treatments; HIV drug resistance, poor tolerance to existing treatments, and high lifelong cost of therapy continue to suggest that prophylactic HIV measures be pursued for individuals who are not infected with the virus. Tenofovir 1% gel is a topical formulation of the nucleotide reverse transcriptase inhibitor tenofovir that is intended to inhibit reverse transcription, an essential part of the viral life cycle, Women apply the gel vaginally 12 hours or less before they anticipate having sexual intercourse and within 12 hours after sexual intercourse.</p> <p>International Partnership for Microbicides, Silver Spring, MD Gilead Sciences, Inc., Foster City, CA</p> <p>Phase III trial ongoing; FDA granted fast-track status</p>	Condoms Harm reduction campaigns Pre-exposure prophylaxis with antiretrovirals	Reduced HIV transmission	Tracked more than 2 years; International Partnership for Microbicides appears to be shifting development focus to vaginal dapivirine gel or ring for preventing HIV; no longer meets horizon scanning criteria for tracking.

Table 40. AHRQ Priority Condition: 10 Obesity: 0 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason

Table 41. AHRQ Priority Condition: 11 Peptic Ulcer Disease and Dyspepsia: 2 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
<i>Andrographis paniculata</i> extract (HMPL-004) for treatment of ulcerative colitis	Patients in whom ulcerative colitis (UC) has been diagnosed	<p>Patients with UC have abnormally and chronically activated immune systems in the absence of any known invader, leading to periodic bouts of abdominal pain, diarrhea, and rectal bleeding. UC is typically treated with anti-inflammatory drugs with varied success, and investigators have not found a long-term cure or strategy besides surgery to prevent periodic disease flares. HMPL-004 is derived from the <i>Andrographis paniculata</i> plant. The extract purportedly inhibits multiple cellular targets including specific tumor necrosis factors (TNFs) and interleukin cytokines. HMPL-004 also purportedly inhibits the activation of specific cellular proteins associated with inflammation. Specific cytokine inhibition is thought to disrupt the inflammatory signal transduction pathway, thus suppressing UC. HMPL-004 purportedly is associated with fewer adverse events than available inflammatory cytokine inhibitors. In clinical trials, it has been administered orally, twice daily, in doses of 400 or 600 mg.</p> <p>Hutchison MediPharma, Ltd., Shanghai, China</p> <p>Phase III trial ongoing</p>	<p>Aminosalicylates (mesalazine)</p> <p>Antibiotics (for acute flares)</p> <p>Corticosteroids (e.g., prednisone)</p> <p>Immunomodulators (e.g., azathioprine)</p> <p>Monoclonal antibodies (e.g., natalizumab, infliximab)</p>	<p>Improved clinical response</p> <p>Reduced flare symptoms</p> <p>Reduced or postponed need for surgery</p> <p>Improved quality of life</p>	<p>Manufacturer terminated multiple phase III trials and halted development for this indication.</p>

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Teduglutide (Gattex) for treatment of short bowel syndrome	Patients in whom short bowel syndrome (SBS) has been diagnosed	<p>SBS typically arises after extensive resection of the bowel because of Crohn’s disease and is a highly disabling condition that can lead to serious, life-threatening complications as well as malnutrition, severe diarrhea, dehydration, fatigue, osteopenia, and weight loss due to the reduced intestinal absorption. Available treatments supplement and stabilize nutritional needs; however, parenteral support does not improve absorption of nutrients and is associated with infections, blood clots, liver damage, poor quality of life, and high costs. Teduglutide (Gattex™) is a recombinant analogue of human glucagon-like peptide 2 that purportedly increases nutrient absorption and intestinal cell growth in patients with SBS. Gattex is a self-administered injectable given once daily at a dose of 0.05 mg/kg.</p> <p>NPS Pharmaceuticals, Inc., Bedminster, NJ</p> <p>FDA approved Dec 2012 for treating SBS</p>	Intravenous fluids Parenteral nutrition	Improved hydration Improved nutritional status Weight gain Reduced diarrhea Improved quality of life	Tracked for 2 years after FDA approval; no longer meets horizon scanning criteria for tracking.

Table 42. AHRQ Priority Condition: 12 Pregnancy, Including Preterm Birth: 0 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason

Table 43. AHRQ Priority Condition: 13 Pulmonary Disease, Asthma: 1 Intervention

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Temperature-controlled laminar air-flow device (Airsonett) for treatment of atopic asthma	Patients in whom atopic asthma has been diagnosed	<p>Despite pharmaceutical treatment and lifestyle modification, many patients continue to have difficulty controlling asthma symptoms. Airsonett is a temperature-controlled laminar air-flow device that is positioned over the patient while he or she sleeps. The device purportedly creates a downward flow of filtered air that surrounds the sleeping patient's breathing zone with the intention of providing air in convection currents that is free of allergens and irritants.</p> <p>Airsonett AB, Ängelholm, Sweden</p> <p>Phase III trials completed</p>	<p>Air purifiers Antiallergenic pillow/mattress encasements Home heating, ventilation, and air conditioning systems</p>	<p>Reduced asthma symptoms Improved peak nasal inspiratory flow Improved sleep quality Improved quality of life</p>	<p>Phase III trials have been completed with no clear U.S. regulatory strategy; no longer meets horizon scanning criteria for tracking.</p>

Table 44. AHRQ Priority Condition: 14 Substance Abuse: 0 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason

Table 45. AHRQ Priority Condition: 15 Cross-Cutting: 2 Interventions

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
Senior-specific emergency departments for treatment of elderly patients	Senior or elderly patients who visit an emergency department (ED)	<p>20% of all seniors use an ED at least once a year, and half of all ED patients are seniors. General EDs can be uncomfortable or unsafe for elderly patients, and risk of hospital readmission and drug interactions are high in this population. Additionally, EDs do not always have access to geriatrician staff members. EDs for seniors are designed specifically for the elderly population. Structural, safety, and comfort changes include wider hallways (for wheelchairs), hand rails, different lighting systems, easier-to-read visuals, pressure-reducing beds, and alarms for wandering patients. Care teams and care delivery are redesigned to include clinicians and nurses with special training in geriatric medicine, including education on issues related to ageism and sensory appreciation in the elderly (so that these skills can be used to communicate more effectively with older adults and their caregivers). The different approach to care involves being more thorough with each patient and conducting on a routine basis assessments that typically are made only as needed (e.g., cognitive exams to detect issues that normally would go unchecked in other EDs).</p> <p>Senior-specific EDs have been opened across the U.S.</p> <p>1st senior-specific ED launched in 2008; about 50 senior-specific EDs exist and at least 150 are in development in U.S.; multigroup task force released Geriatric Emergency Department Guidelines in Jan 2014</p>	General EDs	Improved health outcomes for seniors Improved quality of life	Tracked nearly 2 years and is diffusing broadly in U.S., as evidenced by release of implementation guidelines for these EDs and implementation of senior-specific EDs by many health systems.

Topic Title	Potential Patient Population	Intervention Developer/Manufacturer(s) Phase of Development	Potential Comparators	Potential Health or Other Impacts	Reason
<p>Wireless monitoring program (Care Beyond Walls and Wires) for rural patients with chronic conditions</p>	<p>Patients with chronic conditions who have been recently discharged from the hospital and who live in rural areas</p>	<p>Up to 1/2 of patients with heart failure discharged from the hospital are rehospitalized within 3–6 months. Reasons for this include not taking medications as prescribed, improper diet, lack of awareness of heart failure signs, and lack of planned followup with a doctor. These issues are particularly salient for rural populations, such as Native Americans, who often don't have access to cars or other transportation, running water, or electricity. The Care Beyond Walls and Wires program is intended to overcome these barriers and reduce hospital readmissions. The program uses smart phones and in-home monitoring equipment to collect data on weight, blood pressure, activity, and other important health indicators and transfer the data to nurses at a medical center. The nurses monitor the data daily and work with physicians to detect declines in a patient's health status and intervene early, potentially reducing unnecessary travel, physician office visits, costs, and hospital readmissions. The cell phones and monitoring equipment are donated by manufacturers. Rural residents without electricity use solar-powered batteries. Patients are enrolled in the program for at least 31 days.</p> <p>Flagstaff Medical Center, Flagstaff, AZ, as part of a National Institutes of Health public-private partnership</p> <p>50-patient trial completed Apr 2013</p>	<p>In-person patient-monitoring visits Kiosk monitoring programs</p>	<p>Fewer office visits and hospital readmissions Improved patient monitoring Improved patient outcomes Reduced costs</p>	<p>Further research by the horizon scanning team identified availability of programs in all geographic regions and literature extending back several years, indicating broad diffusion.</p>