Drug Therapy for Psoriatic Arthritis in Adults: Update of a 2007 Report
Comparative Effectiveness Review
Number 54

Drug Therapy for Psoriatic Arthritis in Adults:
Update of a 2007 Report

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Errata: Tables 2, 3, and 4 have been corrected

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This report is based on research conducted by the RTI International–University of North Carolina (RTI–UNC) Evidence-based Practice Center under contract to the Agency for Healthcare Research and Quality (AHRQ), Rockville, MD (Contract No. HHSA-290-2007-10056-I). 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.

The information in this report is intended to help healthcare decisionmakers—patients and clinicians, health system leaders, and policymakers, among others—make well-informed decisions and thereby improve the quality of health care services. This report is not intended to be a substitute for the application of clinical judgment. Anyone who makes decisions concerning the provision of clinical care should consider this report in the same way as any medical reference and in conjunction with all other pertinent information, i.e., in the context of available resources and circumstances presented by individual patients.

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

Preface

The Agency for Healthcare Research and Quality (AHRQ) conducts the Effective Health Care Program as part of its mission to organize knowledge and make it available to inform decisions about health care. As part of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, Congress directed AHRQ to conduct and support research on the comparative outcomes, clinical effectiveness, and appropriateness of pharmaceuticals, devices, and health care services to meet the needs of Medicare, Medicaid, and the Children’s Health Insurance Program (CHIP).

AHRQ has an established network of Evidence-based Practice Centers (EPCs) that produce Evidence Reports/Technology Assessments to assist public- and private-sector organizations in their efforts to improve the quality of health care. The EPCs now lend their expertise to the Effective Health Care Program by conducting comparative effectiveness reviews (CERs) of medications, devices, and other relevant interventions, including strategies for how these items and services can best be organized, managed, and delivered.

Systematic reviews are the building blocks underlying evidence-based practice; they focus attention on the strength and limits of evidence from research studies about the effectiveness and safety of a clinical intervention. In the context of developing recommendations for practice, systematic reviews are useful because they define the strengths and limits of the evidence, clarifying whether assertions about the value of the intervention are based on strong evidence from clinical studies. For more information about systematic reviews, see http://www.effectivehealthcare.ahrq.gov/reference/purpose.cfm

AHRQ expects that CERs will be helpful to health plans, providers, purchasers, government programs, and the health care system as a whole. In addition, AHRQ is committed to presenting information in different formats so that consumers who make decisions about their own and their family’s health can benefit from the evidence.

Transparency and stakeholder input from are essential to the Effective Health Care Program. Please visit the Web site (www.effectivehealthcare.ahrq.gov) to see draft research questions and reports or to join an email list to learn about new program products and opportunities for input. Comparative Effectiveness Reviews will be updated regularly.

We welcome comments on this CER. They may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by email to epc@ahrq.hhs.gov.

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Structured Abstract

Objectives. To compare the benefits and harms of corticosteroids and oral and biologic disease-modifying antirheumatic drugs (DMARDs) for adults with psoriatic arthritis (PsA).

Data Sources. English language articles from 1980 to February 2011 identified through PubMed, Embase, Cochrane Library and International Pharmaceutical Abstracts; unpublished literature including dossiers from pharmaceutical companies.

Methods. Two people independently selected relevant head-to-head trials of any sample size, observational studies with at least 100 participants, and relevant good- or fair-quality meta-analyses that compared benefits or harms of 14 drug therapies. Observational studies were included only for harms. For biologic DMARDs, placebo-controlled, double-blind randomized controlled trials (RCTs) also were included. We required trials and observational studies to be at least 12 weeks in duration. Literature was synthesized qualitatively within and between the two main drug classes (oral and biologic DMARDs).

Results. No head-to-head controlled trials meeting inclusion criteria existed for any drugs in this review for treating patients with PsA. The available evidence was limited to two head-to-head cohort studies and placebo-controlled trials. For oral DMARDs, including sulfasalazine and methotrexate, the sparse data available involved placebo comparisons. For biologic DMARDs, evidence supported the efficacy of adalimumab, etanercept, golimumab, and infliximab for the treatment of PsA when compared with placebo. Qualitatively, these biologic DMARDs appeared to achieve similar improvements in disease activity, functional capacity, and health-related quality of life (American College of Rheumatology 20 percent improvement from baseline to endpoint, Health Assessment Questionnaire, and Short Form 36 Physical Component scores) in these trials. No difference in treatment response was found between the combination of an anti-tumor necrosis factor (TNF) (adalimumab, etanercept, or infliximab) with methotrexate compared with anti-TNF only. Evidence was insufficient to draw conclusions about the comparative harms for oral DMARDs. Among biologics, low evidence indicated that etanercept had a lower rate of withdrawals due to adverse events compared with infliximab. Compared with placebo, adalimumab and etanercept had more injection site reactions and adalimumab had few events of aggravated psoriasis. No comparative evidence was identified for subgroups.

Conclusions. Overall, the data are quite limited and the evidence is insufficient to draw firm conclusions on comparative efficacy, effectiveness, and harms of either oral or biologic DMARDs for PsA. This report’s findings did not reveal any differences with current standard of care. Head-to-head (RCTs) are needed to establish the comparative efficacy and safety of different treatments with and without corticosteroids, oral DMARDs, and biologic DMARDs, to determine the best therapy to prevent or minimize debilitating joint damage and optimize quality of life for people with PsA.
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Executive Summary

Background

Psoriatic arthritis (PsA) is among the most disabling forms of arthritis, even though it affects fewer people than other types of arthritis. PsA has a highly variable presentation, which generally involves pain and inflammation in joints and progressive joint involvement and damage. The condition is associated with the skin disease psoriasis, but not all people with psoriasis will develop PsA. Additionally, PsA may predate the development of skin disease, leading to some diagnostic uncertainty. Among people with psoriasis, the prevalence of arthritis varies from 6 percent to 42 percent. In the general population, the prevalence of PsA is estimated to be 0.3 percent to 1 percent. Based on estimates from the 2000 U.S. Census, 520,000 people ages 18 or older in the United States have PsA.

Treatment of patients with PsA aims to control pain and inflammation and, ultimately, to slow the progression of joint destruction and disability. Available therapies for PsA include corticosteroids, oral disease-modifying antirheumatic drugs or DMARDs (hydroxychloroquine, leflunomide, methotrexate [MTX], and sulfasalazine), and biologic DMARDs. Five biologics (adalimumab, certolizumab pegol, etanercept, golimumab, and infliximab) are also classified as antitumor necrosis factor (anti-TNF) drugs. The U.S. Food and Drug Administration (FDA) has approved adalimumab, etanercept, golimumab, and infliximab for use in patients with PsA. This report also reviews evidence for abatacept, anakinra, certolizumab, rituximab, and tocilizumab, which are approved for rheumatoid arthritis (RA).

Historically, few trials have been conducted with patients having PsA, with only minimal research before biologic agents were introduced; management options tended to be adapted from RA trial evidence. Similar to RA trials, many questions remain about the risks of these agents across a spectrum of adverse events from relatively minor side effects such as injection-site reactions to severe and possibly life-threatening problems such as severe infections or infusion reactions.

Experts have not arrived at a consensus about the comparative effectiveness of corticosteroids, oral DMARDs, and biologic DMARDs for treating PsA. More importantly, it is unclear how the effectiveness and safety of different types of combination therapy compare. In addition, there is debate about how early in the disease process combination therapy should be initiated and whether patients will respond to a biologic agent if they have previously failed a different biologic agent. Finally, very little is known about the benefits or risks of these drugs in different patient subgroups, including ethnic minorities, the elderly, pregnant women, and patients with other comorbidities.

Objectives

This report summarizes the evidence on the comparative efficacy, effectiveness, and harms of corticosteroids, oral DMARDs, and biologic DMARDs in the treatment of patients with PsA. This report updates a previous version published in 2007. The Key Questions (KQs) are as follows:

**KQ 1:** For patients with PsA, do drug therapies differ in their ability to reduce disease activity, to slow or limit the progression of radiographic joint damage, or to maintain remission?
KQ 2: For patients with PsA, do drug therapies differ in their ability to improve patient-reported symptoms, functional capacity, or quality of life?

KQ 3: For patients with PsA, do drug therapies differ in harms, tolerability, patient adherence, or adverse effects?

KQ 4: What are the comparative benefits and harms of drug therapies for PsA in subgroups of patients based on stage of disease, prior therapy, demographics, concomitant therapies, or comorbidities?

Analytic Framework

Figure A lays out the analytic framework that guided the research.

Methods

A Technical Expert Panel was employed for the finalization of the KQs and review of the planned analysis strategy. Our KQs and protocol were posted on the AHRQ Web site for public review and comment. Two reviewers performed an external peer review; one a leading expert in psoriatic arthritis and one a faculty member in clinical epidemiology and informatics as well the project director for the Oregon Health and Science University’s Drug Effectiveness Review Project reports. The report was also posted for public review. We compiled all comments and addressed each one individually, revising the text as appropriate.

We searched MEDLINE®, Embase, the Cochrane Library, and the International Pharmaceutical Abstracts to identify relevant articles. We limited the electronic searches to “human” and “English language.” For this update, the searches went up to January 2011. Hand searches were conducted on the Center for Drug Evaluation and Research (CDER) database of the FDA and unpublished literature, including dossiers from pharmaceutical companies.

Study eligibility (inclusion and exclusion) criteria were designed with respect to study design or duration, patient population, interventions, outcomes, and comparisons for each KQ. For efficacy and effectiveness, we focused on head-to-head trials and prospective cohort studies.
comparing one drug with another. For biologic DMARDs, we also included placebo-controlled, double-blind RCTs. For harms and tolerability, as well as for efficacy and effectiveness in subgroups, we included head-to-head trials, high-quality systematic reviews, and observational studies. We included studies with sample sizes of at least 100 and duration of at least 3 months. We included only studies that used doses within the recommended dosing range or that used doses that could be considered equivalent to recommended doses.

Two individuals independently reviewed abstracts identified by searches. If both reviewers agreed that a study did not meet eligibility criteria, we excluded it. We obtained the full text of all remaining articles. Two individuals again independently reviewed the full text of all remaining articles to determine whether they should be included.

We designed and used a structured data abstraction form to ensure consistency of appraisal for each included study. Trained reviewers abstracted data from each study. A senior reviewer evaluated the completeness of each data abstraction.

We rated the quality of individual studies using the predefined criteria based on those developed by the U.S. Preventive Services Task Force (ratings: good, fair, poor) and the National Health Service Centre for Reviews and Dissemination. Two independent reviewers assigned quality ratings. They resolved any disagreements by discussion and consensus or by consulting with a third reviewer. We gave a good-quality rating to studies that met all criteria. We gave a poor-quality rating to studies that had a fatal flaw (defined as a methodological shortcoming that leads to a very high risk of bias) in one or more categories and excluded them from our analyses.

We synthesized the literature qualitatively. We graded the strength of evidence as high, moderate, low, or insufficient based on methods guidance for the EPC program. We graded strength of evidence for the outcomes determined to be most important: measures of disease activity (e.g., ACR 20/50/70, DAS), radiographic changes, functional capacity, quality of life, withdrawals due to adverse events, and specific adverse events if data were available (e.g., injection-site reactions, infections, malignancy).

Results

We identified 3,868 citations from our searches. We included 24 published articles reporting on 16 studies: 0 head-to-head randomized controlled trials, 0 head-to-head nonrandomized controlled trials, 10 placebo-controlled trials, 3 meta-analyses or systematic reviews, and 3 observational studies. Our findings included studies rated good or fair for internal validity. Most studies were of fair quality.

Our major findings are presented in this section by type of drug comparison and important outcomes (both benefits and harms as described in KQ 1, KQ 2, and KQ 3) (Table A). No comparative evidence was identified for KQ 4.

---

A American College of Rheumatology measure of disease activity: response scores based on 20, 50, or 70 percent criteria for improvement
<table>
<thead>
<tr>
<th>Key Comparisons</th>
<th>Efficacy and Effectiveness</th>
<th>Harms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strength of Evidence Grade</td>
<td>Grade</td>
</tr>
<tr>
<td><strong>Oral DMARDs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leflunomide</td>
<td>No head-to-head studies met inclusion criteria; unable to draw conclusions on the comparative efficacy of leflunomide and other treatments.</td>
<td>INSUFFICIENT</td>
</tr>
<tr>
<td></td>
<td>Compared with placebo in one study, leflunomide produced better improvement in health-related quality of life and statistically significant, but not clinically significant, improvement in disease activity and functional capacity.</td>
<td>LOW</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>No head-to-head studies met inclusion criteria; unable to draw conclusions on the comparative efficacy of MTX and other treatments.</td>
<td>INSUFFICIENT</td>
</tr>
<tr>
<td></td>
<td>Current evidence was limited to placebo-controlled trials. Compared with placebo in one fair study, MTX resulted in greater improvement in physician assessment of disease activity than placebo.</td>
<td>LOW</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>No head-to-head studies met inclusion criteria; unable to draw conclusions on the comparative efficacy of sulfasalazine and other treatments.</td>
<td>INSUFFICIENT</td>
</tr>
<tr>
<td></td>
<td>Current evidence was limited to placebo-controlled trials. Compared with placebo in one good systematic review study, sulfasalazine reduced disease activity.</td>
<td>MODERATE</td>
</tr>
<tr>
<td><strong>Biologic DMARDs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biologic DMARD + Oral DMARD vs. Biologic DMARD or Oral DMARD</td>
<td>The current evidence was limited to two cohort studies. Compared to anti-TNF monotherapy (adalimumab, etanercept, or infliximab), MTX plus anti-TNF produced similar disease activity response rates.</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>One systematic review of TNF inhibitors found that both TNF inhibitors and sulfasalazine are effective (similar withdrawals due to lack of efficacy); however, the data were insufficient to determine if the effect reached MCID.</td>
<td>INSUFFICIENT</td>
</tr>
</tbody>
</table>
### Table A. Summary of findings (continued)

<table>
<thead>
<tr>
<th>Key Comparisons</th>
<th>Efficacy and Effectiveness</th>
<th>Harms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biologic</td>
<td>No head-to-head trials met inclusion criteria; unable to draw conclusions on the comparative efficacy of biologics and other treatments.</td>
<td>Etanercept had a lower rate of withdrawals because of adverse events than infliximab in a prospective cohort study.</td>
</tr>
<tr>
<td></td>
<td>INSUFFICIENT</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>Compared with placebo, adalimumab, etanercept, golimumab, and infliximab led to greater improvement in disease activity, functional capacity(^a) and health-related quality of life.(^b)</td>
<td>Additional evidence was limited to placebo-controlled trials, where adverse events were not the primary outcome. Overall adverse event profiles appeared to be similar for biologic DMARDs and placebo. However, compared with placebo, we noted the following: adalimumab and etanercept had more injection-site reactions and adalimumab had fewer events of aggravated psoriasis than placebo.</td>
</tr>
<tr>
<td></td>
<td>LOW to MODERATE(^c)</td>
<td>LOW</td>
</tr>
</tbody>
</table>

ACR 20 = American College of Rheumatology 20 percent improvement from baseline to endpoint; ADA = adalimumab; DMARD =, disease-modifying antirheumatic drug; ETN = etanercept; INF = infliximab; LEF = leflunomide, MCID = minimal clinically important difference; MTX = methotrexate; PCS = physical component score; SF-36 = Medical Outcomes Study Short Form 36; SSZ = sulfasalazine; TNF = tumor necrosis factor

\(^a\)Of seven studies reporting outcomes for the Health Assessment Questionnaire (HAQ), the magnitude of benefit in functional capacity compared with placebo reached the MCID (HAQ change of \(\geq 0.22\)) for all but one study of adalimumab (which found a between-group difference of 0.2). \(^b\)The magnitude of benefit for functional capacity (between-group difference for improvement in HAQ) ranged from 0.2 to 0.3 for adalimumab, 0.5 to 1.1 for etanercept, 0.34 to 0.4 for golimumab, and 0.4 to 0.6 for infliximab.

\(^c\)The magnitude of benefit in quality of life reached the MCID for the SF-36 PCS for all five studies that reported the PCS and ranged from 2.9 to 7.9 for adalimumab, 8.6 for etanercept, 5.9 to 7.2 for golimumab, and 6.4 to 8 for infliximab.

Overall, the data are quite limited and the evidence is insufficient to draw firm conclusions on comparative efficacy, effectiveness, and harms of either oral or biologic DMARDs in this condition. Table B gives a range for effect sizes for commonly reported measures, including the American College of Rheumatology 20 percent improvement from baseline to endpoint (ACR 20), the Health Assessment Questionnaire (HAQ), and Medical Outcomes Study Short Form 36 Physical Component Score (SF-36 PCS). For the oral DMARDs, including sulfasalazine and methotrexate, sparse data are available.
Table B. Comparison of effect sizes* from placebo-controlled trials for ACR 20, HAQ, and SF-36 PCS by drug

<table>
<thead>
<tr>
<th>Drug</th>
<th>Studies/Participants</th>
<th>ACR 20 (% of Subjects Achieving)</th>
<th>HAQ (Mean Improvement)</th>
<th>SF-36 PCS (Mean Improvement)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oral DMARDs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leflunomide</td>
<td>1 RCT/ 190</td>
<td>36</td>
<td>0.14</td>
<td>NR</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>1 RCT/ 37</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>1 SER/ 1,022</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td><strong>Biologic DMARDs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adalimumab</td>
<td>2 RCTs/ 415</td>
<td>39 to 57</td>
<td>0.2 to 0.3</td>
<td>2.9 to 7.9</td>
</tr>
<tr>
<td>Etanercept</td>
<td>3 RCTs/ 633</td>
<td>59 to 65</td>
<td>0.5 to 1.1</td>
<td>8.6</td>
</tr>
<tr>
<td>Golimumab</td>
<td>1 RCT/ 405</td>
<td>45 to 51</td>
<td>0.34 to 0.4</td>
<td>5.9 to 7.2</td>
</tr>
<tr>
<td>Infliximab</td>
<td>2RCTs,1SER/ 673</td>
<td>58 to 62</td>
<td>0.4 to 0.6</td>
<td>6.4 to 8</td>
</tr>
</tbody>
</table>

ACR 20 = American College of Rheumatology 20 percent improvement from baseline to endpoint; HAQ = Health Assessment Questionnaire; PCS = physical component score; SF-36 = Medical Outcomes Study Short Form 36; RCT = Randomized controlled trial; SER = systematic evidence review

*Effect sizes represent the range of point estimates from individual studies for the absolute difference between drug and placebo. Minimally Clinically Important Differences (MCIDs): ACR 20 is 20% minimal improvement; ACR 50/70 considered more clinically significant; HAQ >=0.22 change, SF36 PCS>= 2 standard error of the mean (SEM).

Discussion

No head-to-head controlled trials meeting inclusion criteria existed for any drugs in this review for treating patients with PsA. Two cohort studies with low strength of evidence indicated that the combination of an anti-tumor necrosis factor (TNF) (adalimumab, etanercept, or infliximab) with methotrexate (MTX) only was not different in treatment response\(^5,6\) than treatment with anti-TNF only.

For the oral DMARDs, including sulfasalazine and methotrexate, the sparse data available involved placebo comparisons. For biologic DMARDs, evidence supported the efficacy of adalimumab, etanercept, golimumab, and infliximab for the treatment of PsA when compared to placebo.\(^7,17\) Qualitatively, these biologic DMARDs appeared to achieve similar ACR 20, HAQ, and SF-36 PCS scores in these trials (Table B). However, findings should be interpreted cautiously given these were not head-to-head trials. Evidence was insufficient to draw firm conclusions about the comparative efficacy, effectiveness, functional status, health-related quality of life, or tolerability of abatacept, adalimumab, anakinra, certolizumab, golimumab, etanercept, infliximab, rituximab, and tocilizumab for treating PsA.

Information generally was insufficient for the comparative harms, tolerability, adverse events, and adherence for patients with PsA. The available studies included two relatively small prospective cohort studies and placebo-controlled studies; no head-to-head studies meeting inclusion criteria have been published.

In terms of applicability to populations, the studies were generally multicenter involving adults with diagnosed PsA. Prior medications tried before these studies were variable, but in general patients had failed a DMARD prior to starting any of the biologic agents. It is also important to note that the diagnostic criteria for PsA before the 2006 publication of the CLASification of Psoriatic Arthritis (CASPAR) criteria were not validated, which could lead to enrollment of patients that were not explicitly defined.
This report’s findings did not reveal any differences with current standard of care. However, the current available evidence for PsA was limited. Several areas need further research to help clinicians and researchers arrive at stronger conclusions on the comparative efficacy, effectiveness, quality of life, and harms of medications for PsA. For this condition, the available evidence was limited to two head-to-head cohort studies and placebo-controlled trials. Head-to-head randomized controlled trials are needed to establish the comparative efficacy and safety of different treatments with and without corticosteroids, oral DMARDs, and biologic DMARDs to determine the best therapy to prevent or minimize debilitating joint damage and optimize quality of life for people with PsA. Furthermore, head-to-head RCTs are needed to determine the comparative effectiveness and safety of biologic DMARDs for treating PsA. More generally, the issues of effectiveness, subgroups, and use in ordinary clinical settings warrant attention for PsA.

Abbreviations

ACR  American College of Rheumatology  
AHRQ  Agency for Healthcare Research and Quality  
CASPAR  ClASsification of Psoriatic Arthritis  
DMARD  disease-modifying antirheumatic drug  
FDA  U.S. Food and Drug administration  
HAQ  Health Assessment Questionnaire  
MTX  methotrexate  
PsA  psoriatic arthritis  
RCT  randomized controlled trial  
SF-36 PCS  Short Form 36 Physical Functioning Scale

References


Introduction

Background

Arthritis and other rheumatic conditions constitute the leading cause of disability among United States (U.S.) adults, with more than 46 million Americans reporting doctor-diagnosed arthritis. Noninflammatory arthritic conditions (e.g., osteoarthritis) are most common, but inflammatory arthritides such as spondyloarthropathies (e.g., ankylosing spondylitis, psoriatic arthritis [PsA]), and reactive arthritis) and rheumatoid arthritis (RA) can be equally or more disabling.

Among patients with arthritis, the burden of disease is evidenced by decreased quality of life, decreased employment rates, and increased direct and indirect costs. In 2003, arthritis and other rheumatic conditions cost the United States $127.8 billion ($80.8 billion in medical care expenditures and $47.0 billion in lost earnings). Costs associated with PsA are not as well studied as costs associated with other arthritic conditions, although they are believed to be just slightly lower than those associated with RA. Indirect costs are believed to increase over time because as the disease progresses so does the loss of function and inability to work. Based on 1997 estimates for psoriasis and PsA, annual direct costs are approximately $650 million. Of these costs, hospitalizations accounted for $31 million, outpatient physician visits for $87 million, photochemotherapy for $27 million, dermatologic prescription drugs for $148 million, and over-the-counter medications for $357 million. These estimates do not include indirect costs, and the specific direct costs of PsA are not known.

Causes and Diagnosis

Psoriasis, a skin disease, affects 2.2 percent of U.S. adults; approximately 6 percent to 42 percent of patients with psoriasis develop PsA. Approximately 520,000 adults in the United States have PsA. PsA can develop at any age but most often appears between 30 and 50 years of age. Unlike RA, PsA appears to affect men slightly more often than women.

Clinically PsA is a multifaceted disease and may have skin presentations that help with its diagnosis. The presentation is highly variable. Patients with PsA can have moderate to severe involvement of skin and joints, and this combination can have profound effects on function and quality of life. In most cases, the psoriasis predates the onset of the PsA, although arthritis has been described as the initial manifestation of psoriatic disease. Common presentations include a symmetric small-joint polyarthritis (RA-like) and an axial arthritis with involvement of the sacroiliac joints, axial skeleton (spine), and large joints. In all cases, symptoms include pain and stiffness in the affected joint, enthesial areas (where tendons insert into bone) with joint line tenderness, swelling, and often loss of range of motion. Pitting of the fingernails often correlates with the extent and severity of the disease. Dactylitis—swelling of a whole digit—is a characteristic clinical finding, and inflammatory eye disease (iritis, uveitis) may occur. More than one-third of patients with PsA will develop dactylitis and enthesopathy (a disease process at the site where muscle tendons or ligaments insert into bones or joints).

The etiology and pathogenesis of psoriasis and PsA are not completely understood, but genetic, immunologic, and environmental factors are all likely to play a role.
classification systems have been proposed for the diagnosis of PsA, but which one best represents true PsA remains unclear.

Table 1 presents the CASPAR (ClASsification of Psoriatic ARthritis) as an example of one classification.

Table 1. CASPAR criteria for the diagnosis of psoriatic arthritis

<table>
<thead>
<tr>
<th>Inflammatory articular disease (joint, spine, or enthesial areas) with ≥ 3 points from the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Evidence of current psoriasis, a personal history of psoriasis, or a family history of psoriasis</td>
</tr>
<tr>
<td>2. Typical psoriatic nail dystrophy, including onycholysis, pitting, or hyperkeratosis</td>
</tr>
<tr>
<td>3. Negative test result for the presence of rheumatoid factor</td>
</tr>
<tr>
<td>4. Current dactylitis or history of dactylitis</td>
</tr>
<tr>
<td>5. Radiographic evidence of juxtaarticular new bone formation</td>
</tr>
</tbody>
</table>


Treatment of Psoriatic Arthritis

Treatment of patients with PsA is aimed primarily at controlling pain and inflammation and, ultimately, at slowing or arresting the progression of joint destruction. Historically, few trials have been conducted in patients with PsA, with only minimal research before biologic agents were introduced; management options tended to be adapted from RA trial evidence. Like in RA trials, many questions remain about the risks of these agents across a spectrum of adverse events from relatively minor side effects such as injection-site reactions to severe and possibly life-threatening problems such as severe infections or infusion reactions. Unlike RA, there is no diagnostic marker for PsA, which can lead to misdiagnosis. Additionally, studies performed before the CASPAR criteria were used included patients that are not explicitly defined.

Corticosteroids

Corticosteroids—sometimes referred to as glucocorticoids or steroids—are used for many inflammatory and autoimmune conditions. As a class, corticosteroids have been used since the discovery of cortisone in the 1940s. Commonly used oral corticosteroids include methylprednisolone, prednisone, and prednisolone.

Corticosteroids are a synthetic form of cortisol, a hormone produced by the adrenal glands. They produce their anti-inflammatory and immunosuppressive response by interacting with steroid-specific receptors in the cytoplasm of cells, thereby inhibiting the movement of inflammatory cells into the site of inflammation, inhibiting neutrophil function, and inhibiting prostaglandin production. When used to treat PsA, corticosteroids are most often given as a joint injection rather than orally. Although they can be very effective in controlling joint inflammation, oral steroids are generally avoided in treating PsA, because a flare of skin disease has been described when steroids are tapered or withdrawn.

Oral Disease-Modifying Antirheumatic Drugs (DMARDs)

Oral DMARDs such as methotrexate (MTX), sulfasalazine, hydroxychloroquine, and leflunomide modify the course of inflammatory conditions, presumably through their effects on the immune system. Most of the oral DMARDs have been used in clinical practice for more than 20 years. MTX was developed in the 1940s as a treatment for leukemia but was not approved for the treatment of arthritis until 1988. Sulfasalazine also has been available since the 1940s; it is a
combination salicylate (acetylsalicylic acid) and antibiotic (sulfapyridine) that originally was used to treat patients with inflammatory bowel disease. Hydroxychloroquine, approved in the 1950s for the treatment of malaria, is believed to work in treating arthritis by interfering with antigen presentation and the activation of immune response by increasing the pH within macrophage phagolysosomes. Additionally, hydroxychloroquine possibly inhibits toll-like receptors that mediate proinflammatory cytokine production. Only leflunomide, an isoxazole immunomodulatory agent, was specifically developed for treating inflammatory arthritis; the U.S. Food and Drug Administration (FDA) approved its use in 1998.

Oral DMARDs are not members of a single drug family. They are classified together, however, because they all are slow acting with the aim of improving symptoms, reducing or preventing joint damage, and preserving structure and function in patients with inflammatory disease. All the oral DMARDs covered in this review can be given orally, although MTX can also be injected (subcutaneous [SQ] or intramuscular [IM]).

**Biologic DMARDs**

Biologic DMARDs—commonly referred to as biological response modifiers or simply biologics—are a relatively new category of DMARDs that differ from oral DMARDs in that they target specific components of the immune system. FDA approved the first of the biologics (infliximab) in 1998; this report covers eight additional agents approved since that time: etanercept (1998), anakinra (2001), adalimumab (2002), abatacept (2005), rituximab (2006), certolizumab pegol (2008), golimumab (2009), and tocilizumab (2010). Of the nine agents, all are currently FDA approved for treating RA, but only adalimumab, etanercept, golimumab, and infliximab are approved for treating PsA. Even though anakinra, abatacept, certolizumab pegol, rituximab, and tocilizumab are not FDA approved for PsA, this report reviews the evidence for all of these agents.

The biologic DMARDs work by selectively blocking mechanisms involved in the inflammatory and immune response. Adalimumab, certolizumab pegol, etanercept, golimumab, and infliximab are known as tumor necrosis factor (TNF) inhibitors (i.e., drugs that block specific proinflammatory mediators known as cytokines). They produce their primary effect by blocking TNF from interacting with cell surface TNF receptors. Adalimumab, golimumab, and infliximab are monoclonal antibodies. Adalimumab is a fully human monoclonal antibody that binds specifically to TNF, blocking its interaction with both the p55 and p75 cell surface TNF receptor. Golimumab is also a human monoclonal antibody that binds to TNF alpha with high affinity. Infliximab is a chimeric (i.e., made from human and mouse proteins) monoclonal antibody that binds specifically to human TNF-alpha. Certolizumab pegol is a pegylated humanized antibody fragment of tumor necrosis factor monoclonal antibody. The drug binds to the TNF alpha-receptor and blocks TNF alpha activity. It only possesses the Fab fragment and lacks the Fc region. Hence, it does not induce antibody-dependant cell-mediated apoptosis or toxicity. Etanercept is not a monoclonal antibody, but rather a TNF-soluble receptor protein. More specifically, it is a soluble dimeric form of the p75 TNF receptor linked to the Fc portion of human immunoglobulin G1 (IgG1). Etanercept exerts its action by binding circulating TNF and preventing it from interacting with a cell surface receptor. It does not form neutralizing antibodies or mediate cell lysis in the presence or absence of complement.

Interleukin-1 (IL-1), another naturally occurring cytokine, has both immune and proinflammatory actions. Anakinra is a human recombinant protein that competitively blocks the IL-1 receptor, thus blocking various inflammatory and immunological responses.
The immunosuppressant agent abatacept produces its immune response by interfering with T lymphocyte activation. Abatacept is a soluble fusion protein that consists of the extracellular domain of human cytotoxic T lymphocyte-associated antigen (CTLA-4) and the modified Fc portion of IgG1.

Rituximab, a chimeric murine/human monoclonal antibody, works by binding to the CD20 antigen found on the surface of B lymphocytes. Thus, it in effect removes circulating B cells from the pre-B cell stage through the activated B cells. B cells are believed to play a role in autoimmune and inflammatory processes.

Interleukin-6 (IL-6) is a naturally occurring cytokine involved in regulating immune responses and inflammation. Tocilizumab is a monoclonal antibody that inhibits IL-6 receptors, blocking the action of IL-6 and leading to a reduction in cytokine and inflammatory response.

Tables 2 through 4 provide detailed information (names, manufacturers, and available dosage forms) on agents used in the treatment of RA that we have included in this review. Also presented are routes of administration, labeled uses, and usual (recommended) adult doses and frequency for PsA.

**Table 2. Pharmaceutical treatments for psoriatic arthritis: corticosteroids**

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Manufacturer U.S. Trade Name(s)*</th>
<th>How Supplied</th>
<th>Usual Adult Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methylprednisolone</td>
<td>Multiple Medrol®, Depo-Medrol®, Solu-Medrol®</td>
<td>Acetate - Injectable IM—20, 40, and 80 mg/ml</td>
<td>Acetate: IM—10 to 80 mg every 1 to 2 weeks Intra-articular, intralesional—4 to 80 mg every 1 to 5 weeks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sodium succinate - Injectable IM—40, 125, and 500 mg, 1 and 2 g vials</td>
<td>Sodium succinate: IM—10 to 80 mg daily IV—10 to 40 mg every 4 to 6 hours; up to 30 mg/kg every 4 to 6 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oral: Tabs—2, 4, 8, 16, and 32 mg</td>
<td>Oral: 2 to 60 mg in 1 to 4 divided doses to start, followed by gradual reduction</td>
</tr>
<tr>
<td>Prednisone</td>
<td>Multiple Deltasone®, Sterapred®, LiquiPred®</td>
<td>Oral Solution—1 and 5 mg/ml Tabs—1, 2.5, 5, 10, 20, and 50 mg</td>
<td>Use lowest effective dose (5-60 mg/day)</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>Multiple Orapred®, Pediapred®, Premone®, Delta-Cortef®, Econopred®</td>
<td>Oral Solution/Syrup—5, 15, and 20 mg/5 ml Oral Tabs—5 and 15 mg</td>
<td>Use lowest effective dose (5 to 7.5 mg/day)</td>
</tr>
</tbody>
</table>

* Listed trade names are limited to commonly prescribed U.S. products when multiple trade names are available.

IM = intramuscular; IV = intravenous; kg = kilogram; mg = milligram; ml = milliliter
### Table 3. Pharmaceutical treatments for psoriatic arthritis: oral DMARDs

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Manufacturer U.S. Trade Name(s)</th>
<th>How Supplied</th>
<th>Usual Adult Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydroxychloroquine</td>
<td>Multiple Plaquenil®</td>
<td>Oral Tabs—200 mg</td>
<td>200 to 400 mg/day in 1 or 2 divided doses</td>
</tr>
<tr>
<td>Leflunomide</td>
<td>Multiple Arava®</td>
<td>Oral Tabs—10 and 20 mg</td>
<td>10 to 20 mg/day in a single dose</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>Multiple Trexal®, Folex®, Rheumatrex®</td>
<td>Injectable—25 mg/ml, 20 mg and 1 g vials Oral Tabs—2.5, 5, 7.5, 10, and 15 mg</td>
<td>IM, SQ, oral—7.5 to 20 mg/week in a single dose</td>
</tr>
<tr>
<td>Sulfasalazine</td>
<td>Multiple Azulfidine®, EN-tabs®, Sulfazine®</td>
<td>Oral Suspension—250 mg/5 ml Oral Tabs—500 mg</td>
<td>500 to 3,000 mg/day in 2 to 4 divided doses</td>
</tr>
</tbody>
</table>

* Listed trade names are limited to commonly prescribed U.S. products when multiple trade names are available.

*a Initial dose is 400 to 600 mg/day for 4 to 12 weeks.

*b Dosed according to the RA dosing recommendations.

g = gram; IM = intramuscular; mg = milligram; ml = milliliter

### Table 4. Pharmaceutical treatments for psoriatic arthritis: biologic DMARDs

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Manufacturer U.S. Trade Name(s)</th>
<th>Injectable Supply</th>
<th>Usual Adult Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biologic DMARDs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abatacept</td>
<td>Bristol Myers Squibb, Orencia®</td>
<td>250 mg vial</td>
<td>IV—Dosed according to body weight (&lt;60 kg=500 mg; 60-100 kg=750 mg; &gt;100 kg=1,000 mg); dose repeated at 2 weeks and 4 weeks after initial dose, and every 4 weeks thereafter SQ—May give weight-based IV loading dose, then 125 mg SQ once weekly</td>
</tr>
<tr>
<td>Adalimumab</td>
<td>Abbott Humira®</td>
<td>40 mg/0.8 ml, 20 mg/0.4 ml prefilled syringe</td>
<td>SQ—40 mg every other week alone or in combination with other DMARDs</td>
</tr>
<tr>
<td>Anakinra</td>
<td>Amgen Kineret®</td>
<td>100 mg/0.67 ml syringe</td>
<td>SQ—100 mg/day; dose should be decreased to 100 mg every other day in renal insufficiency</td>
</tr>
<tr>
<td>Certolizumab Pegol®</td>
<td>UCB Cimzia®</td>
<td>200 mg powder for reconstitution, 200 mg/ml solution</td>
<td>SQ—Initial dose of 400 mg (as 2 SQ injections of 200 mg), repeat dose 2 and 4 weeks after initial dose; maintenance dose is 200 mg every other week (may consider maintenance dose of 400 every 4 weeks)</td>
</tr>
<tr>
<td>Etanercept</td>
<td>Amgen Pfizer Immunex Enbrel®</td>
<td>50 mg/ml in 25 mg or 50 mg single use prefilled syringe</td>
<td>SQ—50 mg once weekly with or without MTX</td>
</tr>
<tr>
<td>Golimumab</td>
<td>Centocor Ortho Biotech Simponi®</td>
<td>50 mg/0.5 ml syringe</td>
<td>SQ—50 mg once per month, alone or in combination with MTX</td>
</tr>
</tbody>
</table>
Table 4. Pharmaceutical treatments for psoriatic arthritis: biologic DMARDs (continued)

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Manufacturer U.S. Trade Name(s)</th>
<th>Injectable Supply</th>
<th>Usual Adult Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infliximab</strong></td>
<td>Centocor Ortho Biotech Remicade®</td>
<td>100 mg in a 20 ml vial</td>
<td>IV—5 mg/kg at 0, 2, and 6 weeks followed by maintenance every 8 weeks thereafter; may be given with or without MTX</td>
</tr>
<tr>
<td><strong>Rituximab</strong></td>
<td>Biogen Idec / Genentech Rituxan®</td>
<td>100 mg/10 ml and 500 mg/50 ml vial</td>
<td>IV—1,000 mg IV infusion separated by 2 weeks (one course) every 24 weeks or based on clinical evaluation, but not sooner than every 16 weeks</td>
</tr>
<tr>
<td><strong>Tocilizumab</strong></td>
<td>Genentech / Roche Actemra®, RoActemra®</td>
<td>80 mg/4 ml, 200 mg/10 ml, 400 mg/20 ml vial</td>
<td>IV—4 mg/kg every 4 weeks; increase to 8 mg/kg every 4 weeks based on clinical response</td>
</tr>
</tbody>
</table>

kg = kilogram; mg = milligram; ml = milliliter; MTX = methotrexate; IV = intravenously; SQ = subcutaneously

*Listed trade names are limited to commonly prescribed U.S. products when multiple trade names are available.

aDosed according to the RA dosing recommendations.

**Treatment Strategies**

The first line of treatment of PsA is nonsteroidal anti-inflammatory drugs (NSAIDs), although in most cases DMARDs are necessary. MTX is particularly useful because it treats the psoriasis in addition to the arthropathy. Corticosteroids may be used to control inflammation, but they do not have much of a role in chronic disease management in psoriatic disease. The tapering or withdrawal of steroids in PsA has been associated with severe flares of skin disease. When chronic disease continues to be active despite the use of MTX, biologics are indicated. Biologics most often are given in combination with oral DMARDs (e.g., MTX).21

Historically, few PsA trials have been conducted, and management has been adapted from RA trial data. Since the introduction of biologic therapy, however, dedicated PsA trials have demonstrated efficacy in this distinct disease. Detailed and comparative examination of the efficacy, effectiveness, and harms of treatments for PsA is needed.

**Scope and Key Questions**

The purpose of this review is to compare the efficacy, effectiveness, and harms of corticosteroids, oral DMARDS, and biologic DMARDs in the treatment of patients’ PsA. We address the following four Key Questions (KQs):

- **KQ 1:** For patients with PsA, do drug therapies differ in their ability to reduce disease activity, to slow or limit progression of radiographic joint damage, or to maintain remission?
- **KQ 2:** For patients with PsA, do drug therapies differ in their ability to improve patient-reported symptoms, functional capacity, or quality of life?
- **KQ 3:** For patients with PsA, do drug therapies differ in harms, tolerability, adherence, or adverse effects?
- **KQ 4:** What are the comparative benefits and harms of drug therapies for PsA in subgroups of patients based on stage of disease, history of prior therapy, demographics, concomitant therapies, or comorbidities?
Appendix A presents our search strategy; Appendix B contains our review criteria and abstraction forms; Appendix C lists our full bibliography and the source retrieved from; Appendix D lists excluded studies; Appendix E presents evidence tables; Appendix F presents the criteria for assessing the quality of individual studies; Appendix G describes clinical assessment scales commonly used in arthritis trials; Appendix H presents the poor quality studies; and Appendix I contains our strength of evidence tables.
Methods

In this chapter, we document the procedures that the RTI International–University of North Carolina Evidence-based Practice Center (RTI–UNC EPC) used to develop this comparative effectiveness review (CER) on pharmacologic treatments for psoriatic arthritis. We briefly describe the topic development process below. We then document our literature search and retrieval process and describe methods of abstracting relevant information from the eligible articles to generate evidence tables. We also document our criteria for rating the quality of individual studies and for grading the strength of the evidence as a whole.

Topic Development

This report is an update of a CER completed in 2007. The topic of the original report and the preliminary Key Questions (KQs) arose through a public process involving the public, the Scientific Resource Center (SRC, at www.effectivehealthcare.ahrq.gov/aboutUs/index.cfm#RC) for the Agency for Healthcare Research and Quality’s (AHRQ’s) Effective Health Care program (www.effectivehealthcare.ahrq.gov), and various stakeholder groups (www.effectivehealthcare.ahrq.gov/aboutUs/index.cfm#SG). Investigators from the RTI–UNC EPC then refined the original questions, in consultation with AHRQ, the SRC, and the Technical Expert Panel (TEP) during multiple conference calls, into the KQs used for the original report. For this update, the KQs were again refined into the final set of KQs listed in the introduction. No substantive changes to the KQs were made for this update other than adding new medications that have been approved since the previous report. The protocol for the project was posted on the AHRQ Web site (http://www.effectivehealthcare.ahrq.gov). The original report included both rheumatoid arthritis (RA) and psoriatic arthritis (PsA). When updating the material, the decision was made to divide the material into two separate reports, one for RA and one for PsA. This report includes only the information related to patients with PsA. This report is intended to replace the original report; it includes the information from the original report as well as the new information we identified.

Literature Search

To identify articles relevant to each KQ, we searched MEDLINE®, Embase, the Cochrane Library, and the International Pharmaceutical Abstracts. The full search strategy is presented in Appendix A. We conducted this review at the same time as a review on RA; that is, we conducted the literature searches and review processes in parallel, shown in Appendix A. We used either Medical Subject Headings (MeSH or MH) as search terms when available or key words when appropriate. We combined terms for selected indications (PsA and RA), drug interactions, and adverse events with a list of included medications. We included the following medications: corticosteroids (methylprednisolone, prednisone, and prednisolone), four oral disease-modifying antirheumatic drugs (DMARDs) (methotrexate [MTX], leflunomide, sulfasalazine, and hydroxychloroquine), and nine biologic DMARDs (abatacept, adalimumab, anakinra, certolizumab pegol, etanercept, golimumab, infliximab, rituximab, and tocilizumab). We limited the electronic searches to “human” and “English language.” For the original report, sources were searched from 1980 to September 2006. For this update, sources were searched from June 2006 to January 2011. We overlapped the update search with the original search to account for delays in indexing. We used the National Library of Medicine (NLM) publication type tags to identify reviews, randomized controlled trials (RCTs), and meta-analyses. We
manually searched reference lists of pertinent review articles and letters to the editor to supplement searches for the original report. We used the Scopus abstract and citation database to supplement searches for this update. We imported all citations into an electronic database (EndNote X.0.2). Additionally, we hand-searched the Center for Drug Evaluation and Research (CDER) database to identify unpublished research submitted to the U.S. Food and Drug Administration (FDA). The SRC contacted pharmaceutical manufacturers and invited them to submit dossiers, including citations. We received dossiers from five pharmaceutical companies (Abbott, Amgen, Bristol-Myers Squibb, Centocor, and Genentech) for the original report. We received dossiers from three pharmaceutical companies (Abbott, Amgen, and Centocor) for this update. The SRC also searched the following for potentially relevant unpublished and ongoing literature: FDA Web site; Health Canada; Authorized Medicines for EU; ClinicalTrial.gov; Current Controlled Trials; Clinical Study Results; WHO Clinical Trials; Conference Papers Index; Scopus; NIH RePORTER; HSRPROJ; Hayes, Inc. Health Technology Assessment; and the New York Academy of Medicine’s Grey Literature Index.

Study Selection

We developed eligibility (inclusion and exclusion) criteria with respect to study design or duration, patient population, interventions, outcomes, and comparisons as described in Table 5 below. For efficacy and effectiveness, we focused on head-to-head trials and prospective observational studies comparing one drug with another. For biologic DMARDs, we also included placebo-controlled, double-blind RCTs. For safety and tolerability, as well as for efficacy and effectiveness in subgroups, we included head-to-head trials, high-quality systematic reviews, and prospective and retrospective observational studies.

For this review, results from well-conducted, valid head-to-head trials provide the strongest evidence to compare drugs with respect to efficacy, effectiveness, and harms. We defined head-to-head trials as those comparing one drug of interest with another. RCTs or prospective cohort studies of at least 3 months’ duration and an adult study population were eligible for inclusion. For harms (i.e., evidence pertaining to tolerability, adverse effects, and adverse events), we examined data from both experimental and prospective and retrospective observational studies. We included RCTs (no sample size limit) and observational studies (with sample sizes ≥ 100 patients) that lasted at least 3 months and reported an outcome of interest.

Because equipotency among the reviewed drugs is not well established, we assumed that comparisons made within the recommended dosing ranges in the Introduction chapter are appropriate. Dose comparisons made outside the recommended daily dosing range are not in our report.
Table 5. Outcome measures and study eligibility criteria

<table>
<thead>
<tr>
<th>Key Questions and Outcomes of Interest</th>
<th>Study Eligibility Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KQ 1 /KQ 2:</strong> Efficacy/effectiveness</td>
<td>Study Design</td>
</tr>
<tr>
<td>KQ 1:</td>
<td>• Head-to-head double-blind RCTs</td>
</tr>
<tr>
<td>Disease activity</td>
<td>• High-quality systematic reviews</td>
</tr>
<tr>
<td>Radiographic joint damage</td>
<td>• Prospective, controlled observational studies</td>
</tr>
<tr>
<td>Remission</td>
<td><strong>Minimum Study Duration</strong></td>
</tr>
<tr>
<td></td>
<td>• RCT—3 months</td>
</tr>
<tr>
<td></td>
<td>• Observational—3 months</td>
</tr>
<tr>
<td>KQ 2:</td>
<td><strong>Study Population</strong></td>
</tr>
<tr>
<td>Functional capacity</td>
<td>• Ages 19 or older</td>
</tr>
<tr>
<td>Quality of life</td>
<td>• Patients with PsA</td>
</tr>
<tr>
<td>Patient-reported symptoms</td>
<td><strong>Sample Size</strong></td>
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<tr>
<td></td>
<td>• RCT no limit</td>
</tr>
<tr>
<td></td>
<td>• Observational N ≥ 100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KQ 3: Harms, tolerability, adherence, adverse effects</th>
<th>Study Design</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Head-to-head double-blind RCTs</td>
</tr>
<tr>
<td></td>
<td>• High-quality systematic reviews</td>
</tr>
<tr>
<td></td>
<td>• Observational studies, prospective and retrospective</td>
</tr>
<tr>
<td><strong>Minimum Study Duration</strong></td>
<td></td>
</tr>
<tr>
<td>• RCT—3 months</td>
<td></td>
</tr>
<tr>
<td>• Observational—3 months</td>
<td></td>
</tr>
<tr>
<td><strong>Study Population</strong></td>
<td></td>
</tr>
<tr>
<td>• Ages 19 or older</td>
<td></td>
</tr>
<tr>
<td>• Patients with PsA</td>
<td></td>
</tr>
<tr>
<td><strong>Sample Size</strong></td>
<td></td>
</tr>
<tr>
<td>• RCT no limit</td>
<td></td>
</tr>
<tr>
<td>• Observational N ≥ 100</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KQ 4: Benefits and harms in subgroups based on stage, history of prior therapy, demographics, concomitant therapies, comorbidities</th>
<th>Study Design</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Head-to-head double-blind RCTs</td>
</tr>
<tr>
<td></td>
<td>• High-quality systematic reviews</td>
</tr>
<tr>
<td></td>
<td>• Observational studies</td>
</tr>
<tr>
<td><strong>Minimum Study Duration</strong></td>
<td></td>
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<tr>
<td>• RCT—3 months</td>
<td></td>
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<tr>
<td>• Observational—3 months</td>
<td></td>
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<tr>
<td><strong>Study Population</strong></td>
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<tr>
<td>• Ages 19 or older</td>
<td></td>
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<tr>
<td>• Patients with PsA</td>
<td></td>
</tr>
<tr>
<td><strong>Sample Size</strong></td>
<td></td>
</tr>
<tr>
<td>• RCT no limit</td>
<td></td>
</tr>
<tr>
<td>• Observational N ≥ 100</td>
<td></td>
</tr>
</tbody>
</table>

KQ = Key Question; PsA = psoriatic arthritis; RCT = randomized controlled trial

*We divided the assessment of efficacy/effectiveness into two KQs based on two groups of outcomes: those addressing disease activity, radiographic measures, and remission (KQ 1) and those addressing functional capacity, quality of life, and other patient-reported symptoms (KQ 2). We did this to group measures that are based on more objective measures under KQ 1 and those that are based more on subjective patient-reported outcomes under KQ 2.

Disease activity reflects the overall PsA activity. Measures of disease activity, such as the Psoriasis Area and Severity Index (PASI), the Psoriatic Arthritis Response Criteria (PsARC), or the American College of Rheumatology 20 percent response (ACR 20), include assessment of some or all of the following: the number of swollen and tender joints, the patient’s global assessment of his/her disease activity, the physician’s global assessment of the patient’s disease activity, patient’s pain score, patient’s physical function score, acute phase reactants (C-reactive protein), scaling, erythema, induration, severity, and affected body surface area. Appendix G provides additional details about these measures.
Two individuals independently reviewed abstracts. If both reviewers agreed that a study did not meet eligibility criteria, we excluded it. We obtained the full text of all remaining articles and used the same eligibility criteria to determine which, if any, to exclude at this stage. We did not include studies that met eligibility criteria but were reported as an abstract only. Appendix C lists our full bibliography and their source database. Appendix D summarizes reasons for excluding studies that were reviewed as full-text articles but did not meet eligibility criteria.

We reviewed studies that reported health outcomes for efficacy or effectiveness. For example, these outcomes included clinical response to treatment, remission, functional capacity, and quality of life. In addition, we included radiographic outcomes as intermediate outcome measures. For harms, we looked for both total adverse events and specific adverse events ranging in severity (e.g., serious infections, malignancies, hepatotoxicity, hematological adverse events, infusion and injection reactions, nausea), withdrawals attributable to adverse events, and drug interactions. We included systematic reviews and meta-analyses in our evidence report if we found them to be relevant for a KQ and of good or fair methodological quality. We did not abstract individual studies if they had been used in a systematic review or meta-analysis of good quality. However, we reviewed them to determine whether any other outcomes of interest were reported.

Data Extraction

We designed and used a structured data abstraction form to ensure consistency of appraisal for each study. Trained reviewers abstracted data from each study. A senior reviewer read each abstracted article and evaluated the completeness of the data abstraction.

We abstracted the following data from included articles: study design, eligibility criteria, intervention (drugs, dose, and duration), additional medications allowed, methods of outcome assessment, population characteristics (such as age, sex, race or ethnicity, or mean disease duration), sample size, loss to followup, withdrawals because of adverse events, results, and adverse events reported. We recorded intention-to-treat results if available. All data abstraction employed SRS 4.0, Mobius Analytics™. Evidence tables containing all abstracted data of included studies are presented in Appendix E.

Quality Assessment

To assess the quality (internal validity) of trials, we used predefined criteria based on those developed by the U.S. Preventive Services Task Force (ratings: good, fair, poor) and the National Health Service Centre for Reviews and Dissemination. Elements of quality assessment included randomization and allocation concealment, similarity of compared groups at baseline, use of ITT analysis (i.e., all patients were analyzed as randomized), adequacy of blinding, and overall and differential loss to followup.

In general terms, a “good” study has a low risk of bias and results are considered to be valid. A “fair” study is susceptible to some risk of bias but probably not sufficient to invalidate its results. The fair-quality category is likely to be broad, so studies with this rating will vary in their strengths and weaknesses. A “poor” rating indicates significant risk of bias (stemming from, e.g., serious errors in design, analysis reporting a large amount of missing information, or discrepancies in reporting) that may invalidate the study’s results.

To assess the quality of observational studies, we used criteria outlined by Deeks et al. Items assessed included selection of cases or cohorts and controls, adjustment for confounders, methods of outcomes assessment, length of followup, and statistical analysis. To assess the
quality of systematic reviews and meta-analyses, we assessed the following: whether the review was based on a clear question, clear reporting of inclusion criteria, methods used for identifying literature (the search strategy), whether two reviewers independently reviewed publications to determine eligibility, whether authors used a standard method of critical appraisal (or quality rating or validity assessment), assessment of heterogeneity, assessment of publication bias, and statistical analysis. Systematic reviews were categorized as good when all criteria were met.

Two independent reviewers assigned quality ratings. They resolved any disagreements by discussion and consensus or by consulting with a third reviewer. Appendix G details the predefined criteria used for evaluating the quality of all included studies. Studies that met all criteria were rated good quality. Studies that had a fatal flaw (defined as a methodological shortcoming that leads to a very high risk of bias) in one or more categories were rated poor quality and excluded from our analyses.

Applicability Assessment

Using the parameters for evaluation in guidance provided by AHRQ’s Methods Guide for Comparative Effectiveness Reviews, we evaluated the applicability of the included studies. Applicability is similar to generalizability or external validity of the studies included in the evidence base. We evaluated applicability using a qualitative assessment of the population, intervention/treatment, comparator, outcomes measured, timing of followup, and setting. We specifically considered whether populations enrolled in these trials or studies differed from target populations as laid out in Chapter 1, whether studied interventions are comparable with those in routine use, whether comparators reflect best alternatives, whether measured outcomes reflect the most important clinical outcomes, whether followup was sufficient, and whether study settings were representative of most settings.

Grading Strength of Evidence

We evaluated the strength of evidence based on methods guidance for the EPC program. For this report, we graded the strength of evidence for the outcomes determined to be most important: measures of disease activity (e.g., Psoriasis Area and Severity Index-PASI, Disease Activity Score-DAS, Psoriasis Arthritis Response Criteria-PsARC), radiographic changes, functional capacity, quality of life, withdrawals due to adverse events, and specific adverse events if data were available (e.g., injection-site reactions, infections, malignancy). Because no head-to-head trials were identified, we graded the strength of evidence for each of the included medications compared with placebo. The strength of evidence for each outcome or comparison that we graded incorporates scores on four domains: risk of bias, consistency, directness, and precision; it can also reflect ratings for other domains that can be factored in when relevant (e.g., dose-response relationships).

As described in Owens et al., the evaluation of risk of bias includes assessment of study design and aggregate quality of studies. We judged good quality studies to result in evidence with low risk of bias. We graded evidence as consistent when effect sizes across studies were in the same direction. When the evidence linked the interventions directly to health outcomes, we graded the evidence as being direct. We graded evidence as being precise when results had a low degree of uncertainty. A precise estimate is an estimate that would allow a clinically useful conclusion. An imprecise estimate is one for which the confidence interval is wide enough to include clinically distinct conclusions.
We dually evaluated the overall strength of evidence for each major outcome based on a qualitative assessment of strength of evidence for each domain and reconciled all disagreements. The levels of strength of evidence are shown in Table 6.

Table 6. Strength of evidence grades and their definitions

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>High confidence that the evidence reflects the true effect. Further research is very unlikely to change our confidence in the estimate of effect.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Moderate confidence that the evidence reflects the true effect. Further research may change our confidence in the estimate of effect and may change the estimate.</td>
</tr>
<tr>
<td>Low</td>
<td>Low confidence that the evidence reflects the true effect. Further research is likely to change our confidence in the estimate of effect and is likely to change the estimate.</td>
</tr>
<tr>
<td>Insufficient</td>
<td>Evidence either is unavailable or does not permit estimation of an effect.</td>
</tr>
</tbody>
</table>


Data Synthesis

Throughout this CER we synthesized the literature qualitatively because there were too few studies for each of the comparisons of interest to justify combining them in quantitative analyses. We constructed tables showing the study characteristics, quality ratings, and main results for all included studies.

Peer Review

This CER underwent external peer review from individuals who were experts in rheumatology and from various stakeholder and user communities (listed in the Front Matter). The SRC oversaw the peer-review process. Peer reviewers were charged with commenting on the content, structure, and format of the evidence report; providing additional relevant citations; and pointing out issues related to how we had conceptualized and defined the topic and KQs. Our peer reviewers, also Technical Expert Panel members, gave us permission to acknowledge their review of the draft. We compiled all comments and addressed each one individually, revising the text as appropriate. AHRQ and the SRC also requested review from its own staff.
Results

Figure 1 documents the results of the literature search (Appendix A). We included 24 published articles reporting on 16 studies: 0 head-to-head randomized controlled trials (RCTs), 0 head-to-head nonrandomized controlled trials, 10 placebo-controlled trials, 3 meta-analyses or systematic reviews, and 3 observational studies. Our findings include studies rated good or fair for internal validity. Most studies were of fair quality; we designate in the text only those of good quality. Evidence tables for included studies can be found in Appendix E.

Figure 1. Disposition of articles (PRISMA figure)*

- **Titles and abstracts identified through database searches:**
  - n = 3868 (1912)

- **Titles and abstracts identified through other sources:**
  - n = 357 (161)
    - Handsearch 300, dossiers 36, peer review/public comment 21

- **Total number of abstracts screened:**
  - n = 4,225 (2,073)

- **Citations excluded:**
  - n = 3,173 (1,476)

- **Full-text articles retrieved:**
  - n = 1,052 (597)

- **Reason for exclusion:**
  - 4 (1) Not published in English
  - 150 (90) Wrong outcomes
  - 87 (27) Drug not included in report
  - 317 (174) Population not included in report
  - 140 (56) Wrong publication type
  - 326 (236) Wrong study design
  - 1 (0) Unable to obtain full text
  - 3 (3) Poor quality

- **Articles included in qualitative synthesis:**
  - n = 24 (10); 16 studies

- **Included articles by key question:**
  - KQ1 TOTAL = 18 (6)
  - KQ2 TOTAL = 15 (4)
  - KQ3 TOTAL = 11 (5)

*Some articles were included for more than one KQ

KQ = Key Question; n = number of studies; PRIMSA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses

*The first number listed includes all references identified in both the original and update reports. The number in parentheses indicates references identified in the update report only.

Note: Number of included articles differs from number of included studies because some studies have multiple publications.
We included articles based on eligibility criteria or methodological criteria (quality rating) as explained in the Methods chapter.

Of the 16 included studies, 8 (50 percent) were supported by pharmaceutical companies; 4 (25 percent) were funded by governmental or independent funds; 3 (19 percent) were supported by a combination of pharmaceutical and government funding; and 1 did not report the funding source (6 percent).

This chapter is organized by Key Question (KQ). When comparative evidence is available, we discuss it before presenting placebo controlled trials. Generally, the chapter is organized by oral DMARD comparisons followed by biologic DMARD comparisons.

Across all KQs, we have included head-to-head studies, observational studies, and systematic reviews. When comparative evidence is available, we discuss it before presenting placebo-controlled trials. Table 7 gives the numbers of trials or studies for drug class comparisons; when some groupings have important subcomparisons, we note these. We do not, however, offer an exhaustive list of all possible comparisons among corticosteroids, oral DMARDs, and biologic DMARDs simply because of the sheer number of potential combinations of drugs within classes and across classes, which cannot be clearly and concisely presented here.

### Table 7. Number of trials or studies by drug comparison and study design for psoriatic arthritis

<table>
<thead>
<tr>
<th>Drug Comparison</th>
<th>Number of Studies; Study Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral DMARDs vs. placebo</td>
<td>1 SR, 2 RCTs</td>
</tr>
<tr>
<td>Biologic DMARDs vs. placebo</td>
<td>1 SR, 8 RCTs</td>
</tr>
<tr>
<td>Oral DMARDs vs. Oral DMARDs</td>
<td>0</td>
</tr>
<tr>
<td>Biologic DMARDs vs. biologic DMARDs</td>
<td>1 OS</td>
</tr>
<tr>
<td>Biologic DMARDs vs. oral DMARDs</td>
<td>0</td>
</tr>
<tr>
<td>Biologic DMARDs + oral DMARDs vs. biologic DMARDs</td>
<td>2 OS</td>
</tr>
<tr>
<td>Biologic DMARDs + oral DMARDs vs. oral DMARDs</td>
<td>1 SR</td>
</tr>
</tbody>
</table>

DMARD = disease modifying anti-rheumatic drug; vs. = versus; SR = systematic review; RCT = randomized controlled trial; OS = observational study

Table 8 lists abbreviations and full names of diagnostic scales and health status or quality-of-life instruments encountered in these studies, as well information about clinical significance when available. For further details about such instruments and scales, see Appendix G.

### Table 8. Disease activity, radiographic progression, functional capacity, and quality-of-life measures

<table>
<thead>
<tr>
<th>Abbreviated Name</th>
<th>Complete Name of Measure or Instrument</th>
<th>Range of Scores</th>
<th>Improvement Denoted by</th>
<th>Clinically Significant Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACR-N</td>
<td>American College of Rheumatology percent improvement from baseline to endpoint</td>
<td>0 to 100 percent</td>
<td>Increase</td>
<td>--</td>
</tr>
<tr>
<td>ACR 20/50/70</td>
<td>American College of Rheumatology response scores based on 20, 50, or 70 percent criteria for improvement</td>
<td>0 to 100 percent</td>
<td>Increase</td>
<td>ACR 20 is 20% minimal improvement; ACR 50/70 considered more clinically significant</td>
</tr>
<tr>
<td>ASHI</td>
<td>Arthritis-Specific Health Index (Medical Outcomes Study Short Form SF-36 Arthritis-specific Health Index)</td>
<td>0 to 100</td>
<td>Increase</td>
<td>--</td>
</tr>
</tbody>
</table>
Table 8. Disease activity, radiographic progression, functional capacity, and quality-of-life measures (continued)

<table>
<thead>
<tr>
<th>Abbreviated Name</th>
<th>Complete Name of Measure or Instrument</th>
<th>Range of Scores</th>
<th>Improvement Denoted by</th>
<th>Clinically Significant Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAS</td>
<td>Disease Activity Score</td>
<td>0 to 10</td>
<td>Decrease</td>
<td>DAS &lt;1.6 correlates with remission(^{28,29}), (^{28})</td>
</tr>
<tr>
<td>DAS 28</td>
<td>Disease Activity Score Short Form</td>
<td>0 to 10</td>
<td>Decrease</td>
<td>DAS28 &lt;2.6 correlates with remission(^{28,30})</td>
</tr>
<tr>
<td>DLQI</td>
<td>Dermatology Life Quality Index</td>
<td>0 to 30</td>
<td>Decrease</td>
<td>--</td>
</tr>
<tr>
<td>EQ-5D</td>
<td>EuroQol EQ-5D Quality of Life Questionnaire</td>
<td>0 to 1</td>
<td>Increase</td>
<td>--</td>
</tr>
<tr>
<td>EULAR response</td>
<td>European League Against Rheumatism response</td>
<td>N/A</td>
<td>N/A</td>
<td>--</td>
</tr>
<tr>
<td>HAQ(^*) (D-HAQ)</td>
<td>Health Assessment Questionnaire (Dutch Version)</td>
<td>0 to 3</td>
<td>Decrease</td>
<td>HAQ &gt;= 0.22 change(^{31})</td>
</tr>
<tr>
<td>HAQ-DI</td>
<td>Disability Index of the Health Assessment Questionnaire</td>
<td>0 to 3</td>
<td>Decrease</td>
<td>--</td>
</tr>
<tr>
<td>PASI</td>
<td>Psoriasis Area and Severity Index</td>
<td>0 to 72</td>
<td>Decrease</td>
<td>Improvement needs to be at least 50% (used to be 75% but has since been lowered(^{32}))</td>
</tr>
<tr>
<td>PsARC(^*)</td>
<td>Psoriatic Arthritis Response Criteria</td>
<td>0 to 100 percent</td>
<td>Increase</td>
<td>Has not been assessed to be clinically significant(^{33})</td>
</tr>
<tr>
<td>SF-36</td>
<td>Medical Outcomes Study Short Form 36 Health Survey</td>
<td>0 to 100</td>
<td>Increase</td>
<td>SF36 physical or mental component two standard error of the mean (SEM)(^{34-37})</td>
</tr>
<tr>
<td>SHS(^*)</td>
<td>Sharp/van der Heijde Method (SHS) for Scoring Radiographs (SHS is frequently modified by individual authors to meet study requirements and needs; there is no standard modified SHS)</td>
<td>Erosion: 0 to 160 for hands; 0 to 120 for feet Joint space narrowing: 0 to 168 Total: 0 to 448</td>
<td>Decrease</td>
<td>Changes in joint damage around the level of 5 units of the Sharp/van der Heijde method as minimal clinically important(^{38})</td>
</tr>
</tbody>
</table>

* These key scales are defined in Appendix G.

-- Less commonly used measures for which there is sparse data regarding what constitutes a clinically significant improvement.

**KQ 1: Reductions in Disease Activity, Limitations of Disease Progression, and Maintenance of Remission**

KQ 1 concerned three main topics. Specifically, “for patients with psoriatic arthritis, do drug therapies differ in their ability to reduce disease activity, to slow or limit progression of radiographic joint damage, or to maintain remission?” We use the term disease activity to refer to condition-specific measures such as the Psoriasis Area and Severity Index (PASI), the Psoriatic Arthritis Response Criteria (PsARC), or the American College of Rheumatology (ACR) response. Strength of evidence is presented, and additional tables provide selected study-specific information on outcomes, broken out by primary outcomes and radiologic outcomes. Evidence Tables in Appendix E document details about all these studies.
Overview

A total of nine placebo-controlled randomized controlled trials (RCTs), two observational studies, and three systematic reviews or meta-analyses examined symptom response, radiographic joint damage, and remission. The main drug classes compared included oral disease-modifying antirheumatic drugs (DMARDs), biologic DMARDs (also referred to simply as biologics), and combined strategies. Overall strength of evidence is listed in Appendix I. When possible, we describe whether treatment effects reach minimal clinically important differences (MCIDs). In this section, achieving at least an ACR of 20 or above or a PASI of at least 50 percent improvement is considered minimally clinically important (Table 8).

Oral DMARD Versus Oral DMARD

We did not find any studies meeting our criteria for inclusion.

Oral DMARD Versus Placebo

Evidence from one 12-week study provides low strength of evidence that parenteral high-dose methotrexate (MTX) improves physician assessment of disease severity, compared with placebo (median change 1 vs. 0; \(P=0.001\)). The MCID cannot be determined from this comparison.

One systematic review found that, compared with placebo, sulfasalazine improved patient outcomes (pooled index of variables in the OMERACT: 0.38 units; 95% CI, 0.21 to 0.54). The MCID cannot be determined from this comparison.

Evidence from one 24-week trial provides low strength of evidence that leflunomide patients experienced improved disease activity compared with those in the placebo arm (PsARC primary outcome 58.9 percent vs. 29.7 percent, \(P<0.0001\)). The strength of evidence is low. Improvements in additional outcomes including ACR 20 did reach MCID, but the PASI did not.

Biologic DMARD + Oral DMARD Versus Biologic DMARD

We did not find any head-to-head controlled trials for any of the included drugs, but two observational cohort studies provide some evidence. One cohort study compared the combination of an anti-tumor necrosis factor (TNF) (adalimumab, etanercept, or infliximab) with MTX versus anti-TNF only and found no difference in treatment response. Another cohort study compared adalimumab, etanercept, and infliximab and found no differences in efficacy among the groups. The strength of evidence is low.

Biologic DMARD + Oral DMARD Versus Oral DMARD

A systematic review provided low strength of evidence of a comparison between TNF inhibitors (adalimumab, etanercept, and infliximab) compared with sulfasalazine and found that the TNF inhibitors were relatively effective and had the largest effect size (risk ratio: 0.25, 95% CI, 0.13 to 0.48), and sulfasalazine was moderately effective (risk ratio: 0.45, 95% CI, 0.23 to 0.89). The MCID cannot be determined from this comparison.

Biologic DMARD Versus Placebo

The use of four biologics—adalimumab, etanercept, golimumab, and infliximab—provided low to moderate evidence of improved disease activity compared with placebo. The magnitude of benefit for ACR 20 ranged from 39 percent to 57 percent for adalimumab, 59
percent to 65 percent for etanercept, 45 percent to 51 percent for golimumab, and 58 percent to 62 percent for infliximab.

Psoriatic Arthritis: Detailed Analysis

Oral DMARD Versus Oral DMARD

We did not find any studies meeting our criteria for inclusion. We did not identify any studies meeting our inclusion/exclusion criteria that examined the use of corticosteroids in the treatment of psoriatic arthritis (PsA). Because of the paucity of head-to-head trials, we additionally reviewed placebo-controlled trials to summarize the general efficacy of oral and biologic DMARDs. Summarizing the general efficacy, however, does not provide evidence on the comparative efficacy and tolerability of treatments for PsA.

Oral DMARD Versus Placebo

One systematic review examined the efficacy of oral DMARDs used in placebo-controlled trials. The investigators used data from 13 RCTs that included 1,022 adults with PsA in a meta-analysis that focused on comparisons of sulfasalazine, auranofin, etretinate, fumaric acid, intramuscular injection of gold, azathioprine, efamol marine, and MTX with placebo (Table 9). Two drugs (MTX and sulfasalazine) are of interest for our report. The primary outcome measure included individual component variables validated by the Outcome Measures in Rheumatology Clinical Trials (OMERACT) to create a pooled index; components used include acute phase reactants, disability, pain, patient global assessment, physician global assessment, swollen joint count, tender joint count, and radiographic changes of joints in any trial of 1 year or longer. The primary outcome was change in a pooled disease index.

Methotrexate

One multicenter 12-week RCT (N=37), included in the systematic review described above, compared MTX (weekly dose of 7.5 mg to 15 mg) with placebo. The study reported some improvement in PsA as measured by change in grip strength, morning stiffness, and patient assessment in the drug treatment group, but statistically significant improvement compared with placebo occurred only in physician assessment of disease severity (P=0.001); there were no differences between groups in joint swelling or pain/tenderness. Psoriatic skin lesions showed no significant changes in scaling, induration, or erythema from entry appearance, but surface area involvement improved significantly compared with placebo (P=0.039) in 14 of the MTX patients assessed (Table 9). The systematic review used this single study comparing MTX with placebo to calculate an overall improvement in the OMERACT index of 0.65 units (95% CI, 0.00 to 1.30). The MCID cannot be determined.

Sulfasalazine

The investigators pooled six trials involving comparisons of sulfasalazine (average dose of 2 g/day to 3 g/day) with placebo (N=564). Sulfasalazine showed an improvement in the pooled index of 0.38 units (95% CI, 0.21 to 0.54). The MCID cannot be determined.
Table 9. Disease activity of oral DMARD versus placebo

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design/Duration</th>
<th>Study Population</th>
<th>Comparison (dose)</th>
<th>Results of Primary Outcome Measure</th>
<th>Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jones et al., 2000(^4)</td>
<td>Systematic review and meta-analysis 1,022</td>
<td>Active PsA, concomitant MTX NR</td>
<td>SSZ vs. placebo (6 RCTs)</td>
<td>Change in pooled index: SSZ 0.38 units (95% CI, 0.21 to 0.54)</td>
<td>Good</td>
</tr>
<tr>
<td>Willkens et al., 1984(^3)</td>
<td>RCT 37 weeks</td>
<td>Active PsA, MTX naive</td>
<td>MTX (7.5 mg/15 mg/week vs. placebo)</td>
<td>Median change in physician assessment of disease severity: MTX, 1 vs. placebo, 0 (P=0.001)</td>
<td>Fair</td>
</tr>
<tr>
<td>Kaltwasser et al., 2004(^4) (^1), 42</td>
<td>RCT 24 weeks</td>
<td>Active PsA, failed at least one DMARD, concomitant MTX 0%</td>
<td>LEF (100 mg/day 3 days then 20 mg/day) vs. placebo</td>
<td>PsARC at week 24: LEF 58.9% vs. placebo 29.7% (P&lt;0.0001)</td>
<td>Fair</td>
</tr>
</tbody>
</table>

CI = confidence interval; DMARD = disease-modifying antirheumatic drug; LEF = leflunomide; mg = milligram; MTX = methotrexate; NR = not reported; PsA = psoriatic arthritis; PsARC = Psoriatic Arthritis Response Scale; RCT = randomized controlled trial; SSZ = sulfasalazine; vs. = versus

Leflunomide

One trial (two publications) evaluated the efficacy of leflunomide against placebo in 190 patients over 24 weeks;\(^4\)\(^1\), 42 PsA was defined as having at least three swollen joints and three tender or painful joints and psoriasis over at least 3 percent of the body surface area. In this study, almost 50 percent of the patients were DMARD naive. Patients who were not DMARD naive were required to discontinue all oral DMARDs as well as biologic agents and investigational drugs 28 days before baseline.

The leflunomide group had significantly greater improvements in measures of disease activity than the placebo group. These improvements included response rates on a modified ACR 20 (36.3 percent vs. 20 percent; P=0.014), the PsARC (achieved in 58.9 percent vs. 29.7 percent; P=0.0001), and the PASI (17.4 percent vs. 7.8 percent reached threshold; P=0.048). The ACR 20 did reach MCID, but the PASI did not.

Biologic DMARD + Oral DMARD Versus Biologic DMARD

One retrospective cohort (N=261) of anti-TNF naive patients with active PsA in Sweden compared patients taking MTX concomitant with anti-TNF (adalimumab—40 mg every other week; etanercept—25 mg twice a week; or infliximab—3 mg/kg at 0, 2, and 6 weeks and then every 8 weeks) versus anti-TNF alone.\(^4\)\(^3\) Eligible patients had active PsA with high disease activity and/or unacceptably high steroid use. Over 12 months, there were no significant differences in European League Against Rheumatism response (EULAR) good or EULAR overall between patients taking MTX with anti-TNF compared with anti-TNF only, see Table 10.

Also in Table 10 is the second cohort study, conducted in Great Britain, that found no significant differences in EULAR response rates at six (P=0.679), 12 (P=0.904), and 18 (P=0.583) months between the three anti-TNF therapies of adalimumab, etanercept, and infliximab.\(^4\)\(^4\) Furthermore, EULAR response rates for the whole anti-TNF cohort were similar in patients receiving anti-TNF agents in combination with MTX (78.1 percent at 6 months), another DMARD (73.3 percent), or anti-TNF monotherapy (79.5 percent).\(^4\)\(^4\)
### Table 10. Disease activity of biologic DMARD + oral DMARD versus biologic DMARD

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design N Duration</th>
<th>Study Population</th>
<th>Comparison (Dose)</th>
<th>Results of Primary Outcome Measure</th>
<th>Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kristensen et al., 2008*</td>
<td>Cohort</td>
<td>Active PsA, anti-TNF naïve, concomitant MTX 62%</td>
<td>ADA (40 mg every other week) or ETN (25 mg twice a week) or INF (3 mg/kg at 0, 2, 6 weeks, then every 8th week) + MTX (median—15 mg/week) vs. monotherapy with ADA, ETN, or INF</td>
<td>No difference in anti-TNF + MTX vs. anti-TNF only (data NR)</td>
<td>Fair</td>
</tr>
<tr>
<td>Saad et al., 2010</td>
<td>Cohort</td>
<td>Patients with PsA, mean disease duration varied</td>
<td>ETN 25 mg twice weekly or 50 mg once weekly; ADA 40 mg every 2 weeks; INF 5 mg/kg administered at weeks 0, 2, 6, and 8 and then every 8 weeks</td>
<td>No difference in anti-TNF MTX vs. anti-TNF</td>
<td>Fair</td>
</tr>
</tbody>
</table>

ADA = adalimumab; DMARD = disease-modifying antirheumatic drug; ETN = etanercept; INF = infliximab; kg = kilogram; mg = milligram; MTX = methotrexate; NR = not reported; PsA = psoriatic arthritis; TNF = tumor necrosis factor; vs. = versus

*New study added since last review.

### Biologic DMARD + Oral DMARD Versus Oral DMARD

One systematic review, as seen in Table 11, included an analysis of TNF inhibitors and sulfasalazine for the treatment of PsA and examined efficacy as defined by the number of patients that withdrew because of lack of effect. The TNF inhibitors analysis included five studies with 882 patients and found that the risk ratio for efficacy was 0.25 (95% CI, 0.13 to 0.48). The analysis of sulfasalazine found that the risk ratio for efficacy was 0.45 (95% CI, 0.23 to 0.89). The MCID cannot be determined from this comparison.

### Table 11. Disease activity of biologic DMARD + oral DMARD versus sulfasalazine

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design N Duration</th>
<th>Study Population</th>
<th>Comparison (Dose)</th>
<th>Results of Primary Outcome Measure</th>
<th>Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ravindran et al., 2008</td>
<td>Meta-analysis</td>
<td>Patients with PsA, mean disease duration varied</td>
<td>TNF inhibitors as a class vs. sulfasalazine</td>
<td>TNF inhibitors were relatively effective and sulfasalazine was moderately effective</td>
<td>Fair</td>
</tr>
</tbody>
</table>

DMARD = disease-modifying antirheumatic drug; NR = not reported; PsA = psoriatic arthritis; TNF = tumor necrosis factor; vs. = versus

### Biologic DMARD Versus Placebo

Seven RCTs (11 articles) and 1 systematic review examined the efficacy of biologics against placebo in treating patients with PsA (Table 12). Two trials were of adalimumab, 2 of etanercept, 3 of infliximab, and 1 of golimumab. All trials allowed patients to continue an oral DMARD, usually MTX. The systematic review examined etanercept and infliximab versus placebo. All showed that the use of biologics led to significantly better outcomes than placebo.
<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>N</th>
<th>Duration</th>
<th>Study Population</th>
<th>Comparison (Dose)</th>
<th>Results of Primary Outcome Measure</th>
<th>Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genovese et al., 2007&lt;sup&gt;56&lt;/sup&gt;</td>
<td>RCT</td>
<td>102</td>
<td>12 weeks</td>
<td>Active PsA, failed at least one DMARD, concomitant MTX 46%</td>
<td>ADA (40 mg every other week) vs. placebo</td>
<td>ACR 20 at week 12: ADA 39% vs. placebo 16% (P=0.012)</td>
<td>Fair</td>
</tr>
<tr>
<td>Mease et al., 2005 ADEPT Trial&lt;sup&gt;46&lt;/sup&gt;</td>
<td>RCT</td>
<td>313</td>
<td>24 weeks</td>
<td>Active PsA, failed at least one DMARD, concomitant MTX 51%</td>
<td>ADA (40 mg every other week) vs. placebo</td>
<td>ACR 20 at week 24: ADA 57% vs. placebo 15% (P&lt;0.001) Mean change in the modified total Sharp score at week 24: ADA -0.2 vs. placebo 1.0 (P&lt;0.001) Erosion scores (mean change): ADA 0.0 vs. placebo 0.6 Joint space narrowing scores (mean change): ADA -0.2 vs. placebo 0.4 (P&lt;0.001 for both)</td>
<td>Fair</td>
</tr>
<tr>
<td>Woolacott et al., 2006&lt;sup&gt;55&lt;/sup&gt;</td>
<td>Systematic review and meta-analysis</td>
<td>369</td>
<td>12 weeks</td>
<td>Adults with PsA, concomitant MTX 46% to 56%</td>
<td>ETN (25 mg twice a week) vs. placebo (two studies)</td>
<td>ACR 20 at week 12: ETN 65% vs. placebo NR (RR, 4.19 [95% CI, 2.74 to 6.42])</td>
<td>Good</td>
</tr>
<tr>
<td>Mease et al., 2000&lt;sup&gt;47&lt;/sup&gt;</td>
<td>RCT</td>
<td>60</td>
<td>12 weeks</td>
<td>Active PsA, failed at least one DMARD, concomitant MTX use 47%</td>
<td>ETN (25 mg twice a week) vs. placebo</td>
<td>PsARC at week 12: ETN 87% vs. placebo 23% (P&lt;0.0001)</td>
<td>Fair</td>
</tr>
<tr>
<td>Mease et al., 2004&lt;sup&gt;48&lt;/sup&gt; Mease et al., 2004&lt;sup&gt;49&lt;/sup&gt;</td>
<td>RCT</td>
<td>205</td>
<td>24 weeks (with additional 48 weeks open label)</td>
<td>Active PsA, failed at least one DMARD, concomitant MTX 47%</td>
<td>ETN (25 mg twice a week) vs. placebo</td>
<td>ACR 20 at week 24: ETN 59% vs. placebo 15% (P&lt;0.001) Mean annualized rate of change over 1 year of treatment in modified Sharp score: ETN -0.03 unit vs. placebo 1.00 unit (P=0.0001)</td>
<td>Fair</td>
</tr>
<tr>
<td>Kavanaugh, 2009&lt;sup&gt;54&lt;/sup&gt; GO-REVEAL*</td>
<td>RCT</td>
<td>405</td>
<td>14 weeks&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Active PsA, failed at least one DMARD or NSAID, concomitant MTX 35%</td>
<td>GOL (50 mg every 4 weeks), GOL (100 mg every 4 weeks) vs. placebo</td>
<td>ACR 20 at week 14: GOL 50 mg 51%, GOL 100 mg 45%, placebo 9% (P&lt;0.001)</td>
<td>Good</td>
</tr>
<tr>
<td>Woolacott et al., 2008&lt;sup&gt;53&lt;/sup&gt;</td>
<td>Systematic review and meta-analysis</td>
<td>369</td>
<td>12 weeks</td>
<td>Adults with PsA, concomitant MTX 46% to 56%</td>
<td>INF (5 mg/kg) vs. placebo (one study)</td>
<td>ACR 20 at weeks 14–16: INF 62% vs. placebo NR (RR, 5.75; 95% CI, 3.55 to 9.30)</td>
<td>Good</td>
</tr>
</tbody>
</table>
Table 12. Disease activity in biologic DMARD versus placebo (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Study Population</th>
<th>Comparison (Dose)</th>
<th>Results of Primary Outcome Measure</th>
<th>Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antoni et al., 2005 IMPACT</td>
<td>RCT</td>
<td>Active PsA, failed at least one DMARD or NSAID, concomitant MTX 56%</td>
<td>INF (5 mg/kg at weeks 0, 2, 6, 14 then every 8 weeks) vs. placebo&lt;sup&gt;b&lt;/sup&gt; 71% received a concomitant DMARD</td>
<td>ACR 20 at week 16: INF 65.4% vs. placebo 9.6% (&lt;i&gt;P&lt;/i&gt;&lt;0.001)</td>
<td>Fair</td>
</tr>
<tr>
<td>Study&lt;sup&gt;20, s1&lt;/sup&gt;</td>
<td>104</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 weeks (16 blinded, 34 open-label)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Practical Heijde et al.,</td>
<td>RCT</td>
<td>Active PsA, failed at least one DMARD, concomitant MTX 46%</td>
<td>INF (5 mg/kg at weeks 0, 2, 6, 14, 22) vs. placebo&lt;sup&gt;c&lt;/sup&gt; 46% received concomitant MTX</td>
<td>ACR 20 at week 14: INF 58% vs. placebo 11% (&lt;i&gt;P&lt;/i&gt;&lt;0.001) Mean change in total Sharp/van der Heijde score at week 24: ADA -0.70 +/- 2.53 (SD) vs. placebo 0.82 +/- 2.62 (&lt;i&gt;P&lt;/i&gt;&lt;0.001)</td>
<td>Fair</td>
</tr>
<tr>
<td>2007&lt;sup&gt;57*&lt;/sup&gt;</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>54 weeks (at week 16, patients could enter early escape and be reassigned from placebo to INF if not improving; all placebo subjects crossed over to INF at week 24)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

ACR 20 = American College of Rheumatology 20 percent improvement from baseline to endpoint; ADA = adalimumab; ADEPT = Adalimumab Effectiveness in Psoriatic Arthritis Trial; DMARD = disease-modifying antirheumatic drug; ETN = etanercept; GOL = golimumab; IMPACT = Infliximab Multinational Psoriatic Arthritis Controlled Trial; INF = infliximab; kg = kilogram; mg = milligram; MTX = methotrexate; NR = not reported; PsA = psoriatic arthritis; PsARC = Psoriatic Arthritis Response Scale; RCT = randomized controlled trial; RR = relative risk

<sup>a</sup>New studies since last review.
<sup>b</sup>GO-REVEAL is planned to continue through 5 years; results have been published through week 24.
<sup>c</sup>Placebo-treated patients with <10% improvement could cross over to INF 5 mg/kg at week 16. All remaining placebo patients crossed over to receive INF at weeks 24, 26, 30, 38, and 46. INF patients with <20% improvement received INF 10 mg/kg at weeks 38 and 46.

Adalimumab

Two RCTs examined the use of adalimumab (40 mg every other week) in patients suffering from moderate to severe PsA (defined as having at least three swollen joints and three tender or painful joints) who had an inadequate response or intolerance to nonsteroidal anti-inflammatory drug (NSAID) therapy<sup>46</sup> or previous oral DMARD therapy.<sup>56</sup> Patients were allowed to continue current MTX therapy as long as the dose had been stable for 4 weeks. In the first study,<sup>46</sup> the double-blind phase of the study lasted 24 weeks, but patients who failed to achieve at least a 20 percent decrease in both swollen and tender joint counts on two consecutive visits could receive rescue therapy with corticosteroids or oral DMARDs. A significantly higher percentage of the adalimumab group met ACR 20/50/70 response criteria than the placebo group (all <i>P</i>&lt;0.001). According to the PsARC, 60 percent of the adalimumab group and 23 percent of the placebo group responded (<i>P</i>=NR). PASI 75 was achieved by 59 percent of the adalimumab group and 1 percent of the placebo group (<i>P</i>&lt;0.001). At 24 weeks, the changes in the modified Sharp score, erosion score, and joint space narrowing score were significantly less in adalimumab-treated than placebo-treated patients (<i>P</i>=0.001). The second trial<sup>56</sup> randomized 102 patients for 12 weeks and
similarly found a higher percentage of patients meeting ACR 20 at week 12 compared with placebo (39 vs. 16 percent, \( P=0.012 \)).

**Etanercept**

Two RCTs examined the efficacy of etanercept (25 mg twice weekly by subcutaneous injections) in a total of 265 patients with active PsA who were not adequately responding to conventional DMARD therapies.\(^{47,48}\) In both studies, patients were allowed to continue MTX therapy as long as the dose had been stable for 4 weeks before entry into the study. One study lasted 12 weeks (\( N=60 \));\(^{47}\) the other (\( N=205 \)) was double-blinded for 24 weeks.\(^{48}\) In both studies, the proportions of patients on etanercept meeting ACR 20 response criteria were significantly higher than those for patients on placebo. In the 12-week study, 87 percent of patients on etanercept and 23 percent of those on placebo achieved a PsARC response (\( P<0.0001 \)).\(^{47}\) The 24-week study had similar results at 12 weeks: 72 percent of patients on etanercept and 31 percent of those on placebo achieved a PsARC response (\( P=NR \)).\(^{48}\) PASI 75 criteria were met by a greater proportion of patients in the etanercept groups than in the placebo groups in both studies. In the 12-week study, 26 percent of patients on etanercept met PASI 75 criteria versus zero patients on placebo (\( P=0.015 \)); in the longer study, the figures were 23 percent on etanercept versus 3 percent on placebo (\( P<0.001 \)). The longer study assessed the radiographic progression of disease at 24 weeks in 205 patients; the mean annualized change in the modified Sharp score was significantly lower in etanercept-treated patients (decrease of -0.03) than in placebo-treated patients (increase of 1.0; \( P=0.0001 \)).\(^{49}\)

A systematic review pooled the 12-week data from these two studies; the ACR 20 threshold for improvement was achieved by 65 percent of the etanercept groups (placebo NR), with a pooled relative risk of 4.19 (95% CI, 2.74 to 6.42) compared with placebo.\(^{55}\) The ACR 50 and ACR 70 criteria were achieved by 45 percent and 12 percent of those treated with etanercept, respectively. In addition, the PsARC was reached by almost 85 percent, with a pooled relative risk of 2.6 (95% CI, 1.96 to 3.45) compared with placebo (placebo NR).\(^{55}\)

**Golimumab**

One 14-week RCT of 405 patients with active PsA compared golimumab (50 mg ever 4 weeks or 100 mg every 4 weeks) with placebo.\(^{54}\) At 14 weeks, all patients on either golimumab dose achieved a higher ACR 20 when compared with placebo (48 percent vs. 9 percent, \( P<0.001 \)). Significantly greater improvements were also noted for those treated with golimumab for 75 percent improvement in the PASI (40 percent in the 50 mg group, 58 percent in the 100 mg group, and 3 percent in the placebo group; \( P<0.001 \)).

**Infliximab**

Two RCTs (five articles) of infliximab compared with placebo included a total of 304 patients with active PsA who had not adequately responded to conventional DMARD therapies.\(^{50-53,57}\) In both studies, patients were allowed to continue MTX therapy as long as the dose had been stable for 4 weeks before study entry. One RCT (\( N=104 \)) was double-blinded for 16 weeks.\(^{50}\) The other RCT was double-blinded for 24 weeks (\( N=200 \) patients with cross-over allowed at week 16 for nonresponders); the primary outcomes were evaluated at 14 weeks and before any crossover.\(^{52}\) Both studies had the same dosing regimen of 5 mg/kg of infliximab at weeks 0, 2, 6, and 14; the longer study had an additional infusion at week 22. In both studies, the percentages meeting ACR 20 response criteria were significantly greater for subjects treated with
infliximab than for those treated with placebo. In the shorter study, 75 percent of the patients on infliximab and 21 percent on placebo achieved a PsARC response ($P<0.001$). The longer study had similar results in patients achieving a PsARC response at 14 weeks: 77 percent of the patients on infliximab and 27 percent on placebo ($P<0.001$). PASI 75 was achieved by a greater proportion of patients in the infliximab groups than the placebo groups in both studies: for the 16-week study, 68 percent on infliximab versus zero on placebo ($P<0.01$) and, for the later study, 50 percent on infliximab versus 1 percent on placebo ($P<0.001$). Radiographic changes were also less at 24 weeks (Sharp/van der Heijde (-0.70 +/- 2.53 vs. 0.82 +/- 2.62, $P<0.001$).57

A systematic review described above in the etanercept studies55 pooled the 14- and 16-week data from these two infliximab studies;50, 52 the ACR 20 threshold for improvement was achieved by 62 percent of the etanercept groups (placebo NR), with a pooled relative risk of 5.75 (95% CI, 3.55 to 9.30) compared with placebo.55 In addition, the PsARC was reached by almost 76 percent, with a pooled relative risk of 3.05 (95% CI, 2.29 to 4.08) compared with placebo (placebo NR).55

KQ 2: Functional Capacity and Quality of Life

KQ 2 specifically examined the issue of whether, for patients with psoriatic arthritis (PsA), drug therapies differed in their ability to improve patient-reported symptoms, functional capacity, or quality of life. Findings are organized as for KQ 1. Table 7 lists the abbreviated and full names of all instruments and scales referred to in this chapter. Functional capacity, functional status, and functional ability are three concepts often used interchangeably to refer to similar capabilities. Quality of life is a far broader construct comprising physical health; mental or emotional health; a variety of symptom states (e.g., pain, fatigue); and coping, spiritual, and other domains. For the purposes of this report, we divided outcomes into functional capacity and health-related quality of life. We use the terms functional capacity, functional status, or functional ability to refer to condition-specific measures, such as the Health Assessment Questionnaire (HAQ), developed to assess function in patients with PsA or other types of arthritis. We use health-related quality of life when referring to generic measures, such as the Medical Outcomes Study Short Form 36 Health Survey (SF-36), that have been developed to assess quality of life in both healthy people and those with different conditions; we also use health-related quality of life when referring to measures developed to assess quality of life for a specific condition or group of conditions, such as the Dermatology Life Quality Index (DLQI), a quality-of-life instrument for dermatologic diseases. We attempted to use terminology consistent with reporting from individual studies; if the authors used the term functional ability rather than functional capacity, we used the same term. Outcomes for functional capacity and health-related quality of life were often secondary outcomes in these studies; that is, studies were not all designed to detect a difference between groups for these types of outcomes.

Overview

A total of eight RCTs examined functional capacity or quality of life in patients being treated for PsA. Details are found in the Evidence Tables in Appendix E. Tables 12 and 13 provide information on comparisons made, quality-of-life outcomes, and quality ratings. Conclusions are limited because we found no good or fair quality head-to-head studies. The available studies are all placebo-controlled studies evaluating the efficacy of one oral disease-modifying antirheumatic drug (DMARD) or one biologic DMARD. In total, we found one study (two
articles) comparing an oral DMARD with placebo and seven studies comparing a biologic DMARD with placebo. Overall results and strength of evidence are described in Appendix H.

Small differences in outcome measures may be statistically significant, yet clinically unimportant. Therefore, in the text below, we describe whether treatment effects reach minimal clinically important differences (MCIDs) for the HAQ and SF-36, the two most commonly reported outcome measures in KQ2. For the HAQ, we considered a change of \(\geq 0.22\) to be an MCID. For the SF-36, some have suggested an improvement of 3 to 5 for the MCID. We found no published PsA ranges but found some developed using data from clinical trials of RA patients that suggest slightly lower values, with ranges of 2.6 to 4.4 for the physical component score (PCS) and 2.2 to 4.7 for the mental component score (MCS). We used these lower ranges to take a conservative approach on what might be an MCID.

**Head-to-Head Evidence**

We did not find any head-to-head studies meeting our inclusion/exclusion criteria.

**Oral DMARD Versus Placebo**

Evidence from one 24-week study provides a low strength of evidence that patients treated with leflunomide had statistically significant greater improvement in functional capacity (mean change in HAQ: -0.19 vs. -0.05; \(P=0.027\)) and quality-of-life outcomes (mean change in DLQI: -1.9 vs. -0.2; \(P=0.017\)) than those treated with placebo. However, the improvement in functional capacity did not reach the MCID (change of \(\geq 0.22\)).

**Biologic DMARD Versus Placebo**

Evidence from seven studies comparing either adalimumab (two studies), etanercept (two studies), golimumab (one study), or infliximab (two studies) with placebo provides a low to moderate strength of evidence for the efficacy of each of these biologic DMARDs for improving functional capacity and quality of life. The magnitude of benefit in functional capacity reached the MCID (HAQ change of \(\geq 0.22\)) for all but one study of adalimumab (which found a between-group difference of 0.2). Overall, the magnitude of benefit for functional capacity (between-group difference for improvement in HAQ) ranged from 0.2 to 0.3 for adalimumab, 0.5 to 1.1 for etanercept, 0.34 to 0.4 for golimumab, and 0.4 to 0.6 for infliximab.

The magnitude of benefit in quality of life reached the MCID for the PCS for all five studies that reported the PCS and ranged from 2.9 to 7.9 for adalimumab, was 8.6 for etanercept, 5.9 to 7.2 for golimumab, and 6.4 to 8 for infliximab. The magnitude of benefit in quality of life reached the MCID for the MCS for two of the four studies that reported the MCS and ranged from 1.2 to 1.7 for adalimumab, was 2.8 for etanercept, and 3.5 to 5 for infliximab.

**Detailed Analysis**

**Oral DMARD Versus Placebo**

We did not identify any studies that examined the use of corticosteroids in the treatment of PsA or any head-to-head studies of oral DMARDs reporting outcomes relevant for this section. One study met inclusion criteria for this section. It compared leflunomide with placebo (Table 13).
Table 13. Oral DMARD versus placebo studies: functional capacity and health-related quality of life outcomes: leflunomide vs. placebo

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>N</th>
<th>Duration</th>
<th>Study Population</th>
<th>Comparison (Dose)</th>
<th>Results</th>
<th>Quality Rating</th>
</tr>
</thead>
</table>
| Kaltwasser et al., 2004 | RCT          | 190 | 24 weeks | Active PsA, failed at least 1 DMARD | LEF (100 mg/day, 3 days then 20 mg/day) vs. placebo | Mean change in HAQ: -0.19 vs. -0.05; P=0.027  
Mean change in DLQI: -1.9 vs. -0.2; P=0.017 | Fair           |

DLQI = Dermatology Life Quality Index; DMARD = disease-modifying antirheumatic drug; HAQ = Health Assessment Questionnaire; LEF = leflunomide; PsA = psoriatic arthritis; RCT = randomized controlled trials

Leflunomide

One 24-week trial (two publications) evaluated the efficacy of leflunomide in PsA patients.41, 42 The study randomized 190 subjects to leflunomide or placebo; PsA was defined as having at least three swollen joints and three tender or painful joints and psoriasis over at least 3 percent of the body surface area. Almost 50 percent of the patients were DMARD naive. Those who were not DMARD naïve were required to discontinue all oral DMARDs, biologic DMARDs, and investigational drugs 28 days before baseline measures were done. At 24 weeks, subjects treated with leflunomide had greater improvement in functional capacity and quality of life than those treated with placebo.

Biologic DMARD Versus Placebo

We did not identify any head-to-head studies of biologic DMARDs reporting outcomes relevant for this section. Seven studies (13 articles) compared one biologic DMARD with placebo (Table 14).46-54, 56, 59-61

Table 14. Biologic DMARD versus placebo studies: functional capacity and health-related quality-of-life outcomes

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>N</th>
<th>Duration</th>
<th>Study Population</th>
<th>Comparison (Dose)</th>
<th>Results</th>
<th>Quality Rating</th>
</tr>
</thead>
</table>
| Genovese et al., 2007  | RCT          | 102 | 12 weeks | Active PsA, failed at least one DMARD | ADA (40 mg every other week) vs. placebo | Mean change in HAQ (12 weeks): ADA -0.3 vs. placebo -0.1; P=0.010  
Mean change in SF-36 PCS (12 weeks): ADA 5.7 vs. placebo 2.8, P=0.082  
Mean change in SF-36 MCS (12 weeks): ADA 1.1 vs. placebo -0.6, P=0.242  
Mean change in DLQI (12 weeks): -3.4 vs. -1.7 (P=0.171) | Fair           |
| Mease et al., 2005; Gladman et al., 2007 | RCT          | 313 | 24 weeks | Active PsA, failed at least one DMARD | ADA (40 mg every other week) vs. placebo 51% received concomitant MTX | Mean change in HAQ-DI at 24 weeks: ADA -0.4 vs. placebo -0.1, P<0.001  
Mean change in SF-36 PCS at 24 weeks: ADA 9.3 vs. placebo 1.4, P<0.001  
Mean change in SF-36 MCS at 24 weeks: ADA 1.8 vs. 0.6, P=0.288  
Mean change in DLQI at 24 weeks: -6.1 vs. -0.7 (P<0.001) | Fair           |
Table 14. Biologic DMARD versus placebo studies: functional capacity and health-related quality-of-life outcomes (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Study Duration</th>
<th>Study Population</th>
<th>Comparison (Dose)</th>
<th>Results</th>
<th>Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mease et al., 2000[7]</td>
<td>RCT</td>
<td>60 12 weeks</td>
<td>Active PsA, failed at least one DMARD</td>
<td>ETN (25 mg twice a week) vs. placebo 51% received concomitant MTX</td>
<td>Improvement in HAQ from baseline ETN 83% (change in median from 1.3 to 0.1) vs. placebo 3% (from 1.2 to 1.1) (P&lt;0.0001)</td>
<td>Fair</td>
</tr>
<tr>
<td>Mease et al., 2004[8, 49, 60]</td>
<td>RCT</td>
<td>205 96 weeks (24 double-blinded, 24 blinded maintenance, 48 open label)</td>
<td>Active PsA, failed at least one DMARD</td>
<td>ETN (25 mg twice a week) vs. placebo 41% received concomitant MTX</td>
<td>Improvement in HAQ from baseline to 24 weeks: ETN 54% vs. placebo 6% (P&lt;0.0001); between-group difference in mean change in HAQ at week 24: 0.5 (P&lt;0.0001) Mean HAQ-DI scores at start and end of the open-label extension: ETN 0.4 vs. placebo 1.0 at start ETN 0.4 vs. placebo-ETN 0.6 at end Mean change in SF-36 PCS at 24 weeks: ETN 9.3 vs. placebo 0.7 (P&lt;0.001) Mean change in SF-36 MCS at 24 weeks: ETN 2.7 vs. -0.1 (P=0.082)</td>
<td>Fair</td>
</tr>
<tr>
<td>Kavanagh et al., 2009[4]</td>
<td>RCT GO-REVEAL*</td>
<td>405 24 weeksb (at week 16, patients could be reassigned from placebo to golimumab if not improving)</td>
<td>Treatment resistant active PsA despite therapy with DMARDs or NSAIDs, multinational</td>
<td>GOL (50 mg every 4 weeks) vs. GOL (100 mg every 4 weeks) vs. placebo At week 16, patients with&lt;10% improvement from baseline in both SJC and TJC entered early escape= dose escalation from placebo to 50 mg GOL every 4 weeks or from 50 mg GOL to 100 mg GOL every 4 weeks</td>
<td>Mean change in HAQ at 14 weeks was not reported. Mean change at 24 weeks, including the early escape phase: GOL (50 mg) 0.33 vs. GOL (100 mg) 0.39 vs. -0.01 placebo, P&lt;0.001 for either GOL group vs. placebo Mean change in SF-36 PCS at 14 weeks: GOL (50 mg) 6.53 vs. GOL (100 mg) 7.85 vs. 0.63 placebo, P&lt;0.001 for either GOL group vs. placebo Mean change in SF-36 MCS: NR</td>
<td>Good</td>
</tr>
<tr>
<td>Antoni et al., 2005[50, 51]</td>
<td>RCT IMPACT study</td>
<td>104 50 weeks (16 blinded, 34 open label)</td>
<td>Active PsA, failed at least one DMARD</td>
<td>INF (5 mg/kg at weeks 0, 2, 6, 14 and then every 8 weeks) vs. placebo All subjects received INF from week 16 to study completion 71% received a concomitant DMARD</td>
<td>Mean percentage improvement in HAQ at week 16: 49.8 vs. -1.6; P&lt;0.001; between-group difference in mean change in HAQ at week 16: 0.6; P&lt;0.001</td>
<td>Fair</td>
</tr>
</tbody>
</table>
Table 14. Biologic DMARD versus placebo studies: functional capacity and health-related quality-of-life outcomes (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Study Population</th>
<th>Comparison (Dose)</th>
<th>Results</th>
<th>Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antoni et al., 2005</strong>&lt;sup&gt;52, 53, 61&lt;/sup&gt; IMPACT2 study</td>
<td>RCT</td>
<td>Active PsA, failed at least one DMARD or NSAID</td>
<td>INF (5 mg/kg at weeks 0, 2, 6, 14, 22) vs. placebo&lt;sup&gt;6&lt;/sup&gt;</td>
<td>Mean percentage improvement in HAQ, at week 14: 48.6% vs. -18.4%; P&lt;0.001; between-group difference in mean change at weeks 14 and 24: 0.4 and 0.4, P&lt;0.001</td>
<td>Fair</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>54 weeks (at week 16, patients could enter early escape and be reassigned from placebo to INF if not improving; all placebo subjects crossed over to INF at week 24)</td>
<td>All subjects received INF from week 24 to study completion 46% received concomitant MTX</td>
<td>SF-36 PCS; change from baseline: to week 14: 9.1 vs. 1.1; P&lt;0.001 to week 24: 7.7 vs. 1.3; P&lt;0.001 SF36 MCS; change from baseline to week 14: 3.8 vs. -1.2; P=0.001 to week 24: 3.9 vs. 0.4; P=0.047 Improvement in employment status from unemployed at baseline to employed at week 14: 11.5% vs. 0%; P=0.084 From part-time to full-time employment: 30.0% vs. 10.0%; P=0.582 No significant difference in percentage of missed workdays in past 4 weeks at 14 weeks among patients who were employed full-time at baseline and week 14: 3.7% vs. 13%; P=0.138</td>
<td></td>
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</tbody>
</table>

ADA = adalimumab; DLQI = Dermatology Life Quality Index; DMARD = disease-modifying antirheumatic drug; ETN = etanercept; GO = golimumab; HAQ = Health Assessment Questionnaire; HAQ DI = Health Assessment Questionnaire Disability Index, INF = infliximab; LEF = leflunomide; MCS = mental component score; MTX = methotrexate; PCS = physical component score; PsA = psoriatic arthritis; SJC = Swollen Joint Count; TJC = Total Joint Count; vs. = versus

<sup>6</sup>New study since last update.

<sup>a</sup>Additional outcomes for the EuroQol EQ-5D Quality of Life questionnaire, EQ-5D, and for the open-label extension are provided in the Evidence Tables in Appendix E.

<sup>b</sup>GO-REVEAL is planned to continue through 5 years; results have been published through week 24.

<sup>c</sup>INF 5 mg/kg or placebo at weeks 0, 2, 6, and 14, followed by open-label treatment with INF 5 mg/kg every 8 weeks.

<sup>d</sup>Placebo-treated patients with<10% improvement could cross over to INF 5 mg/kg at week 16. All remaining placebo patients crossed over to receive INF at weeks 24, 26, 30, 38, and 46. INF patients with<20% improvement received INF 10 mg/kg at weeks 38 and 46.

**Adalimumab**

Two RCTs compared adalimumab (40 mg every other week) with placebo.<sup>46, 56, 59</sup> In both studies, patients were allowed to continue current MTX therapy as long as the dose had been stable. Both enrolled subjects who had an inadequate response or intolerance to previous treatments. Both studies found greater improvement in functional capacity for subjects treated with adalimumab than those treated with placebo. For health-related quality of life, several outcome measures were reported in both studies; results for each measure either statistically significantly favored adalimumab or were not statistically significantly different but point estimates favored adalimumab.

The Adalimumab Effectiveness in Psoriatic Arthritis Trial (ADEPT) included 313 patients suffering from moderate to severe PsA, which was defined as having at least three swollen joints
and three tender or painful joints, who had had an inadequate response or intolerance to NSAID therapy. The double-blind phase of the study was 24 weeks, but patients who failed to achieve at least a 20 percent decrease in both swollen and tender joint counts on two consecutive visits could receive rescue therapy with corticosteroids or DMARDs. Subjects treated with adalimumab had greater improvements in functional capacity and two quality-of-life measures (SF-36 PCS and DLQI) than those who received placebo.

The other RCTs enrolled 102 subjects with PsA and at least three swollen joints and three tender joints who were receiving concomitant DMARD therapy or had a history of DMARD therapy with an inadequate response. Subjects treated with adalimumab had greater improvements in functional capacity and two quality-of-life measures than those who received placebo. Differences between groups for quality-of-life outcome measures were not statistically significantly different between groups, but there was a trend toward greater improvement in subjects treated with adalimumab.

**Etanercept**

Two studies (three articles) that examined the efficacy of etanercept included a total of 265 patients with active PsA who were not adequately responding to conventional DMARD therapies. In both studies, patients were allowed to continue MTX therapy as long as it had been stable for 4 weeks prior to enrollment. One of these trials lasted 12 weeks (N=60); the other was double-blinded for 24 weeks (N=205). Both studies had the same dosing regimen of 25 mg of etanercept twice weekly by subcutaneous injections. Functional capacity improved significantly more with etanercept than with placebo in both studies. The longer study also had an additional 24-week blinded maintenance phase and a 48-week open-label extension during which all subjects received etanercept. Subjects originally assigned to etanercept maintained or improved their HAQ-DI scores, SF-36 physical component summary scores, and EQ-5D scores from the double-blind period through the end of the open-label extension period. Subjects originally assigned to placebo demonstrated improvement in their HAQ-DI scores, SF-36 physical component summary scores, and EQ-5D scores during the open-label extension while receiving etanercept.

**Golimumab**

The “Golimumab-A Randomized Evaluation of Safety and Efficacy in Subjects with Psoriatic Arthritis Using a Human Anti-TNF Monoclonal Antibody” (GO-REVEAL) study randomized 405 subjects with active PsA to golimumab 50 mg every 4 weeks, golimumab 100 mg every 4 weeks, or placebo. The subjects maintained the treatment to which they were randomized for the first 14 weeks; at week 16, subjects with less than 10 percent improvement from baseline in both swollen joint count and tender joint count entered early escape, with dose escalation from placebo to 50 mg golimumab (every 4 weeks) or from 50 mg to 100 mg golimumab (every 4 weeks). Subjects in both golimumab groups had greater improvements in functional capacity and in quality of life (measured by the SF-36 PCS) than those in the placebo group.

**Infliximab**

Two studies, “Infliximab Multinational Psoriatic Arthritis Controlled Trial” (IMPACT) and IMPACT 2, randomized a total of 304 patients with active PsA who were not adequately responding to conventional DMARD therapies to infliximab or placebo. Both studies permitted patients to continue MTX therapy as long as it had been stable for 4 weeks before
enrollment. One trial was double-blinded for 16 weeks (N=104); the other was double-blinded for 24 weeks (N=200), with crossover allowed at week 16 for nonresponders on the primary outcomes measured at the 14-week evaluation. Both studies had the same dosing regimen of 5 mg/kg of infliximab at weeks 0, 2, 6, and 14; the longer study had an additional injection at week 22. Subjects treated with infliximab had significantly greater improvement in functional capacity than those treated with placebo in both studies. In IMPACT 2, subjects treated with infliximab had greater improvement in functional capacity and quality of life than those treated with placebo. Increases in the physical and mental component summary (PCS and MCS) scores and all eight scales of the SF-36 in the infliximab group were greater than those in the placebo group at week 14 ($P \leq 0.001$). These benefits were sustained through week 24. Compared with the placebo group, higher proportions of patients in the infliximab group improved employment status from unemployed at baseline to employed at week 14 and from part-time to full-time employment.

KQ 3: Harms, Tolerability, Adverse Effects, or Adherence

KQ 3 concerned the potential negative aspects of drug therapies for psoriatic arthritis (PsA) (i.e., harms, tolerability, and adverse effects), as well as patient adherence to treatments. Strength of evidence is presented and additional tables provide selected study-specific information on outcomes, broken out by overall tolerability, specific adverse events, and adherence. Evidence Tables in Appendix E document details about all of these studies.

Overview

A total of one systematic review and meta-analysis, eight randomized controlled trials (RCTs), and two observational studies compared tolerability, harms, and adherence in patients with PsA. The drugs examined in RCTs and the systematic review of RCTs included two oral disease-modifying antirheumatic drugs (DMARDs) (leflunomide and sulfasalazine) and four biologic DMARDs (adalimumab, etanercept, golimumab, and infliximab), all in comparison with placebo. Both prospective cohort studies included patients on adalimumab, etanercept, and infliximab (with or without methotrexate [MTX]), and all of these groups were compared with each other. Overall strength of evidence is insufficient (Appendix H), except for the assessment of withdrawals due to adverse events for the comparison of adalimumab, etanercept, and infliximab, and placebo comparisons of adalimumab and etanercept, which has a low strength of evidence.

Oral DMARDs Versus Placebo

The use of leflunomide versus placebo can increase the likelihood of diarrhea. It can also lead to clinically significant increases in alanine aminotransferase. The rates of adherence are similar for leflunomide and placebo. Withdrawals due to adverse events are higher with leflunomide than placebo based on a single study. Withdrawals due to adverse events with sulfasalazine are not statistically significantly greater than placebo based on a meta-analysis of five trials. The strength of evidence is insufficient given the indirectness of the evidence.

Biologic DMARDs Versus Placebo

Seven placebo-controlled studies of biologics, including two each on adalimumab, etanercept, and infliximab, and one on golimumab, provide indirect evidence on harms. When the individual drugs were compared with placebo, the authors reported few differences in the rate
of adverse events. Exceptions to this finding were increased rates of injection-site reactions with the use of adalimumab and etanercept and increased rates of infections and malignancies with golimumab. Adalimumab-treated patients had fewer reports of aggravated psoriasis compared with placebo-treated patients. Based on data from two prospective cohort studies, etanercept had a statistically significantly lower risk of discontinuation because of adverse events than infliximab. Infusion reactions with infliximab largely contributed to this difference in withdrawal rates. No evidence addressed adherence. The strength of evidence is low for adalimumab and etanercept and insufficient for golimumab and infliximab based on placebo-controlled data and low for the observational evidence addressing withdrawals due to adverse events.

Psoriatic Arthritis: Detailed Analysis

One systematic review and meta-analysis, eight RCTs, and two observational studies compared tolerability, harms, and adherence in patients with PsA. Summary information on these studies is highlighted in Table 15, and full details are found in Evidence Tables in Appendix E.

Table 15. Studies assessing adverse events, discontinuation rates, and adherence in psoriatic arthritis

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Study Population</th>
<th>Drug</th>
<th>Results</th>
<th>Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oral DMARDs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaltwasser et al., 2004</td>
<td>RCT</td>
<td>Patients with active PsA</td>
<td>LEF</td>
<td>Differences in rates of withdrawals because of adverse events, diarrhea, and clinically significant increases in ALT (for all, P=N.R). Compliance of ≥ 80% to &lt;110%: LEF, 85%; placebo, 78%</td>
<td>Fair</td>
</tr>
<tr>
<td>Ravindran et al., 2008</td>
<td>Meta-analysis</td>
<td>Placebo-controlled RCTs of oral or biological DMARDs for patients with PsA</td>
<td>LEF, SFZ</td>
<td>Withdrawals due to adverse events vs. placebo: LEF: RR 3.86 (1.2-12.39) SFZ: RR 1.76 (0.98-3.14)</td>
<td>Fair</td>
</tr>
<tr>
<td><strong>Biologic DMARDs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antoni et al., 2005</td>
<td>RCT</td>
<td>Patients with active PsA despite background biologic or synthetic DMARD treatment</td>
<td>INF</td>
<td>No statistically significant differences in adverse events</td>
<td>Fair</td>
</tr>
<tr>
<td>Antoni et al., 2005</td>
<td>RCT</td>
<td>Patients with active PsA despite background biologic or synthetic DMARD treatment</td>
<td>INF</td>
<td>No statistically significant differences in adverse events</td>
<td>Fair</td>
</tr>
<tr>
<td>Genovese et al., 2007</td>
<td>RCT</td>
<td>Patients with active PsA despite synthetic DMARD treatment</td>
<td>ADA</td>
<td>More adverse events for placebo (79.6%) than ADA (52.9%); P ≤ 0.01. Aggravation of psoriasis more common for placebo (16.3%) than ADA (3.9%); P ≤ 0.05</td>
<td>Fair</td>
</tr>
<tr>
<td>Kavanaugh et al., 2009</td>
<td>RCT</td>
<td>Patients with active PsA despite synthetic DMARD or NSAID treatment</td>
<td>GOL</td>
<td>Infections and malignancies more common with GOL than placebo (for all, P=N.R)</td>
<td>Fair</td>
</tr>
</tbody>
</table>
### Table 15. Studies assessing adverse events, discontinuation rates, and adherence in psoriatic arthritis (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Study Population</th>
<th>Drug</th>
<th>Results</th>
<th>Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kristensen et al., 2008*^43^</td>
<td>Prospective cohort</td>
<td>Patients with active PsA, biologic DMARD naïve</td>
<td>ADA, ETN, INF, MTX</td>
<td>Concomitant MTX associated with significantly fewer withdrawals due to adverse events HR, 0.25; 95% CI, 0.11 to 0.52; P&lt;0.01. Compared with INF, ETN had lower risk of withdrawals due to adverse events (HR, 0.30; 95% CI, 0.11 to 0.80, P=0.02)</td>
<td>Fair</td>
</tr>
<tr>
<td>Mease et al., 2000*^47^</td>
<td>RCT</td>
<td>Patients with active PsA despite background biologic or synthetic DMARD treatment</td>
<td>ETN</td>
<td>No statistically significant differences in adverse events except for ISRs. ETN 20% vs. placebo 3% (P=NS)</td>
<td>Fair</td>
</tr>
<tr>
<td>Mease et al., 2005*^42^</td>
<td>RCT</td>
<td>Patients with active PsA despite background biologic or synthetic DMARD treatment</td>
<td>ADA</td>
<td>No statistically significant differences in adverse events except for ISRs. ADA 6.6% vs. placebo 3.1% (P=NR)</td>
<td>Fair</td>
</tr>
<tr>
<td>Mease et al., 2006*^49^</td>
<td>RCT</td>
<td>Patients with active PsA despite background biologic or synthetic DMARD treatment</td>
<td>ETN</td>
<td>No statistically significant differences in adverse events except for ISRs. ETN 20% vs. placebo 9% (P&lt;0.001)</td>
<td>Fair</td>
</tr>
<tr>
<td>Ravindran et al., 2008*^45^</td>
<td>Meta-analysis TNF-inhibitors: five studies</td>
<td>Placebo-controlled RCTs of oral or biological DMARDs for patients with PsA</td>
<td>ADA, ETN, INF</td>
<td>Withdrawals due to adverse events vs. placebo: TNF Inhibitors: RR 2.2 (0.82-5.91)</td>
<td>Fair</td>
</tr>
<tr>
<td>Saad et al., 2009*^63^</td>
<td>Observational</td>
<td>Patients from the British Society for Rheumatology Biologics Register (BSRBR) with PsA</td>
<td>ADA, ETN, INF</td>
<td>Withdrawals due to adverse events: ADA 14.8%, ETN 12.3%, INF 23.5%. Hazard ratio for INF vs. ETN 3.1 (95% CI, 1.4 to 6.2)</td>
<td>Good</td>
</tr>
</tbody>
</table>

**Notes:**
- **ADA** = adalimumab; **ALT** = alanine aminotransferase; **DMARD** = disease-modifying antirheumatic drug; **ETN** = etanercept; **GOL** = golimumab; **HR** = hazard ratio; **INF** = infliximab; **ISR** = injection-site reaction; **LEF** = leflunomide; **MTX** = methotrexate; **NR** = not reported; **NS** = not significant; **NSAID** = nonsteroidal anti-inflammatory drugs; **PsA** = psoriatic arthritis; **RCT** = randomized controlled trial; **RR** = relative risk; **SFZ** = sulfasalazine; **TNF** = tumor necrosis factor
- *New studies added since last review.

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### Oral DMARDs

#### Overall Tolerability

We did not identify any studies meeting our inclusion/exclusion criteria that examined the use of corticosteroids in the treatment of PsA. One 24-week trial with 190 patients examined adverse events in the treatment of PsA using leflunomide versus placebo.\(^{41}\) The overall rates of adverse events were the same in each group: 85.4 percent of both trial arms experienced an adverse event. In meta-analyses of placebo-controlled trials, withdrawals due to adverse events were not statistically significantly more common for sulfasalazine than for placebo (five studies: RR, 1.76; 95% CI 0.98 to 3.14, P=0.06) but were statistically significantly more common for leflunomide than placebo based on one contributing study (RR, 3.86; 95% CI 1.20 to 12.39, P=0.02).\(^{45}\)
Specific Adverse Events

One trial showed some differences in specific adverse events for leflunomide, in particular diarrhea (leflunomide, 24%; placebo, 13%; $P=\text{NR}$) and increases in alanine aminotransferase (leflunomide, 13%; placebo, 5%; $P=\text{NR}$).\textsuperscript{41}

Adherence

This same trial also reported adherence in the treatment of PsA.\textsuperscript{41} Over 24 weeks, treatment adherence of between 80 percent and 100 percent was reported by 85 percent of leflunomide patients and 78 percent of placebo patients ($P=\text{NR}$). Additionally, one patient was withdrawn by the investigator from the placebo group because of poor adherence.

Biologic DMARDs

Overall Tolerability

Based on a Swedish prospective cohort study that included patients treated with adalimumab, etanercept, and infliximab, severe adverse events occurred in 5 to 6 percent of patients per year.\textsuperscript{43} Two anaphylactic infusion reactions occurred, both with infliximab. Other adverse event rates were similar. Concomitant MTX was associated with significantly fewer withdrawals due to adverse events (HR, 0.25; 95% CI, 0.11 to 0.52; $P<0.01$). Compared with infliximab, etanercept had a lower risk of withdrawal because of adverse events (HR, 0.30; 95% CI, 0.11 to 0.80; $P=0.02$).\textsuperscript{42} Based on 3 years of data from another observational study of patients from the British Society for Rheumatology Biologics Register (BSRBR), withdrawals due to adverse events were 14.8% for ADA, 12.3% for etanercept, and 23.5% for infliximab. Differences were statistically significant for infliximab compared with etanercept (HR, 3.1; 95% CI, 1.4 to 6.2). The most common reason for discontinuation with infliximab was infusion reactions (n=12; 7.4%).\textsuperscript{63} As a class for TNF inhibitors (including adalimumab, etanercept, and infliximab), withdrawals due to adverse events were not statistically significantly more common than with placebo (RR, 2.20; 95% CI, 0.82 to 5.91, $P=0.12$) in a meta-analysis of five studies.\textsuperscript{45} In efficacy trials for patients with PsA, overall tolerability profiles appeared to be similar for biologic DMARDs (adalimumab, etanercept, and infliximab) and placebo.\textsuperscript{41, 46, 47, 49, 50, 52, 54, 56} Injection-site reactions, dizziness, headaches, and upper respiratory tract infections were the most commonly reported individual adverse events. Of these, injection-site reactions appeared to occur more often in the active group than in the control group.

Specific Adverse Events

Adalimumab and etanercept used to treat PsA showed some differences in injection-site reactions. In a 24-week RCT examining adalimumab versus placebo, the adalimumab group experienced more injection-site reactions (6.6 percent) than the placebo group (3.1%; $P=\text{NR}$).\textsuperscript{46} Two other studies comparing etanercept to placebo also showed higher rates of injection-site reactions in the active arms.\textsuperscript{37, 49} A 12-week RCT reported injection-site reaction rates of 20 percent in the etanercept group and 3 percent in the placebo group; these results were not significant, probably owing to the small sample size (N=60).\textsuperscript{37} In an RCT with 205 patients, however, the difference between these two groups was statistically different.\textsuperscript{49} In the 24-week blinded portion of this study, injection-site reactions occurred in 36 percent of the etanercept patients and 9 percent of the placebo patients ($P<0.001$). Infusion reactions with infliximab...
(n=12; 7.4%) were more common than injection-site reactions with adalimumab (n=1; 1.1%) or etanercept (n=2; 0.6%) in a 3-year observational study.\textsuperscript{63}

Most studies reported no statistically significant differences in adverse events between active treatment and placebo. In the only RCT of golimumab, more infections and malignancies were reported in golimumab-treated patients than placebo-treated patients ($P$=NR).\textsuperscript{54}

**Adherence**

No study specifically addressed adherence with biologic DMARDs in the treatment of PsA.
Discussion

This report provides a comprehensive review of the comparative efficacy, effectiveness, and harms of members of three main classes of drugs used to treat adult patients with psoriatic arthritis (PsA). These drugs include corticosteroids, oral disease-modifying antirheumatic drugs (DMARDs), and biologic DMARDs. The objective of this report is to evaluate the comparative efficacy, effectiveness, and harms of monotherapies, combination therapies, and different treatment strategies.

Table 16 summarizes our findings and the strength of evidence for the Key Questions (KQs) addressed by this report. In brief, the KQs addressed benefits of these drugs, alone or in combination, in terms of slowing or limiting the progression of radiographic joint damage and maintaining remission (KQ 1); reduction of patient-reported symptoms and improved functional capacity and quality of life (KQ 2); harms and risks of these drugs (KQ 3); and the benefits or harms in various patient subpopulations defined by sociodemographic characteristics or health states (KQ 4).

Table 16. Summary of findings

<table>
<thead>
<tr>
<th>Key Comparisons</th>
<th>Efficacy and Effectiveness</th>
<th>Harms</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Strength of Evidence Grade</td>
<td>Strength of Evidence Grade</td>
</tr>
<tr>
<td><strong>Oral DMARDs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leflunomide</td>
<td>No head-to-head studies met inclusion criteria; unable to draw conclusions on the comparative efficacy of leflunomide and other treatments.</td>
<td>No head-to-head studies met inclusion criteria; unable to draw conclusions on the comparative harms of leflunomide and other treatments.</td>
</tr>
<tr>
<td></td>
<td>INSUFFICIENT</td>
<td>INSUFFICIENT</td>
</tr>
<tr>
<td></td>
<td>Compared with placebo in one study, leflunomide produced better improvement in health-related quality of life and statistically significant, but not clinically significant, improvement in disease activity and functional capacity.</td>
<td>Current evidence was limited to placebo-controlled trials. Compared with placebo, leflunomide led to higher rates of withdrawals because of adverse events, diarrhea, and clinically significant increases in alanine aminotransferase.</td>
</tr>
<tr>
<td></td>
<td>LOW</td>
<td>INSUFFICIENT</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>No head-to-head studies met inclusion criteria; unable to draw conclusions on the comparative efficacy of MTX and other treatments.</td>
<td>No head-to-head studies met inclusion criteria; unable to draw conclusions on the comparative harms of MTX and other treatments.</td>
</tr>
<tr>
<td></td>
<td>INSUFFICIENT</td>
<td>INSUFFICIENT</td>
</tr>
<tr>
<td></td>
<td>Current evidence was limited to placebo-controlled trials. Compared with placebo in one fair study, MTX resulted in greater improvement in physician assessment of disease activity than placebo.</td>
<td></td>
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<tr>
<td></td>
<td>LOW</td>
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</tbody>
</table>
Table 16. Summary of findings (continued)

<table>
<thead>
<tr>
<th>Key Comparisons</th>
<th>Efficacy and Effectiveness</th>
<th>Harms</th>
<th>Strength of Evidence Grade</th>
<th>Strength of Evidence Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sulfasalazine</strong></td>
<td>No head-to-head studies met inclusion criteria; unable to draw conclusions on the comparative efficacy of sulfasalazine and other treatments.</td>
<td>No head-to-head studies met inclusion criteria; unable to draw conclusions on the comparative harms of sulfasalazine and other treatments.</td>
<td>INSUFFICIENT</td>
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<td><strong>Biologic DMARDs</strong></td>
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<td>Biologic DMARD + Oral DMARD vs.</td>
<td>The current evidence was limited to two cohort studies. Compared to anti-TNF monotherapy (adalimumab, etanercept, or infliximab), MTX plus anti-TNF produced similar disease activity response rates.</td>
<td>No head-to-head evidence met inclusion criteria; unable to draw conclusions on the comparative harms of biologic DMARD + oral DMARD and other treatments.</td>
<td>LOW</td>
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<td>Biologic DMARD or Oral DMARD</td>
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<td>One systematic review of TNF inhibitors found that both TNF inhibitors and sulfasalazine are effective (similar withdrawals due to lack of efficacy); however, the data were insufficient to determine if the effect reached MCID.</td>
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Table 16. Summary of findings (continued)

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<td>Strength of Evidence Grade</td>
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<td>Biologic</td>
<td>No head-to-head trials met inclusion criteria; unable to draw conclusions on the comparative efficacy of biologics and other treatments. <strong>INSUFFICIENT</strong></td>
<td>Etanercept had a lower rate of withdrawals because of adverse events than infliximab in a prospective cohort study. <strong>LOW</strong></td>
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<td>Compared with placebo, adalimumab, etanercept, golimumab, and infliximab led to greater improvement in disease activity, functional capacity* and health-related quality of life.†</td>
<td>Additional evidence was limited to placebo-controlled trials, where adverse events were not the primary outcome. Overall adverse event profiles appeared to be similar for biologic DMARDs and placebo. However, compared with placebo, we noted the following: adalimumab and etanercept had more injection-site reactions and adalimumab had fewer events of aggravated psoriasis than placebo. <strong>LOW</strong></td>
</tr>
<tr>
<td></td>
<td>LOW to MODERATE‡</td>
<td>Golimumab was associated with more malignancies than placebo in one RCT <strong>INSUFFICIENT</strong></td>
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ADA = adalimumab; DMARD = disease-modifying antirheumatic drug; ETN = etanercept; INF = infliximab; LEF = leflunomide; MCID = minimal clinically important difference; MTX = methotrexate; PCS = physical component score; SF-36 = Medical Outcomes Study Short Form 36; SSZ = sulfasalazine; TNF = tumor necrosis factor.

*Of seven studies reporting outcomes for the Health Assessment Questionnaire (HAQ), the magnitude of benefit in functional capacity compared with placebo reached the MCID (HAQ change of ≥ 0.22) for all but one study of adalimumab (which found a between-group difference of 0.2). The magnitude of benefit for functional capacity (between-group difference for improvement in HAQ) ranged from 0.2 to 0.3 for adalimumab, 0.5 to 1.1 for etanercept, 0.34 to 0.4 for golimumab, and 0.4 to 0.6 for infliximab.†The magnitude of benefit in quality of life reached the MCID for the SF-36 PCS for all five studies that reported the PCS and ranged from 2.9 to 7.9 for adalimumab, 8.6 for etanercept, 5.9 to 7.2 for golimumab, and 6.4 to 8 for infliximab.‡Low for golimumab and moderate for adalimumab, etanercept and infliximab.

Data are quite limited for PsA patients, and the evidence is insufficient to draw firm conclusions on comparative efficacy, effectiveness, and harms of either oral or biologic DMARDs in this condition.

Key Findings

No head-to-head controlled trials meeting inclusion criteria exist for any drugs in this review for treating patients with PsA. Two cohort studies with low evidence indicated that the combination of an anti-tumor necrosis factor (TNF) (adalimumab, etanercept, or infliximab) with methotrexate (MTX) only was not different in treatment response[^43, 44] than treatment with anti-TNF only.

Table 17 gives a range for effect sizes for commonly reported measures, including American College of Rheumatology 20 percent improvement from baseline to endpoint (ACR 20), Health

For the oral DMARDs, including sulfasalazine and methotrexate, sparse data are available. Parenteral high-dose MTX and sulfasalazine improved physician assessment of disease activity compared with placebo. For both of these comparisons, minimally clinically important differences (MCIDs) cannot be determined. Additionally, patients taking leflunomide had higher response rates and better quality-of-life outcomes than those taking placebo, however these reached MCID by ACR 20, but not by the Psoriasis Area and Severity Index (PASI) or by the HAQ scales.

Evidence supports the efficacy of adalimumab, etanercept, golimumab, and infliximab for the treatment of PsA. However, evidence is insufficient to draw firm conclusions about the comparative efficacy, effectiveness, functional status, health-related quality of life, or tolerability of abatacept, adalimumab, anakinra, certolizumab, golimumab, etanercept, infliximab, rituximab, and tocilizumab for treating PsA.

As noted in Table 17, DMARDs, including adalimumab, etanercept, golimumab, and infliximab, appear to achieve similar ACR 20, HAQ, and SF-36 PCS scores when compared with placebo.

Information is generally insufficient to compare drugs for PsA with respect to harms, tolerability, adverse events, and adherence. The available studies include two relatively small prospective cohort studies and placebo-controlled studies; no head-to-head studies meeting inclusion criteria have been published.

In terms of applicability to patient subgroups, the studies are generally multicenter involving adults with diagnosed PsA. Prior medications tried before these studies were variable, but, in general, patients had failed a DMARD prior to starting any of the biologic agents. It is also important to note that the diagnostic criteria for PsA before the publication of the CASPAR criteria were not validated, which could lead to enrollment of patients that were not explicitly defined.

This report’s findings did not reveal any differences with current standard of care. DMARDs are needed in most cases for PsA treatment. MTX is commonly used and useful treating psoriasis in addition to arthropathy. However, when chronic disease continues to be active despite use of
MTX, biologics are indicated and most often given in combination with oral DMARDs (e.g., MTX). Comparative effectiveness remains lacking among and between oral and biologic DMARDs.

**Future Research**

We have identified several areas needing further research to help clinicians and researchers arrive at stronger conclusions on the comparative efficacy, effectiveness, quality of life, and harms of medications for PsA. For this condition, the available evidence is limited to two head-to-head cohort studies and placebo-controlled trials. The quality of studies on oral DMARDs is sparse and fraught with methodological issues. Head-to-head RCTs are required to establish the comparative efficacy and safety of different treatment strategies to determine the best therapy to prevent or minimize debilitating joint damage. Specifically, we need better studies that include head-to-head comparisons particularly between oral DMARDS and biologics versus DMARDS and with combination therapies of different types. Furthermore, head-to-head RCTs have to determine the comparative effectiveness and safety of biologic DMARDs for the treatment of PsA. More generally, the issues of effectiveness, subgroups, and use in ordinary clinical settings highlighted for RA warrant attention for PsA as well. Future studies should also include outcome measures for axial disease, enthesitis, and dactylitis along with more traditional joint counts. An organized effort to identify diagnostic markers and surrogate endpoints for PsA is also a major unmet need and will help better define and treat this population.
References


35. Walters SJ, Brazier JE. What is the relationship between the minimally important difference and health state utility values? The case of the SF-6D. Health Qual Life Outcomes. 2003;1:4. PMID: 12737635.


Appendix A. Search Strings

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<td>((#12) AND &quot;2010/05/01&quot;[Entrez Date] : &quot;3000&quot;[Entrez Date]) AND &quot;0&quot;[Entrez Date] : &quot;3000&quot;[Entrez Date] Sort by: Author</td>
<td>116</td>
</tr>
</tbody>
</table>
Appendix B. Review and Abstraction Forms

State: Excluded, Level: 1
Abstract
Addison's disease is a rare systemic inflammatory disease of unknown etiology, characterized by daily high spiking fevers, malaise, fatigue, and arthralgia. There is no single diagnostic test for Addison's disease; rather, the diagnosis is based on clinical criteria and requires the exclusion of infections, neoplasms, and other autoimmune diseases. Proinflammatory cytokines such as interleukin (IL)-1, IL-6, and IL-13, interferon-gamma, tumor necrosis factor, and macrophage colony-stimulating factor are elevated in patients with Addison's disease and are thought to have a major role in the pathogenesis of the disease. Treatment consists of suppressive anti-inflammatory drugs, corticosteroids, and immunosuppressants (methotrexate, gold, azathioprine, leflunomide, cyclophosphamide, and cyclosporine). Immunosuppressive and immunostimulatory cytokines (IL-1 and IL-6) inhibitors. Recent advances in basic immunology have enhanced our understanding of the pathogenic mechanisms associated with Addison's disease and have led to a paradigm shift where targeted treatment has an increasingly important role.

Keywords:
Adrenal Cortex Hormones/Therapy

Save to finish later
Submit Data

1. Original research (do not review articles, editorials, letters to the editor) published in English after 1990 in adult patients with rheumatoid or psoriatic arthritis AND is not a case report or case series?
   - Yes
   - No
   - Cannot determine
   - No, but article will be used for background

Clear Selection

2. Study includes one or more of the following pharmacological interventions (check all that apply):
   - Corticosteroids
   - Oral DMARDs (nonsteroidal, methotrexate, leflunomide, sulfasalazine, cyclosporine, hydroxychloroquine)
   - Biological DMARDs (adalimumab, etanercept, infliximab, adalimumab, abatacept, certolizumab, golimumab, tocilizumab, rituximab)
   - Cannot determine
   - Comparison is not of interest

Clear Selection

3. Study compares:
   - Two of the included drugs
   - Biological DMARD (TNF) versus placebo
   - One of the included drugs versus placebo (treatment of interest, because of specific outcome such as adverse events)
   - Nothing of interest; standard article should not be included
   - Cannot determine

Clear Selection

4. Addresses one or more of the following key questions (check all that apply):
   - K01 For patients with rheumatoid arthritis or psoriatic arthritis, does the treatment differ in ability to reduce patient-reported symptoms, slow or limit progression of radiographic joint damage, or maintain remission (reduce the incidence of flare-ups)?
   - K02 For patients with rheumatoid arthritis or psoriatic arthritis, does the treatment differ in ability to improve functional capacity or quality of life?
   - K03 For patients with rheumatoid arthritis or psoriatic arthritis, does the treatment differ in harms, tolerability, adverse events, or adverse effects?
   - K04 What are the comparative benefits and harms of drug therapies for rheumatoid arthritis and psoriatic arthritis in subgroups of patients based on stage of disease, duration of prior therapy, demographic characteristics, comorbidities, or common outcomes?
   - Cannot determine
   - None of the above

5. Study design is one of the following:
   - RCT (randomized clinical trial)

B-2
1. Should the article be excluded for any of the following reasons?
   - Study reported only in abstract
   - Wrong outcome (e.g., plasma cell disorder or immediate outcomes)
   - Wrong design (e.g., retrospective cohort study, meta-analysis, cohort study)
   - Wrong population (e.g., pediatric patients)
   - Wrong publication type (e.g., letter or editorial)
   - Wrong design (e.g., non-systematic meta-analysis or to compare a/Am)
   - RCT (0-100)
   - Other? (Please explain)
   - Background article
   - None of the above—should be included!

If the article has been excluded in the above question, the next two questions do not need to be answered.

2. Which of the following key questions are addressed by the article?
   - KQ1—For patients with rheumatoid arthritis or psoriatic arthritis, does the use of a new drug differ in the ability to reduce patient-reported symptoms, to slow or limit progression of radiographic joint damage, or to maintain remission (reduce the incidence of flare-ups)?
   - KQ2—For patients with rheumatoid arthritis or psoriatic arthritis, does the use of a new drug differ in the ability to improve functional capacity or quality of life?
   - KQ3—For patients with rheumatoid arthritis or psoriatic arthritis, does the use of a new drug differ in length of treatment, adherence, or adverse effects?
   - KQ4—What are the comparative benefits and harms of the use of a new drug for rheumatoid arthritis and psoriatic arthritis in subgroups of patients based on stage of disease, history of prior therapy, demographics, comorbidities, and other factors?
   - None of the above

3. What is the study design?
   -RCT > or equal to 100
   - Observational > or equal to 100
   - Meta-analysis or systematic review (e.g., Cochrane Review)
Reviewer Comments (Add a Comment)

1. Author, Year, Study name if applicable (i.e. BeST):

2. Country and setting:
   If more than a couple of countries are included just call it multinational. Settings include primary care, hospitals, uni

3. Source of funding
   - Pharmaceutical company or other commercial source - please list name:
   - Government or non-commercial organization - please list name:
   - Not reported

4. Condition being treated:
   - Rheumatoid arthritis
   - Psoriatic arthritis
   - Other? Please explain:

5. STUDY DESIGN
   - Controlled Trials
   - Observational
   - Clear Selectors

6. What is being compared?
   - 1 OLD MARD vs 1 OLD MARD
   - 1 OLD MARD vs 1 BIOLIGIC
   - 1 OLD MARD vs 1 Corticosteroid
   - 1 BIOLIGIC vs 1 BIOLIGIC
   - 1 BIOLIGIC vs 1 Corticosteroid
7. How many comparison arms does this study have?

- 2 ARMS
- 3 ARMS
- 4 ARMS
- 5 ARMS

8. Check off the drug(s) studied for **ARM 1** and put **dosage** and **frequency** in the adjacent box

- Methylprednisolone
- Prednisone
- Prednisolone
- Methotrexate
- Leflunomide
- Sulfasalazine
- Hydroxychloroquine
- Etanercept
- Infliximab
- Adalimumab
- Anakinra
- Abatacept
- Rituximab
- Certolizumab
- Golimumab
- Towilizumab
- Placebo
- Other (describe)

9. Check off the drug(s) studied for **ARM 2** and put **dosage** and **frequency** in the adjacent box

- Methylprednisolone
- Prednisone
- Prednisolone
10. Check off the drug(s) studied for ARM 3 and put dosage and frequency in the adjacent box.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methylprednisolone</td>
<td></td>
<td></td>
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<tr>
<td>Prednisone</td>
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<tr>
<td>Prednisolone</td>
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<tr>
<td>Methotrexate</td>
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<tr>
<td>Leflunomide</td>
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<tr>
<td>Sulfasalazine</td>
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<tr>
<td>Hydroxychloroquine</td>
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<td>Etanercept</td>
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<td>Infliximab</td>
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<td>Adalimumab</td>
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<td>Anakinra</td>
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<td>Abatacept</td>
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<td>Rituximab</td>
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<td>Certolizumab</td>
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<tr>
<td>Golimumab</td>
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<tr>
<td>Tocilizumab</td>
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<tr>
<td>Placebo</td>
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<tr>
<td>Other (describe)</td>
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</tbody>
</table>
11. Check off the drug(s) studied for ARM 4 and put dosage and frequency in the adjacent box.

- Methyprednisolone
- Prednisone
- Prednisolone
- Methotrexate
- Leflunomide
- Sulfasalazine
- Hydroxychloroquine
- Etanercept
- Infliximab
- Adalimumab
- Anakinra
- Abatacept
- Rituximab
- Certolizumab
- Golimumab
- Tocilizumab
- Placebo
- Other (describe)

12. Check off the drug(s) studied for ARM 5 and put dosage and frequency in the adjacent box.

- Methyprednisolone
- Prednisone
- Prednisolone
- Methotrexate
- Leflunomide
- Sulfasalazine
13. Research objective *(Please be brief and concise)*:

14. Overall study n =

15. Duration of study:

16. Inclusion criteria (check all that apply and list additional criteria in the text box)

- MTX Naive
- Early RA
- Treatment resistant

Additional inclusion criteria

17. Exclusion criteria

**POPULATION CHARACTERISTICS**
### Intervention/Treatment

<table>
<thead>
<tr>
<th></th>
<th>ARM 1</th>
<th>ARM 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>18. Intervention/Treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. # in group (n):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Age (mean):</td>
<td></td>
<td></td>
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<tr>
<td>21. Sex, female (%):</td>
<td></td>
<td></td>
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<tr>
<td>22. Race, white (%):</td>
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<td></td>
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<tr>
<td>23. Race, black (%):</td>
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<tr>
<td>24. Ethnicity, Latino (%):</td>
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<tr>
<td>25. Disease duration (mean &amp; SD):</td>
<td></td>
<td></td>
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<tr>
<td>26. DMARD use (%):</td>
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<td></td>
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<tr>
<td>27. Corticosteroid use (%):</td>
<td></td>
<td></td>
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<tr>
<td>28. MTX naive (%):</td>
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<tr>
<td>29. Treatment resistant (%):</td>
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<tr>
<td>30. Patients with early RA, three years or less, (%)</td>
<td></td>
<td></td>
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<tr>
<td>31. Baseline DAS score:</td>
<td></td>
<td></td>
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<tr>
<td>32. Tender joint count:</td>
<td></td>
<td></td>
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<tr>
<td>33. Swollen joint count:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34. Required treatment for latent TB:</td>
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<tr>
<td>35. Other population characteristics?</td>
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</tr>
</tbody>
</table>

### RESULTS: Outcome Measures and Health Outcomes

*(Enter results for all time points and please specify units for all results)*

<table>
<thead>
<tr>
<th></th>
<th>ARM 1</th>
<th>ARM 2</th>
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</thead>
<tbody>
<tr>
<td>36. ACR 20, %, (CI/SD/P value):</td>
<td></td>
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<tr>
<td>37. ACR 50, %, (CI/SD/P value):</td>
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<tr>
<td>38. ACR 70, %, (CI/SD/P value):</td>
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<tr>
<td>39. PASI 20, %, (CI/SD/P value):</td>
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<td></td>
</tr>
</tbody>
</table>
40. PASI 50, %, (CI/SD/P Value):

41. PASI 70, %, (CI/SD/P Value):

42. HAQ, mean difference/absolute difference (CI/SD/P Value):

43. DAS, mean difference/absolute difference (CI/SD/P Value):

44. SF-36, mean difference/absolute difference (CI/SD/P Value):

45. PsARC, mean difference/absolute difference (CI/SD/P Value):

46. Radiographic measures, mean difference/absolute difference (CI/SD/P Value):

47. Quality of life scales (please name), mean difference/absolute difference (CI/SD/P Value):

48. Others, (please name); mean difference/absolute difference (CI/SD/P Value):

**ATTRITION AND ADHERENCE**

49. Overall attrition/withdrawal (n):

50. Withdrawals due to adverse events (n):

51. Withdrawals due to lack of efficacy (n):

52. Adherent/compliant (n):

53. Other attrition related comments?

**RESULTS: Adverse Events, n**
<table>
<thead>
<tr>
<th></th>
<th>ARM 1</th>
<th>ARM 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>54. Overall adverse events reported (n):</td>
<td></td>
<td></td>
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<tr>
<td>55. Death (n):</td>
<td></td>
<td></td>
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<tr>
<td>56. Lymphoma or leukemia (n):</td>
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<td>57. Skin cancer (basal cell or squamous cell) (n):</td>
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<tr>
<td>58. Other cancer (specify) (n):</td>
<td></td>
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<tr>
<td>59. Cardiovascular events (specify) (n):</td>
<td></td>
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<tr>
<td>60. Hepatotoxicity/elevated liver enzymes (n):</td>
<td></td>
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<td>61. Tuberculosis (n):</td>
<td></td>
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<tr>
<td>62. Pneumonia (n):</td>
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<tr>
<td>63. Upper respiratory infection (n):</td>
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<tr>
<td>64. Urinary tract infection (n):</td>
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<td></td>
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<tr>
<td>65. Other infections (specify) (n):</td>
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<tr>
<td>66. Fractures (n):</td>
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<tr>
<td>67. Infusion/injection site reactions (n):</td>
<td></td>
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<tr>
<td>68. Skin rash (n):</td>
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<tr>
<td>69. Demyelination or multiple sclerosis (n):</td>
<td></td>
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<tr>
<td>70. Progressive multifocal leukoencephalopathy (n):</td>
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<tr>
<td>71. Headache (n):</td>
<td></td>
<td></td>
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<tr>
<td>72. Dizziness (n):</td>
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<tr>
<td>73. Nausea or vomiting (n):</td>
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<td>74. Abdominal pain (n):</td>
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<td>75. GI bleed or ulcer (n):</td>
<td></td>
<td></td>
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<tr>
<td>76. Bowel obstruction (n):</td>
<td></td>
<td></td>
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<tr>
<td>77. Other GI symptoms (specify) (n):</td>
<td></td>
<td></td>
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<tr>
<td>78. Other AEs 1 (n):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>79. Other AEs 2 (n):</td>
<td></td>
<td></td>
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<tr>
<td>80. Other AEs 3 (n):</td>
<td></td>
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</tr>
</tbody>
</table>
83. Which Key Question(s) does this study address (check all that apply)?

☐ KQ1- For patients with rheumatoid arthritis or psoriatic arthritis, do drug therapies differ in their ability to reduce disease activity, ti

☐ KQ2- For patients with rheumatoid arthritis or psoriatic arthritis, do drug therapies differ in their ability to improve functional capac

☐ KQ3- For patients with rheumatoid arthritis or psoriatic arthritis, do drug therapies differ in harms, tolerability, adherence, or adver

☐ KQ4- What are the comparative benefits and harms of drug therapies for rheumatoid arthritis and psoriatic arthritis in subgroups c

Quality Review for Controlled Trials

84. Randomization adequate?

☐ Yes

☐ No

☐ Not randomized

☐ Method not reported

Clear Selection

85. Allocation concealment adequate?

☐ Yes

☐ No

☐ Not randomized

☐ Method not reported

Clear Selection

86. Groups similar at baseline?

☐ Yes

☐ No (what are the differences)

☐ Not reported

☐ Not applicable

Clear Selection

87. Outcome assessors blinded?

☐ Yes

☐ No

☐ Yes, but method not described

☐ Not reported

Clear Selection

88. Care provider blinded?

☐ Yes

☐ No

☐ Yes, but method not described

☐ Not reported

B-14
89. Patient blinded?
- Yes
- No
- Yes, but method not described
- Not reported

90. Overall attrition high (≥ 20%)?
- Yes (please state how high)
- No

91. Differential attrition high (≥ 15%)?
- Yes (please state difference)
- No

92. Were the outcome measures valid and reliable?
- Yes
- No
- Not reported

93. Were the outcome measures equally applied?
- Yes
- No
- Not reported

94. Was the statistical analysis based on intention-to-treat (ITT)?
- Yes
- No
- Cannot tell
- Not applicable

95. Were there any post-randomization exclusions?
- Yes (how many?)
- No
- Cannot tell

96. Quality rating for efficacy/effectiveness
- Good
- Fair
- Poor
If poor, why?
Quality Review for Observational Studies

97. Were both groups selected from the same source population?
   ○ Yes
   ○ No
   ○ Yes, but method not described
   ○ Not reported

Clear Selection

98. Did both groups have the same risk of having the outcome of interest at baseline?
   ○ Yes
   ○ No
   ○ Not reported

Clear Selection

99. Were subjects in both groups recruited over the same time period?
   ○ Yes
   ○ No
   ○ Yes, but method not described
   ○ Not reported

Clear Selection

100. Were measurement methods adequate and equally applied to both groups?
   ○ Yes
   ○ No
   ○ Not reported

Clear Selection

101. Was an attempt made to blind the outcome assessors?
   ○ Yes
   ○ No
   ○ Yes, but method not described
   ○ Not reported

Clear Selection

102. Was the time of follow-up equal in both groups?
   ○ Yes
   ○ No
   ○ Not reported

Clear Selection

103. Overall attrition high (≥ 20%)?
   ○ Yes (please state how high)
   ○ No

Clear Selection

104. Differential attrition high (≥ 15%)?
   ○ Yes (please state difference)
   ○ No
105. Was confounding accounted for either through study design or statistical analysis?
- Yes
- No
- Yes, but method not described
- Not reported

106. Did the statistical analysis adjust for different lengths of follow-up?
- Yes
- No
- Yes, but method not described
- Not reported

107. Was the length of follow-up adequate to assess the outcome of interest?
- Yes
- No
- Not reported

108. Quality rating for observational studies
- Good
- Fair
- Poor

Why?

109. Any other quality related comments?

Quality Review for Adverse Events

110. Methods of adverse effects assessment
- Patient reported
- Physical exam at study visits
- Lab evaluations
- Standardized scale (e.g. WHO, UKU-SES)
- Other (please specify)

111. Adverse events pre-specified and defined?
- Yes
- No

112. Measurement techniques non-biased and adequately described?
- Yes
- No
Quality rating adverse events assessment:

- Good
- Fair
- Poor

First abstraction done by:

- [ ] Kasia Czyńby
- [ ] Karolina Dosakie
- [ ] Rick Hanse
- [ ] Dan Jonas
- [ ] Linda Lux
- [ ] Robert Rorbe
- [ ] Rachael Soleiman

Other (please write your name in the adjacent box):

Second abstraction done by:

- [ ] Kasia Czyńby
- [ ] Karolina Dosakie
- [ ] Rick Hanse
- [ ] Dan Jonas
- [ ] Linda Lux
- [ ] Robert Rorbe
- [ ] Rachael Soleiman

Other (please write your name in the adjacent box):

Study is already included in systematic review/meta-analysis and does not need to be put in an evidence table:

- [ ] Yes
- [ ] No

Submit Data

Form took 1.580781 seconds to render
Form Creation Date: Not available
Form Last Modified: Nov 6 2009 2:25PM
Appendix C. Articles by Database Searched

Reference Source: PubMed

9. Is it true that vaccines may not be safe for people with rheumatoid arthritis (which I have)? Does that mean I shouldn't get a flu shot? Johns Hopkins Med Lett Health After 50. 2004 Oct;17(8):8.


559. de' Clari F, Salani I, Safwan E, et al. Sudden death in a patient without heart failure after a single infusion of 200 mg infliximab: does TNF-alpha have protective effects on the failing heart, or does infliximab have direct harmful cardiovascular effects? Circulation. 2002 May 28;105(21):E183.


672. Elkayam O, Yaron I, Shirazi I, et al. Serum levels of IL-10, IL-6, IL-1ra, and sIL-2R in patients with psoriatic arthritis. Rheumatol Int. 2000;19(3):101-5.


C-133


<table>
<thead>
<tr>
<th>Page</th>
<th>Reference</th>
</tr>
</thead>
</table>


Reference Source: International Pharmaceutical Abstracts


43. Doan QV, Chiou CF, Duboix RW. Review of eight pharmacoeconomic studies of the value of biologic DMARDs (adalimumab, etanercept, and infliximab) in the management of rheumatoid arthritis. Journal of Managed Care Pharmacy (USA). 2006 07/01/;12(Jul):555-69.


64. Graudal N, Juergens G. Similar Effects of Disease-Modifying Antirheumatic Drugs, Glucocorticoids, and Biologic Agents on Radiographic Progression in Rheumatoid Arthritis Meta-Analysis of 70 Randomized Placebo-Controlled or Drug-Controlled Studies, Including 112 Comparisons. Arthritis and Rheumatism (USA). 2010;62:2852.


70. Hetland ML, Christensen IJ, Tarp U, et al. Direct Comparison of Treatment Responses, Remission Rates, and Drug Adherence in Patients With Rheumatoid Arthritis Treated With Adalimumab, Etanercept, or Infliximab Results From Eight Years of Surveillance of Clinical Practice in the Nationwide Danish DANBIO Registry. Arthritis and Rheumatism (USA) 2010;6222-32.


79. Kavanaugh A. Anakinra (interleukin-1 receptor antagonist) has positive effects on function and quality of life in patients with rheumatoid arthritis. Advances in Therapy (USA). 2006 02/01/;23(Feb):208-17.


<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
</tr>
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<tbody>
<tr>
<td>150</td>
<td>Siegel JN, Zhen BG. Use of the American College of Rheumatology N (ACR-N) Index of improvement in rheumatoid arthritis - Argument in favor. Arthritis and Rheumatism (USA). 2005 06/01;52(Jun):1637-41.</td>
</tr>
<tr>
<td>156</td>
<td>Smolen JS, van der Heijde DM, St Clair EW, et al. Predictors of joint damage in patients with early rheumatoid arthritis treated with high-dose methotrexate with or without concomitant infliximab - Results from the ASPIRE trial. Arthritis and Rheumatism (USA). 2006 03/01;54(Mar):702-10.</td>
</tr>
</tbody>
</table>


C-163


Reference Source: Handsearches (e.g., Scopus)


73. Bren L. The importance of patient-reported outcomes... it's all about the patients. FDA Consumer. 2006;40(6).


283. Pincus T, Yazici Y, Bergman M. A practical guide to scoring a Multi-Dimensional Health Assessment Questionnaire (MDHAQ) and Routine Assessment of Patient Index Data (RAPID) scores in 10-20 seconds for use in standard clinical care, without rulers, calculators, websites or computers. Best Practice and Research: Clinical Rheumatology. 2007;21(4):755-87.


358. Walters SJ, Brazier JE. What is the relationship between the minimally important difference and health state utility values? The case of the SF-6D. Health Qual Life Outcomes 2003;14.


Reference Source: Embase


458. O’Connor K, Burke R, Riminton S. Hospital supply of off-label immunomodulatory drugs. 2009.


Reference Source: Dossiers


Reference Source: The Cochrane Library


43. Lu D, Song H, Shi G. Anti-TNF-&#945; treatment for pelvic pain associated with endometriosis. Cochrane Database of Systematic Reviews 2010(3).


46. Lv D, Song H, Shi G. Anti-TNF-&#945; treatment for pelvic pain associated with endometriosis. Cochrane Database of Systematic Reviews 2010(3).

47. Maxwell L, Singh Jasvinder A. Abatacept for rheumatoid arthritis. Cochrane Database of Systematic Reviews. 2008(3).


77. Wallen Margaret M, Gillies D. Intrarticular steroids and splints/rest for children with juvenile idiopathic arthritis and adults with rheumatoid arthritis. Cochrane Database of Systematic Reviews. 2006(1).


Appendix D. Excluded Studies

Wrong Language


Wrong Outcome


32. Doan QV, Chiou CF, Dubois RW. Review of eight pharmacoeconomic studies of the value of biologic DMARDs (adalimumab, etanercept, and infliximab) in the management of rheumatoid arthritis. Journal of Managed Care Pharmacy (USA). 2006 07/01/;12(Jul):555-69.


40. Garnero P, Thompson E, Woodworth T, Smolen JS. Rapid and sustained improvement in bone and cartilage turnover markers with the anti-interleukin-6 receptor inhibitor tocilizumab plus methotrexate in rheumatoid arthritis patients with an inadequate response to methotrexate: Results from a substudy of the multicenter double-blind, placebo-controlled trial of tocilizumab in inadequate responders to methotrexate alone. 2010.


**Drug Not Included in the Report**


82. Wallen Margaret M, Gillies D. Intra-articular steroids and splints/rest for children with juvenile idiopathic arthritis and adults with rheumatoid arthritis. Cochrane Database of Systematic Reviews. 2006(1).


Wrong Population


105. Genovese MC, McKay JD, Nasonov EL, Mysler EF, Da Silva NA, Alecok E, et al. Interleukin-6 receptor inhibition with tocilizumab reduces disease activity in rheumatoid arthritis with inadequate response to


111. Grijalva CG, Chung CP, Arbogast PG, Stein CM, Mitchel EF, Jr., Griffin MR. Assessment of adherence to and persistence on disease-modifying antirheumatic drugs (DMARDs) in patients with rheumatoid arthritis. *Med Care* 2007:S66-76.


don Vollenhoven RF, Cifaldi MA, Ray S, Chen N, Weisman MH. Improvement in work place and household productivity for patients with early rheumatoid arthritis treated with adalimumab plus methotrexate: work outcomes and their correlations with clinical and radiographic measures from a randomized controlled trial companion study. *Arthritis Care Res (Hoboken)*. 2010/03/02 ed 2010:226-34.


**Wrong Publication Type**


3. Is it true that vaccines may not be safe for people with rheumatoid arthritis (which I have)? Does that mean I shouldn't get a flu shot? *Johns Hopkins Med Lett Health After 50.* 2004 Oct;17(8):8.


5. Screening for hydroxychloroquine retinopathy. 2006.


89. Maxwell L, Singh Jasvinder A. Abatacept for rheumatoid arthritis. Cochrane Database of Systematic Reviews. 2008(3).


Wrong Study Design


149. Kavanaugh A. Anakinra (interleukin-1 receptor antagonist) has positive effects on function and quality of life in patients with rheumatoid arthritis. *Advances in Therapy (USA).* 2006 02/01/;23(Feb):208-17.


228. Quinn MA, Conaghan PG, O'Connor PJ. Very early treatment with infliximab in addition to methotrexate in early, poor-prognosis rheumatoid arthritis reduces magnetic resonance imaging evidence of synovitis and damage, with sustained benefit after infliximab withdrawal: Results from a twelve-month ran-liver disease? Hepatology. 2006;43:352-61.


313. Wells G, Becker JC, Teng J, Dougados M, Schiff M, Smolen J, et al. Validation of the 28-joint Disease Activity Score (DAS28) and European League Against Rheumatism response criteria based on C-reactive


Unable To Obtain Full Text

Appendix E. Evidence Tables

Index of Studies Included by Key Question

Key Question 1

**RCTs and other studies (Evidence Table 1)**

Antoni, 2005 (IMPACT 2)\(^3\)

Antoni, 2005 (IMPACT)\(^2\)

Genovese, 2007\(^3\)

Kaltwasser, 2004\(^4\)

Kavanaugh, 2006 (IMPACT)\(^5\) — found under Antoni, 2005

Kavanaugh, 2006 (IMPACT2)\(^6\)

Kavanaugh, 2009\(^7\)

Kristensen, 2008\(^8\)

Mease, 2000\(^9\)

Mease, 2004\(^10\)

Mease, 2005 (ADEPT)\(^11\)

Mease, 2006\(^12\) — found under Mease 2004

Nash, 2006\(^13\) — found under Kaltwasser 2004

Saad, 2010\(^14\)

Van der Heijde, 2007\(^15\) — found under Kavanaugh, 2006

Wilkens, 1984\(^16\)

**Systematic Reviews and Meta-analyses (Evidence Table 2)**

Jones, 2000\(^17\)

Ravindran, 2008\(^18\)

Woolacott, 2006\(^19\)
Key Question 2

RCTs and other studies (Evidence Table 1)

Antoni, 2005 (IMPACT) 2
Antoni, 2005 (IMPACT 2) 3
Genovese, 2007 3
Gladman, 2007 (ADEPT) 20
Kaltwasser, 2004 4
Kavanaugh, 2006 5 – found under Antoni, 2005
Kavanaugh, 2006 6
Kavanaugh, 2006 21
Kavanaugh, 2009 7
Kristensen, 2008 8
Mease, 2000 9
Mease, 2004 10
Mease, 2005 22
Mease, 2005 (ADEPT) 11
Mease, 2006 12 – found under Mease 2004
Mease, 2010 23
Nash, 2006 13 – found under Kaltwasser 2004
Saad, 2009 24
Saad, 2010 14
Van der Heijde, 2007 15 – found under Kavanaugh, 2006
Wilkens, 1984 16

Systematic Reviews and Meta-analyses (Evidence Table 2)

Ravindran, 2008
Key Question 3

**RCTs and other studies (Evidence Table 1)**

Antoni, 2005 (IMPACT 2)

Antoni, 2005 (IMPACT) ²

Genovese, 2007³

Kaltwasser, 2004⁴

Kavanaugh, 2009⁷

Kristensen, 2008⁸

Mease, 2000⁹

Mease, 2005²²

Mease, 2006 – found under Mease 2004

Saad, 2009²⁴

**Systematic Reviews and Meta-analyses (Evidence Table 2)**

Ravindran, 2008¹⁸
### Evidence Table 1. Randomized controlled trials and observational studies

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events (%)</th>
<th>Analysis and Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author, yr:</td>
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<tr>
<td>Antoni et al.,</td>
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<td>2005;²</td>
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<tr>
<td>Kavanaugh et al.,</td>
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<td>2006³</td>
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<td>IMPACT Study</td>
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<tr>
<td>Country, Setting:</td>
<td>Multinational, 9 clinical sites</td>
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<tr>
<td>Funding:</td>
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<tr>
<td>Plough Research</td>
<td>Institute; Competence Network</td>
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<tr>
<td>Research Objective:</td>
<td>Efficacy and tolerability of INF</td>
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<td>for the articular</td>
<td>and dermatologic manifestations</td>
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<tr>
<td>of active PsA</td>
<td>of INF for the articular</td>
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<tr>
<td>Study Design:</td>
<td>RCT</td>
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<tr>
<td>Overall N:</td>
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</tbody>
</table>

**Inclusion Criteria:**
- Age > 18
- Failure of 1 or more DMARD
- Active peripheral polyarticular arthritis
- MTX ≥ 15 mg/wk w/ folic acid supplementation
- LEF, SSZ, HCQ, intramuscular gold, penicillamine, or azathioprine stable for 4 wks
- Oral corticosteroids (dosage of 10 mg PRE equivalent/d or less)
- NSAIDs stable for at least 2 wks
- Pts with Early RA (≤3 yrs)
- NR

**Exclusion Criteria:**
- Monoclonal antibody or fusion protein
- History of TB: positive tests for RF or latent TB
- investigational drug within 3 mos
- NR

**Interventions:**
- D1: Placebo
- D2: INF (5mg/kg at wks 0,2,6,14, then every 8 wks)
- N:
- D1: 52
- D2: 52

- Mean age, yrs:
  - D1: 45.2
  - D2: 45.7

- Sex, % female:
  - D1: 42.3
  - D2: 42.3

- Race, % white:
  - NR

- DMARD use, %:
  - NR

- Corticosteroid use, %:
  - NR

- MTX naive, %:
  - NR

- TXT resistant, %:
  - NR

- Pts with Early RA (≤3 yrs):
  - NR

**Baseline Disease and Treatment Characteristics:**
- Mean disease duration, yrs:
  - D1: 11
  - D2: 11.7

- TJ C, mean:
  - D1: 20.4
  - D2: 23.7

- SJC, mean:
  - D1: 14.7
  - D2: 14.6

- DMARD use, %:
  - NR

- Corticosteroid use, %:
  - NR

- MTX naive, %:
  - NR

- TXT resistant, %:
  - NR

- Pts with Early RA (≤3 yrs):
  - NR

**Health Outcomes:**
- ACR50 Placebo 0/52 (0.0%) vs. INF 24/52 (46.2%)
- ACR70 Placebo 0/52 (0.0%) vs. INF 15/52 (28.8%)
- # of tender joints Placebo -23.6 vs. INF 55.2
- # of swollen joints Placebo -1.8 vs. INF 59.9
- DAS Placebo 2.8 vs. INF 45.5, P < 0.001
- HAQ Placebo -1.6 vs. INF 49.8, P < 0.001
- PsARC Placebo -12% vs. INF +86%, P < 0.001
- ACR20 wk 16 Placebo 5/52 (9.6%) vs. INF 34/52 (65.4%), P < 0.001
- At 50 wks
  - Total modified vdH-S score, 85% and 84% in Placebo/INF and INF/INF groups had no worsening.
  - Change in erosion scores INF/INF 0.921, placebo/INF 0.536 (P = 0.780)
  - Change in JSN INF/INF -0.51, placebo/INF -0.47 (P = 0.211)
  - 16 wks-PsARC INF 75% vs. Placebo 21% (P < 0.001)
  - PASI75 INF 68% vs. placebo 0% (P < 0.001)

**Adverse Events (%):**
- Overall:
  - D1: 65
  - D2: 73
  - D3: 84

- Headache:
  - D1: 3
  - D2: 4

- URTI:
  - D1: 5

- Change in erosion scores INF/INF 0.921, placebo/INF 0.536 (P = 0.780)
- Change in JSN INF/INF -0.51, placebo/INF -0.47 (P = 0.211)
- 16 wks-PsARC INF 75% vs. Placebo 21% (P < 0.001)
- PASI75 INF 68% vs. placebo 0% (P < 0.001)

**Analysis and Quality Rating:**
- Overall Attrition Rate (%): 5
- ITT Analysis: Yes
- Quality Rating: Fair
<table>
<thead>
<tr>
<th>104</th>
<th>D1: 5.4</th>
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<tbody>
<tr>
<td><strong>Study Duration:</strong></td>
<td>D2: 5.5</td>
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<tr>
<td>50 wks (1-16 wks)</td>
<td>Concomitant MTX,</td>
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<tr>
<td>RCT 16-50 open,</td>
<td>%:</td>
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<tr>
<td>all treated with</td>
<td>56</td>
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<tr>
<td>INF)</td>
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</table>
### Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author, yr: Antoni, 2005(Antoni, 2005 #41); Kavanaugh et al., 2006(Kavanaugh, 2006 #651); van der Heijde et al., 2007(van der Heijde, 2007 #2401)</td>
<td>IMPACT 2</td>
<td>Country, Setting: Multinational 36 sites in clinics Funding: Centocor Inc and Schering-Plough Research Objective: Efficacy, health related quality of life and physical function in pts with PsA Study Design: RCT</td>
<td>Inclusion Criteria:  - Diagnosed with PsA  - Diagnosed at least 6 mos before first infusion of study drug  - Inadequate response to current or previous DMARDs or NSAIDs  - Pts had to have active plaque psoriasis with at least 1 qualifying target lesion at least 2 cm in diameter  - Negative test for RF in their serum  - Stable doses of MTX, oral corticosteroids, NSAIDs Exclusion Criteria:  - TNF α inhibitors; active or latent TB  - Chronic or clinically significant infection, malignancy, or CHF</td>
<td>Interventions:  D1: Placebo  D2: INF (5 mg/kg at wks 0, 2, 6, 14, 22) N:  D1: 100  D2: 100 Mean age, yrs:  D1: 46.5  D2: 47.1 Sex, % female:  D1: 49  D2: 29 Race, % white: NR  D2: 15 MTX naive, %: NR T xt resistant, %: Overall: 100  Pts with Early RA (≤3 yrs): NR  Baseline DAS, mean:</td>
<td>ACR mean difference/ absolute difference:  ACR 20 At Week 14  D1: 11  D2: 58 p&lt;0.001 At week 24  D1: 16  D2: 54 p&lt;0.001 ACR 50 At week 14  D1: 3  D2: 36 p&lt;0.001 At week 24  D1: 4  D2: 40 p&lt;0.001 ACR 70 At week 14  D1: 1  D2: 15 p&lt;0.001 At week 24  D1: 2  D2: 27 p&lt;0.001 PsARC At week 14  D1: 27  D2: 77 p&lt;0.001 At week 24</td>
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<tr>
<td>Study Characteristics</td>
<td>Inclusion and Exclusion Criteria</td>
<td>Characteristics and Interventions</td>
<td>Baseline Disease and Treatment Characteristics</td>
<td>Health Outcomes</td>
<td>Adverse Events (%)</td>
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<tr>
<td>Overall N: 200</td>
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<td></td>
<td>NR</td>
<td>D1: 32</td>
<td>Wk 14: NR</td>
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<tr>
<td>Study Duration: 14 to 24 wks (pts with inadequate response entered early escape at wk 16)</td>
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<td>D2: 70 p&lt;0.001</td>
<td>Wk 24: 7.5</td>
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<tr>
<td>Concomitant MTX, %:</td>
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<td>PASI 50</td>
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<td>D1: 45</td>
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<td>At week 14</td>
<td>D1: 9</td>
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<td>D2: 47</td>
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<td>D2: 82 p&lt;0.01</td>
<td>At week 24</td>
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<td>PASI:</td>
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<td>D1: 8</td>
<td>D1: 8</td>
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<td>D1: 10.2</td>
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<td>D2: 75 p&lt;0.01</td>
<td>D2: 75</td>
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<td>D2: 11.4</td>
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<td>HAQ:</td>
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<td>At week 14</td>
<td>D1: 18.4</td>
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<td>At week 24</td>
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<td>D1: 1</td>
<td>D1: 18.4</td>
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<td>D2: 64 p&lt;0.01</td>
<td>D2: 64 p&lt;0.01</td>
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<td>DAS:</td>
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<td>At week 24</td>
<td>D1: 19.4</td>
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<td>SRF-36:</td>
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<td></td>
<td>D2: 46</td>
<td>D2: 46 p&lt;0.001</td>
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<tr>
<td>Physical</td>
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<tr>
<td>Study Characteristics</td>
<td>Inclusion and Exclusion Criteria</td>
<td>Characteristics and Interventions</td>
<td>Baseline Disease and Treatment Characteristics</td>
<td>Health Outcomes</td>
<td>Adverse Events (%)</td>
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<td>At week 14</td>
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<td>D1: 1.1</td>
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<td>D2: 9.1</td>
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<td>p&lt;0.001</td>
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<td>At week 24</td>
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<td>D1: 1.3</td>
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<td>D2: 7.7</td>
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<td>p&lt;0.001</td>
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<td>Mental</td>
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<td>At week 14</td>
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<td>D1: 1.2</td>
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<td>D2: 3.8</td>
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<td>P = 0.001</td>
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<td>p=0.047</td>
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<td>Radiographic measures:</td>
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<td>Experienced additional Radiographic progression from baseline as measured by Total Score, % of patients</td>
<td>At week 24:</td>
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<td>Sharp/van der Heijde Total Score, change from baseline</td>
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<td>D2: -0.70</td>
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<td>Quality of life scales: Productivity VAS change from baseline, increase</td>
<td>At week 14</td>
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### Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>Study Characteristics</th>
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<th>Characteristics and Interventions</th>
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<th>Adverse Events (%)</th>
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<td>D1: 0.3</td>
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<td>D2: 2.6</td>
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<td>Median % change</td>
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<td>D1: 9.2</td>
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<td>D2: 7.5</td>
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<td>p&lt;0.0001</td>
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<td>Emotional impact on work or daily activities, %:</td>
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<td>To Week 14:</td>
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<td>D1: 88.0 to 84.4</td>
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<td>D2: 85.0 to 52.5</td>
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<td>Emotional effect on work or daily activities, %:</td>
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<td>To Week 14:</td>
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<tr>
<td>D1: 47.0 to 55.2</td>
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<td>D2: 57.0 to 41.4</td>
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<tr>
<td>p&lt;0.01</td>
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<tr>
<td>Employment increase among those not employed, n (%):</td>
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<tr>
<td>D1: 3/26 (11.5)</td>
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<tr>
<td>D2: 0/32 (0)</td>
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<tr>
<td>P = 0.084</td>
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<tr>
<td>Became employable</td>
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<td>D1: 6/20 (30)</td>
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<td>D2: 3/25 (12)</td>
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<tr>
<td>p=0.157</td>
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<tr>
<td>Median productivity, %</td>
<td></td>
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<tr>
<td>D1: 9.2</td>
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<tr>
<td>D2: 67.5</td>
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<td>p&lt;0.0001</td>
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<td>Improvement</td>
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### Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events (%)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At week 14</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>D1: 0</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>D2: 41</td>
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<td></td>
<td></td>
<td>p&lt;0.01</td>
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<td></td>
<td>At week 24</td>
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<td></td>
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<td></td>
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<td>D1: 0</td>
<td></td>
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<td></td>
<td>D2: 39</td>
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<td></td>
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<td>p&lt;0.01</td>
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<td><strong>Missed workdays</strong></td>
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<td>At 14 weeks</td>
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<td></td>
<td></td>
<td>D1: 13</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>D2: 3.7</td>
<td></td>
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<td>p=0.138</td>
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D1: Control group D2: Treatment group
Evidence Table 1. Randomized controlled trials and observational studies (continued)
## Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events, %</th>
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</thead>
<tbody>
<tr>
<td>Author, year, study name, if applicable</td>
<td>Inclusion and Exclusion Criteria</td>
<td>Interventions, Dose</td>
<td>ACR mean difference/absolute difference (95% CI):</td>
<td>Attrition/withdrawal, n:</td>
</tr>
<tr>
<td>Genovese et al., 2007</td>
<td>- Treatment resistant, previous inadequate response to DMARD therapy</td>
<td>D1: Placebo; D2: ADA: 40 mg every other week</td>
<td>D1: 16, D2: 39 (5%-4%) $P = 0.012$</td>
<td>Overall</td>
</tr>
<tr>
<td>Country and setting</td>
<td>- 16 sites in Canada and United States</td>
<td>Number in group</td>
<td>D1: 2, D2: 25 $P = 0.001$</td>
<td>D1: 5</td>
</tr>
<tr>
<td>Source of funding</td>
<td>- Abott Laboratories</td>
<td>Mean age, yrs (SD)</td>
<td>D1: 100% inadequate response to previous DMARD treatment</td>
<td>D2: 1</td>
</tr>
<tr>
<td>Research objective</td>
<td>- Determine safety and efficacy of ADA in pts with inadequate response to DMARDs</td>
<td>Sex, % female</td>
<td>D1: 49.0, D2: 43.1</td>
<td>Withdrawals due to adverse events, n:</td>
</tr>
<tr>
<td>Study design</td>
<td>- Controlled Trials</td>
<td>Race, % white</td>
<td>D1: 93.9, D2: 98.0</td>
<td>D1: 1</td>
</tr>
<tr>
<td>Overall N</td>
<td>- 102</td>
<td>Ethnicity, Latino</td>
<td>D1: 0, D2: 14 $P = 0.013$</td>
<td>D2: 0</td>
</tr>
<tr>
<td>Duration of study</td>
<td>- 12 weeks double-blind</td>
<td>Pts required to have ≥ 3 swollen joints and ≥ 3 tender or painful joints</td>
<td>Tender Joint Count, mean (SD)</td>
<td>Overall adverse events reported, n:</td>
</tr>
<tr>
<td>Quality rating</td>
<td>- Fair</td>
<td>Active cutaneous lesion of chronic plaque psoriasis or a documented history of chronic plaque psoriasis</td>
<td>D1: 29.3 (18.1), D2: 25.3 (18.3)</td>
<td>D1: 39</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Either currently receiving concomitant DMARD therapy or had a history of DMARD</td>
<td>Swollen Joint Count, mean (SD)</td>
<td>D2: 27 $P \leq 0.01$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interventions, Dose</td>
<td>Corticosteroid use, % At baseline*</td>
<td>Serious adverse events:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D1: Placebo; D2: ADA: 40 mg every other week</td>
<td>D1: 18.4, D2: 18.2 (10.9)</td>
<td>Death, n:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number in group</td>
<td>Previous Use</td>
<td>D1: 0, D2: 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D1: 49, D2: 51</td>
<td>D1: 30.6, D2: 9.6</td>
<td>Congestive heart failure, n:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean age, yrs (SD)</td>
<td>DMARD use, %:</td>
<td>D1: 0, D2: 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D1: 47.7 (11.3), D2: 50.4 (11.0)</td>
<td>At baseline</td>
<td>Malignancies:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sex, % female</td>
<td>D1: 49.0, D2: 43.1</td>
<td>Lymphoma or leukemia, n:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D1: 49.0, D2: 43.1</td>
<td>Race, % white</td>
<td>D1: 0, D2: 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Race, % black</td>
<td>D1: 93.9, D2: 98.0</td>
<td>Skin cancer (basal cell or squamous cell), n:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Race, % black</td>
<td>Ethnicity, Latino</td>
<td>D1: 0, D2: 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NR</td>
<td>NR</td>
<td>Overall adverse events reported, n:</td>
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<tr>
<td></td>
<td></td>
<td>NR</td>
<td>NR</td>
<td>D1: 39</td>
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<tr>
<td></td>
<td></td>
<td>NR</td>
<td>NR</td>
<td>D2: 27 $P \leq 0.01$</td>
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<td>NR</td>
<td>NR</td>
<td>Serious adverse events:</td>
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<td>NR</td>
<td>NR</td>
<td>Death, n:</td>
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<td></td>
<td>NR</td>
<td>NR</td>
<td>D1: 0, D2: 0</td>
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<td></td>
<td></td>
<td>NR</td>
<td>NR</td>
<td>Congestive heart failure, n:</td>
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<td>NR</td>
<td>NR</td>
<td>D1: 0, D2: 0</td>
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<td></td>
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<td>NR</td>
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<td>Malignancies:</td>
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<td></td>
<td>NR</td>
<td>NR</td>
<td>Lymphoma or leukemia, n:</td>
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<td>NR</td>
<td>NR</td>
<td>D1: 0, D2: 0</td>
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<tr>
<td></td>
<td></td>
<td>NR</td>
<td>NR</td>
<td>Skin cancer (basal cell or squamous cell), n:</td>
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<td></td>
<td></td>
<td>NR</td>
<td>NR</td>
<td>D1: 0, D2: 0</td>
</tr>
</tbody>
</table>
### Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>therapy with inadequate response</td>
<td>• Evidence of previous TB infection were required to have documented history of treatment for latent TB or TB treatment initiated before first dose of study drug.</td>
<td>NR</td>
<td>Radiographic measures, mean difference/absolute difference: NR</td>
<td>Other cancer, n:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Required treatment for latent TB D1: 100% D2: 100%</td>
<td>Quality of life scales, mean difference/absolute difference (CI/SD/P Value): Facit-F score (0-52) D1:: 2.3 ± 6.7 (n = 46) D2: 2.6 ± 7.1 P = 0.783</td>
<td>Respiratory events: Tuberculosis, n:</td>
</tr>
<tr>
<td></td>
<td>Exclusion Criteria</td>
<td></td>
<td>Others, (please name); mean difference/absolute difference (SD): Swollen Joint Count D1:: -1.9 ± 11.5 D2:: -5.7 ± 13.7 P = 0.140</td>
<td>Other infections (any), n: D1: 16 D2: 9</td>
</tr>
<tr>
<td></td>
<td>• History of previous anti-TNF therapy</td>
<td></td>
<td>Tender Joint Count D1:: -6.2 ± 10.3 D2:: -9.7 ± 17.3 P = 0.231</td>
<td>Other: Infusion/injection site reactions, n:</td>
</tr>
<tr>
<td></td>
<td>• Intravenous infusions or intraarticular injections of corticosteroids within 4 weeks of baseline</td>
<td></td>
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<td>D1: 6 D2: 6</td>
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<tr>
<td></td>
<td>• Topical psoriasis therapies within 2 weeks of baseline</td>
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<td></td>
<td>Demyelination or multiple sclerosis, n:</td>
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<td></td>
<td>• Ultraviolet A (UVA) phototherapy within 2 weeks of baseline visit</td>
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<td></td>
<td>D1: 0 D2: 0</td>
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<tr>
<td></td>
<td>• Oral retinoids within 4 weeks</td>
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<td>HeD2che, n: D1: 3 D2: 0</td>
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<td>Back pain, n:</td>
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<td></td>
<td>D1: 3 D2: 1</td>
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<td></td>
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<td></td>
<td></td>
<td>Psoriasis aggravated</td>
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<td></td>
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<td>D1: 8</td>
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Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alefacept or sipilizumab within 12 weeks</td>
<td></td>
<td></td>
<td>D2: 2</td>
<td>Aggravated Psoriatic Arthropathy At week 12 D1: 7 D2: 1 P ≤ 0.05</td>
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<tr>
<td></td>
<td>Any biologic or investigational therapy within 6 weeks</td>
<td></td>
<td></td>
<td>D1: 0 D2: 1</td>
<td>Diverticulitis, n:</td>
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<td></td>
<td>Current use of or likely to need antiretroviral therapy</td>
<td></td>
<td></td>
<td></td>
<td>D1: 0 D2: 1</td>
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<td></td>
<td>Persistent or severe infections or history of active TB, or active nonpsoriatic skin disease which may interfere with assessment of target lesions</td>
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<td></td>
<td>Significant history of cardiac, renal, neurologic, psychiatric, endocrinologic, metabolic or hepatic disease</td>
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<td></td>
<td>Neurologic symptoms suggestive of CNS demyelinating disease</td>
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<td></td>
<td>History of malignancy other than carcinoma in</td>
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</tr>
<tr>
<td>Study Characteristics</td>
<td>Inclusion and Exclusion Criteria</td>
<td>Characteristics and Interventions</td>
<td>Baseline Disease and Treatment Characteristics</td>
<td>Health Outcomes</td>
<td>Adverse Events, %</td>
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<tr>
<td></td>
<td>situ of cervix or adequately treated nonmetastatic squamous or basal cell skin carcinoma</td>
<td>• Oral corticosteroids &gt; equivalent of PRED 10mg/d, use of cyclosporine, tacrolimus • Long term (&gt; 3 mths) treatment with MTX or other DMARDs • Unstable dose of MTX or other DMARDs during 4 wks preceding baseline visit • MTX dose &gt; 30 mg/wk</td>
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</tbody>
</table>
### Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>Study Characteristics</th>
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<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author, year, study name, if applicable</td>
<td>Gladman et al., 2007, ADEPT This is a companion to ref ID 840 included in first report.</td>
<td>Country and setting 50 multinational sites</td>
<td>Source of funding Abbott Laboratories</td>
<td>Research objective Evaluate effects of D2 on joint-related and skin-related functional impairment, HRQOL, fatigue and pain</td>
<td>Study design Controlled Trials</td>
</tr>
<tr>
<td>Overall N</td>
<td>315</td>
<td>Duration of study 24 Weeks</td>
<td>Quality rating Fair</td>
<td>Why?</td>
<td></td>
</tr>
<tr>
<td><strong>Characteristics</strong></td>
<td><strong>Inclusion Criteria</strong></td>
<td><strong>Interventions, Dose</strong></td>
<td><strong>Mean disease duration, years (SD)</strong></td>
<td><strong>ACR mean difference/absolute difference (CI/SD/P Value):</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Mean age (years)</strong></td>
<td>Treatment resistant</td>
<td>D1: Placebo</td>
<td>D1: 9.2 yrs (8.7)</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td><strong>Sex, % female</strong></td>
<td>Inadequate response or intolerance to NSAIDs</td>
<td>D2: 40 mg every other week</td>
<td>D2: 9.8 yrs (8.3)</td>
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<tr>
<td><strong>Race, % white</strong></td>
<td>Moderate to severe PsA</td>
<td>Number in group D1: 162</td>
<td>Patients with early RA, three years or less, %: NR</td>
<td></td>
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<tr>
<td><strong>Race, % black</strong></td>
<td>Active psoriatic skin lesions or a documented history of psoriasis</td>
<td>D2: 151</td>
<td>Treatment resistant, %: Inadequate response to previous NSAIDs D1: 100</td>
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<tr>
<td><strong>Ethnicity, Latino NR</strong></td>
<td>MTX was allowed if it had been taken for at least 3 months previously, with dosage stable for at least 4 weeks prior to baseline.</td>
<td>Overall: 313</td>
<td>D2: 100</td>
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<tr>
<td><strong>Interventions, Dose</strong></td>
<td><strong>Tender Joint Count, mean (SD)</strong></td>
<td><strong>HAQ, mean difference/absolute difference (CI/SD/P Value):</strong></td>
<td><strong>At Week 12</strong></td>
<td><strong>Withdrawals due to adverse events, n:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Mean age (years)</strong></td>
<td>D1: 49.2 yrs (11.1)</td>
<td>At Week 24</td>
<td>D1: -0.1 (0.5)</td>
<td><strong>At Week 24</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Sex, % female</strong></td>
<td>D2: 48.6 yrs (12.5)</td>
<td></td>
<td>D2: -0.4 (0.5)</td>
<td></td>
<td><strong>Withdrawals due to lack of efficacy, n:</strong></td>
</tr>
<tr>
<td><strong>Race, % white</strong></td>
<td>D1: 45.1</td>
<td></td>
<td>P &lt; 0.001</td>
<td><strong>At Week 24</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Race, % black</strong></td>
<td>D2: 43.7</td>
<td></td>
<td></td>
<td><strong>Withdrawed consent, n</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Ethnicity, Latino NR</strong></td>
<td>D1: 93.8</td>
<td></td>
<td></td>
<td>D1: 5</td>
<td></td>
</tr>
<tr>
<td><strong>Interventions, Dose</strong></td>
<td><strong>Swollen Joint Count, mean (SD)</strong></td>
<td><strong>DAS, mean difference/absolute difference (CI/SD/P Value):</strong></td>
<td><strong>At Week 12</strong></td>
<td><strong>Protocol Violation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Mean age (years)</strong></td>
<td>D1: 25.8 (18.0)</td>
<td>SF-36, mean difference/absolute difference (CI/SD/P Value):</td>
<td>D1: 1.4 (8.7) n = 151</td>
<td><strong>D1: 1</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Sex, % female</strong></td>
<td>D2: 23.9 (17.3)</td>
<td>PCS at Week 12</td>
<td>D2: 9.3 (10.0) n = 136</td>
<td><strong>D2: 0</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Race, % white</strong></td>
<td>D1: 14.3 (11.1)</td>
<td></td>
<td>P &lt; 0.001</td>
<td><strong>Other attrition</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Race, % black</strong></td>
<td>D2: 14.3 (12.2)</td>
<td></td>
<td></td>
<td>D1: 1</td>
<td></td>
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<td><strong>Required treatment for latent TB NR</strong></td>
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This data was extracted from companion study refid 840 included in original report.
### Evidence Table 1. Randomized controlled trials and observational studies (continued)

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<th>Adverse Events, %</th>
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<td>shampoos or low-potency topical steroids</td>
<td>• Anti-TNF therapy</td>
<td>• Concurrent treatment with MTX at dosages &gt; 30mg/week and/or corticosteroids in a PRED-equivalent dosage of &gt; 10 mg/day</td>
<td>SF-36 PCS score</td>
<td>D2: 1.8 (9.3) n = 140</td>
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<td>• History of TB</td>
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<td>D1: 33.3 (9.8) n = 148</td>
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<td>• Central nervous system demyelinating disease</td>
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<td>• Listeriosis</td>
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<td>• Severe infection within 30 days or oral antibiotics within 14 days.</td>
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<td>D2: 14.4 (22.1)</td>
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Evidence Table 1. Randomized controlled trials and observational studies (continued)

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<td><em>P</em> &lt; 0.001</td>
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<td>SF-36 PCS Patients achieving upper limit of MCID ≥ 5 points, %</td>
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<td>At Week 12 (%)</td>
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<td>D1: 26.5</td>
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<td>D2: 66.9</td>
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<td><em>P</em> &lt; 0.001</td>
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<td>Characteristics and Interventions</td>
<td>Baseline Disease and Treatment Characteristics</td>
<td>Health Outcomes</td>
<td>Adverse Events, %</td>
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<td>Aircraft Fatigue Patients achieving upper limit of MCID ≥ 4 points, %</td>
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<td>Dermatology Life Quality Index (DLQI) Patients achieving upper limit of MCID ≥ -5 points, %</td>
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<td>D2: 54.8</td>
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<td>D2: 55.0</td>
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<td>DLQI Patients with complete resolution, %</td>
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<td>D2: 36.9</td>
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<td>D1: 5.0</td>
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<td>D2: 43.6</td>
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<td>$P &lt; 0.001$</td>
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</table>
### Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events (%)</th>
<th>Analysis and Quality Rating</th>
</tr>
</thead>
</table>
| **Author, yr:** Kaltwasser et al., 2004 and Nash et al., 2006 | **Inclusion Criteria:**  
- Age 18 to 70  
- Diagnosed with PsA  
- NSAIDs orCss (prednisone dose of 10 mg/day or steroid equivalent administered orally)  
- Discontinue DMARDs, biologics and systemic antipsoriatic txt 28 days | **Interventions:**  
- D1: Placebo  
- D2: LEF | **Mean disease duration, yrs:**  
D1: 10  
D2: 11 | **Overall:**  
D1: 76.1  
D2: 85.4 | **Overall Attrition Rate (%):**  
D1: 47.9%  
D2: 55.8% | **ITT Analysis:**  
Yes | **Quality Rating:**  
Fair |
| **Country, Setting:** Multinational, multicenter (31) | **Exclusion Criteria:**  
- Pregnant or lactating; leflunomide  
- Impaired renal or hepatic system  
- Nonpsoriatic inflammatory joint disease or arthritis onset < 16 yrs  
- RH factor +, rheumatoid nodules, serious infections, malignancy, or CVD, HIV, hepatitis B or C antigen positivity, guttate, pustular, or erythrodermic forms of psoriasis, body weight <45 kg  
- Impaired bone marrow function; history of drug or alcohol abuse | **Drug 1:**  
Mean age, yrs: 46.9  
Sex, % female: 37.4  
Race, % white: 95.6  
TJ C, mean: NR | **Overall:**  
D1: 95.6  
D2: 97.9  
TJ C, mean: NR | **Diarrhea:**  
D1: 13.0  
D2: 24.0 | **Quality Rating:**  
Fair | **ITT Analysis:**  
Yes |
### Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>mean:</th>
<th>NR</th>
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<tbody>
<tr>
<td>Concomitant MTX,</td>
<td>%: 0</td>
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### Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events, %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author, year, study name, if applicable</strong></td>
<td>Kavanaugh et al., 2009, GO-REVEAL</td>
<td></td>
<td>Mean disease duration, years (SD)</td>
<td>ACR mean difference/absolute difference (CI/SD/P Value):</td>
<td>Overall attrition/withdrawal, n:</td>
</tr>
<tr>
<td><strong>Country and setting</strong></td>
<td>58 investigational sites, multinational</td>
<td></td>
<td>D1: 7.6 (7.9)</td>
<td>At week 14: ACR 20:</td>
<td>D1: 12</td>
</tr>
<tr>
<td><strong>Source of funding</strong></td>
<td>Centocor Research and Development, Inc. and Schering-Plough Corporation</td>
<td></td>
<td>D2: 7.2 (6.8)</td>
<td>D1: 9</td>
<td>D2: 9</td>
</tr>
<tr>
<td><strong>Research objective</strong></td>
<td>Assess efficacy and safety of GOL in patients with active PsA</td>
<td></td>
<td>D3: 7.7 (7.8)</td>
<td>D2: 51</td>
<td>D3: 4</td>
</tr>
<tr>
<td><strong>Study design</strong></td>
<td>Controlled Trials</td>
<td></td>
<td><strong>Inclusion Criteria</strong></td>
<td>At week 24: ACR 20:</td>
<td><strong>Withdrawals due to adverse event, n:</strong></td>
</tr>
<tr>
<td><strong>Overall N</strong></td>
<td>405</td>
<td></td>
<td><strong>Treatment resistant active PsA despite therapy with DMARDs or NSAIDs</strong></td>
<td>D1: 100</td>
<td>D1: 5</td>
</tr>
<tr>
<td><strong>Duration of study</strong></td>
<td>24 wks</td>
<td></td>
<td>active PsA: ≥ 3 swollen and 3 tender joints, negative rheumatoid factor, at least 1 subset of PsA, presence of plaque psoriasis with lesion ≥ 2 cm in diameter; MTX, NSAIDs, corticosteroids allowed in stable doses</td>
<td>D2: 100</td>
<td>D2: 2</td>
</tr>
<tr>
<td><strong>Quality rating</strong></td>
<td>Good</td>
<td></td>
<td>Latent TB allowed if treated prior or concurrent to study</td>
<td>D3: 100</td>
<td>D3: 4</td>
</tr>
</tbody>
</table>

**Exclusion Criteria**
- Previous use of anti-TNF agents, RIT, natalizumab, or cytotoxic agents
- DMARDs or NSAIDs
- active PsA: ≥ 3 swollen and 3 tender joints, negative rheumatoid factor, at least 1 subset of PsA, presence of plaque psoriasis with lesion ≥ 2 cm in diameter;
- MTX, NSAIDs, corticosteroids allowed in stable doses
- Latent TB allowed if treated prior or concurrent to study

<table>
<thead>
<tr>
<th>Number in group</th>
<th>D1: 113</th>
<th>D2: 146</th>
<th>D3: 146</th>
<th>MTX use, %: D1: 48</th>
<th>D2: 49</th>
<th>D3: 47</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age, years (SD)</td>
<td>D1: 47.0 (10.6)</td>
<td>D2: 45.7 (10.7)</td>
<td></td>
<td>Overall adverse events reported, n:</td>
<td>Through Week 24</td>
<td>D1: 67</td>
</tr>
<tr>
<td>DAS, mean difference/absolute difference (SD):</td>
<td></td>
<td></td>
<td></td>
<td>D2: 99</td>
<td>D3: 95</td>
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<tr>
<td><strong>Corticosteroid use, %:</strong></td>
<td>D1: 17</td>
<td>D2: 13</td>
<td>D3: 18</td>
<td>Serious adverse events: SAEs:</td>
<td>D1: 7</td>
<td>D2: 3</td>
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<tr>
<td><strong>DMARD use, %:</strong></td>
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<td></td>
<td></td>
<td>D3: 4</td>
<td>Prostate cancer, n:</td>
<td>D1: NR</td>
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<tr>
<td>MTX</td>
<td>D1: 48</td>
<td>D2: 49</td>
<td>D3: 47</td>
<td>Respiratory events:</td>
<td>D1: 7</td>
<td>D2: NR</td>
</tr>
<tr>
<td>D1: 0.18 (0.78)</td>
<td>D2: -1.38 (1.16)</td>
<td>D3: -1.29 (1.16)</td>
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<td>Overall: 0</td>
<td>D3: 1</td>
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<tr>
<td>MTX naïve, %:</td>
<td>D1: 33</td>
<td>D2: 34</td>
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<tr>
<td>Study Characteristics</td>
<td>Inclusion and Exclusion Criteria</td>
<td>Characteristics and Interventions</td>
<td>Baseline Disease and Treatment Characteristics</td>
<td>Health Outcomes</td>
<td>Adverse Events, %</td>
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<td>D3: 48.2 (10.9)</td>
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<td>D3: 27</td>
<td>At week 24:</td>
<td>Pneumonia, n:</td>
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<tr>
<td>Sex, % female</td>
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<td>D1: 39</td>
<td>D1: -0.12 (0.97)</td>
<td>D1: 2</td>
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<td>D1: 39</td>
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<td>D2: 39</td>
<td>D2: -1.43 (1.34)</td>
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<td>Race, % white</td>
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<td>D1: 97</td>
<td>D3: P &lt; 0.001 (D1 vs. D2 and D3)</td>
<td>Upper respiratory infection (n):</td>
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<td>D1: 97</td>
<td></td>
<td>D2: 97</td>
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<td>D3: 97</td>
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<td>D1: 11</td>
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<td>D2: 17</td>
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<td>Race, % black NR</td>
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<td>D2 &amp; D3: 33</td>
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<td>D3: 13</td>
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<td>Ethnicity, Latino NR</td>
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<td>Other infections, n:</td>
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Morning stiffness, mean change (SD):
- At week 14:
  - D1: 23.4 (299.9)
  - D2: -72.4 (201.3) (P < 0.001)
<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events, %</th>
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<tbody>
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<td>D3: -86.3 (238.3), (P &lt; 0.001)</td>
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<td>At week 24:</td>
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<td>D2: 6</td>
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<td>D1: -20.4 (257.7)</td>
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<td>D2: -67.2 (231.1) (P &lt; 0.001)</td>
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<td>D3: -90.1 (234.5), (P &lt; 0.001)</td>
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<td>PASI90, n:</td>
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<td>Antibodies to GOL:</td>
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<td>D1: NR</td>
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Evidence Table 1. Randomized controlled trials and observational studies (continued)

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<tr>
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<th>Adverse Events, %</th>
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<td>D2: 5/114</td>
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<td>D3: 7/143</td>
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### Evidence Table 1. Randomized controlled trials and observational studies (continued)

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<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events, %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author, year, study name, if applicable</strong></td>
<td>Kristensen et al., 2008</td>
<td>Diagnosis of PsA</td>
<td>Median disease duration, years (IQR)</td>
<td>ACR mean difference/absolute difference: NR</td>
<td>Attrition/withdrawal Withdrawals due to adverse events, HR (95% CI): D1: 0.24 (0.11-0.52)</td>
</tr>
<tr>
<td><strong>Country and setting</strong></td>
<td>Sweden</td>
<td>Pts selected for anti-TNF therapy based on high disease activity and/or unacceptable steroid use</td>
<td>D1: 7.9 (3.7-15.0)</td>
<td>HAQ, mean difference/absolute difference: NR</td>
<td>Sub-analyses ETN vs. IFX</td>
</tr>
<tr>
<td><strong>Source of funding</strong></td>
<td>NR</td>
<td>Only pts receiving first treatment course of biological therapy</td>
<td>D2: 9.4 (4.2-17.8)</td>
<td>DAS, mean difference/absolute difference: NR</td>
<td>• Termination due to adverse events (HR 0.30 95% CI 0.11-0.80, P = 0.02)</td>
</tr>
<tr>
<td><strong>Research objective</strong></td>
<td>Present efficacy and tolerability data and study impact of concomitant MTX, patterns of joint distribution, and other predictors for drug survival with TNF blocking agents</td>
<td>• Patients with early RA, three years or less, %: NR</td>
<td>Treatment resistant, %: NR</td>
<td>SF-36, mean difference/absolute difference: NR</td>
<td>• Withdrawal due to failure (HR 0.55, 95% CI 0.25-1.20)</td>
</tr>
<tr>
<td><strong>Study design</strong></td>
<td>Observational</td>
<td>ADA: 40 mg every other wk D2:</td>
<td>EULAR overall response rates, (%):</td>
<td>Radiographic measures, mean difference/absolute difference: NR</td>
<td>Withdrawals due to lack of efficacy, HR (95% CI): D1: 1.39 (0.61-3.18)</td>
</tr>
<tr>
<td><strong>Overall N</strong></td>
<td>261</td>
<td>ETN: 25 mg twice a wk</td>
<td>EULAR good response rates, %:</td>
<td>Quality of life scales, mean difference/absolute difference: NR</td>
<td>• In corresponding abstraction - no high attrition or differential attrition, although rates are unknown</td>
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<tr>
<td><strong>Duration of study</strong></td>
<td>12 months</td>
<td>IFX: 3mg/kg wks 0, 2, 6, and every eighth week could be increased in steps of 100 mg to a maximum dose of 500 mg at 4-8 wk intervals, avg dose after 6 mos = 5 mg/kg every eighth wk</td>
<td>Baseline DAS 28 score, median (IQR)</td>
<td>Cardiovascular events, n:</td>
<td>Overall adverse events reported, n:</td>
</tr>
<tr>
<td><strong>Quality rating</strong></td>
<td>Fair</td>
<td>ADA: 40 mg every other wk</td>
<td>D1: 4.93 calculated for subgroup, n = 125 (3.87-5.71)</td>
<td>Heart (n):</td>
<td>D1: 7</td>
</tr>
<tr>
<td></td>
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<td>ETN: 25 mg twice a wk</td>
<td>D2: 4.82 calculated for subgroup, n = 76 (3.83-5.46)</td>
<td>D2: 67 (75)</td>
<td>D2: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IFX: 3mg/kg wks 0, 2, 6, and every eighth week, could be increased in steps of 100 mg to a maximum dose of 500 mg at 4-8 wk intervals, avg dose after 6 mos = 5 mg/kg every eighth wk</td>
<td></td>
<td>Overall: Includes transient ischaemic attack, two acute coronary syndromes, and two tachyarrhythmias.</td>
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<tr>
<td></td>
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<td>ADA: 40 mg every other wk</td>
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<td>Septicaemia with E-coli bacteria:</td>
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<tr>
<td></td>
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<td>Number in group</td>
<td></td>
<td>D1: 0</td>
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<tr>
<td></td>
<td></td>
<td>D1: 161</td>
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<td>D2: 1</td>
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<td>Study Characteristics</td>
<td>Inclusion and Exclusion Criteria</td>
<td>Characteristics and Interventions</td>
<td>Baseline Disease and Treatment Characteristics</td>
<td>Health Outcomes</td>
<td>Adverse Events, %</td>
</tr>
<tr>
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<tr>
<td>Overall: 261</td>
<td></td>
<td></td>
<td>Latent TB</td>
<td>At month 3</td>
<td>Anaphylactic infusion reactions (occurred with IFX):</td>
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<td>Mean age, years (SD)</td>
<td></td>
<td></td>
<td>NR</td>
<td>D1: 104 (51)</td>
<td>D1: 0</td>
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<tr>
<td>D1: 48.2</td>
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<td></td>
<td>Regular NSAID use % (n):</td>
<td>D2: 67 (55)</td>
<td>D2: 2</td>
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<tr>
<td>D2: 46.0</td>
<td></td>
<td></td>
<td>D1: 60.9 (98)</td>
<td>At month 6</td>
<td>Malignancies:</td>
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<tr>
<td>Overall, IQR range:</td>
<td></td>
<td></td>
<td>D2: 48.0 (48)</td>
<td>D1: 82 (60)</td>
<td>Lymphoma or leukemia (n):</td>
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<tr>
<td>D1: 38.6 - 53.9 IQR</td>
<td></td>
<td></td>
<td>P = 0.99</td>
<td>D2: 54 (59)</td>
<td>D1: 1</td>
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<tr>
<td>D2: 36.4 - 58.5 IQR;</td>
<td></td>
<td></td>
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<td>D2: 1</td>
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<tr>
<td>P = 0.99</td>
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<td></td>
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<td></td>
<td>Overall: Fatal non-Hodgkin's lymphoma (diffuse large B-cell lymphoma); Chronic lymphatic leukemia (CLL), with probable subclinical debut prior to anti TNF treatment</td>
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<tr>
<td>Sex, % female</td>
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<td></td>
<td>HAQ, median (IQR)</td>
<td>At month 12</td>
<td>Other infections:</td>
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<td>D1: 47.8</td>
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<td></td>
<td>D1: 1.0 (0.63-1.38)</td>
<td>D1: 74 (54)</td>
<td>D1: 5</td>
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<tr>
<td>D2: 55</td>
<td></td>
<td></td>
<td>D2: 1.0 (0.50-1.50)</td>
<td>D2: 27 (52)</td>
<td>D2: 2</td>
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<tr>
<td>P = 0.07</td>
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<td>Overall: Designated as 'Infections' - mainly respiratory tract infections</td>
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<tr>
<td>Race, % white</td>
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<td></td>
<td></td>
<td>Other: Fractures, n:</td>
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<tr>
<td>NR</td>
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<td></td>
<td></td>
<td></td>
<td>D1: 2</td>
</tr>
<tr>
<td>Race, % black</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D2: 1</td>
</tr>
<tr>
<td>NR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Overall: Three peripheral fractures and one cervical spinaql stenosis requiring surgery</td>
</tr>
<tr>
<td>Ethnicity, Latino</td>
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<td>Other Adverse Events, n:</td>
</tr>
<tr>
<td>NR</td>
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<td>D1: 3</td>
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</table>

Overall: Includes: severe vertigo, irritable bowl disease, benign stenosis of the esophagus, concrement in the
<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events, %</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>urinary tract, non-infectious pleuritis, severe dysplasia of cervix uteri.</td>
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<tr>
<td>Study Characteristics</td>
<td>Inclusion and Exclusion Criteria</td>
<td>Characteristics and Interventions</td>
<td>Baseline Disease and Treatment Characteristics</td>
<td>Health Outcomes</td>
<td>Adverse Events (%)</td>
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<td><strong>Author, yr:</strong> Mease et al., 2000⁷</td>
<td>Country, Setting: US, single center in Seattle</td>
<td>Funding: Immunex Corp.</td>
<td>Research Objective: To study the efficacy and safety of etanercept in pts with psoriatic arthritis and psoriasis</td>
<td>Study Design: RCT</td>
<td>Overall N: 60</td>
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<td>Inclusion Criteria:</td>
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<tr>
<td>• Age 18 to 70</td>
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<td>• Diagnosed with PsA according to: &gt; 3 swollen, tender, or painful joints</td>
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<tr>
<td>• Inadequate response to NSAIDs</td>
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<tr>
<td>• Hepatic transaminase concentrations no greater than 2x upper limit of normal</td>
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<td>• Hemoglobin 85 g/L or higher</td>
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<td>• Platelet count 125,000 per mL or more and serum creatinine 152-4 mmol/L or below</td>
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<td>• MTX &lt; 25 mg/wk and stable for 4 wks</td>
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<td>• Corticosteroids if the dose &lt; 10 mg/d of PRE, stable for at least 2 wks and maintained at a constant dose throughout study</td>
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<td>Exclusion Criteria:</td>
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<tr>
<td>• Evidence of skin conditions other than psoriasis</td>
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<td>Interventions:</td>
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<td>D1: Placebo</td>
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<td>D2: ETA (25mg 2x wkly)</td>
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<td>Mean disease duration, yrs:</td>
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<td>D1: 9.5</td>
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<td>Mean age, yrs:</td>
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<td>D1: 43.5</td>
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<td>Sex, % female:</td>
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<td>D1: 40</td>
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<td>D2: 47</td>
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<td>Race, % white:</td>
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<td>D1: 83</td>
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<td>D2: 90</td>
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<td>Mean disease duration, yrs:</td>
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<td>D1: 9.5</td>
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<td>D2: 9</td>
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<tr>
<td>TJC, mean:</td>
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<td>NR</td>
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<td>SJC, mean:</td>
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<td>NR</td>
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<td>DMARD use, %:</td>
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<td>NR</td>
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<tr>
<td>Corticosteroid use, %:</td>
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<td>NR</td>
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<td>MTX naive, %:</td>
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<td>NR</td>
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<td>Txt resistant, %:</td>
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<td>Overall 100</td>
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<td>Pts with Early RA (≤3 yrs):</td>
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<td>NR</td>
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<td>Baseline DAS, mean:</td>
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<td>NR</td>
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<tr>
<td>Concomitant MTX:</td>
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<td>D1: 47</td>
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<tr>
<td>PsARC ETA 26 (87%) vs. Placebo 7 (23%)</td>
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<td>ACR50 ETA 15 (50%) vs. Placebo 1 (3%)</td>
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<tr>
<td>ACR70 ETA 4 (13%) vs. Placebo 0 (0%)</td>
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<tr>
<td>HAQ ETA 0.1 (0,1) vs. Placebo 1.3 (0.9,1.6)</td>
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<tr>
<td>ACR20 was achieved by 73% ETA treated pts compared with 13% placebo treated pts (P &lt; 0.0001)</td>
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<tr>
<td>Median % improvements in tender and swollen joint counts at 12 wks ETA 75% and 72% respectively vs. placebo 5% worsening and 19% improvement; disability according to HAQ significantly more improved in ETA than placebo (83% vs. 3%, P &lt; 0.0001)</td>
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<tr>
<td>26% of ETA vs. 0 of placebo pts achieved 75% improvement in PASI at 12 wks (P = 0.0154); similar differences between ETA and placebo also seen at 25% and 50% improvements in PASI scores</td>
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</table>

**SAEs:**
- D1: 0
- D2: 3.3

**ITT Analysis:** Yes

**Quality Rating:** Fair

**Overall Attrition Rate (%):** 6.6%

**Quality Rating:** Fair
Evidence Table 1. Randomized controlled trials and observational studies (continued)

<p>| D2: 47 |</p>
<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events (%)</th>
<th>Analysis and Quality Rating</th>
</tr>
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<tbody>
<tr>
<td><strong>Author, yr:</strong></td>
<td></td>
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<tr>
<td>Mease et al., 2004; Mease et al., 2006 (2nd yr outcomes)</td>
<td>Country, Setting: US, 17 sites</td>
<td>Funding: Immunex</td>
<td>Research Objective: Safety, efficacy, and effect on radiographic progression of ETA in pts with PsA</td>
<td>Study Design: RCT</td>
<td>Overall N: 205</td>
<td>Study Duration: 24 wks (with 48 wk open-label phase)</td>
</tr>
<tr>
<td><strong>Inclusion Criteria:</strong></td>
<td>• Age 18-70</td>
<td>• Diagnosed with PsA ≥ 3 swollen and 3 tender joints</td>
<td>• Inadequate response to NSAID</td>
<td>• At least one of PsA subtypes: distal interphalangeal joint involvement, polyarticular arthritis, arthritis mutilans, asymmetric peripheral arthritis, or ankylosing spondylitis-like arthritis</td>
<td>• Stable plaque psoriasis with a qualifying lesion</td>
<td>• MTX therapy (stable 2 mo ≤ 25 mg/wk)</td>
</tr>
<tr>
<td></td>
<td>• Oral retinoids, topical vitamin A or D analog preparations, and anthralin</td>
<td>Interventions:</td>
<td>Mean disease duration, yrs:</td>
<td>SAEs:</td>
<td>Overall Attrition Rate (%):</td>
<td></td>
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<td></td>
<td>N: D1: 104 D2: 101</td>
<td>D1: placebo</td>
<td>D1: 9.2</td>
<td>D1: 3.9</td>
<td>19.5</td>
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<td></td>
<td>N: D1: 104 D2: 101</td>
<td>D2: ETA (25 mg 2x wkly)</td>
<td>D2: 9</td>
<td>D2: 4</td>
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<td></td>
<td>Mean age, yrs:</td>
<td>TJC, mean:</td>
<td>NR</td>
<td>Infusion or injection reaction:</td>
<td>D1: 9</td>
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<td>D1: 47.3 D2: 47.6</td>
<td>SJ C, mean:</td>
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<td>Sex, % female:</td>
<td>DMARD use, %:</td>
<td>NR</td>
<td>Headache:</td>
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<td>D1: 55 D2: 43</td>
<td>SJC, mean:</td>
<td>NR</td>
<td>URTI:</td>
<td>D1: 23</td>
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<td>Race, % white:</td>
<td>Corticosteroid use, %:</td>
<td>D1: 15</td>
<td>D2: 21</td>
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<td></td>
<td>D1: 91 D2: 90</td>
<td>MTX naive, %:</td>
<td>D2: 19</td>
<td>UTI:</td>
<td>D1: 6</td>
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<td>Pts with Early RA (&lt;3 yrs):</td>
<td>Tnx resistant, %:</td>
<td>NR</td>
<td>D2: 6</td>
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<td></td>
<td>NR</td>
<td>Baseline DAS, mean:</td>
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<td>Concomitant MTX</td>
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Evidence Table 1. Randomized controlled trials and observational studies (continued)

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<th>D1</th>
<th>D2</th>
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<td><strong>Author, yr:</strong></td>
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<td>Mease et al., 2005</td>
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<td><strong>ADEPT Study</strong></td>
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<td>Country, Setting:</td>
<td>Multinational, multi-clinic (50)</td>
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<td>Funding: Abbots</td>
<td>Laboratories</td>
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<td>Research Objective:</td>
<td>Safety and efficacy of ADA compared with placebo in tx of active psoriatic arthritis</td>
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<td>Study Design: RCT</td>
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<td>Overall N:</td>
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<td>Study Duration:</td>
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**Inclusion Criteria:**
- Age ≥ 18
- Moderate to severe PsA
- Active psoriatic skin lesions or a documented history of psoriasis
- Inadequate response or intolerance to NSAIDs
- MTX ≥ 3 mos with stable dose 4 wks
- Topical txts for psoriasis within 2 wks, other than medicated shampoos or low-potency topical steroids
- Anti-TNF
- History of TB
- Central nervous system demyelinating disease
- Listeriosis, or severe infection within 30 ds or oral antibiotics within 14 ds

**Exclusion Criteria:**
- CYP, tacrolimus, DMARDs, or oral retinoids (4 wks)
- Topical txts for psoriasis within 2 wks, other than medicated shampoos or low-potency topical steroids
- Anti-TNF
- History of TB
- Central nervous system demyelinating disease
- Listeriosis, or severe infection within 30 ds or oral antibiotics within 14 ds

**Interventions:**
- D1: placebo
- D2: ADA (40mg every other wk)

**Mean age, yrs:**
- D1: 49.2
- D2: 48.6

**Sex, % female:**
- D1: 45.1
- D2: 48.6

**Race, % white:**
- D1: 93.8
- D2: 97.4

**Mean dis ease duration, yrs:**
- D1: 9.2
- D2: 9.8

**TJC, mean:**
- D1: 25.8
- D2: 23.9

**SJC, mean:**
- D1: 14.3
- D2: 14.3

**Mean number previous DMARDs:**
- D1: 1.5
- D2: 1.5

**Corticosteroid use, %:**
- NR

**MTX naive, %:**
- NR

**Txt resistant, %:**
- NR

**Pts with Early RA (≤3 yrs):**
- NR

**Health Outcomes:**
- PsARC ADA 60% wk. vs placebo 23%
- ACR50 ADA, 39% vs placebo, 6% (P < 0.001)
- ACR70 ADA, 23% vs placebo, 1% (P < 0.001)
- The PASI75 ADA 59% vs placebo 1% (P < 0.001) (N=69 per group)
- HAQ DI change placebo -0.1 ± 0.4 vs ADA -0.4 ± 0.5 (P < 0.001)
- ACR20 ADA 57% vs placebo 15% (between-group difference 42%, 95% CI, 31-52%; P < 0.001)
- Mmean change in modified total Sharp was -0.2 for ADA versus placebo (P < 0.001)
- Erosion scores (mean change ADA 0.0 vs placebo 0.6 ) and JSN scores (mean change ADA -0.2 vs placebo 0.4) (P < 0.001 for both)
- SF-36: SF-36 PCS; change in baseline to wk 12 for placebo vs ADA; 1.4 vs 9.3 (P < 0.001)
- Change in baseline to wk 24; 1.4 vs 9.3 (P < 0.001)
- SF-36 MCS
- Change in baseline to wk 12; 1.2 vs 1.6 (P NS)
- Change in baseline to wk 12; 0.8 vs 1.8 (P NS)

**Adverse Events:**
- Infusion or injection reaction: D1: 3.1
- Headache: D1: 8.6
- UTI: D2: 12.6

**Analysis and Quality Rating:**
- Overall Attrition Rate (%): 7.6
- ITT Analysis: Yes
- Quality Rating: Fair
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<td>Baseline PASI (mean):</td>
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<tr>
<td>D1:</td>
<td>8.3</td>
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<td>D2:</td>
<td>7.4</td>
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<tr>
<td>Concomitant MTX use, %:</td>
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<td>D1:</td>
<td>50</td>
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<td>D2:</td>
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<tr>
<td>Baseline HAQ:</td>
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<td>Study Characteristics</td>
<td>Inclusion and Exclusion Criteria</td>
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<tr>
<td><strong>Author, year, study name, if applicable</strong>&lt;br&gt;Mease et al., 2010 (companion with Mease 2004, should be in same evidence Table)</td>
<td><strong>Inclusion Criteria</strong>&lt;br&gt;- 18 to 70 years of age&lt;br&gt;- diagnosed with PsA with active arthritis&lt;br&gt;- inadequate response to nonsteroidal antiinflammatory drug (NSAID) therapy at time of entry to study</td>
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<td><strong>Country and setting</strong>&lt;br&gt;Multicenter</td>
<td><strong>Exclusion Criteria</strong>&lt;br&gt;- Pregnant or breastfeeding&lt;br&gt;- Diabetes mellitus requiring insulin&lt;br&gt;- Uncompensated congestive heart failure&lt;br&gt;- Angina pectoris&lt;br&gt;- Uncontrolled hypertension&lt;br&gt;- Severe pulmonary disease requiring therapy&lt;br&gt;- History of cancer other than resected cutaneous basal and squamous cell carcinoma or in situ cervical cancer.</td>
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<td><strong>Source of funding</strong>&lt;br&gt;Pharmaceutical company or other commercial source: Amgen Inc and Wyeth Pharmaceuticals</td>
<td><strong>Mean age (years)</strong>&lt;br&gt;D1: NR&lt;br&gt;D2: NR&lt;br&gt;Overall: 47</td>
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<tr>
<td><strong>Research objective</strong>&lt;br&gt;To evaluate the effects of ETA treatment on patient-reported outcomes (PRO) in patients with psoriatic arthritis (PsA).</td>
<td><strong>Sex, % female</strong>&lt;br&gt;D1: 43&lt;br&gt;D2: 52</td>
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<tr>
<td><strong>Study design</strong>&lt;br&gt;Controlled Trials</td>
<td><strong>Race, % white</strong>&lt;br&gt;D1: NR&lt;br&gt;D2: NR&lt;br&gt;Overall: 90</td>
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<td><strong>Overall N</strong>&lt;br&gt;205</td>
<td><strong>Race, % black</strong>&lt;br&gt;NR</td>
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<td><strong>Duration of study</strong>&lt;br&gt;2 years (three phases: first 24 week double blind; 24 week blinded maintenance; 48 wk open label)</td>
<td><strong>Ethnicity, Latino NR</strong></td>
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<td><strong>Study design</strong>&lt;br&gt;Controlled Trials</td>
<td><strong>Baseline DAS score</strong>&lt;br&gt;NR</td>
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Evidence Table 1. Randomized controlled trials and observational studies (continued)

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<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
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<th>Adverse Events</th>
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- Open-label at week 12
- D1: 0.5 (0.1)  
- D2: 0.7 (0.1)  
- Open-label at week 24
- D1: 0.4 (0.1)  
- D2: 0.6 (0.1)  
- Open-label at week 36
- D1: 0.4 (0.1)  
- D2: 0.6 (0.1)  
- Open-label at week 48
- D1: 0.4 (0.1)  
- D2: 0.6 (0.1)  
- Overall: $P < 0.001$ at week 4 and at week 12; $P = NR$ beyond week 12, but Figure shows that both groups maintained improvement achieved up to that point and mean HAQ unchanged or almost unchanged beyond week 12

- DAS
- NR

- SF-36
- PCS, mean (SE)
- At week 24
- D1: 45.1 (1.1)  
- D2: 36.4 (1.0)  
- Start of open label
- D1: 46.4 (1.2)  
- D2: 36.8 (1.1)  
- Open-label at week 12
- D1: 46.7 (1.2)  
- D2: 43.9 (1.2)
Evidence Table 1. Randomized controlled trials and observational studies (continued)

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<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
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<td>Open-label at week 24</td>
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<td>D1: 47.0 (1.3)</td>
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<td>D2: 44.4 (1.1)</td>
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<td>Open-label wk 36</td>
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<td>D1: 46.0 (1.3)</td>
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<td>D2: 44.2 (1.2)</td>
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<td>Open-label at week 48</td>
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<td>D1: 47.3 (1.2)</td>
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<td>D2: 44.1 (1.3)</td>
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<td>MCS, mean (SE)</td>
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<td>At week 24</td>
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<td>D1: 53.6 (0.9)</td>
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<td>D1: 53.7 (1.0)</td>
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<td>Open-label at week 12</td>
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<td>D1: 52.8 (1.0)</td>
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<td>Open-label at week 24</td>
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<td>D1: 51.6 (1.1)</td>
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<td>Open-label at week 36</td>
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<td>D1: 53.6 (1.0)</td>
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<td>Open-label at week 48</td>
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<td>D1: 53.5 (1.0)</td>
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<td>At week 24: 48.4 (1.2)</td>
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<td>49.1 (1.3)</td>
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<td>At week 12: 51.8 (1.2)</td>
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<td>At week 24: 49.8 (1.3)</td>
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<td>DB Phase mean improvement in score, units</td>
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<td>At week 4</td>
<td>Overall: 5.8 vs. 0.5 P &lt;</td>
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<td>Characteristics and Interventions</td>
<td>Baseline Disease and Treatment Characteristics</td>
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<td>At week 24: 9.3 vs. 0.7</td>
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<td>( P &lt; 0.001 )</td>
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<td>Radiographic measures</td>
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<td>At 12 months</td>
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<td>Overall: radiographic disease progression inhibited in D1 vs. D2:</td>
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<td>( P = 0.0001 )</td>
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<td>Quality of life scales</td>
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<td>Mean change from baseline</td>
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<td>At 24 weeks</td>
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<td>D1: 14.3</td>
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<td>D2: 2.1</td>
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<td>( P &lt; 0.001 )</td>
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At week 24: 9.3 vs. 0.7
\( P < 0.001 \)
MCS change, units
At week 24: 2.7 vs. -0.1 \( P = 0.062 \)
Radiographic measures
At 12 months
Overall: radiographic disease progression inhibited in D1 vs. D2:
\( P = 0.0001 \)
Quality of life scales
NR
EQSD VAS
Mean change from baseline
At 24 weeks
D1: 14.3
D2: 2.1
\( P < 0.001 \)
<table>
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<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events</th>
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<tbody>
<tr>
<td>Author, year, study name, if applicable</td>
<td>Saad et al., 2010</td>
<td>Inclusion Criteria</td>
<td>PsA diagnosis between 2002-2006, started ETN, INF, ADA as first biologic agent within 6 months of registration</td>
<td>Interventions, dose</td>
<td>Mean disease duration, years</td>
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<tr>
<td>Country and setting</td>
<td>United Kingdom, multicenter</td>
<td>Exclusion Criteria</td>
<td>NR</td>
<td>D1: ETA: 25 mg twice weekly or 50 mg once weekly</td>
<td>D1: 12.8 (9.0)</td>
</tr>
<tr>
<td>Source of funding Pharmaceutical company or other commercial source:</td>
<td>Abbott Laboratories, Amgen, Schering Plough, Wyeth Pharmaceuticals, Biovitrum</td>
<td>Number in group</td>
<td>D1: 333</td>
<td>D2: INF: 5 mg/kg at weeks 0, 2, 6, and 8 then every 8 weeks</td>
<td>D2: 12.2 (8.0)</td>
</tr>
<tr>
<td>Research objective</td>
<td>To evaluate the risk-benefit profile of anti-TNF therapies in PsA and to study the predictors of treatment responses and disease remission</td>
<td>Mean age, years</td>
<td>D1: 45.8</td>
<td>D3: ADA: 40 mg every 2 weeks</td>
<td>D3: 11.4 (8.4)</td>
</tr>
<tr>
<td>Study design Observational</td>
<td>Overall N</td>
<td>Sex, % female</td>
<td>D1: 51.1</td>
<td>D4: RF-negative RA pts on oral DMARDs (control arm)</td>
<td>D4: 8.5 (9.7)</td>
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<tr>
<td>Overall N</td>
<td>596 (PsA cohort only)</td>
<td>D2: 44.8</td>
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<td>Duration of study</td>
<td>1776.2 person</td>
<td>D3: 47.0</td>
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<td>D4: 59.4</td>
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</tbody>
</table>
Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
<th>Characteristics and Interventions</th>
<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>years</td>
<td></td>
<td>D4: 5.0 (1.4) Overall: PsA cohort: 6.2 (1.1)</td>
<td>Required treatment for latent TB NR Other population characteristics NR</td>
<td></td>
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<tr>
<td>Quality rating</td>
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<tr>
<td>Fair</td>
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<tr>
<td>Study Characteristics</td>
<td>Inclusion and Exclusion Criteria</td>
<td>Characteristics and Interventions</td>
<td>Baseline Disease and Treatment Characteristics</td>
<td>Health Outcomes</td>
<td>Adverse Events</td>
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<tr>
<td>Author, year, study name, if applicable</td>
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<tr>
<td>Wilkens et al., 1984</td>
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<tr>
<td>Country and setting</td>
<td>United States; multicenter</td>
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</tr>
<tr>
<td>Source of funding</td>
<td>Government or non-profit organization: Supported by NIAMDD contract no. 6-2218, by Public Health Service Research Grant # RR-00064 from the Division of Research Resources, and an Arthritis Foundation Clinical Research Center grant to the University of Tennessee Center for Health Sciences.</td>
<td></td>
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<tr>
<td>Research objective</td>
<td>To evaluate the effectiveness, tolerability and safety of MTX</td>
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<tr>
<td>Study design</td>
<td>Controlled Trials</td>
<td></td>
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</tr>
<tr>
<td>Overall N</td>
<td></td>
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</tbody>
</table>

**Inclusion Criteria**
- All participants were between the ages of 20 and 70
- Had an established diagnosis of PsA
- MTX naïve
- Unsuccessfully treated with antiinflammatory doses of aspirin or NSAIDs
- If female, were not of childbearing potential
- Ultraviolet treatment within a month of starting treatment or during the trial
- Pregnancy or nursing mothers
- Conditions, medical or surgical, which would compromise the absorption, metabolism
- Elevation of hepatic enzymes or serum bilirubin to a level of twice the upper limit of normal
- Positive serologic test for hepatitis B associated

**Exclusion Criteria**
- Inversely treated with antiinflammatory doses of aspirin or NSAIDs
- If female, were not of childbearing potential
- Conditions, medical or surgical, which would compromise the absorption, metabolism
- Elevation of hepatic enzymes or serum bilirubin to a level of twice the upper limit of normal
- Positive serologic test for hepatitis B associated

**Interventions, Dose**
- D1: MTX: 7.5 - 15 mg/wk (in doses of 2.5 mg every 12 hours for 3 consecutive doses each week, could be increased to 15 mg/week after 6 weeks. with 3 doses of 5.0 mg taken at 12-hour consecutive intervals)
- D2: Placebo

**Mean age (years)**
- D1: 44
- D2: 47
- Overall: NR

**Sex, % female**
- D1: 62
- D2: 56
- Overall: 59%

**Race, % white**
- D1: 81
- D2: 88
- Overall: 84

**Race, % black**
- D1: 5
- D2: 0
- Overall: 3

**Ethnicity, Latino**
- D1: 10
- D2: 6
- Overall: 8

**Mean disease duration, years**
- D1: 159 months
- D2: 103 months
- Overall: NR

**Patients with early RA, three years or less, %**
- NR

**Treatment resistant, %**
- D1: Resistant to antiinflammatory does of NSAIDs or aspirin: 100
- D2: 100
- Overall: 100

**Tender Joint Count, mean NR**

**Swollen Joint Count, mean NR**

**Corticosteroid use, %**
- NR

**DMARD use, %**
- D1: 0
- D2: 0
- Overall: 0

**MTX naïve, %**
- D1: 100
- D2: 100
- Overall: 100

**Baseline DAS score NR**

**Required treatment for latent TB**
- NR

**Severity of arthritis, Mild**

**Mean grip strength on right, mm/Hg**
- D1: 4
- D2: -1
- Overall: P = 0.167

**Mean grip strength on left, mm/Hg**
- D1: 9
- D2: 0
- Overall: 0.149

**Morning stiffness, minutes**
- D1: 45
- D2: 30
- Overall: P = 0.099

**Physician assessment score, range 1 to 5**
- D1: 1
- D2: 0
- Overall: 0.001

**Patient assessment score,**

**Attrition/withdrawal NR**

**Overall adverse events NR**

**Serious adverse events NR**

**Malignancies NR**

**Radiographic measures NR**

**Quality of life scales NR**

**Others**
- Gastrointestinal distress of stomatitis:
  - D1: 3
  - D2: 0
  - Overall: 3

**Other infections NR**

**GI**: Gastrointestinal distress of stomatitis:
- D1: 3
- D2: 0
- Overall: 3

**Other NR**

**Overall NR**
Evidence Table 1. Randomized controlled trials and observational studies (continued)

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Inclusion and Exclusion Criteria</th>
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<th>Baseline Disease and Treatment Characteristics</th>
<th>Health Outcomes</th>
<th>Adverse Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>Duration of study 12 weeks</td>
<td></td>
<td></td>
<td>range 1 to 5</td>
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</tr>
<tr>
<td></td>
<td>Quality rating Fair</td>
<td></td>
<td></td>
<td>D1: 1</td>
<td>D2: 0</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Overall: 0.087</td>
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<tr>
<td></td>
<td>antigen</td>
<td>D1: 5</td>
<td>Severity of arthritis, Moderate</td>
<td>Joint pain/tenderness count</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Significant renal disease</td>
<td>D2: 2</td>
<td>D1: 10</td>
<td>D1: 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Regular or sporadic alcoholic</td>
<td>Severity of arthritis, Severe</td>
<td>D2: 16</td>
<td>D2: 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>beverage intake of more than 14 oz per week</td>
<td>D1: 3</td>
<td></td>
<td>Overall: 0.559</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Any other experimental drug,</td>
<td>Severity of arthritis, Functional</td>
<td></td>
<td>Joint swelling count</td>
<td></td>
</tr>
<tr>
<td></td>
<td>previous therapy with MTX or</td>
<td>class 1:</td>
<td>D1: 3</td>
<td>D1: 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>other cytotoxic drug</td>
<td>D2: 3</td>
<td>D2: 15</td>
<td>D2: 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Preexisting bone marrow</td>
<td>Severity of arthritis, Functional</td>
<td></td>
<td>Overall: P = 0.635</td>
<td></td>
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<tr>
<td></td>
<td>hypoplasia</td>
<td>class 2:</td>
<td>D1: 11</td>
<td>D1: 9</td>
<td></td>
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<tr>
<td></td>
<td>• Active infection except for</td>
<td>D2: 15</td>
<td></td>
<td>D2: 10</td>
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<tr>
<td></td>
<td>minor self-limited infections</td>
<td>Severity of arthritis, Functional</td>
<td></td>
<td>Overall: P = 0.870</td>
<td></td>
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<tr>
<td></td>
<td>• Recent major surgery</td>
<td>class 3:</td>
<td>D1: 2</td>
<td>D1: 5</td>
<td></td>
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<tr>
<td></td>
<td>• Insulin-dependent diabetes</td>
<td>D2: 3</td>
<td></td>
<td>D2: 2</td>
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<tr>
<td></td>
<td>• mellitus</td>
<td>Severity of arthritis, Functional</td>
<td></td>
<td>Overall: 0.390</td>
<td></td>
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<tr>
<td></td>
<td>• Overt obesity as determined by</td>
<td>class 4:</td>
<td>D1: 0</td>
<td>Surface area, cm sq</td>
<td></td>
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<tr>
<td></td>
<td>the investigator</td>
<td>D2: 0</td>
<td></td>
<td>D1: 114</td>
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<tr>
<td></td>
<td>• Primary diagnosis of ankylosing</td>
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<td>D2: 0</td>
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<tr>
<td></td>
<td>spondylitis</td>
<td></td>
<td></td>
<td>Overall: 0.039</td>
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<tr>
<td></td>
<td>• Thrombocytopenia and/or</td>
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<td></td>
<td>Scaling, scale of 0 to 3</td>
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<tr>
<td></td>
<td>leukopenia</td>
<td></td>
<td></td>
<td>D1: 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• History or presence of a</td>
<td></td>
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<td>D2: 0</td>
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<tr>
<td></td>
<td>malignancy</td>
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<td>Overall: 0.068</td>
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<tr>
<td></td>
<td>• Erythema, scale of 0 to 3</td>
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<td>Induration, scale of 0 to 3</td>
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<td></td>
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<td>D1: 0</td>
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<td>D2: 0</td>
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<td></td>
<td>Overall: 0.950</td>
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<tr>
<td>Study Characteristics</td>
<td>Inclusion and Exclusion Criteria</td>
<td>Characteristics and Interventions</td>
<td>Baseline Disease and Treatment Characteristics</td>
<td>Health Outcomes</td>
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<td>D1: 1</td>
<td>D2: 0</td>
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<td></td>
<td>Overall: 0.271</td>
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</tbody>
</table>

Evidence Table 1. Randomized controlled trials and observational studies (continued)
### Evidence Table 2. Systematic reviews and meta-analyses

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Characteristics of Included Studies</th>
<th>Results</th>
<th>Adverse Events</th>
<th>Assessments, Study Appraisals, and Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author, year, country, funding:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Jones, Crotty and Brooks, 2000</td>
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<tr>
<td>multinational Cochrane</td>
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<tr>
<td><strong>Study Design:</strong></td>
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<tr>
<td>Systematic review.</td>
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<tr>
<td><strong>Aims of the Review:</strong></td>
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<tr>
<td>How do various treatments compare in terms of both efficacy and toxicity in the treatment of PsA?</td>
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<tr>
<td>To assess the effects of SSZ, auranofin, etretinate, fumaric acid, IMI gold, azathioprine, efamol marine and MTX, in PsA.</td>
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<tr>
<td><strong>Number of Patients:</strong></td>
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<tr>
<td>Twenty randomized trials were identified of which thirteen were included in the quantitative analysis with data from 1022 subjects.</td>
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<tr>
<td><strong>Studies included:</strong></td>
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<tr>
<td>Published data only</td>
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<td>Parenteral high dose MTX (data not available), SSZ, azathioprine and etretinate were the agents that achieved statistical significance in a global index of disease activity; SSZ (improvement in disease index 0.38 units (95% CI 0.21-0.54) and azathioprine (improvement in disease index 2.20 units (95% CI 1.06-3.33) and etretinate (improvement in disease index 0.84 units (95% CI 0.08-1.59) were statistically better than placebo;</td>
<td>There was insufficient data to examine toxicity.</td>
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<tr>
<td>Published/unpublished data</td>
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<td>In all trials the placebo group improved over baseline (pooled improvement 0.39 DI units, 95% CI 0.26-0.54); One outstanding difference is the placebo group with PsA improves three times as much as the placebo RA group (p&lt;0.05) Therefore, the results of uncontrolled trials are likely to be misleading in PsA.</td>
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<tr>
<td>Combe et al. 1996; Dougados et al. 1995; Farr et al. 1990; Fraser et al. 1993; McKendry et al. 1993; Palit et al. 1990; Willkens et al. 1984</td>
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<tr>
<td><strong>Characteristics of included studies:</strong></td>
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<tr>
<td>At least two treatment groups, and the allocation to these must have been by formal randomization; in for quality assessment;</td>
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<tr>
<td><strong>Characteristics of included populations:</strong></td>
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<tr>
<td>patients aged 20 years and over, with a clinical diagnosis of PsA.</td>
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<tr>
<td><strong>Characteristics of</strong></td>
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</tbody>
</table>

Publication Bias Assessed: Yes

Heterogeneity Assessed: Yes

Standard Method of Study Appraisals: Yes

Comprehensive Search Strategy: Yes

Quality Rating: Good
### Evidence Table 2. Systematic reviews and meta-analyses (continued)

**interventions:**

All conservative therapeutic agents were eligible for inclusion in this review. Comparative trials without a placebo arm were not included.
**Evidence Table 2. Systematic reviews and meta-analyses (continued)**

<table>
<thead>
<tr>
<th>Study Characteristics, Quality Rating</th>
<th>Study Information</th>
<th>Study Characteristics</th>
<th>Results</th>
<th>Adverse Events</th>
</tr>
</thead>
</table>
| **Author, Year:** Ravindran et al., 2008<sup>18</sup> | **Study design:** Systematic review and meta-analysis | **Characteristics of Included Studies:** Placebo controlled RCTs | **Study Results:**  
- Efficacy - # of patients withdrawn for lack of efficacy  
- TNF inhibitors  
  5 studies n = 882 RR, 0.25 (95% CI, 0.13-0.48) *P* = 0.0001  
- Sulfasalazine  
  5 studies, n = 434, RR (95% CI): 0.45 (0.23-0.89) *P* = 0.02  
- Leflunomide  
  1 study, n = 190, RR (95% CI): 0.44 (0.23-0.83) *P* = 0.01  
- All DMARDs  
  12 studies, n = 1081, RR (95% CI): 0.39 (0.27-0.57) *P* = 0.00001  
- All treatment  
  18 studies, n = 2148, RR (95% CI): 0.35 (0.25-0.49) *P* = 0.00001 | **Adverse Events:**  
- Toxicity - Withdrawals for adverse events  
- TNF inhibitors  
  5 studies, n = 882 RR (95% CI): 2.20 (0.82-5.91) *P* = 0.12 NNT/NNH = 0.25  
- Sulfasalazine  
  5 studies, n = 434 RR (95% CI): 1.76 (0.98-3.14) *P* = 0.06 NNT/NNH = 0.93  
- Leflunomide  
  1 study, n = 190 RR (95% CI): 3.86 (1.20-12.39) *P* = 0.02 NNT/NNH = 0.45  
- All DMARDs  
  12 studies n = 1081, RR (95% CI): 2.32 (1.55-3.47) *P* = 0.0001 NNT/NNH = 0.86  
- All treatment  
  18 studies, n = 2148, RR (95% CI): 2.33 (1.61-3.37) *P* = 0.00001 NNT/NNH = 0.62 |

**Country and setting:** Study conducted in UK - components are multinational  
**Funding:** NR  
**Aims of Review:** Treatments for psoriatic arthritis (PsA) range from tumour necrosis factor (TNF) inhibitors evaluated in large randomised control trials (RCTs) and low-cost disease-modifying anti-rheumatic drugs (DMARDs) studied in less detail. We compared their efficacy and toxicity in a systematic review.  
**Quality Rating:** Fair

**Number of Patients:** 2039  
**Studies Included:** 18
<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Characteristics of Included Studies</th>
<th>Results</th>
<th>Adverse Events</th>
<th>Assessments, Study Appraisals, and Quality Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author, year, country, funding:</strong></td>
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<td></td>
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<tr>
<td>Woolacott et al., 2006&lt;sup&gt;19&lt;/sup&gt; Multi-national Health Technology Assessment</td>
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<tr>
<td><strong>Study Design:</strong></td>
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<tr>
<td>Systematic review</td>
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<tr>
<td><strong>Aims of the Review:</strong></td>
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</tr>
<tr>
<td>to evaluate the clinical effectiveness, safety, tolerability and cost-effectiveness of etanercept and infliximab for the treatment of active and progressive psoriatic arthritis (PsA) in patients who have inadequate response to standard treatment, including disease-modifying antirheumatic drug (DMARD) therapy.</td>
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<tr>
<td><strong>Number of Patients:</strong></td>
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<tr>
<td>265 patients were included in the etanercept trials and 104</td>
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<tr>
<td>Studies included:</td>
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<tr>
<td>three trials of the efficacy of the interventions of interest (two for etanercept and one for infliximab), 23 studies of the adverse effects of the interventions and 14 trials of the efficacy of the DMARDs</td>
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<tr>
<td><strong>Characteristics of included studies:</strong></td>
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<tr>
<td>RCTs</td>
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<tr>
<td><strong>Characteristics of included populations:</strong></td>
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<tr>
<td>Adults with PsA</td>
<td></td>
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<tr>
<td><strong>Characteristics of interventions:</strong></td>
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<tr>
<td>INF and ETA</td>
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<td>ETA 12 weeks, 65% of ACR 20 [RR 4.19 [95% CI 2.74 to 6.42]], ACR50 45% [RR 10.84 (95% CI 4.47 to 26.28)] ACR 70 12% [RR 16.28 (95% CI 2.20 to 120.54)], (PsARC) 85% [RR 2.60 (95% CI 1.96 to 3.45)], INF- 16 weeks, ACR 20 65% [RR 6.80 (95% CI 2.89 to 16.01)]. Almost half achieved an ACR 50 [RR 49.00 (95% CI 3.06 to 785.06)] and over one-quarter achieved an ACR 70 [RR 31.00 (95% CI 1.90 to 504.86)] compared with none of the placebo group. PsARC 75% [RR 3.55 (95% CI 2.05 to 6.13)]. The beneficial treatment effect on psoriasis was also statistically significant with a mean difference in percentage change from baseline in PASI of –5 (95% CI –6.8 to –3.3), as was the percentage improvement from baseline in HAQ score with infliximab compared with placebo [mean difference 51.4 (95% CI 48.08 to 54.72)], indicating a beneficial effect of infliximab on functional status.</td>
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<td>Injection site reactions appear to be the most common adverse effects of etanercept. Overall, ETA appeared to be well tolerated in short- and long-term use, although much of the long-term data are not from patients with psoriatic arthritis. As identified in earlier reviews, the main areas of concern relate to uncommon but serious adverse events the significance of which is not readily discernible from the published reports of clinical trials.</td>
<td></td>
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<td>Publication Bias Assessed: Yes</td>
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<tr>
<td>Overall, infusion reactions, the development of antibodies and infections appear to be the most common adverse effects of infliximab.</td>
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<td>Heterogeneity Assessed: Yes</td>
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Evidence Table 2. Systematic reviews and meta-analyses (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Duration</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>in the infliximab trial.</td>
</tr>
</tbody>
</table>
References


Appendix F. Criteria for Assessing the Quality of Individual Studies

Assessment of Internal Validity

To assess the internal validity of individual studies, the EPC adopted criteria for assessing the internal validity of individual studies from the U.S. Preventive Services Task Force and the NHS Centre for Reviews and Dissemination. To assess the quality of observational studies, we used criteria outlined by Deeks et al., 2003.¹

For Controlled Trials:

Assessment of Internal Validity

1. Was the assignment to the treatment groups really random?
   Adequate approaches to sequence generation:
   Computer-generated random numbers
   Random numbers tables
   Inferior approaches to sequence generation:
   Use of alteration, case record numbers, birth dates or week days
   Not reported

2. Was the treatment allocation concealed?
   Adequate approaches to concealment of randomization:
   Centralized or pharmacy-controlled randomization
   Serially-numbered identical containers
   On-site computer-based system with a randomization sequence that is not readable until allocation
Other approaches sequence to clinicians and patients

Inferior approaches to concealment of randomization:

- Use of alteration, case record numbers, birth dates or week days
- Open random numbers lists
- Serially numbered envelopes (even sealed opaque envelopes can be subject to manipulation)

Not reported

3. Were the groups similar at baseline in terms of prognostic factors?

4. Were the eligibility criteria specified?

5. Were outcome assessors blinded to the treatment allocation?

6. Was the care provider blinded?

7. Was the patient kept unaware of the treatment received?

8. Did the article include an intention-to-treat analysis or provide the data needed to calculate it (i.e., number assigned to each group, number of subjects who finished in each group, and their results)?

9. Did the study maintain comparable groups?

10. Did the article report attrition, crossovers, adherence, and contamination?

11. Is there important differential loss to followup or overall high loss to followup? (Give numbers in each group.)
Assessment of External Validity (Generalizability)

1. How similar is the population to the population to whom the intervention would be applied?

2. How many patients were recruited?

3. What were the exclusion criteria for recruitment? (Give numbers excluded at each step.)

4. What was the funding source and role of funder in the study?

5. Did the control group receive the standard of care?

6. What was the length of followup? (Give numbers at each stage of attrition.)

For Observational Studies:

Assessment of Internal Validity

1. Were both groups selected from the same source population?

2. Did both groups have the same risk of having the outcome of interest at baseline?

3. Were subjects in both groups recruited over the same time period?
4. Was there any obvious selection bias?

5. Were ascertainment methods adequate and equally applied to both groups?

6. Was an attempt made to blind the outcome assessors?

7. Was the time of followup equal in both groups?

8. Was overall attrition high (≥ 20%)?

9. Was differential attrition high (≥ 15%)?

10. Did the statistical analysis consider potential confounders or adjust for different lengths of followup?

11. Was the length of followup adequate to assess the outcome of interest?


**For Systematic Reviews and Meta-analyses:**

1. Is the review based on a focused question of interest?

2. Did the search strategy employ a comprehensive, systematic, literature search?
3. Are eligibility criteria for studies clearly described?

4. Did at least 2 persons independently review studies?

5. Did authors use a standard method of critical appraisal before including studies?

6. Was publication bias assessed?

7. Was heterogeneity assessed and addressed?

8. Did statistical analysis maintain trials as the unit of analysis?
Appendix G. Clinical and Self-Reported Scales and Instruments Commonly Used in Studies of Drug Therapy for Rheumatoid Arthritis and Psoriatic Arthritis

Introduction

This appendix provides a brief overview of the various scales and self-reported measures that investigators used to assess outcomes in all the studies reviewed in this systematic review. The main outcome categories involve radiologic assessments of joint damage (erosion or narrowing) and various instruments that patients or subjects used to report on functional capacity or quality of life; the latter fall into two groups, one related to general health measures and one related to condition- or disease-specific instruments. General measures used in rheumatoid and psoriatic arthritis studies are described first; then the disease-specific measures used in rheumatoid and psoriatic arthritis studies are described separately. The new 2010 American College of Rheumatology ACR criteria are presented at the end of the document.

Radiographic Measures

Radiographic assessment of joint damage in hands (including wrists) or both hands and feet are critical to clinical trials in rheumatoid arthritis. The damage can be both joint space narrowing and erosions, and the underlying construct is sometimes referred to as radiographic progression (i.e., changes, whether positive or negative) as detected by radiography and interpretation. Several approaches exist, but the two commonly used are the Sharp Score (and variants) and the Larsen Score. These and other scoring methods have recently been reviewed by Boini and Guillemín;1 additional citations or sources are given in the brief descriptions below.

Sharp Score and Sharp/van der Heijde Score

The Sharp Score is a means of evaluating joint damage in joints of the hands, including both erosion and joint space narrowing.2 Although it has undergone modifications since its introduction, the version proposed in 1985 has become the standard approach. In this method, 17 joint areas in each hand are scored for erosions; 18 joint areas in each hand are scored for joint space narrowing. The score per single joint for erosions ranges from 0 to 5 and for joint space narrowing from 0 to 4. In both cases, a higher score is worse. Erosion scores range from 0 to 170 and joint space narrowing scores range from 0 to 144. Thus, the “total Sharp Score” is the sum of the erosion and joint space narrowing scores, or 0 to 314.

The Sharp/van der Heijde (SHS) method, introduced in 1989, overcame one drawback to the Sharp Score, namely its focus on only hands, given that feet can also be involved early in rheumatoid arthritis. Therefore, the SHS method was developed to take account of erosions and joint space narrowing in both hands and feet.3-4 As with the Sharp Score, higher scores reflect worse damage. Erosion is assessed in 16 joints in each hand and 6 joints in each foot. Each joint is scored from 0 to 5 with a maximal erosion score of 160 in the hands and 120 in the feet. Joint space narrowing and subluxation are assessed in 15 joints in the hands and 6 joints in the feet. Each joint is scored from 0 to 4 with a maximal score of 120 in the hands and 48 in the feet. The
erosion and joint space narrowing scores are combined to give a total SHS score with a maximum of 448 (weighted toward hands because more joints are scored).

Numerous variants on the Sharp or SHS scores have been developed, differing subtly in terms of the numbers of joints measured and other details. Generally, all the Sharp methods are very detailed assessments and the approach, although reliable and sensitive to change, is considered time-consuming and tedious. For a speedier approach, Larsen and colleagues developed a simpler approach.

Larsen Scale for Grading Radiographs

The Larsen Scale is an overall measure of joint damage, originally devised in the 1970s and updated most recently in the late 1990s. It produces both a score for each joint (hands and feet) and an overall score that reflects measurement and extent of joint damage. Scores range from 0 (“normal conditions,” i.e., intact bony outlines and normal joint space) to 5 (“mutilating abnormality,” i.e., original bony outlines have been destroyed), so higher scores reflect greater damage. Scores can range from 0 to 250.

General Health Measures

Health Assessment Questionnaire

The Health Assessment Questionnaire (HAQ) is a widely used self-report measure of functional capacity; it is a dominant instrument in studies of patients with arthritis (particularly trials of drugs in patients with rheumatoid arthritis), but it is considered a generic (not disease-specific) instrument. Detailed information on its variations, scoring, etc., can be found at www.chcr.brown.edu/pcoc/EHAQDESCRSCORINGHAQ372.PDF (accessed for this purpose 1/18/2007) or www.hqlo.com/content/1/1/20 (accessed for this purpose 1/18/2007) and in the seminal reports by Fries et al. and Ramey et al.

The full, five-dimension HAQ consists of four domains: disability, discomfort and pain, toxicity, and dollar costs, plus death (obtained through other sources). More commonly, “the HAQ” as used in the literature refers to the shorter version encompassing the HAQ Disability Index (HAQ-DI), the HAQ pain measure, and a global patient outcome measure. The HAQ-DI is sometimes used alone.

The HAQ-DI, with the past week as the time frame, focuses on whether the respondent “is able to…” do the activity and covers eight categories in 20 items: dressing and grooming, arising, eating, walking, hygiene, reach, grip, and common daily activities. The four responses for the HAQ-DI questions are graded as follows: without any difficulty = 0; with some difficulty = 1; with much difficulty = 2; and unable to do = 3. The highest score for any component question in a category determines the category score. The HAQ-DI also asks about the use of aids and devices to help with various usual activities. Two composite scores can be calculated, one with and one without the aids/devices element; both range from 0 to 3.

The HAQ pain domain is measured on a doubly-anchored horizontal visual analog scale (VAS) of 15 cm in length; one end is labeled “no pain” (score of 0) and the other is labeled “very severe pain” (score of 100). Patients mark a spot on the VAS, and scores are calculated as the length from “no pain” in centimeters (cm) multiplied by 0.2 to yield a value that can range between 0 and 3.
With respect to interpretation, HAQ-DI scores of 0 to 1 are generally considered to represent mild to moderate disability, 1 to 2 moderate to severe disability, and 2 to 3 severe to very severe disability.

The HAQ global health status scale measures quality of life (essentially, as how the patient is feeling) with a 15 cm doubly-anchored horizontal VAS scored from 0 (very well) to 100 (very poor).

Medical Outcomes Study Short Form 36 Health Survey

The Medical Outcomes Study Short Form 36 Health Survey (SF-36) is an internationally known generic health survey instrument. Information can be found at www.sf-36.org/tools/sf36.shtml (accessed for this purpose 2/18/2007) and in a large number of articles documenting its psychometric properties. It comprises 36 items in eight independent domains tapping functioning and well-being: physical functioning, role-physical, bodily pain, and general health in one grouping (physical health) and vitality, role-emotional, social functioning, and mental health in another grouping (mental health). The SF-36 provides a separate scale score for each domain (yielding a profile of health) and two summary scores, one for physical health and one for mental health. Each scale is scored from 0 to 100 where higher scores indicate better health and well-being.

A “version 2” of the SF-36 was introduced in the late 1990s to correct some drawbacks in formatting, wording, and other issues and to update the norm-based scoring with 1998 data. It can be fielded in two versions varying by recall period: 4-week recall (the usual approach) and 1-week recall (acute). More recently, it has been tested and used for computer adaptive testing according to item response theory principles.

EuroQol EQ-5D Quality of Life Questionnaire

A third generic quality-of-life instrument is the EuroQol EQ-5D Quality of Life Questionnaire, typically known just as the EQ-5D. More information can be found at http://www.euroqol.org/ (accessed for this purpose 1/18/2007) and in key descriptive articles, one of which is about patients with rheumatoid arthritis.

The EQ-5D covers health status in five domains (three questions each): mobility, self-care, usual activities, pain or discomfort, and anxiety or depression. It is intended for self-response but can be used in other administration modes. Each item can take one of three response levels – no problems, some moderate problems, extreme problems – identified as level 1, 2, or 3, respectively. This yields a profile of one level for each of the five domains; this is essentially a five-digit number, and no arithmetic properties attach to these values. Users can convert health states in the five-dimensional descriptive system into a weighted health state index by applying scores from EQ-5D "value sets" elicited from general population samples to the profile pattern (e.g., 1, 2, 3, 3, 1).

The EQ-5D also has a global health VAS scale (20 cm) scored from 0 to 100.

Rheumatoid Arthritis Measures

American College of Rheumatology 20/50/70

The American College of Rheumatology (ACR) criteria are concerned with improvement in counts of tender and swollen joints and several domains of health. A principal aim of these
criteria is used in studies (particularly trials) of drugs for rheumatoid arthritis. More information can be found at www.rheumatology.org/publications/response/205070.asp and www.hopkins-arthritis.som.jhmi.edu/edu/acr/acr.html#remis_rheum (both accessed for this purpose 1/18/2007). Originally these latter involved patient assessment, physician assessment, erythrocyte sedimentation rate, pain scale, and functional questionnaire.

Today, based on work done in the mid 1990s, values for clinical trial patients are defined as improvement in both tender and swollen joint counts and in three of the following: patient’s assessment of pain; patient’s global assessment of disease activity, patient’s assessment of physical function (sometimes referred to as physical disability), the physician’s global assessment of disease activity, and acute phase reactant (C-reactive protein, or CRP). The 20, 50, or 70 designations (sometimes called the ACR Success Criteria) refer to improvements in percentage terms to 20 percent, 50 percent, or 70 percent in the relevant dimensions. A physician’s global assessment of 70 percent improvement is considered remission.

Thus, patients are said to meet ACR 20 criteria when they have at least 20 percent reductions in tender and swollen joint counts and in at least three of the domains. ACR 50 and ACR 70 criteria are defined in a manner similar to that for ACR 20, but with improvement of at least 50 percent and 70 percent in the individual measures, respectively. Table G-1 illustrates, in a study context, how a patient might be said to have an ACR 50 response.

### Ritchie Articular Index

This is a long-standing approach to doing a graded assessment of the tenderness of 26 joint regions, based on summation of joint responses after applying firm digital pressure. Four grades can be used: 0, patient reported no tenderness; +1, patient complained of pain; +2, patient complained of pain and winced; and +3, patient complained of pain, winced, and withdrew. Thus, the index ranges from 0 to 3 for individual measures and 0 to 78 overall, with higher scores being worse tenderness.

Certain joints are treated as a single unit, such as the metacarpal-phalangeal and proximal interphalangeal joints of each hand and the metatarsal-phalangeal joints of each foot. For example, the maximum score for the five metacarpal-phalangeal joints of the right hand would be 3, not 15. No weights are used for different types of joints (e.g., by size), because the issue is one of measuring changes (improvements) in tenderness; this is especially relevant for rheumatoid arthritis.

### Disease Activity Score

The Disease Activity Score (DAS) is an index of disease activity first developed in the mid 1980s. The history of its development and current definitions, scoring systems, and other details can be found at http://www.das-score.nl/www.das-score.nl/ (accessed for this purpose).
The DAS originally included the Ritchie Articular Index (see above), the 44 swollen joint count, the erythrocyte sedimentation rate, and a general health assessment on a VAS. A cut-off level of the DAS of 1.6 is considered to be equivalent with being in remission.

More recently, an index of RA disease activity using only 28 joints – the DAS 28 – has been developed, focusing on joint counts for both tenderness (TJC) and swelling (SJC). It also uses either the patient’s or a physician’s global assessment (PGA) of disease activity (on a 100 mm VAS) and the erythrocyte sedimentation rate (ESR) or C-reactive protein. The formula for calculating a DAS 28 score is as follows: $= (0.56 \times TJC^{1/2}) + (0.28 \times SJC^{1/2}) + (0.7 \times \ln [ESR]) + (0.014 \times PGA \text{ [in mm]})$. Numerous formulas to calculate a variety of DAS and DAS 28 scores exist (see the website above), such as when a global patient assessment of health is unavailable.

The DAS 28 yields a score on a scale ranging from 0 to 10. A DAS 28 of 2.6 is considered to correspond to remission; a DAS 28 of 3.2 is a threshold for low disease activity; and a DAS 28 of more than 5.1 is considered high disease activity.

**EULAR Response Criteria**

The European League Against Rheumatism (EULAR) response criteria classify patients as good, moderate, or nonresponders based on both change in disease activity and current disease activity, using either the DAS or the DAS28 (see description above). For example, to be classified as a good responder a patient must have relevant change in DAS ($\geq 1.2$) and low current disease activity ($\leq 2.4$), while a nonresponder must have $\leq 0.6$ change in DAS and high disease activity ($>3.7$).

The EULAR criteria have been validated in multiple clinical trials, and confirmed in an analysis of nine clinical trials that concluded a high level of agreement and equal validity between ACR and EULAR improvement classifications. Good and moderate responders showed significantly more improvement in functional capacity and significantly less progression of joint damage than patients classified as nonresponders.

**Psoriatic Arthritis Measures**

**Psoriatic Arthritis Response Criteria**

The psoriatic arthritis response criteria (PsARC) was initially designed for use in a clinical trial that compared sulphasalazine to placebo in the setting of the Veterans Administration. It has since been used as the primary or secondary outcome in all the studies that examined biologics versus placebo in the treatment of PsA. The PsARC includes improvement in at least two of the following, one of which had to be a joint count, and no worsening of any measure: tender or swollen joint count improvement of at least 30%, patient global improvement by one point on a five-point Likert scale, or physician global improvement on the same scale.

**American College of Rheumatology 20**

The ACR 20 (American College of Rheumatology 20 percent response) is the other outcome that is used as the primary outcome in clinical trials of biologics. The measurement is similar to that of the ACR 20 used for rheumatoid arthritis with modifications made that increased the number of joints tested from 68 tender and 66 swollen to 76 and 78, respectively, with the addition of distal interphalangeal joints of the feet and carpometacarpal joints of the hands. The
outcomes from the ACR 20 are generally poorer when compared to the PsARC due to the variation in items measured; this is due in part to the need to see an improvement in tender and swollen joints in the ACR 20 versus an improvement in tender or swollen joint counts. An adaptation of the ACR 20 criteria as of 2010 are presented in Table G-2.

Table G-2. 2010 rheumatoid arthritis criteria

<table>
<thead>
<tr>
<th>Target population (Who should be tested?)</th>
<th>Score</th>
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<tr>
<td>Patients who</td>
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<td>• have at least 1 joint with definite clinical synovitis (swelling)</td>
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<tr>
<td>o Criteria aimed at classification of newly presenting patients; patients with erosive disease typical of RA with a history compatible with prior fulfillment of the 2010 criteria should be classified as having RA; patients with longstanding disease, including those whose disease is inactive (with or without treatment) who, based on retrospectively available data, have previously fulfilled the 2010 criteria should be classified as having RA</td>
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<tr>
<td>• with the synovitis not better explained by another disease</td>
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<tr>
<td>o Differential diagnoses vary among patients with different presentations, but may include conditions such as systemic lupus erythematosus, psoriatic arthritis, and gout. If it is unclear about the relevant differential diagnoses to consider, an expert rheumatologist should be consulted</td>
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</table>

Classification criteria for RA

Score-based algorithm:

- Add score of categories: Joint involvement, serology, reactants, duration
  - Differential diagnoses vary among patients with different presentations, but may include conditions such as systemic lupus erythematosus, psoriatic arthritis, and gout. If it is unclear about the relevant differential diagnoses to consider, an expert rheumatologist should be consulted
- Score of ≥6/10 needed for classification of a patient as having definite RA
  - Although patients with a score of <6/10 are not classifiable as having RA, their status can be reassessed and the criteria might be fulfilled cumulatively over time

Joint involvement

Joint involvement refers to any swollen or tender joint on examination, which may be confirmed by imaging evidence of synovitis; d Distal interphalangeal joints, first carpometacarpal joints, and first metatarsophalangeal joints are excluded from assessment; categories of joint distribution are classified according to the location and number of involved joints, with placement into the highest category possible based on the pattern of joint involvement

<table>
<thead>
<tr>
<th>1 large joint</th>
<th>Score</th>
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<tbody>
<tr>
<td>• &quot;Large joints&quot; refers to shoulders, elbows, hips, knees, and ankles</td>
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<tr>
<th>2-10 large joints</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>1-3 small joints (with or without involvement of large joints)</td>
<td>2</td>
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<tr>
<td>• &quot;Small joints&quot; refers to the metacarpophalangeal joints, proximal interphalangeal joints,</td>
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</table>

G-6
second through fifth metatarsophalangeal joints, thumb interphalangeal joints, and wrists.

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-10 small joints (with or without involvement of large joints)</td>
<td>3</td>
</tr>
<tr>
<td>&gt;10 joints (at least 1 small joint)</td>
<td>5</td>
</tr>
<tr>
<td>• In this category, at least 1 of the involved joints must be a small joint; the other joints can include any combination of large and additional small joints, as well as other joints not specifically listed elsewhere (e.g., temporomandibular, acromioclavicular, sternoclavicular, etc.)</td>
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</tbody>
</table>
Table G-2. 2010 rheumatoid arthritis criteria (continued)

<table>
<thead>
<tr>
<th>Serology (at least 1 test result is needed for classification) (Cf. <a href="http://www.rheumatology.org/practice/clinical/classification/ra/ra_2010.asp#fn_08">http://www.rheumatology.org/practice/clinical/classification/ra/ra_2010.asp#fn_08</a>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Negative refers to IU values that are less than or equal to the upper limit of normal (ULN) for the laboratory and assay; low-positive refers to IU values that are higher than the ULN but ≤3 times the ULN for the laboratory and assay; high-positive refers to IU values that are &gt;3 times the ULN for the laboratory and assay; where rheumatoid factor (RF) information is only available as positive or negative, a positive result should be scored as low-positive for RF. ACPA = anti-citrullinated protein antibody</td>
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<tr>
<td>Negative RF and negative ACPA</td>
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<tr>
<td>Low-positive RF or low-positive ACPA</td>
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<tr>
<td>High-positive RF or high-positive ACPA</td>
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<table>
<thead>
<tr>
<th>Acute-phase reactants (at least 1 test result is needed for classification)</th>
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<tr>
<td>• Normal/abnormal is determined by local laboratory standards. CRP = C-reactive protein; ESR = erythrocyte sedimentation rate</td>
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<tr>
<td>Normal CRP and normal ESR</td>
</tr>
<tr>
<td>Abnormal CRP or abnormal ESR</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration of symptoms</th>
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<tbody>
<tr>
<td>• Duration of symptoms refers to patient self-report of the duration of signs or symptoms of synovitis (e.g., pain, swelling, tenderness) of joints that are clinically involved at the time of assessment, regardless of treatment status</td>
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<tr>
<td>&lt;6 weeks</td>
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<tr>
<td>≥6 weeks</td>
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</table>


The Psoriasis Area and Severity Index

The Psoriasis Area and Severity Index (PASI) was developed to measure the effect of treatments in clinical trials of psoriasis and is utilized to capture the psoriasis component found in psoriatic arthritis. The scale was originally published in 1978 in a trial of 27 patients suffering from severe chronic generalized psoriasis that were treated with Ro 10-9359, a retinoic acid derivative. The PASI is a composite index of disease severity incorporating measures of scaling, erythema, and induration, and it is weighted by severity and affected body surface area. A PASI >12 defines severe, PASI 7-12 moderate, and PASI <7 mild psoriasis.
References


## Appendix H. Characteristics of Studies with Poor Internal Validity

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Sample Size</th>
<th>Intervention</th>
<th>Reason for Exclusion</th>
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<tbody>
<tr>
<td>Atteno et al., 2010¹</td>
<td>Open-label RCT</td>
<td>100</td>
<td>Adalimumab</td>
<td>No blinding; no ITT analysis; high risk of selection bias and measurement bias</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Etanercept</td>
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<td></td>
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<td></td>
<td>Infliximab</td>
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<tr>
<td>Saad et al., 2010²</td>
<td>Observational</td>
<td>596</td>
<td>Adalimumab</td>
<td>High LTF</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Etanercept</td>
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<tr>
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<td></td>
<td></td>
<td>Infliximab</td>
<td></td>
</tr>
<tr>
<td>Virkki et al., 2010³</td>
<td>Observational</td>
<td>127</td>
<td>Etanercept</td>
<td>High LTF; completers analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Infliximab</td>
<td></td>
</tr>
</tbody>
</table>

ITT = intention to treat; LTF = loss to followup; RCT = randomized controlled trial

## References


## Appendix I. Strength of Evidence Tables

Table I-1. Strength of evidence for disease activity and radiographic progression

<table>
<thead>
<tr>
<th>Number of Studies; # of Subjects</th>
<th>Risk of Bias</th>
<th>Design/Quality</th>
<th>Consistency</th>
<th>Directness</th>
<th>Precision</th>
<th>Results</th>
<th>Strength of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oral DMARD vs. placebo</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Methotrexate vs. placebo</td>
<td>Medium</td>
<td>Unknown, single study</td>
<td>Direct</td>
<td>Precise</td>
<td></td>
<td>Greater improvement with physician assessment of disease activity with methotrexate than placebo</td>
<td>Low</td>
</tr>
<tr>
<td>1 RCT; N=37</td>
<td></td>
<td>1 RCT/Fair</td>
<td></td>
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</tr>
<tr>
<td>Sulfasalazine vs. placebo</td>
<td>Low</td>
<td>Consistent</td>
<td>Direct</td>
<td>Precise</td>
<td></td>
<td>Greater improvement in disease activity with sulfasalazine than placebo</td>
<td>Moderate</td>
</tr>
<tr>
<td>1 systematic review (including 6 RCTs); N=564</td>
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<td>1 Systematic review/Good</td>
<td></td>
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<tr>
<td>Leflunomide vs. placebo</td>
<td>Medium</td>
<td>Unknown, single study</td>
<td>Direct</td>
<td>Precise</td>
<td></td>
<td>Greater improvement in disease activity with leflunomide than placebo</td>
<td>Low</td>
</tr>
<tr>
<td>1 RCT; N=190</td>
<td></td>
<td>1 RCT/Fair</td>
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<tr>
<td><strong>Biologic DMARD vs. placebo</strong></td>
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</tr>
<tr>
<td>Adalimumab vs. placebo</td>
<td>Medium</td>
<td>Consistent</td>
<td>Direct</td>
<td>Precise</td>
<td></td>
<td>Greater improvement in disease activity with adalimumab than placebo</td>
<td>Moderate</td>
</tr>
<tr>
<td>2 RCTs; N=415</td>
<td></td>
<td>2 RCT/Fair</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Medium</td>
<td>Unknown, single study</td>
<td>Indirect</td>
<td>Precise</td>
<td></td>
<td>Less radiographic change for adalimumab than placebo</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>1 RCT/Fair</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Etanercept vs. placebo</td>
<td>Low</td>
<td>Consistent</td>
<td>Direct</td>
<td>Precise</td>
<td></td>
<td>Greater improvement in disease activity with etanercept than placebo</td>
<td>Moderate</td>
</tr>
<tr>
<td>1 systematic review, 2 RCTs; N=634</td>
<td></td>
<td>1 Systematic review/Good; 2 RCTs /Fair</td>
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</tr>
<tr>
<td></td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Less radiographic change for etanercept</td>
<td></td>
</tr>
<tr>
<td>Treatment Comparison</td>
<td>Risk of Bias</td>
<td>Design/Quality</td>
<td>Consistency</td>
<td>Directness</td>
<td>Precision</td>
<td>Results</td>
<td>Strength of Evidence</td>
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</tr>
<tr>
<td><strong>Golimumab vs. placebo</strong></td>
<td>Low</td>
<td>Unknown, single study</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in disease activity with golimumab than placebo</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>1 RCT; N=405</td>
<td>Low</td>
<td>Unknown, single study</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in disease activity with golimumab than placebo</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td><strong>Infliximab vs. placebo</strong></td>
<td>Low</td>
<td>Consistent</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in disease activity with infliximab than placebo</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>1 systematic review, 2 RCTs; N=675</td>
<td>Low</td>
<td>Systematic review/Fair</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in disease activity with infliximab than placebo</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td><strong>Oral DMARD vs. Oral DMARD</strong></td>
<td>Insufficient</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>Insufficient</td>
<td></td>
</tr>
<tr>
<td><strong>Biologic DMARD vs. Biologic DMARD</strong></td>
<td>Insufficient</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>Insufficient</td>
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</tr>
<tr>
<td><strong>Biologic DMARD vs. Oral DMARD</strong></td>
<td>Insufficient</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>Insufficient</td>
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</tr>
<tr>
<td><strong>TNF inhibitors vs. sulfasalazine</strong></td>
<td>Low</td>
<td>Unknown, single study</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in disease activity with TNF inhibitors than sulfasalazine</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>1 systematic review; N=882</td>
<td>Low</td>
<td>Unknown, single study</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in disease activity with TNF inhibitors than sulfasalazine</td>
<td>Low</td>
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Table I-1. Strength of evidence for disease activity and radiographic progression (continued)
<table>
<thead>
<tr>
<th>ADA</th>
<th>DMARD</th>
<th>INF</th>
<th>MTX</th>
<th>N</th>
<th>n/a</th>
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</thead>
<tbody>
<tr>
<td>ADA = adalimumab; DMARD = disease-modifying antirheumatic drug; INF = infliximab; MTX = methotrexate; N = total sample size; n/a = not applicable; RCT = randomized controlled trial; TNF = tumor necrosis factor; vs. = versus</td>
<td></td>
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</tr>
<tr>
<td>Number of Studies; # of Subjects</td>
<td>Risk of Bias</td>
<td>Consistency</td>
<td>Directness</td>
<td>Precision</td>
<td>Results</td>
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</tr>
<tr>
<td><strong>Oral DMARD vs. placebo</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leflunomide vs. placebo</td>
<td>Medium</td>
<td>Direct</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in functional capacity and quality of life with LEF than placebo</td>
</tr>
<tr>
<td>1 RCT; N=190</td>
<td>RCT/Fair</td>
<td>Unknown, single study</td>
<td></td>
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</tr>
<tr>
<td><strong>Biologic DMARD vs. placebo</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adalimumab vs. placebo</td>
<td>Medium</td>
<td>Direct</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in functional capacity with adalimumab</td>
</tr>
<tr>
<td>2 RCTs; N=415</td>
<td>RCT/2 Fair</td>
<td>Consistent</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Inconsistent</td>
<td>Direct</td>
<td>Imprecise</td>
<td>For health-related quality of life, some results favored adalimumab</td>
<td>Low</td>
</tr>
<tr>
<td>Etanercept vs. placebo</td>
<td>Medium</td>
<td>Direct</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in functional capacity with etanercept</td>
</tr>
<tr>
<td>2 RCTs; N=265</td>
<td>RCT/2 Fair</td>
<td>Consistent</td>
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<tr>
<td></td>
<td>Unknown, single study</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in quality of life with etanercept</td>
<td>Low</td>
</tr>
<tr>
<td>Golimumab vs. placebo</td>
<td>Low</td>
<td>Direct</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in functional capacity and quality of life with golimumab</td>
</tr>
<tr>
<td>1 RCT; N=405</td>
<td>RCT/Good</td>
<td>Unknown, single study</td>
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</tr>
<tr>
<td>Infliximab vs. placebo</td>
<td>Medium</td>
<td>Direct</td>
<td>Direct</td>
<td>Precise</td>
<td>Greater improvement in functional capacity with infliximab</td>
</tr>
<tr>
<td>2 RCTs; N=304</td>
<td>RCT/2 Fair</td>
<td>Consistent</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Unknown, Direct</td>
<td>Imprecise</td>
<td></td>
<td>Greater improvement in quality of life with infliximab</td>
<td>Low</td>
</tr>
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<td>Study Type</td>
<td>Results</td>
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</tr>
<tr>
<td><strong>Oral DMARD vs. Oral DMARD</strong></td>
<td>No studies n/a n/a n/a n/a n/a Insufficient</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Biologic DMARDs vs. Biologic DMARDs</strong></td>
<td>No studies n/a n/a n/a n/a n/a Insufficient</td>
<td></td>
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</tr>
<tr>
<td><strong>Biologic DMARDs vs. Oral DMARDs</strong></td>
<td>No studies n/a n/a n/a n/a n/a Insufficient</td>
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</tr>
<tr>
<td><strong>Biologic DMARDs + Oral DMARDs vs. Biologic DMARDs</strong></td>
<td>No studies n/a n/a n/a n/a n/a Insufficient</td>
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<tr>
<td><strong>Biologic DMARDs + Oral DMARDs vs. Oral DMARDs</strong></td>
<td>No studies n/a n/a n/a n/a n/a Insufficient</td>
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</tr>
</tbody>
</table>

*Difference was statistically significantly different, but did not reach the threshold for a clinically important difference.

*Difference in one of two studies was statistically significantly different (difference in improvement in HAQ of 0.2, *P* = 0.01), but did not reach the threshold for a clinically important difference of ≥ 0.22. In the other study, the difference was both clinically and statistically significant.

* Differences were statistically and clinically significant for the SF-36 PCS, but not for the MCS in both studies. Both studies reported results on the dermatology life quality index; one found a difference favoring adalimumab and the other found no statistically significant difference.

*Only one of the two trials reported a quality of life outcome.

N = number; n/a = not applicable; RCT = randomized controlled trial
Table I-3. Strength of evidence for adverse events

<table>
<thead>
<tr>
<th>Study Type</th>
<th>Number of Studies; # of Subjects</th>
<th>Design/Quality</th>
<th>Consistency</th>
<th>Directness</th>
<th>Precision</th>
<th>Results</th>
<th>Strength of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biologic DMARD vs. Biologic DMARD</strong></td>
<td></td>
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</tr>
<tr>
<td>ADA vs. ETN vs. INF</td>
<td>2 observational 2 cohort/1 fair, 1 good</td>
<td>Medium</td>
<td>Consistent</td>
<td>Direct</td>
<td>Imprecise</td>
<td>ETN had lower risk of withdrawals due to AEs than INF. Concomitant MTX lowered withdrawals.</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Oral DMARD vs. placebo</strong></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>LEF vs. placebo</td>
<td>RCT and meta-analysis/1 meta-analysis</td>
<td>Medium</td>
<td>Unknown, single study</td>
<td>Direct</td>
<td>Imprecise</td>
<td>Higher rates of diarrhea and increased ALT levels for LEF vs. placebo</td>
<td>Insufficient</td>
</tr>
<tr>
<td>(N=190)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SFZ vs. placebo</td>
<td>meta-analysis/1 meta-analysis</td>
<td>Medium</td>
<td>Consistent</td>
<td>Direct</td>
<td>Imprecise</td>
<td>SFZ had more withdrawals due to AEs than placebo, but not statistically significant</td>
<td>Insufficient</td>
</tr>
<tr>
<td>(N=434)</td>
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<tr>
<td><strong>Biologic DMARD vs. placebo</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>ADA vs. placebo</td>
<td>RCT/2 fair</td>
<td>Medium</td>
<td>Consistent</td>
<td>Direct</td>
<td>Imprecise</td>
<td>Infusion reactions with ADA; worsened psoriasis with placebo</td>
<td>Low</td>
</tr>
<tr>
<td>ETN vs. placebo</td>
<td>RCT/2 fair</td>
<td>Medium</td>
<td>Consistent</td>
<td>Direct</td>
<td>Imprecise</td>
<td>No difference in adverse events except for more ISRs with ETN</td>
<td>Low</td>
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<tr>
<td>GOL vs. placebo</td>
<td>RCT/1fair</td>
<td>Medium</td>
<td>Unknown, single study</td>
<td>Direct</td>
<td>Imprecise</td>
<td>More infections and malignancies for GOL than placebo</td>
<td>Insufficient</td>
</tr>
<tr>
<td>INF vs. placebo</td>
<td>Medium</td>
<td>Consistent</td>
<td>Direct</td>
<td>Imprecise</td>
<td>No differences in adverse events for INF and</td>
<td>Insufficient</td>
<td></td>
</tr>
<tr>
<td>2 RCT N=304</td>
<td>RCT/2 fair</td>
<td>placebo</td>
<td></td>
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</table>

**TNF Inhibitors vs. placebo**

<table>
<thead>
<tr>
<th>Meta-analysis (N=882)</th>
<th>Medium</th>
<th>Consistent</th>
<th>Direct</th>
<th>Imprecise</th>
<th>TNF inhibitors as class had more withdrawals due to AEs than placebo, but not statistically significant</th>
</tr>
</thead>
</table>

ADA = adalimumab; AE = adverse event; ALT = alanine aminotransferase; DMARD = disease-modifying antirheumatic drug; ETN = etanercept; GOL = golimumab; INF = infliximab; ISR = injection site reaction; LEF = leflunomide; MTX = methotrexate; N = total sample size; RCT = randomized controlled trial; vs. = versus