



## Lung Cancer Screening: A Summary Guide for Primary Care Clinicians

# Lung Cancer Screening With Low-Dose Computed Tomography (LDCT)

### BACKGROUND

Primary care clinicians play a key role in determining the eligibility of patients for lung cancer screening, ensuring patients understand the benefits and harms of lung cancer screening, and working with patients to make decisions about screening that are consistent with the patients' values. Currently, annual screening with low-dose computed tomography (LDCT) is the only recommended screening strategy for lung cancer.

In 2012, lung cancer deaths accounted for about 27 percent of all cancer-related deaths in the United States. The median age at diagnosis was 70 years, and the number of new lung cancer cases was about 59 per 100,000 people. The median age at death was 72 years, and the number of deaths was 47 per 100,000 people. Although early detection and treatment is ideal, only 15 percent of lung cancer cases are diagnosed at an early stage. Smoking is the largest risk factor for lung cancer, causing about 85 percent of lung cancer cases in the United States.

### OVERVIEW OF THE EVIDENCE

Published in August 2011, the National Lung Screening Trial (NLST) was the first trial to provide evidence to support screening for lung cancer with LDCT in reducing lung cancer deaths. The NLST randomized 53,454 high-risk individuals aged 55 to 74 years to three annual screenings with LDCT or standard chest x-rays and followed them for a median of 6.5 years. The study found that people were 16 to 20 percent less likely to die from lung cancer when screened with LDCT, as compared with standard screening chest x-rays. The mortality reduction is equivalent to three lung cancer deaths prevented per 1,000 people screened with three annual LDCT screens over 6.5 years. Previous studies had shown that screening with standard chest x-rays does not reduce the mortality rate from lung cancer. An overall reduction in mortality was also observed (about five in 1,000 fewer total deaths for individuals receiving LDCT rather than a chest x-ray).

Important harms of lung cancer screening with LDCT were also observed. These harms included a high number of false-positive scans and the low predictive value

of a positive scan (only about 6 percent of positive scans led to a lung cancer diagnosis). Some people had invasive diagnostic procedures that led to major complications including infection, bleeding in the lung, or a collapsed lung. Radiation exposure from the LDCT screening and higher doses from followup diagnostic imaging studies were also concerns. The harms from cumulative radiation exposure—such as the rate of development of new cancer—are unknown. Concerns have also been raised about overdiagnosis. Data from the NLST trial suggests that 10 to 20 percent of lung carcinomas diagnosed by LDCT might have never been detected in the patient's lifetime in the absence of screening. Screening with LDCT also disclosed incidental findings (aortic aneurysms, coronary artery calcifications) and other lung findings (emphysema, bronchiectasis, pulmonary fibrosis, carcinoid tumors). However, the benefits of treating screening-detected findings other than lung cancer are unclear.

### ELIGIBILITY CRITERIA FOR LUNG CANCER SCREENING

Criteria according to:	USPSTF	CMS <sup>a</sup>
<b>Relevant group:</b>	Persons with private health insurance	Medicare beneficiaries
<b>Age (years):</b>	55–80	55–77
<b>Smoking status:</b>	Current or former <sup>b</sup> smoker	
<b>Smoking history:</b>	30 pack-years <sup>c</sup>	
<b>Lung cancer signs:</b>	Asymptomatic (no signs of lung cancer)	
<b>Screening frequency:</b>	Yearly	
<b>When to stop screening:</b>	The patient exceeds upper age criterion, has not smoked for more than 15 years, and/or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative surgery	

CMS = Centers for Medicare & Medicaid Services; USPSTF = U.S. Preventive Services Task Force

<sup>a</sup> CMS requires that the beneficiary receive a written order for LDCT by a physician or nonphysician practitioner, as outlined in CMS policies for initial or subsequent LDCT lung cancer screening.

<sup>b</sup> Former smokers must have quit within the last 15 years.

<sup>c</sup> [Number of pack-years = (Average number of packs smoked per day) X (Years smoked)] Note there are 20 cigarettes in 1 pack.

### INSURANCE COVERAGE

Both private insurers and Medicare offer coverage for annual LDCT screening for lung cancer among eligible high-risk individuals who meet all the eligibility criteria. (See Eligibility Criteria For Lung Cancer Screening table.) Private insurance plans and Medicare cover lung cancer screening with no out-of-pocket costs.

Followup invasive diagnostic procedures and repeat imaging to evaluate an abnormal screening test may require out-of-pocket costs.



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## SUMMARY OF THE EVIDENCE FROM THE NATIONAL LUNG SCREENING TRIAL\*

**Benefits:** How did LDCT scans compare with chest x-rays in reducing deaths from lung cancer per 1,000 people screened?

	LDCT	Chest x-ray	
Deaths from lung cancer over 6.5-year followup period	18 in 1,000	21 in 1,000	3 in 1,000 fewer deaths from lung cancer with LDCT
Deaths from all causes over 6.5-year followup period	70 in 1,000	75 in 1,000	5 in 1,000 fewer deaths from all causes with LDCT

\*About the NLST: more than 50,000 smokers participated; participants had up to three annual screenings; average followup was 6.5 years.

**Harms:** What are the harms of screening for lung cancer with LDCT?

	Of 1,000 people screened
<b>Positive (abnormal) results</b>	380
False positives ("false alarms")	356 (about 94%)
<b>Invasive diagnostic procedures (among people with a false positive result)</b>	18
Major complications from invasive diagnostic procedures (e.g., infection, bleeding in lung, collapsed lung)	0.4
<b>Overdiagnosis (diagnosed lung cancer that never would have progressed to cause the patient harm)</b>	
» Estimated at 10–20 percent of lung cancer cases diagnosed with LDCT.	
<b>Radiation exposure (from screening and diagnostic imaging, including cumulative exposure)</b>	
» Harms of repeated exposure to radiation from LDCT and diagnostic imaging, such as causing new cancer, are unknown.	
<b>Comparing sources of radiation exposure with a single LDCT scan:</b>	
Air travel, 10 hours	0.04 mSv
Chest x-ray	0.1 mSv
Screening mammogram	0.4 mSv
LDCT scan	1.4 mSv
Average background radiation in the United States (1 year)	3.0–5.0 mSv
Diagnostic CT	7.0 mSv

mSv = millisievert, a measure of the amount of radiation absorbed by the body.

## SMOKING CESSATION RESOURCES

**BeTobaccoFree.gov** (U.S. Department of Health and Human Services)  
[tinyurl.com/ap657cz](http://tinyurl.com/ap657cz)

Smoking Quitline: 1-877-448-7848

**Smoking & Tobacco Use** (Centers for Disease Control and Prevention)  
[tinyurl.com/ya5jlv1](http://tinyurl.com/ya5jlv1)

Smoking Quitline: 1-800-784-8669

**Help for Smokers and Other Tobacco Users** (Agency for Healthcare Research and Quality)  
[tinyurl.com/owj68h4](http://tinyurl.com/owj68h4)

**Smokefree.gov** (U.S. Department of Health and Human Services)  
[smokefree.gov/ready-to-quit](http://smokefree.gov/ready-to-quit)

## BENEFICIARY REQUIREMENTS FROM CMS

**Initial LDCT Lung Cancer Screening Service:** The beneficiary must receive a written order for LDCT screening during a lung cancer screening counseling and shared decisionmaking visit with a physician or qualified nonphysician practitioner. The initial screening visit must meet the following criteria and must be appropriately documented in the beneficiary's medical record to be covered by Medicare.

» Must be a shared decisionmaking visit, use one or more decision aids, and include discussion of the potential benefits and harms of screening, such as the possibility of followup diagnostic testing, the risk of overdiagnosis, the false-positive rate, and total radiation exposure.

**Shared decisionmaking** is a communication process in which practitioners discuss options and work collaboratively with patients toward preference-based decisions.

» Must include counseling on the importance of adherence to annual lung cancer LDCT screening, the impact of comorbidities on the likelihood of being able to benefit from screening due to the ability to undergo treatment, and willingness to undergo diagnosis and treatment.

» Must include counseling on the importance of not smoking for current and former smokers, and must provide information on tobacco cessation interventions.

**Subsequent LDCT Lung Cancer Screening Service:** Although not required, a physician or qualified nonphysician practitioner may choose to provide a counseling and shared decisionmaking visit for subsequent screenings. The components of the visit are the same as those for the initial visit.

» The patient must receive a *written order* for LDCT screening during any visit.

Written orders for both initial and subsequent LDCT lung cancer screenings must contain the following information and be appropriately documented in the beneficiary's medical record:

- » Beneficiary date of birth
- » Actual pack-year smoking history (number)
- » Current smoking status, and for former smokers, the number of years since quitting
- » Statement that the beneficiary is asymptomatic
- » National Provider Identifier (NPI) of the ordering practitioner



To locate accredited imaging facilities go to [www.cms.gov/Medicare/Medicare-General-Information/MedicareApprovedFacilities/Lung-Cancer-Screening-Registries.html](http://www.cms.gov/Medicare/Medicare-General-Information/MedicareApprovedFacilities/Lung-Cancer-Screening-Registries.html).

## POINTS TO DISCUSS WITH YOUR PATIENTS

- » LDCT is the only recommended screening approach for lung cancer.
- » Screening is not a substitute for quitting smoking. The most important way to lower the chance of dying from lung cancer is to stop smoking.
- » Screening should be done annually until the patient no longer needs to be screened or no longer meets the screening criteria..
- » Screening is a process. An abnormal LDCT scan does not necessarily mean cancer. Additional testing may be needed to determine a diagnosis.
- » Review the evidence about the benefits and harms of screening with your patients.

