

Putting Prevention into Practice

An Evidence-Based Approach

Screening for Lung Cancer

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► See related U.S. Preventive Services Task Force Recommendation Statement at <http://www.aafp.org/afp/2014/0715/od1.html>, Editorials at <http://www.aafp.org/afp/2014/0715/od2.html> and <http://www.aafp.org/afp/2014/0715/od3.html>, and POEM on page 112.

CME This clinical content conforms to AAFP criteria for continuing medical education (CME). See CME Quiz Questions on page 74.

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The case study and answers to the following questions are based on the recommendations of the U.S. Preventive Services Task Force (USPSTF), an independent panel of experts in primary care and prevention that systematically reviews the evidence of effectiveness and develops recommendations for clinical preventive services. More detailed information is available in the USPSTF Recommendation Statement, evidence report, and modeling study at <http://www.uspreventiveservicestaskforce.org>. The practice recommendations in this activity are available at <http://www.uspreventiveservicestaskforce.org/uspstf/uspstlung.htm>.

Case Study

M.B., a woman with diabetes mellitus, presents to your office for an annual well visit. M.B. reports having smoked one and a half packs of cigarettes daily for 20 years. Her neighbor was recently diagnosed with lung cancer, and M.B. requests to be tested for lung cancer, too.

Case Study Questions

1. In which of the following situations would the U.S. Preventive Services Task Force (USPSTF) recommend that M.B. be screened for lung cancer?

- A. M.B. is 60 years of age, her diabetes is well controlled by diet, and she quit smoking 20 years ago.
- B. M.B. is 60 years of age, her diabetes is well controlled by medications, and she quit smoking 10 years ago.
- C. M.B. is 75 years of age, her diabetes is well controlled by medications, and she currently smokes.
- D. M.B. is 78 years of age, her diabetes is poorly controlled, she has emphysema and heart failure with an ejection fraction of 30%, and she currently smokes.

2. It is determined that M.B. should be screened for lung cancer. According to the USPSTF, which one of the following screening tests is recommended?

- A. Annual chest radiography with sputum cytology.
- B. Chest radiography and sputum cytology once every three years.
- C. Annual low-dose computed tomography (CT).
- D. Low-dose CT once every three years.
- E. Annual magnetic resonance imaging.

3. Based on the USPSTF's findings, which one of the following statements about the potential benefits or harms of lung cancer screening is correct?

- A. Annual screening can substantially lower lung cancer incidence in high-risk persons.
- B. Annual screening can prevent a substantial number of lung cancer-related deaths in a defined population of high-risk persons.
- C. Annual screening can prevent most lung cancer-related deaths.
- D. There is a low likelihood of false-positive results; 95% of all positive results lead to a diagnosis of cancer.
- E. Only 1% to 2% of screen-detected cancer cases are overdiagnosed.

Answers appear on the following page.

Answers

1. The correct answers are B and C. The USPSTF recommends annual screening for lung cancer in adults 55 to 80 years of age who have a 30 pack-year smoking history and currently smoke or quit within the past 15 years. Screening should be discontinued once a person has not smoked for 15 years or has developed a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery (B recommendation). Screening may not be appropriate for patients with substantial comorbid conditions, particularly those who are in the upper end of the screening age range. Screening should be viewed as an adjunct to tobacco cessation interventions, and smoking cessation is the most important intervention to prevent non-small cell lung cancer. Advising smokers to stop smoking and preventing nonsmokers from being exposed to tobacco smoke are the most effective ways to decrease the morbidity and mortality associated with lung cancer.

2. The correct answer is C. Annual low-dose CT is recommended by the USPSTF for lung cancer screening in certain persons at high risk of lung cancer. The USPSTF found that low-dose CT has high sensitivity and acceptable specificity for the detection of lung cancer in high-risk persons. Chest radiography and sputum cytologic evaluation have not shown adequate sensitivity or specificity as lung cancer screening tests. The best evidence for the benefit of screening came from the National Lung Screening Trial (NLST), in which participants received three annual screenings. Furthermore, the USPSTF used modeling studies to evaluate different screening intervals, age ranges, smoking histories, and times since quitting. The USPSTF determined that annual low-dose CT screening of individuals 55 to 80 years of age who have a 30 pack-year smoking history and currently smoke or quit within the past 15 years may achieve a reasonable balance of benefits and harms.

3. The correct answer is B. The USPSTF found adequate evidence that annual screening for lung cancer with low-dose CT in a defined population of high-risk persons can prevent a substantial number of lung cancer-related deaths. The largest trial reviewed by the USPSTF, the NLST, found a 16% reduction in lung cancer mortality. However, screening cannot prevent most lung cancer-related deaths, and smoking cessation remains essential. Potential harms of low-dose CT screening include false-negative and false-positive results, incidental findings, overdiagnosis, and radiation exposure. Based on the NLST, even in certain high-risk populations, 95% of all positive low-dose CT screening results do not lead to a diagnosis of cancer. Additionally, based on a modeling study performed for the USPSTF, it is estimated that 10% to 12% of screen-detected cancer cases are overdiagnosed (i.e., they would not have been detected in the patient's lifetime without screening). On balance, the USPSTF concluded with moderate certainty that the potential benefits of screening outweigh the harms, and that there is a moderate net benefit for annual lung cancer screening by low-dose CT in certain asymptomatic persons at high risk of lung cancer (based on age, total cumulative tobacco smoke exposure, and years since quitting smoking).

SOURCES

U.S. Preventive Services Task Force. Screening for lung cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med.* 2014;160(5):330-338.

Humphrey LL, Deffebach M, Pappas M, et al. Screening for lung cancer with low-dose computed tomography: a systematic review to update the U.S. Preventive Services Task Force recommendation. *Ann Intern Med.* 2013;159(6):411-420.

de Koning HJ, Meza R, Plevritis SK, et al. Benefits and harms of computed tomography lung cancer screening strategies: a comparative modeling study for the U.S. Preventive Services Task Force. *Ann Intern Med.* 2014;160(5):311-320. ■