

## Should Family Physicians Routinely Screen for Lung Cancer in High-Risk Populations?

► See related U.S. Preventive Services Task Force Recommendation Statement at <http://www.aafp.org/afp/2014/0715/od1.html>, Putting Prevention into Practice on page 117, and POEM on page 112.

### Yes: CT-Based Screening Is Complex but Worthwhile

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In December 2013, the U.S. Preventive Services Task Force (USPSTF) issued a level B recommendation in support of annual computed tomography (CT)-based lung cancer screening in specific high-risk populations, defined as persons 55 to 80 years of age who have a smoking history of at least 30 pack-years and who currently smoke or have quit within the past 15 years.<sup>1</sup> In making this recommendation, the USPSTF joined several professional societies that have recently endorsed lung cancer screening, including the American Cancer Society<sup>2</sup> and the American College of Chest Physicians.<sup>3</sup>

This broad support follows the publication of the National Lung Screening Trial (NLST), in which more than 50,000 adults 55 to 74 years of age with a smoking history of at least 30 pack-years who were currently smoking or had quit within the past 15 years were randomized to three annual low-dose chest CT scans or three annual chest radiographs.<sup>4</sup> The study met its primary end point; CT-based screening was associated with a 20% reduction in lung cancer mortality and a 6.7% reduction in all-cause mortality. The number needed to screen (NNS) to prevent one lung cancer-related death was 320, which compares favorably with that reported for other cancer screening modalities. For mammography, the NNS is 377 for women 60 to 69 years of age and 1,139 for those 50 to 59 years of age<sup>5</sup>; for fecal occult blood testing, the NNS is 1,250 for persons 45 to 74 years of age.<sup>6</sup>

Despite this clear mortality benefit, several questions have arisen about the feasibility of



This is one in a series of pro/con editorials discussing controversial issues in family medicine.

► See related editorial at <http://www.aafp.org/afp/2014/0715/od3.html>.

widespread lung cancer screening. These include issues pertaining to false-positive findings, morbidity of diagnostic and treatment interventions, risks of radiation exposure, costs, and impact on smoking patterns. Understanding these considerations requires placing the NLST in the context of other cancer screening efforts.

In the CT arm of the NLST, approximately 24% of all screening studies had positive findings, which were defined broadly as a noncalcified pulmonary nodule of at least 4 mm, lung consolidation or obstructive atelectasis, nodule enlargement, or nodules with suspicious attenuation.<sup>7</sup> However, only 4% of these positive findings were ultimately determined to be lung cancer.<sup>4</sup> The 23% false-positive rate is similar to that of flexible sigmoidoscopy (27% for men and 17% for women).<sup>8</sup> In addition, only about 10% of follow-up evaluations for positive findings entailed invasive procedures (e.g., percutaneous biopsy, bronchoscopy, resection); the other 90% resulted only in additional radiographic studies.<sup>4</sup> Although the 1.4% complication rate reported for invasive procedures resulting from lung cancer screening seems higher than the 0.3% rate reported for colonoscopy,<sup>9</sup> this figure includes therapeutic resections in addition to diagnostic biopsies. An analogous estimate for colorectal cancer screening would need to account for colectomies.

The potential harms of radiation from CT have been highlighted in a number of

high-profile reports. In one model, it was estimated that if 50% of all current or former U.S. smokers 50 to 75 years of age receive annual CT screening, 36,000 radiation-related lung cancers would result, a 1.8% increase over baseline.<sup>10</sup> Not only does the mortality benefit of CT screening for lung cancer considerably outweigh this potential risk, but the average per-scan radiation exposure assumed for this projection was more than twice the amount received by participants in the NLST (5 vs. 1.8 millisieverts). Additionally, low-dose CT is performed rapidly (single breath-hold) and without intravenous contrast media, thereby avoiding the risks of nephrotoxicity and allergic reaction, and obviating requirements for vascular access and physician presence.

Smoking cessation remains the best way to decrease lung cancer risk. For a 75-year-old male smoker with a history of more than 40 pack-years, the cumulative risk of lung cancer is 16%. In contrast, the cumulative risks of lung cancer by 75 years of age in men who stopped smoking at ages 60, 50, 40, and 30 fall to 10%, 6%, 3%, and 2%, respectively.<sup>11</sup> There is concern that widely available lung cancer screening could reduce smoking cessation rates, which would decrease screening benefits and cost-effectiveness.<sup>12</sup> However, long-term smoking abstinence and relapse rates are similar among persons with consistently negative screening results and those with positive screening results.<sup>13</sup>

Adherence to age- and smoking-related eligibility criteria for lung cancer screening is key for mortality benefits. Offering screening to persons at lower risk of lung cancer, those with life-limiting comorbid conditions, or those unlikely to complete curative surgical resection will likely undermine screening benefits. Furthermore, screening should be performed in settings that can provide a coordinated process for candidate selection, screening, interpretation of results, counseling, evaluation of positive screening results, cancer treatment, and smoking cessation.

Broadening lung cancer screening from the 33 NLST sites—mainly academic medical centers—to a nationwide effort will be complex. CT-based lung cancer screening

should not be offered to all individuals, nor should it be provided by all medical facilities. Nonetheless, when offered to the appropriate population in the appropriate context, it will reduce the number of deaths caused by this difficult disease.

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