New Horizons in Lung Cancer Screening

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Cancer is the second most common cause of death in the United States, following only heart disease (1, 2). The American Cancer Society estimates there will be nearly 1.9 million new cancer cases and over 600,000 deaths in in the USA in 2021. [2] Lung cancer is the second most common site of new cancer cases in both men and women in the United States, accounting for 12% and 13% of new cancer cases, respectively. Moreover, cancers of the lung and bronchus are anticipated to account for the most cancer related deaths in the United States in 2021 for both men and women, reaching nearly a quarter of all cancer deaths. [1, 2]

Cancer screening has contributed to improved outcomes in many common cancers. For example, earlier detection with mammography and improved therapy resulted in a 41% reduction in breast cancer mortality between 1989-2018. [2] Colon cancer mortality decreased 55% between 1970 to 2018, also attributed to as well as early detection through screening with stool testing, colonoscopy or CT colonography, combined with improved treatments. [2]

As with any screening test, the goal is for the benefit of early detection and improved outcomes to outweigh the risk of the test. Risks to consider include false positives or false negatives, anxiety and medical costs related to the screening exam and/or additional testing resulting from incidental findings on screening, false positives and the overdiagnosis of lesions that would have not progressed or caused harm. [2,3] Further, in screening tests that use radiation, radiation dose needs to be considered.

For most of the 20th century, the age-adjusted cancer death rate increased and peaked in 1991. Since then, rates have declined 31%, driven primarily by progress against the four most common cancer types, breast, prostate, colorectal and lung cancers and attributed to reduced smoking, earlier cancer detection and improved treatments. [2] The incidence and mortality trends of lung cancer are declining, largely due to reduction in smoking, yet the overall relative survival remains low at 21% at 5 years. [2] However, unlike beneficial screening tests for other common cancers that have now been implemented for several decades, an effective screening tool for lung cancer had not been realized until relatively recently. Studies assessing lung cancer screening dates to the 1950s, including chest x-rays or sputum cytology, but none showed benefit as lung cancer screening methods. [3]

The results of the National Lung Screening Trial (NLST), published in June 2011, demonstrated that low-dose CT (LDCT) screening led to a 20% relative reduction in mortality from lung cancer. [4] NLST participants were persons between 55 and 74 years old with at least a 30 -pack year history of smoking, including former smokers within 15 years of quitting. Screening CT was performed using about 20% of the average radiation dose received from a standard chest CT (average 1.5 mSv for low dose, compared to 8 mSv for standard CT at the time of the study). [4] A similar study, the Dutch/Belgian lung cancer screening trial (NELSON) which included mostly men between the ages of 50 and 74 years also showed significantly reduced lung cancer mortality in high-risk individuals who underwent CT screening [5].

In 2013, the United States Preventive Services Task Force (USPSTF) recommended annual lung cancer screening with low-dose CT for persons age 55 through 80 years with a 30-pack year history of smoking who currently smoke or have quit within the last 15 years, citing smoking and older age as the two most important risk factors for lung cancer. [6] This recommendation was updated in March of 2021 after the USPSTF commissioned a systematic review of accuracy, benefits and harms of screening for lung cancer with LDCT. Collaborative modeling studies were also commissioned to

complement the results of the systematic review, including information about optimal age and interval for screenings, and relative benefits and harms. [6] The 2021 Final Recommendation of USPTF expanded eligibility from the 2013 recommendation in both age and smoking history. The new recommendation is LDCT screening for lung cancer in adults age 50-80 years with a 20-pack year history and currently smoke or quit smoking within 15 years. [6] The recommendation for discontinuing screening after a person has not smoked for 15 years, develops a health problem that limits life expectancy or an inability to unwillingness to undergo curative lung cancer surgery to undergo lung surgery remains unchanged from the 2013 recommendation. [6]

As imaging experts, radiologists are in a position to educate and inform referring providers and colleagues about the benefits of screening to reduce lung cancer mortality while adhering to the principles of ALARA and maintain the pledge to Image Wisely by encouraging low dose CT screening for lung cancer. There are numerous resources on lung cancer screening available to radiologists, providers, and patients. These include the patient-centered information on the public information website RadiologyInfo.org (https://www.radiologyinfo.org/en/info/screening-lung), clinical resources (https://www.acr.org/Clinical-Resources/Lung-Cancer-Screening-Resources) and requirements to receive ACR Lung Cancer Screening designation on the ACR.org website (https://www.acraccreditation.org/Lung-Cancer-Screening-Center).

It is important that the medical radiological community share this information and act as liaisons to increase awareness to improve lung cancer screening rates, which to date have been disappointingly low. Studies have shown that less than 20% of individuals eligible for screening under the 2013 recommendations have undergone screening with LDCT. [7] We can add value to our patients by championing the life saving benefits of lung cancer screening with low radiation with low radiation dose CT, particularly to the newly eligible population.

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