Can a Blood Test Predict Who Will Develop Lung Cancer?

Personalized risk assessment identified 9% more lung cancer cases for screening compared with current U.S. guidelines.

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A simple blood test combined with a risk model based on an individual's personal characteristics did a better job predicting who is likely to develop lung cancer and could therefore benefit from screening, according to research published in the Journal of Clinical Oncology.

"A blood test would identify people who could benefit from lung cancer screening but are not eligible today," Samir Hanash, MD, MPH, of the Department of Clinical Cancer Prevention at the University of Texas MD Anderson Cancer Center, said in a press release. "Tens of millions of people worldwide could benefit from lung cancer screening. If you can improve screening eligibility by even 5%, that is incredibly impactful."

Lung cancer is the leading cause of cancer death in the United States and worldwide. It is often detected at a later stage, when it is more difficult to treat. The five-year survival rate for lung cancer is under 20% overall, but rises to over 50% if caught at an early stage, according to the American Lung Association. People with small-cell lung cancer have poorer prognosis than those with the more common non-small-cell lung cancer.

However, only a small proportion of cases are diagnosed early.

Lung cancer screening using low-dose CT scans can help diagnose the malignancy sooner. In April 2021, the U.S. Preventive Services Task Force (USPSTF) updated its guidelines to recommend annual CT screening for current and former smokers ages 50 to 80 who have at least a 20 pack-year history of smoking (a pack a day for 20 years or the equivalent). Health experts hope the expanded recommendation will improve access for underserved groups, including women and racial/ethnic minorities.

But screening recommendations are imprecise, and they may miss people who could benefit. Hanash's team explored whether a blood biomarker test in combination with a risk model based on individual characteristics would improve risk assessment for lung cancer screening compared with the current USPSTF screening criteria.

The blood test, dubbed 4MP, looks for four circulating protein biomarkers: a precursor form of surfactant protein B, cancer antigen 125, carcinoembryonic antigen and cytokeratin-19 fragment. The risk model accounts for age, moking history and other factors.

The researchers compared the screening criteria using specimens from participants in the Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial who had at least a 10 pack-year smoking history. They evaluated 1,299 blood samples from 552 patients who were diagnosed with lung cancer and 8,709 samples from 2,193 people who did not develop lung cancer.

The combined blood test and risk model had overall improved sensitivity, or ability to detect lung cancer if it exists, compared to the current USPSTF criteria (88.4% versus 78.5%). It also had improved specificity, or ability to rule out lung cancer if it's not present (56.2% versus 49.3%). The combined personalized risk assessment would have identified 105 of the 119 people in the PLCO cohort who received a lung cancer diagnosis within one year of the test.

The researchers calculated that, if implemented, the blood test plus risk model would have identified 9.2% more lung cancer cases for screening and would have reduced screening referrals for people without lung cancer by 13.7% compared with the 2021 USPSTF criteria.

"We recognize that a small percentage of people who are eligible for lung cancer screening through an annual low-dose CT scan are actually getting screening. Moreover, CT screening is not readily available in most countries. So, our goal, for many years, has been to develop a simple blood test that can be used first to determine need for screening and make screening for lung cancer that much more effective," Hamash said. "Our study shows for the first time that a blood test could be useful to determine who may benefit from lung cancer screening."

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