

# Refining the Value of Lung Cancer Screening

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Aug 05, 2013

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## Targeting of Low-Dose CT Screening According to the Risk of Lung-Cancer Death

Kovalchik SA, Tammemagi M, Berg CD, et al

*N Engl J Med.* 2013;369:245-254

### Background

The value of lung cancer screening was demonstrated by the National Lung Screening Trial (NLST), which revealed a 20% improvement in overall survival conferred by annual low-dose chest CT screening, compared with chest x-rays over 3 years in a population of patients aged 55-74 with a 30 pack-year smoking history and who quit smoking less than 15 years earlier.<sup>[1]</sup> Since then, however, lung cancer screening has yet to be widely adopted, with many high-risk patients who were eligible under the NLST criteria failing to be screened. Meanwhile, lung cancer screening is applied to other patient populations, such as younger patients or anxious never-smokers with a family history of lung cancer, who may not have qualified for this study.

The challenges stem largely from skepticism about cost of screening and concern over detrimental effects of false-positive results of small lung nodules that ultimately are benign but which lead to significant anxiety, additional follow-up imaging studies, and sometimes invasive procedures. Can we save lives with early detection without causing an epidemic of anxiety over benign lung nodules at a prohibitive cost?

### Study Summary

A very recent report by Kovalchik and colleagues evaluated the data from NLST, stratifying patients within the eligible population by level of risk. This report provides a clear illustration of the importance of degree of risk in determining the value of screening. Using a complex multivariate analysis to define risk more precisely, the investigators identified relevant variables for risk for lung cancer, including age, sex, years since quitting, pack-years of tobacco exposure, and family history, and divided the participants in the screening study into 5 quintiles. As we might expect, the results demonstrated striking differences in the efficacy and significance of an abnormal result depending on whether people within the spectrum of NLST eligibility were on the higher or lower end of that continuum.

Specifically, within the highest risk quintile, CT screening required screening of 161 people and detected 65 false positives for each life saved from lung cancer, quite favorable within the realm of screening for cancer. In contrast, the results were remarkably less favorable for patients who were eligible but were within the lowest risk quartile: here, chest CT screening needed to be performed on over 5000 people and detected 1648 false positives for each lung cancer death prevented. With an improvement in overall survival of 20% in the entire population, this means that the higher-risk patients actually experienced a far greater benefit than that, while those who were lower-risk received much less benefit.

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## Viewpoint

This analysis underscores several critical points. As we implement lung cancer screening on the basis of these findings and the recommendations now emerging from the US Preventive Services Task Force, which indicate screening high-risk patients (defined as current and former smokers 55-79 years of age with a smoking history of 30 pack-years or more, who have smoked in the past 15 years),<sup>[2]</sup> it will be necessary to apply screening to the optimal population.

Although chest CT screening is critical for saving lives from lung cancer, applying criteria for screening too loosely will lead to vastly greater proportions of unnecessary follow-up scans, procedures, and patient anxiety for a very low yield of cancer -- but a financial windfall for clinics affiliated with radiology, pulmonology, and thoracic surgery services.

Chest CT screening is clearly a life-saving tool for the right population, although its benefits can be counterbalanced if misapplied to those with too low a risk. We need to be judicious in screening on the basis of the best evidence and current recommendations to save the most lives in a cost-effective way that avoids unnecessary anxiety, risk, and expense.

## Abstract

## References

1. National Lung Screening Trial Research Team. Reduced lung-cancer mortality with low-dose computed tomographic screening. *N Engl J Med*. 2011;365:395-409. [Abstract](#)
2. 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 Jul 30. [Epub ahead of print] <http://annals.org/article.aspx?articleid=1721248> Accessed July 30, 2013.

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Cite this article: Refining the Value of Lung Cancer Screening. *Medscape*. Aug 05, 2013.