*Project S E.N.S.O.R. News

Volume 26 No. 3 Summer 2015

Lung Cancer Screening for Asbestos-Exposed Workers?

Lung cancer screening with low-dose computed tomography for current and former long-term cigarette smokers has been endorsed by many organizations including the US Preventive Services Task Force (USPSTF), the American College of Chest Physicians, the American Society of Clinical Oncology, the American Thoracic Society, the American Association for Thoracic Society, the American Cancer Society and the National Comprehensive Cancer Network (1). USPSTF's recommendation is summarized in Box 1. Some organizations only recommend screening up to age 75. Effective February 15, 2015, Medicare began to cover the cost for lung cancer screening of individuals 55 to 70 years old who meet the cigarette smoking criteria in Box 1.

What about individuals who have been exposed to workplace lung carcinogens? Should they be screened for lung cancer? Individuals with asbestos exposure who also smoked cigarettes are at appreciably higher risk of lung cancer because of synergism between asbestos and cigarette smoke compared to individuals who only smoked cigarettes. What special consideration should be given to these particularly high-risk individuals? Ideally one would answer this question by designing a randomized clinical trial among individuals with varying levels of exposure to occupational lung carcinogens. No such trials exist. However, an alternative approach would be to extrapolate the findings from the National Lung Cancer Screening Trial to individuals with exposure to workplace lung carcinogens who exhibit the same level of lung cancer risk as the 30-pack-year smokers for whom annual screening is recommended.

A major difficulty for a clinician trying to decide if a patient should be screened is determining the extent of exposure an individual patient has to an occupational lung carcinogen. For cigarettes, clinicians can easily calculate pack-years. However, for other known lung carcinogens such as asbestos, clinicians have no easy way to estimate their patient's exposure. Determining air levels of carcinogens and years of exposure may be difficult because of a worker's variation in jobs held over a working lifetime. Furthermore, the reduction in workplace exposures since the 1980s due to improved engineering controls, increased use of respiratory protection equipment and reduced use of asbestos make extrapolation of lung cancer risk from older to present day workers difficult.

Box 1. US Preventive Service Task Force (USPSTF) Recommendation for Lung Cancer Screening

The USPSTF recommends annual screening for lung cancer with low-dose computed tomography in adults aged 55 to 80 years who have a 30 pack-year cigarette smoking history and currently smoke or have quit within the past 15 years. Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery.

http://www.uspreventiveservicestaskforce.org/Page/Topic/recommendation-summary/lung-cancer-screening?ds=1&s=lung cancer

A meta-analysis of seven cohort studies of 5,074 asbestos-exposed workers who were screened for lung cancer was published in 2014 (2). The population in the seven studies was predominantly male (95% - 99%), age 58 – 68, had a cigarette smoking prevalence of 20% - 97%, and an average duration of asbestos exposure from 18 - 30 years. Lung cancer was detected in 1.1% of the asbestos cohorts, similar to the 1% prevalence of lung cancer found during the National Lung Cancer Screening Trial. Unlike the screening trial, the asbestos cohort studies were one-time screenings, there was no randomization of participants and no follow-up regarding mortality.

The best data for assessing the risk of lung cancer in a heavily-exposed group of asbestos workers is the long-term follow-up of 2,377 members of the U.S. insulator's union who, when first examined between 1981 and 1983, were at least 40 years old and had been insulators for 20 or more years (3). The cohort was followed-up until 2008. The risk of lung cancer mortality by smoking status in this cohort is shown in Figure 1 for insulators with parenchymal asbestosis and in Figure 2 for insulators without parenchymal asbestosis. The risk of lung cancer mortality for individuals with asbestosis is greater for those who also smoked, regardless of when they quit smoking (13.9-64.7 times greater) compared to non-asbestos exposed individuals (8.6-19.0 times greater) who currently smoke or quit less than 15 years (the group for whom lung cancer screening is recommended). For non-smokers with asbestosis the risk of mortality from lung cancer (7.3 times greater) is comparable to smokers who quit less than 15 years (8.6 times greater) for whom screening is recommended. For those without asbestosis, the risk of lung cancer mortality for asbestos-exposed individuals who smoked or ever smoked (7.8-27.7 times greater) was greater than or similar to current smokers (19.1 times greater) or those who quit less than 15 years ago (8.6 times greater) (Figure 2). Based on this study, anyone with 20 or more years of asbestos exposure and asbestosis or anyone with 20 or more years of asbestos exposure who had ever smoked cigarettes would be at a level of risk of lung cancer equivalent to those 30-pack-year cigarette smokers in the random clinical trials who benefited from lung cancer screening.

In addition to a diagnosis of parenchymal asbestosis, the presence of pleural plaques from asbestos exposure is also a marker that an individual is at increased risk of death from lung cancer. However, in a recent study of 5,402 men from France the increased risk of lung cancer among men with asbestos-related pleural plaques was 2.41, after adjustment for smoking and cumulative exposure index to asbestos, which is below the risk of lung cancer in the clinical trials where CT screening for lung cancer was found to be effective (4). Sixty-two percent of the U.S. insulators without asbestosis had pleural plaques (3). Unlike the increased risk in individuals with asbestosis, the presence of pleural plaques in this cohort at increased risk of lung cancer mortality was not associated with an even greater risk of lung cancer mortality than the insulators without asbestos-related radiographic changes (3). However, the presence of asbestos-related pleural plaques is an indication that the clinician should review the completeness of the patient's work history regarding duration and latency since first exposure to asbestos.

Figure 1. Risk of Lung Cancer Mortality
among Asbestos Insulators with Parenchymal Asbestosis
by Cigarette Smoking Status

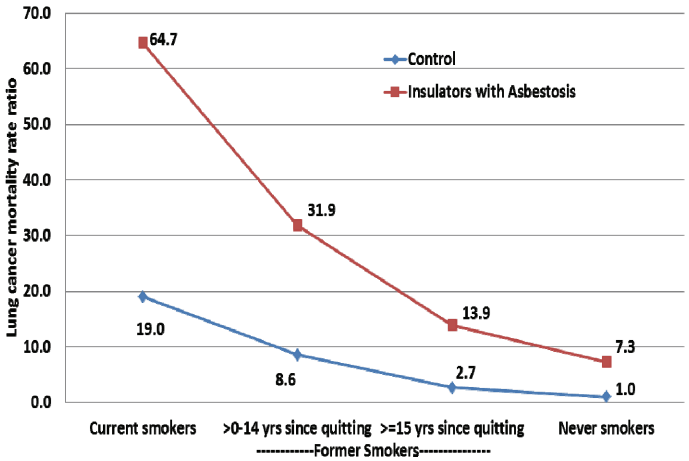
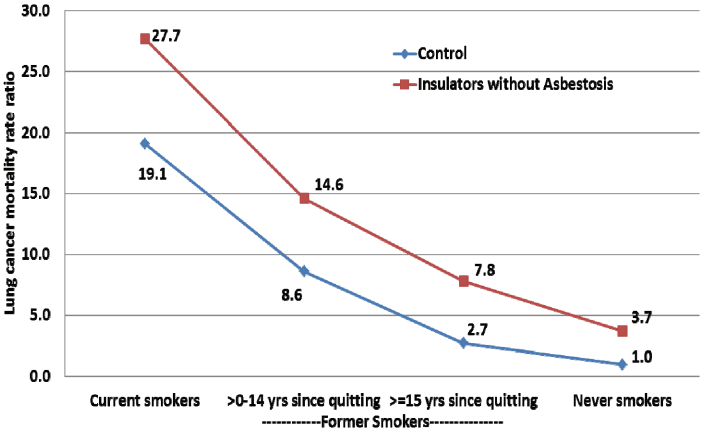


Figure 2. Risk of Lung Cancer Mortality
among Asbestos Insulators without Parenchymal Asbestosis
by Cigarette Smoking Status



(Adapted from Am J Respir Crit Care Med, 2013 (3).)

The greatest benefit to lung cancer screening in the National Lung Cancer Screening Trial was among those with the highest risk for lung cancer (1), which would certainly include individuals with both asbestos exposure and a cigarette smoking history.

Box 2 contains recommendations regarding the screening of individuals with asbestos exposure. These are solely the conclusions of Kenneth Rosenman, MD. Recommendations of the National Comprehensive Cancer Network are shown in Box 3 regarding occupational lung carcinogens, including asbestos. The amount of data on asbestos is not available for other recognized occupational lung carcinogens such as hexavalent chromium, silica or diesel exhaust. Whether one can apply the asbestos data regarding length of exposure, cigarette smoking history and the presence of radiographic changes to silica exposure and silicosis or other individuals with significant exposure to other occupational lung carcinogens is not known.

Box 2. Recommendations for Lung Cancer Screening of Asbestos-Exposed Workers

The data on asbestos exposure and the risk of lung cancer would suggest expanding the recommendation on lung cancer screening to include (1) everyone with asbestosis age 55 to 80 whether or not they smoked cigarettes and (2) all individuals age 55 to 80 without asbestosis who had 20 or more years of asbestos exposure and who had ever smoked cigarettes regardless of when they quit.* *These conclusions differ from USPSTF recommendations* for the general population in that those with significant asbestos exposure would be screened regardless of when they quit smoking and those with asbestosis would be screened regardless of whether they ever smoked cigarettes.

*This second recommendation is based on insulators repeatedly exposed to asbestos for an average of 32 years prior to 1983. In deciding whether current patients have a similar level of exposure to asbestos, clinicians need to not only factor in duration of exposure to asbestos but that exposure to asbestos since the 1980's will usually be less than the exposure prior to the 1980's.

Box 3. Guidelines for Lung Cancer Screening of the National Comprehensive Cancer Network

Lung cancer screening is an option and patients should engage in shared decision making with their doctor if ≥50 years old and ≥ 20 pack years and exposure to arsenic, asbestos, beryllium, cadmium, chromium, coal smoke, nickel, diesel fumes, radon, silica, or soot. **www.nccn.org/patients/guidelines/lung_screening/index.html#**

Dr. Rosenman, as always, is happy to discuss patient diagnostic or management issues with you, 1-800-446-7805.

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*PS *Remember to report all cases of occupational disease!*

Printed on recycled paper.

The Project SENSOR News is published quarterly by Michigan State University-College of Human Medicine with funding from the National Institute for Occupational Safety and Health and is available at no cost. Suggestions and comments are welcome.

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