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Screening for Lung Cancer: What Is the Evidence?

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Lung cancer continues to be an enormous public health problem. In 2003 in the United States alone, 171,900 people were diagnosed with lung cancer and 157,200 died from the disease (Jemal et al., 2003). Many of these cancers could have been prevented with the elimination of tobacco usage. Currently, many public health initiatives are addressing means to reduce and eliminate tobacco usage.

Despite the outcomes of these efforts, a population of smokers and former smokers will remain at risk for developing lung cancer. Healthcare providers frequently are confronted with questions about the effectiveness of screening for lung cancer. This column will examine the clinical evidence for lung cancer screening recommendations.

Few groups have established recommendations for the early detection of lung cancer. When reviewing guidelines, healthcare professionals must consider the intended target audience and user, how they were formulated, supporting evidence, cost issues, and sensitivity and specificity of screening tests. To date, no randomized trial has demonstrated a reduction in lung cancer mortality as a result of screening.

Current Recommendations

The American Cancer Society (ACS) recommends that, to the extent possible, individuals who are at risk for lung cancer as a result of current or prior smoking history be made aware of their continued lung cancer risk. Those who seek testing for early lung cancer detection should be informed about what currently is known about the benefits, limitations, and risks associated with conventional and emerging early detection technologies, as well as the associated diagnostic procedures and treatment (Smith, Cokkinides, & Eyre, 2003).

Recommendations from the American College of Chest Physicians are similar (Bach, Niewoehner, & Black, 2003). For individuals without symptoms or a history of cancer, the guideline's developers recommend against the use of serial chest x-rays (CXRs), sputum cytology, and low-dose helical tomography. At-risk individuals who express an interest in undergoing low-dose computed tomography (CT) scan screening should be made aware of several ongoing, high-quality clinical studies of this technology.

Past Clinical Trials

The Memorial Sloan-Kettering Lung Project (MSKLP) randomized 4,968 men to receive CXR alone and 5,072 men to receive screening with CXR and sputum cytology (Melamed, Flehinger, & Zaman, 1984). In each group, 144 cancers were detected. In the group in which both CXR and sputum cytology screening were used, CXR detected 41% of the cancers, cytology detected 19%, the combination of techniques detected 10%, and 30% of the cases were detected from symptoms. No differences were found between the groups in terms of stage distribution, respectability, survival, or mortality. The researchers concluded that cytology was not needed in a screening program of annual CXRs.

The Johns Hopkins Lung Project (JHLP) randomized 5,226 men to receive either annual CXR or CXR and sputum cytology (Tockman, 1986). In the group screening with CXR and cytology, 194 cancers were found; in the CXR only group, 202 cancers were found. Similar to the MSKLP trial, the investigators concluded that the addition of sputum cytology to an annual CXR offered no additional benefit.

The methodology in the Mayo Lung Project (MLP) was slightly different (Fontana, Sanderson, & Taylor, 1984). Initially 10,933 men underwent a prevalence screen that included CXR and sputum cytology. Ninety-one prevalence cases were discovered. CXR detected 59 cases, cytology detected 17 cases, and CXR with cytology detected 15 cases. In the second part of the study, individuals were randomized to a group receiving CXR and cytology (4,618) or a control group receiving CXR alone (4,593). In the control arm, half of the subjects had annual CXRs and half only received CXR during the final two years. CXR detected one third of the cancers.

The complexity of interpreting the data from these and other nonrandomized studies stems from the fact that the researchers assumed that CXR is an effective screening tool for lung cancer. Further, most of the studies only included men. To date, little evidence exists to answer the more fundamental question of whether or not screening of any kind is better than no screening at all (Strauss, Gleason, & Sugarbaker, 1997). In none of the major randomized control trials was the control group completely unscreened.

More recently, a trial was conducted in Finland that examined the prognosis of patients with lung cancer detected in a single CXR screening (Salomaa et al., 1998). Histologic types, stages, treatments, and survival rates were studied in 93 men who were found to have lung cancer in a single CXR screening of more than 33,000 men who smoked and were 50–69 years of age (screened group). These factors were compared with 239 men of the same age range whose lung cancer was detected through

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