Computed tomography (CT) screening for lung cancer

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Background

In 1993, enrolment into the Early Lung Cancer Action Project (ELCAP) was started. This project screened a cohort of 1000 high-risk persons using low-dose helical CT and chest radiography.13 The report showed that CT-based imaging was much superior to traditional radiography in the initial testing. Furthermore, the results indicated that the false-positive test results common in baseline screening, though not in repeat screening, could be managed with no notable excess of biopsies or thoracotomies when following the ELCAP protocol.

The ELCAP design makes a sharp distinction between diagnostic testing and subsequent intervention and does not address them jointly as is done in a randomised controlled trial where the screening with no screening. The ultimate aim of screening is the pursuit of early diagnosis, which allows for early intervention and ultimately for prevention of the cancer’s fatal outcome. As the usefulness of screening depends on how early the diagnosis is made, the question of ‘the earliest screen-diagnosed malignancies obscured the entire lung parenchyma within it, part-solid has parts that are solid, and non-solid do not have any solid parts other than blood vessels.

ELCAP results showed that the frequency of part-solid and non-solid nodules in relation to that of solid ones in CT-based lung cancer screening at baseline is appreciable (circa 20%). In baseline screening, about half of lung cancers present as part-solid and non-solid nodules. Furthermore, the results indicated that the false-positive test results common in baseline screening, though not in repeat screening, could be managed with no notable excess of biopsies or thoracotomies when following the ELCAP protocol.

Table 1. Updated Results

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<tr>
<th>Estimate and 95% confidence interval (CI)</th>
<th>Baseline</th>
<th>Annual repeat</th>
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<td>1. Frequency of positive result of the initial CT</td>
<td>12% (CI: 11-13%)</td>
<td>6% (CI: 6-7%)</td>
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<td>2. Frequency of screen-diagnoses</td>
<td>98% (CI: 92-100%)</td>
<td>98% (CI: 81-100%)</td>
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<td>3. Frequency of pre-surgical Stage I</td>
<td>96% (CI: 87-99%)</td>
<td>93% (CI: 76-99%)</td>
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<td>4. Estimated curability of Stage I cancers</td>
<td>96.8% (CI: 96.8-96.9)</td>
<td>98.6% (CI: 98.1-99.1)</td>
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The expert pathology review confirmed that all the screen-diagnoses were genuine malignancies.

Since annual CT screening produces Stage I diagnoses in at least 8 out of 10 cases, the overall cure rate that can be achieved by CT screening might be as high as 76%.

Cost-effectiveness

The cost-effectiveness of a single baseline low-dose CT for lung cancer screening from a societal perspective, based on ELCAP using the

An unexpected result of ELCAP was that screening provided a ‘teachable moment’ or a viable opportunity for the delivery of smoking cessation advice and assistance. In a survey of ELCAP, 74% of current smokers agreed that participation in ELCAP increased their motivation for quitting smoking and almost 25% of them had a 1-year quit rate.4 This has led to smoking-cessation advice being incorporated into all subsequent screenings.

International Early Lung Cancer Action Project (I-ELCAP)

The demand for information on screening led to the organisation of the International Conferences on Screening for Lung Cancer to which all those already performing screening or wishing to start it were invited.15 This ultimate led to the formation of the I-ELCAP consortium in 2001. The consortium has a shared set of principles and uses a common protocol and management system so that the data from participating institutions are pooled. As of the 11th Conference in October 2004, about 30 000 enrollees within I-ELCAP have had baseline screening with almost 20 000 repeat screenings. The initial results of this collaboration will be published in 2005.
References