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CT Lung Cancer Screening

The much-awaited results from the Dutch-Belgian Randomized Lung Cancer Screening (NELSON) trial were published online on January 29 in the New England Journal of Medicine.[1] The study shows that CT lung cancer screening can significantly reduce the likelihood of high-risk smokers dying from lung cancer.

EPIDEMIOLOGY

Lung cancer (both small cell and non-small cell) is the second most common cancer in both men and women (not counting skin cancer). In men, prostate cancer is more common, while in women breast cancer is more common.

Lung cancer mainly occurs in older people. Most people diagnosed with lung cancer are 65 years or older; a very small number of people diagnosed are younger than 45 years. The average age of people when first diagnosed is about 70 years.[2]

Lung cancer is by far the leading cause of cancer death among both men and women, making up almost 25% of all cancer deaths. Each year, more people die of lung cancer than of colon, breast, and prostate cancers combined.[2]

On a positive note, the number of new lung cancer cases continues to decrease, partly because people are quitting smoking. Also, the number of deaths from lung cancer continues to drop due to people stopping smoking and advances in early detection and treatment. Early detection can only be achieved through routine screening of individuals at high-risk for lung cancer.[2]

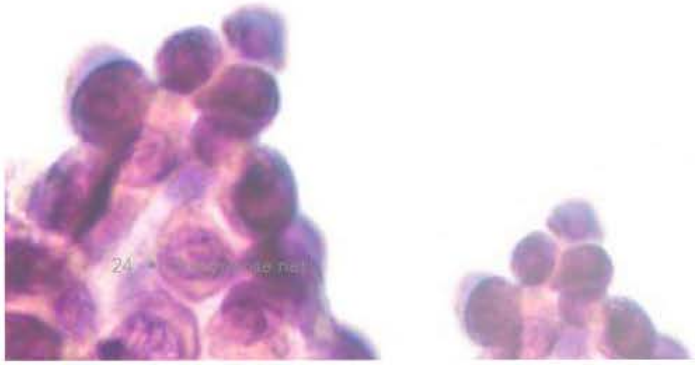
EFFORTS AT EARLY DETECTION OF LUNG CANCER

The large-scale randomized controlled NELSON trial referred to above has investigated the potential benefits of CT lung screening among 15,792 individuals in the Netherlands and Belgium between the ages of 50 and 74 years, who had a high risk of lung cancer. Risk was estimated based on a current smoking history of 20 pack-years or more or having quit smoking 10 years or less before screening.

Participants were randomly assigned to either the CT lung cancer screening protocol or no screening. The four-round screening protocol included a baseline CT exam followed by a CT exam at one, three, and five and a half years after the initial exam.

Analysis of results of the NELSON study showed that screening led to a statistically significant reduction in total lung cancer deaths by 24% for men and 33% for women, compared with no screening.

The study showed that CT lung cancer screening increased the likelihood of detecting lung cancer in the early stages: the proportion of cancers detected in stage IA or IB was 58.6% with CT lung screening and only 13.5% for the control group.



The same study also indicated that the screening interval can be readily increased from one year to two years without any impact on death rate. It was also noted that an increased risk in the screened population was only evident after two years from the start of screening; this further confirmed that a bi-yearly CT scan is adequate as a screening method for lung cancer.

Further observations from this study included that women fare better than men with treatment of early lung cancer and that the best criterion for assessing tumour growth is to measure tumour volume and not diameters.

LUNG CANCER DIAGNOSIS

On CT scan, lung cancer presents mostly as a solid mass. Irregular borders are more indicative of a primary lung tumour, whilst smooth margins are more commonly seen with metastases from an extrapulmonary source. However, benign nodules may also exhibit smooth margins (Fig 1).

Subsolid (not completely solid) pulmonary nodules, comprising pure ground-glass nodules (Fig 2) and part-solid (Fig 3) nodules, have a high risk of indolent malignancy; indolent malignancy refers to a slow growing type of cancer. Lung Imaging Reporting and Data System (Lung-RADS) nodule management guidelines are used to classify nodules based on their likelihood of being malignant (Fig 4). These guidelines have been set based on expert opinion but lack independent validation. In fact, subsolid nodules classified as Lung-RADS categories 2 and 3 have a higher risk of malignancy than reported.[3]

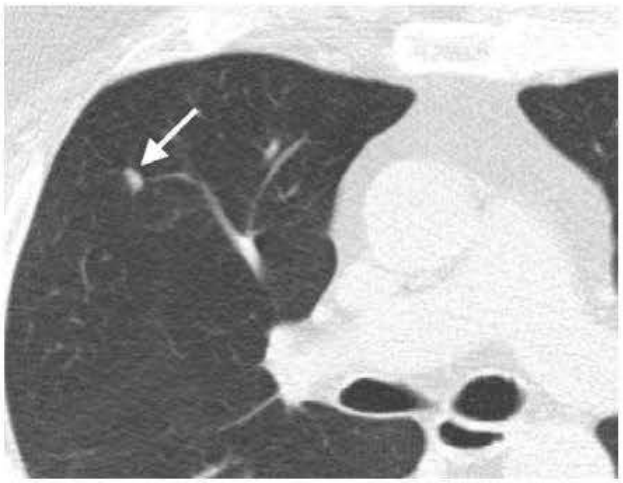


Figure 1. CT scan in 60-year-old man undergoing low-dose lung cancer screening. Scan shows a 6-mm solid nodule with irregular margins along the right minor fissure. This nodule was stable over 2 years of follow-up and most likely represents an intrapulmonary lymph node.

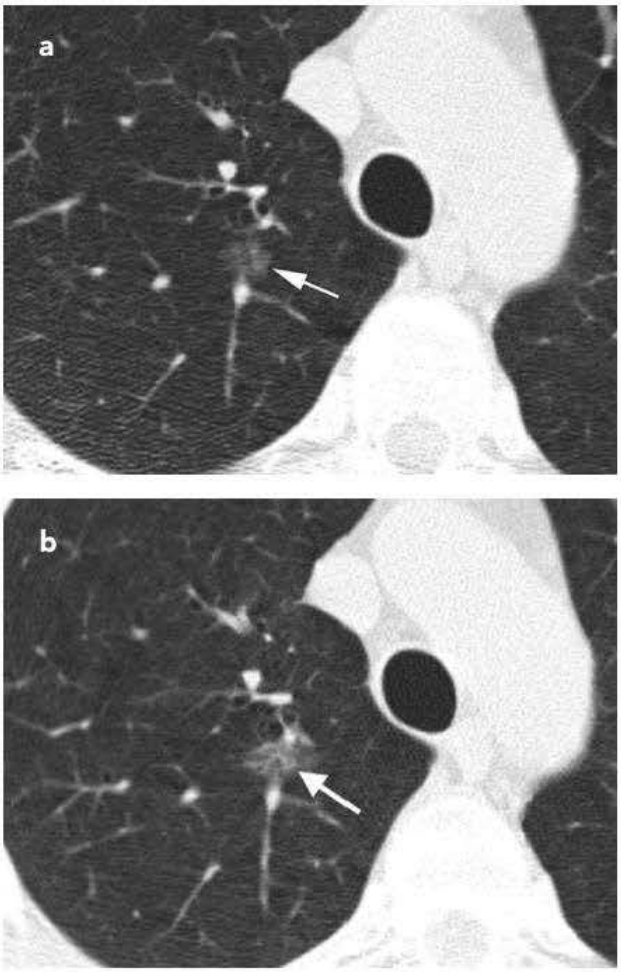


Figure 2. CT scans in a 57-year-old man undergoing low-dose lung cancer screening. (a) Baseline scan shows a right upper lobe pure ground-glass nodule measuring 11 mm (arrow). Nodule was classified as Lung-RADS category 2. (b) CT scans obtained at second annual follow-up show that this nodule grew to 15 mm (arrow). Malignancy was subsequently diagnosed.

Equivocal lung lesions that are either very small or indeterminate by their morphological appearance need to be followed up with CT. A change in size of the relevant lesion is best assessed by measuring lesion volume and not diameter. Increasing lesion size should lead to biopsy.

Enlarged or heterogeneous mediastinal or hilar lymph nodes or those showing increasing size should also raise the level of suspicion in favour of malignant disease.

IMPORTANCE OF EARLY DIAGNOSIS

Currently, the only way to improve outcome of lung cancer treatment is through early detection. Surgical excision is the most effective treatment for lung cancer

Figure 3. CT scans in a 60-year-old woman undergoing low-dose lung cancer screening CT. (a) Baseline scan shows a right lower lobe part-solid nodule measuring 11 mm with 5-mm solid component (arrows). Nodule was classified as Lung-RADS category 3. (b) Scan obtained at second annual follow-up shows that nodule grew to 17 mm with 7 mm solid component (arrows). Malignancy was subsequently diagnosed.

and it is only possible in the early stages of the disease. In addition, smaller cancers need less extensive surgery and consequently lead to lower morbidity. CT lung cancer screening is the best tool for detection of asymptomatic cancers and the results of the NELSON study are clearly supporting this view.

Lung nodule morphology and changing morphology are important criteria that guide management; these criteria are best assessed with CT. One study which remeasured more than 400 subsolid nodules from the National Lung Screening Trial (NLST) data at baseline and follow-up imaging showed that the malignancy risks for these lesions were higher than previously reported.[3] Larger subsolid lesions are also more likely to be malignant based on the same study.

CONCLUSION

Lung cancer is common and has a higher death rate than most cancers. Low-dose lung CT scans have a high accuracy for detection of lung cancers and impact significantly on the disease outcome and on the patient's quality of life. Bi-yearly screening of high risk individuals is therefore highly recommended.

REFERENCES

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