Early detection techniques offer hope for improved outcomes in lung cancer patients

April 18 2012

New techniques for identifying lung cancer earlier –including a new type of chest screening, a nanotech 'nose' and a method to examine the cells of the cheek-- are showing substantial promise, according to presentations at the 3rd European Lung Cancer Conference (ELCC) in Geneva.

"Early detection of lung cancer is vital to improve lung cancer survival rates," commented Egbert F. Smit, professor of pulmunary medicine at the VU University Medical Centre in Amsterdam, The Netherlands, member of the IASLC Prevention, Screening and Early Detection Committee. "Currently, low-dose CT is the only early detection modality that has shown to improve survival rates. However, identifying persons at risk for lung cancer by methods that use less radiation, would be preferable. In this meeting three such methods are presented which hold some promise for future studies," he concluded.

Fast and inexpensive imaging

A fast and inexpensive new imaging technique, called digital chest tomosynthesis, is a promising method for lung cancer screening, report Dr Luca Bertolaccini and Dr Alberto Terzi from S. Croce e Carle Hospital in Cuneo, Italy.

Dr Bertolaccini and colleagues from the Thoracic Surgery Unit directed by Dr Terzi analyzed data from over 1,500 patients with no previous

evidence of cancer, who were screened using the technique. They identified abnormalities in the lungs of 268 subjects, of whom 16 (1.07%) were found to have lung cancer.

"Digital tomography takes about 11 seconds," Dr Bertolaccini said. "The lung cancer detection rate using digital chest tomography is in line with the detection rate of previous studies using computed tomography. The 1% detection rate is adequate for lung cancer screening and the cost is by far lower then using low-dose CT scan."

Based on their experience, the Italian group believes the new technology holds great promise. "Compared to chest CT, patients who underwent digital chest tomography received a far lower radiation dose. Digital chest tomography seems to be a promising first-line tool for lung cancer screening."

Further multicenter studies are needed to confirm the clinical role for the technique in the detection or evaluation of lung nodules, the researchers say. "Digital chest tomography systems for chest imaging are currently available and are not very expensive, and in the coming years we hope that clinical experience will guide the development of optimal clinical utilization strategies," Dr Bertolaccini said.

A blood test for BARD1

A blood test that detects antibodies to a protein known as BARD1 could also be used to detect the telltale signs of lung cancer, say researchers from University Hospitals Geneva.

BARD1 is a protein that is known to drive the development of cancer. Particular forms of the protein, known as BARD1-beta and BARD1-pi are specifically upregulated and correlated with a poor prognosis in lung cancer.

Dr Irmgard Irminger-Finger and colleagues recently began developing a blood test based on these forms of BARD1. Rather than detecting the proteins themselves, they have focused on antibodies produced in response to the protein.

In a study that evaluated blood samples from 60 patients and 40 controls, they found that a test using seven parts of the BARD1 proteins to capture antibodies could detect lung cancer with 87% sensitivity and 68% specificity.

"Thus, antibodies against BARD1 isoforms are telltales of lung cancer and their detection can be further developed towards a blood test," the researchers conclude. Larger studies with the test, including comparisons with CT scans, are now underway.

Artificial nose sniffs out cancer

A 'nano artificial nose' that mimics the human olfactory system can sniff out cancers in the breath, reports PhD student Meggie Hakim, from the lab of Prof Hossam Haick at the Technion – Israel Institute of Technology.

Developed by Prof Haick and collaborators, the NA-NOSE detects volatile organic compounds in an individual's breath using an array of cross-reactive sensors, and then identifies patterns in the molecules allowing it to differentiate between the breath of healthy people and lung cancer patients.

The NA-NOSE has been under research and development since the middle of 2007. The aim of the current study was to evaluate the role of exhaled breath as a potential non-invasive biomarker to distinguish between benign and cancerous conditions, which might be used prior to biopsy. The 74 participants all had 'single pulmonary nodules' that had

been detected by imaging.

The NA-NOSE was 88% accurate in distinguishing between benign and malignant nodules, the researchers report. The sensitivity of the test was 86% --meaning that it correctly identified 86% of the malignant nodules that were present. Its specificity was 93%, meaning that it correctly identified 93% of the benign nodules.

"The ultimate goal of the NA-NOSE device is to identify the changes in the volatile biomarkers' concentrations allowing for early diagnosis of cancer in early stages, ideally at the level of a single cell," Dr Hakim said.

"The NA-NOSE approach is totally different from conventional cancer diagnostics. It diagnoses cancer based on the change of the blood chemistry and metabolic activity, which is reflected in the chemical composition of the exhaled breath. Our future aim is to develop a sensitive device so that only patients who test positive will require conventional, unpleasant and expensive invasive procedures, such as biopsy, to locate their tumor and they will go on to be treated in an early stage, when cure rates are much higher."

Checking the cheeks

In another study, researchers describe promising results with a novel approach to screening for lung cancer by examining the cells on the inside of their cheek.

Dr Hemant Roy from NorthShore University HealthSystem, University of Chicago Medical Center and colleagues at Northwestern University BioEngineering[1] point out that the cells inside the mouth, the buccal mucosa, offer a good opportunity to identify potentially cancerous changes that may be going on in the lungs. Their group uses a novel

optical technique called Low Coherence Enhanced Backscattering Spectroscopy (LEBS) to detect 'micro architectural consequences' of genetic and epigenetic changes that lead to cancer.

In a case-control study with 63 participants they found that five different markers identifiable using LEBS were able to distinguish between lung cancer patients and smokers without lung cancer. Using these markers, the researchers were able to identify cancer cases with great sensitivity.

"While the modest sample size necessitates caution, the diagnostic performance along with the clinical practicality suggests that this minimally intrusive buccal LEBS approach represents a promising pre-screen for lung cancer," they say.

Provided by European Society for Medical Oncology