To Screen or Not to Screen: Using Spiral Computerized Tomography in the Early Detection of Lung Cancer

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In 2002, the American Cancer Society (ACS) estimated that more than 169,000 Americans would be diagnosed with lung cancer. More than a third of this number were estimated to die from the disease (ACS). The lifetime risk of lung cancer for men is about 1 in 12; for women, the risk is 1 in 19. The disease is highly fatal in both sexes. Recent advances in multimodality treatments, including chemotherapy and radiotherapy, have increased its two- and five-year survival rate from lung cancer is only 14% (Presant & Kaiserman, 2000). Therefore, lung cancer control through prevention and early detection is of paramount importance. Besides reducing the risk of lung cancer by altering lifestyle choices and limiting exposure to carcinogenic substances, early detection holds the best promise for cancer control.

Lesions detected at an early stage of disease are most amenable to treatment, resulting in a survival advantage. Cancers detected at stages I and II are most curable. This article focuses on the early detection of lung cancer using the imaging technique of spiral computerized tomography (CT). Spiral CT is summarized, followed by a description of programs that have used this technique for cancer screening.

Computerized Tomography

Medical imaging is vital to the early detection, diagnosis, and treatment of cancer. Imaging may be the first step in prevention of the spread of cancer through early detection. CT imaging, magnetic resonance imaging (MRI), mammography, ultrasound, positron emission testing (Grossman, Griffith, & Hanson, 1999), x-ray imaging, and nuclear medicine imaging are all tools used in cancer detection. CT and MRI are good for imaging soft tissue structures and can be used to build precise computer models of affected tissue. Physicians and surgeons use the models to design surgical and radiation treatments. CT is the method of choice for imaging tumors of the lungs, abdomen, liver, kidneys, pancreas, and pelvis because it can acquire data rapidly and minimize artifacts in images caused by motion, breathing, or peristalsis. Newer spiral CT scanners may be “interventional CTs” that allow real-time imaging for the guidance of biopsy needles. Spiral scanners can image whole anatomic regions of the lungs in 20–30 seconds. Instead of a stack of individual slices, all data are obtained with the patient in one position. The data set can be reconstructed by computer to create a three-dimensional picture. Three-dimensional images provide detailed representations of lesions and normal tissue. Spiral CT scanning is noninvasive, rapid, and can diagnose conditions with limited patient discomfort. Multiple-slice spiral CT systems can collect up to four slices in 20–30 seconds.

Early-stage lung cancers are the most amenable to treatment. Historically, computerized tomography (CT) has been used to detect the presence of lung and other types of cancer. A new type of CT scanner, known as a spiral or helical scanner, can image the entire lung area in 20–30 seconds and produce three-dimensional images. Spiral CT scanning is noninvasive, rapid, and able to diagnose conditions with limited patient discomfort. Although some studies suggest that spiral CT scanners are able to detect potentially cancerous lung nodules at an early stage, their use as a mass screening method for lung cancer is not endorsed by many researchers or the Society of Thoracic Radiology. Studies are in progress to determine the most clinically effective, cost-effective, and efficient method for detecting early-stage lung cancer.

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