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A Sound Idea

Accurate clinical staging of lung cancer remains a challenging task. Prior to the late 1970s, plain chest radiography and bronchoscopy, sometimes supplemented by scintigraphic examinations or mediastinoscopy, were the mainstay of the staging evaluation. The primary difficulty lay in determining the status of regional lymph nodes. As computed tomography (CT) became available for routine use, the overall accuracy of clinical staging of lung cancer rose to 85-95 percent, depending upon the criteria employed in assessing nodal involvement. Certainly, this level of precision is acceptable, particularly as it surpasses the accuracy achieved in the clinical staging of many other solid tumors. Why, then, are improved staging modalities for lung cancer necessary?

The ever-increasing number of patients with bronchogenic carcinoma, the leading cause of cancer-related deaths in the United States, mandates improved methods of management. Recent trials of neoadjuvant chemotherapy, with or without irradiation, exemplify the likely future of therapy for patients with regionally advanced disease. Techniques which permit accurate noninvasive staging are essential if precise assessment of disease response is to be achieved. Part of the difficulty with CT in determining nodal status lies in its dependence on size as a criterion for metastatic involvement. In addition to regional variability in the size of normal lymph nodes, other anatomic structures can also interfere with accurate identification and measurement of nodes, particularly those in the hilum and aortopulmonary window. Magnetic resonance imaging (MRI) has the potential to overcome some of these difficulties, but the present technology necessitates long acquisition times which result in motion artifacts and poor spatial resolution. Many of the problems with CT and MRI may be overcome through the use of ultrasonography.

The original initiative to use sound pulses in measuring distance apparently arose from the tragedy of the ocean liner Titanic, following which a variety of techniques were suggested to permit recognition of objects at distance.1 The threat of submarines to surface shipping during World War I led to the development of transducers capable of generating ultrasound which were subsequently used for depth measurement and the detection of fish shoals. Further refinements during World War II allowed the first true commercial use of ultrasound by Firestone for non-destructive materials testing.2 The inevitable jump to medical diagnostics and therapeutics took but a few years, with the original report of human soft tissue
Endoscopes adapted for ultrasonography have been in clinical use for a decade. These devices generate radial images oriented transversely to the endoscope and employ transducers ranging from 3.5 MHz to 10 MHz. This technology is useful in staging cancer of the esophagus, stomach, prostate, and rectum. Several authors have proposed that endoscopic ultrasonography (EUS) be applied in staging lung cancer, looking primarily at regional nodal involvement. In this issue of Chest (see page 586) Kondo et al report the largest series of lung cancer patients staged by EUS yet published, demonstrating EUS to be comparable to CT in overall accuracy. The advantage that ultrasonography has over computed tomography is that it relies on nodal outline and internal architecture, rather than size, to determine metastatic involvement. As our experience with this modality expands, the results are likely to significantly improve.

A number of questions remain before EUS can be recommended as a standard technique for staging lung cancer. Since most patients will continue to undergo computed tomography, how do we select which patients should have this additional staging procedure? Is 7.5 MHz the optimal transducer frequency, or will a different frequency give better results? Finally, the presence of a "blind area" to EUS in the right paratracheal region is of great concern, as this is the usual lymphatic drainage pathway for all regions of the lung but the left upper lobe. Certainly the results of Kondo et al are encouraging, and suggest that further investigation of this modality is warranted.

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