NMR IN CANCER: XX. FONAR SCANS OF PATIENTS WITH CANCER

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• *FONAR hydrogen scans of two patients with cancer are described. In one patient the scan showed a right lung tumor spread from a primary adenocarcinoma located in the breast. In the other patient, the scan showed a widespread alveolar cell carcinoma disseminated throughout both lung fields.*

INTRODUCTION

In 1971 Damadian originated the idea of whole-body NMR scanning and undertook tests to verify that the nuclear resonance signal could non-invasively detect disease.[1] In 1972 he patented whole-body NMR scanning and the field-focusing NMR (FONAR) technique to carry it out.[2] Other researchers followed.[3–5] The original concept was directed at a medically valuable method for non-surgically detecting human tumors and locating them within the body so that they could be non-invasively characterized by NMR spectroscopy. With the achievement of the first FONAR scan of the normal human body in 1977,[6,7] the main technological obstacles to a medical NMR detector were overcome and the way was open for its application to detecting disease.

EXPERIMENTAL AND RESULTS

We wish now to report the first NMR scans of patients with cancer. The FONAR technique was utilized to achieve these hydrogen scans. Apparatus and method, including use of color-keying, were as previously described.[6,7] Figure 1 is a cross-sectional image through the chest at the level of the aortic arch (3rd intercostal space) in a 42-year-old woman with an adenocarcinoma of the breast that had metastasized to the left lung. The tumor is seen as a band of signal-producing tissue (light blue) bridging the right lung cavity. The tortuous structure separating the right and left lung cavities is the aortic arch. Figure 2 is a cross-sectional image through the low chest at the level of the 10th thoracic vertebra in a patient with advanced alveolar cell carcinoma. The tumor, seen as tissue producing intense signal (red) and less intense signal (light blue), has visibly invaded both lung cavities and obliterated the bulk of the air space.

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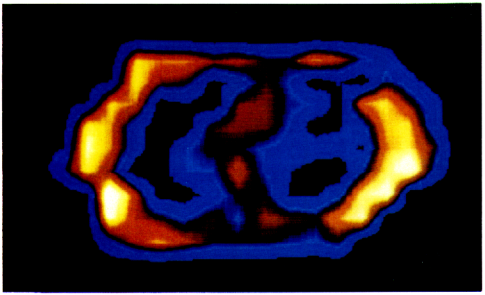

FIGURE 1. FONAR cross-sectional scan through the thorax at the level of the 3rd intercostal space in a patient with an adenocarcinoma of the breast that metastasized to the right lung. The tumor is seen as a band of signal-producing tissue (light blue) bridging the right lung cavity. The tortuous structure separating the right and left lung cavities is the aortic arch. (Scanning time: 36 min.)

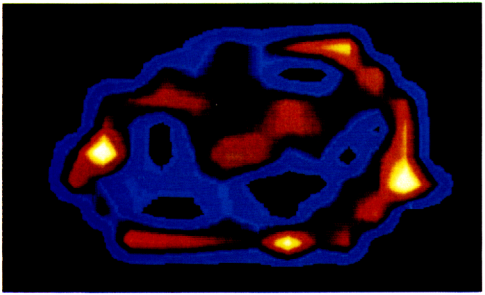

FIGURE 2. FONAR cross-sectional scan through the low chest (10th thoracic vertebra) in a patient with advanced alveolar cell carcinoma. The tumor is seen as intense signal-producing tissue (red, and less signal-intense light blue) invading both lung cavities and obliterating the bulk of the air space. (Scanning time: 30 min.)