Nuclear Magnetic Resonance vs. Computed Tomography

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The diffusion of computed tomographic (CT) scanners into the health care system, after an initially torrid start, eased up considerably once the diagnostic capabilities of the revolutionary devices were recognized. In the establishment of the scanners in the medical community, comments such as "definitive and conclusive diagnosis," "value clearly demonstrated," and "prevention of deaths and disability with relief of pain and suffering" were used frequently and enthusiastically. The ultimate accolade awarded to CT scanning was surely the Nobel Prize in Physiology or Medicine in 1979. In light of this award, the phrase, "the greatest benefit for mankind," is applied. Certainly, no physician can criticize CT scanning as not being a boon to medicine.

Nuclear magnetic resonance (NMR) has now burst on the scene with an excitement only matched by that experienced in the last decade with CT. While NMR is still in its infancy, it has jumped the two hurdles of "how well does it work?" and "can you see something worth seeing?" to "how does the new technology compare with the old?" The few medical centers now doing clinical trials are starting to grapple with sensitivity and specificity, and ultimately the question of utility will come into the picture. At the recent meeting of the XII Symposium Neuroradiologicum at Washington, DC, in October 1982, a strong sense of "déjà vu" existed as the various speakers extolled the merits of NMR. Again, the terms "more sensitive," "less invasive," and "phenomenal ability" were heard, but this time with a difference. Instead of comparing the new modality with the painful, dangerous, comparatively high-radiation technologies such as angiography and pneumoencephalography, the wonder child, CT scanning, was under fire!

It is natural and appropriate that one noninvasive modality be compared with another. Only by carrying out this type of analysis can the utility of NMR in the evaluation of disease be assessed. It is unfortunate, however, that the NMR enthusiasts need to downgrade CT as they do, particularly since, in many of the comparisons, the CT scanners are not used optimally. In one paper, the CT scans were obtained at 230 mAs whereas the scanner can be operated at 460 mAs [1]. Furthermore, in a case of brainstem infarction not seen on the CT scan but seen on the NMR scan, the CT image of the posterior fossa was obtained at a nonoptimal scan angle with a 1 mm pixel size [1], whereas optimal operation of the scanner would be with an angled gantry with 0.5 mm or 0.3 mm pixel size. Nevertheless, the comment is made that NMR is more useful than CT in demonstrating brainstem infarction.

NMR is one of the miracles of imaging in the 1980s. However, a more studied and less rhetorical assessment of its capabilities is necessary. Though NMR can achieve information not achieved by CT (and vice versa), radiologic imaging is not served well by excessive claims for either technology or by operating one machine at less than its full capabilities. We must realize that governmental control will certainly be applied to the diffusion of NMR as it was to CT. Let us be careful that our credibility is not questioned by the public health authorities, who, if they attended the symposium, would be raising questioning eyebrows at those of us who still extol the virtues of CT scanning and those of us who equally praise the NMR technology.

REFERENCE