

# Nonmammographic Imaging of the Breast: Current Issues and Future Prospects

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**B**REAST CANCER incidence is increasing, and at a recent National Institutes of Health consensus development conference, it was estimated that 1.5 million women in the United States will be diagnosed with breast cancer in the 1990s and that approximately 30% will die of their disease.<sup>1</sup> It has been well demonstrated that breast cancer mortality can be reduced with screening mammography, and at present, mammography remains the sole imaging modality with proven capability of detecting small, clinically occult breast cancers.<sup>2-6</sup>

Despite a rapidly growing acceptance of screening mammography, issues remain that have tempered widespread use. Although the risks of very low-dose radiation are currently believed to be negligible, lingering concerns about possible carcinogenesis have contributed to the development of nonionizing imaging modalities. Other areas of concern reflect known limitations of mammographic sensitivity and specificity. Although more accurate than any other currently available breast-imaging modality, mammography is imperfect, and in a large multi-institutional program, only 80% to 90% of breast cancers were detected.<sup>4</sup> There are several possible reasons for a "missed" cancer, although the most common cause is a radiographically dense breast that obscures an underlying noncalcified cancer. Perhaps the most significant limitation of mammography is its relatively low specificity. Of mammographically detected lesions considered suspicious enough to warrant biopsy, only approximately 15% to 30% will prove to be malignant. This low specificity reflects an overlap in the mammographic and gross pathological appearance of benign and malignant lesions.<sup>7</sup> These limitations in sensitivity and specificity have stimulated exploration into alternative or adjunctive imaging modalities.

## ASSESSING THE CLINICAL UTILITY OF ADJUNCTS TO MAMMOGRAPHY

The need for vigorous clinical trials before the dissemination of a "new" breast-imaging technique has been stressed by several investiga-

tors.<sup>8,9</sup> In order to better understand the potential uses of new technologies, the distinction between detection and diagnosis must be emphasized.<sup>9,10</sup> Detection is the ability to find a breast cancer in an asymptomatic patient with no palpable breast lesions. Diagnosis, on the contrary, is the ability to further characterize a detected lesion as benign or malignant. A new screening technique must be able to detect clinically occult breast cancer that is not visible mammographically. A diagnostic technique will be clinically efficacious if it permits a confident etiologic designation that can be shown to alter patient management.<sup>9</sup> A new imaging technique may perform both the role of detection and diagnosis, but this does not have to be the case. Mammography remains the only imaging modality with proven capability to detect early, clinically occult breast cancer, yet there are several other breast imaging techniques that may serve as adjuncts to mammography in the detection and/or diagnosis of breast cancer. Some have been studied and discarded. Others are in varying stages of development and evaluation.

### Thermography

Thermography was developed as a noninvasive imaging modality to detect temperature changes on the skin surface secondary to an underlying breast cancer. It was hoped that

#### ABBREVIATIONS

CT, computed tomography; FDG, 2-[F-18]-fluoro-2-deoxy-D-glucose; F-18-ES, 16-[F-18]-flouroestradiol-17; MRI, magnetic resonance imaging; PET, positron emission tomography scanning; ROC, receiver operating character analysis.

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