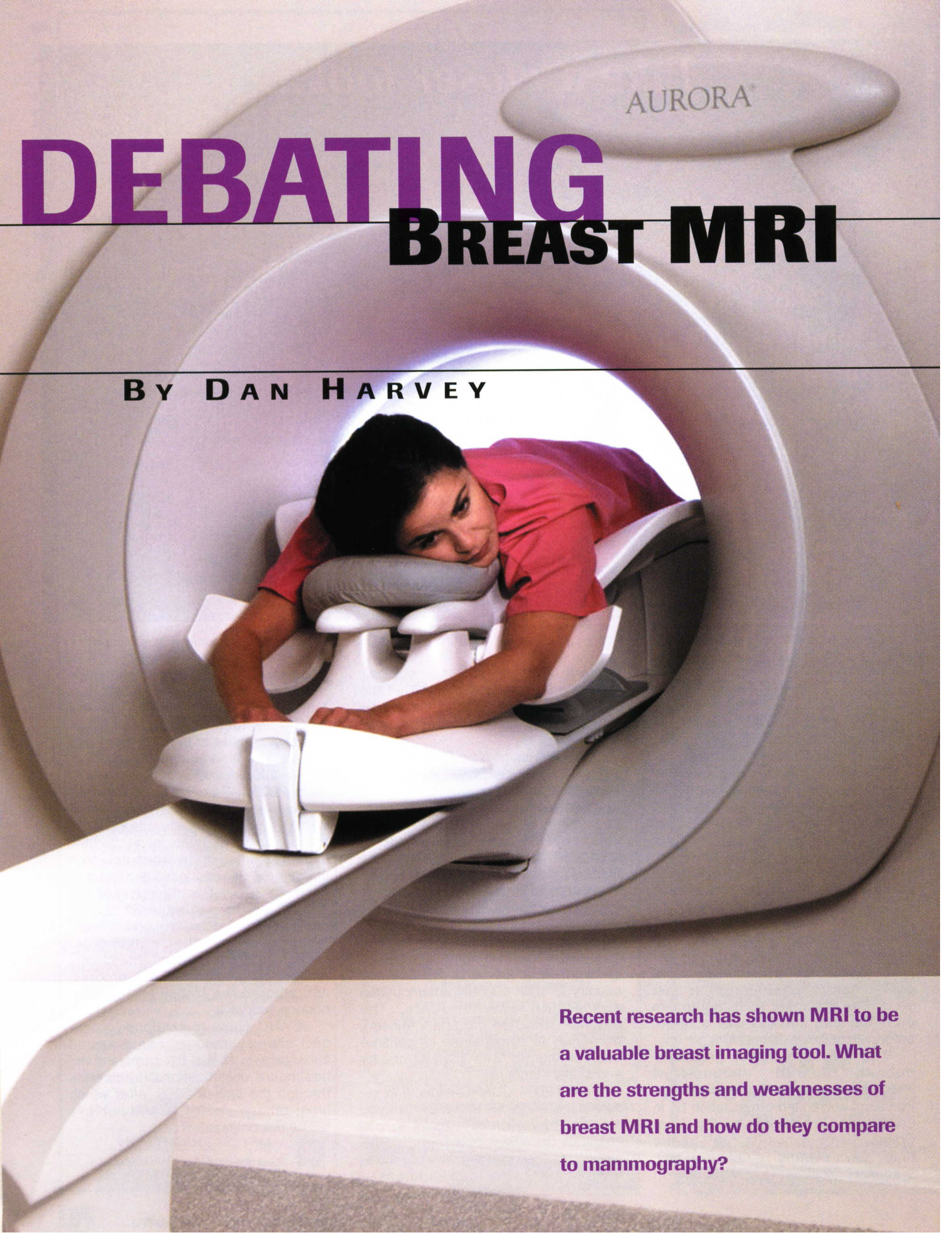
DEBATING BREAST MRI

By Dan Harvey



Recent research has shown MRI to be a valuable breast imaging tool. What are the strengths and weaknesses of breast MRI and how do they compare to mammography?

Since gaining FDA approval in 1991, breast MRI has become an effective complement to mammography in fighting breast cancer.

Primarily perceived as a "problem-solving" modality—and not a general screening tool—breast MRI follows up on the red flags raised by mammographic and physical examinations and often results in revised surgical planning approaches (lumpectomy vs. mastectomy) that improve patient outcomes. The noninvasive procedure produces hundreds of cross-sectional, multidirectional images of the breast, and obtained information can direct clinicians to sites for needle or surgical biopsy.

Breast MRI offers some distinct and significant advantages. It is more sensitive than mammography and can detect small abnormalities missed by mammograms and indicate a multifocal cancer. It can also detect cancer recurrences and residual tumors after lumpectomy, evaluate the extent of breast cancer, assess newly inverted nipples for retroareolar cancer, and locate the primary tumor when there is metastatic disease. The procedure is frequently used to assess the response to preoperative chemotherapy. Further, images can be taken from any plane and orientation.

However, breast MRI also has disadvantages. For example, since its inception more than a decade ago, the procedure has not become widely available due to the high cost and the additional training involved. For the patient, a breast MRI can cost as much as 10 times more than a mammogram. And, while it may be more sensitive than mammography, breast MRI is less specific.

One significant disadvantage is that, unlike mammography, it doesn't detect certain types of small calcifications that can indicate early cancer. In addition, because a contrast agent is used, some normal, noncancerous breast tissue can become enhanced, which can result in unnecessary biopsies. "It can show findings that are not seen on mammograms, while mammograms show findings that the MR doesn't," says Mark D. Novick, MD, medical director of Manhattan East Breast Imaging in New York City, an imaging center offering breast MRI. "When you increase sensitivity to detect smaller lesion sizes, you sacrifice specificity and pick up nonmalignant findings that stimulate false-positive studies that result in biopsies."

However, Novick emphasizes that false positives are a natural phenomenon when trying to diagnose at earlier stages and can be life-saving procedures. "So, it is not that it [a false positive] is a problem that occurs—it is a phenomenon that occurs," he says. "It is not a contraindication or reason not to consider it. It is a statistical phenomenon that occurs based on the technology and the lesion size. The unfortunate situation of a false-positive biopsy is a fortunate diagnosis for the patient."

Clearly, a biopsy in such circumstances is necessary. Biopsy of lesions detected with MRI alone has been difficult since physicians had to learn how to use MRI to direct them toward the suspicious area. A new development recently approved by the FDA—the breast biopsy—was designed to alleviate that problem by allowing physicians to biopsy lesions using MRI guidance.

"The breast MRI biopsy capability will go a long way to diminish the incidence of surgical false-positive biopsies by allowing these areas to be sampled in the magnet with small needles," says Novick.

Time has been another disadvantage. A breast MRI can run as long as 45 minutes to one hour, while a mammogram takes 10 minutes to 15 minutes. But, again, researchers have developed a solution: dynamic, contrast-enhanced breast MRI, which cuts the time by almost one-half.

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In addition to new technological developments, researchers are also trying to determine if breast MRI is useful in screening younger women (younger than 40 years of age) who are at high risk for breast cancer (due to factors such as family history). Breast MRI could be useful in these cases because it can effectively image the dense breast tissue most younger women tend to have.

FOR SELECTED PATIENTS

Breast MRI isn't appropriate for all women. Usually, the best candidates are women who were previously diagnosed with cancer and plan to have surgery or chemotherapy followed by surgery. Women who receive postoperative chemotherapy are best followed with MRI to assess tumor response and for final preoperative planning for breast surgery. Other candidates include high-risk women with dense breast tissue or scar tissue from previous breast surgery or implants. "We believe that breast MRI is more sensitive than mammography and useful in selected breast patients," explains Mary K. Hayes, MD, medical director of the Breast Center at Memorial Regional Hospital in Hollywood, Fla. (a facility that offers breast MRI and MRI-guided breast biopsies and needle localizations).

Facilities using breast MRI have found that primary benefits include determining the extent of cancer, detecting occult cancers in women presenting with metastatic disease and no known primary tumor, identifying and characterizing malignant vs. benign lesions in women with equivocal mammography and/or ultrasound findings, monitoring cancer therapy, and identifying cancer in women at increased risk for breast cancer.

The procedure's viability has been indicated in clinical studies. For instance, a 2001 study—conducted by researchers from the University of Pennsylvania School of Medicine and Millersville University, Pennsylvania—demonstrated that breast MRI was clinically useful in evaluating and staging women with early-stage breast cancer and determining optimal local treatment. The researchers reviewed the charts of 207 women and found that the integration of breast MRI studies into the clinical workup of women with early-stage breast cancer altered the clinical management for a large fraction of them (43 women, or 20% of 212 cancers).

THE BREAST BIOPSY COIL

Because MRI cannot always distinguish between cancerous and noncancerous abnormalities, breast biopsies become necessary. However, a biopsy of an MRI-detected abnormality can be particularly difficult because physicians must learn how to use MRI to guide them in accessing the abnormal tissue. To confront this problem, researchers developed the breast biopsy coil.

The FDA-approved, MRI-compatible breast biopsy coil provides a way for clinicians to more easily access problematic tissue. They can perform needle localization directly in the scanner. During the MRI, the breast coil is placed around the breast to direct surgeons to focal areas where a small piece of tumor tissue can be removed to determine whether it is malignant or benign.

At Memorial Regional Hospital, the need for such a device was keenly felt since breast MRI patient cases have more than tripled there. Without the coil, the hospital could offer patients only two options: extensive surgery to remove the breast or further testing performed at an out-of-state university. Hayes notes that when an abnormality is found, it can be difficult for a surgeon to identify the specific lesion. The MR guidance mechanism allows the RT to perform either a needle biopsy or preoperatively localize the area for the surgeon accurately.

The procedure is similar to breast MRI. The patient lies face-down in a prone posi-