Contrast-Enhanced Mammography: The Cost & Savings of Care

Kathy Schilling, MD, Medical Director, Christine Lynn Women's Health & Wellness Institute, Boca Raton Regional Hospital.

At the Lynn Women's Health and Wellness Institute at Boca Raton Regional Hospital in Florida, we have fully integrated Contrast-Enhanced Mammography (CEM) into breast imaging practice, while still maintaining a robust breast Magnetic Resonance Imaging (MRI) program. The growth of our CEM program is similar to other major women's health centers; we have seen significant time and financial benefits from using CEM, as well as greater patient satisfaction.[1,2,3]

This whitepaper highlights our experience and the impact of incorporating CEM in our clinical practice and the use of CEM biopsy as an alternative to MR options.

Advanced Applications in Breast Imaging

Functional imaging tools such as breast MRI (standard and abbreviated) are supplemental tools that are used for evaluating inconclusive cases seen on mammography or ultrasound. Breast MRI requires the intravenous injection of gadolinium which, when circulating, collects around cancers due to new leaky blood vessels.

A newer technique first cleared for use by the FDA in 2011 for diagnostic purposes is contrast-enhanced mammography or CEM. CEM is a functional imaging tool performed with the intravenous injection of non-ionic based iodine. Post injection, there is a 2-minute waiting period while the contrast circulates, followed by standard mammographic positioning and imaging which are automatically acquired at both a low and high energy level.[4] The low energy image demonstrates the morphology of the breast as seen in a standard 2D full field digital mammographic image. The high energy image is used to automatically generate a recombined image via the system. The recombined image depicts contrast uptake without the distraction of structural density or noise of non-enhancing fibroglandular tissue. The entire CEM exams takes approximately 7 minutes to complete, provides views of both breasts for comparison, results in few artifacts, and is well tolerated by patients.[5] In this way, CEM reveals lesions with higher neovascularity and extravascular leakage of the contrast agent, two common characteristics of early neoplasm[6].

CEM for Assessing Dense Breasts

An estimated 43% of women in the United States (U.S.) have dense breasts, increasing their risk of breast cancer up to fivefold depending on the level of density.[7] Standard full field digital mammography can miss up to a third of cancers in women with the highest breast density.[8] Current guidelines from the FDA, ACR and NCCN call for such patients to undergo additional screening with ultrasound (handheld or automated), CEM, or MRI all of which to find lesions that cannot be seen on routine mammography.[9,10]

Numerous studies both prospective and retrospective, point to benefits of using CEM as an adjunct modality to standard FFDM and Ultrasound. CEM allows for the detection of lesions that would otherwise go undetected.[9]

While MRI demonstrates excellent sensitivity as an additional screening modality, it also has significant challenges that lead to its underuse, including patient appropriateness, patient compliance due to accessibility and cost.[2,10]

CESM is an alternative imaging method to MRI, especially when MRI availability is limited, and for patients for whom MRI is contraindicated.[2,10] While CEM results in slightly higher radiation dose compared to traditional 2D FFDM, it does not exceed the Mammography Quality Standards Act dose limit of 3mGy per view on a 42mm compressed breast thickness as typically tested with an ACR phantom. The risk of adverse contrast reactions is small. This is well documented in the literature and something we can attest to based on our experience with CEM at our facility.[1]

Gaining Momentum

New National Comprehensive Cancer Network® (NCCN) guidelines for breast cancer updated in early 2024 now recommend CEM for patients who qualify for, but cannot undergo MRI. In 2021, the American College of Radiology published an article on the appropriate use of CEM and included a supplement to the 2013 BI-RADS Lexicon for CEM in 2022.[10,12]

There are several advantages to CEM:

- CEM can be used for patients with indications for, but contraindications to, MRI. This includes those with pacemakers, aneurysm clips or other metallic hardware, claustrophobia, obesity, or the inability to lie motionless.[1]
- Patients prefer CEM to breast MRI because it's faster, more comfortable, quieter, and less anxiety-provoking[2]. Two out of three patients prefer the SenoBright/ SenoBright HD experience to a breast MRI, with faster procedure time, greater comfort, lower noise level and lower rates of anxiety.[5]
- Logistical ease and comfort of known surroundings as patients undergo CEM in the same location as their mammogram.[8]

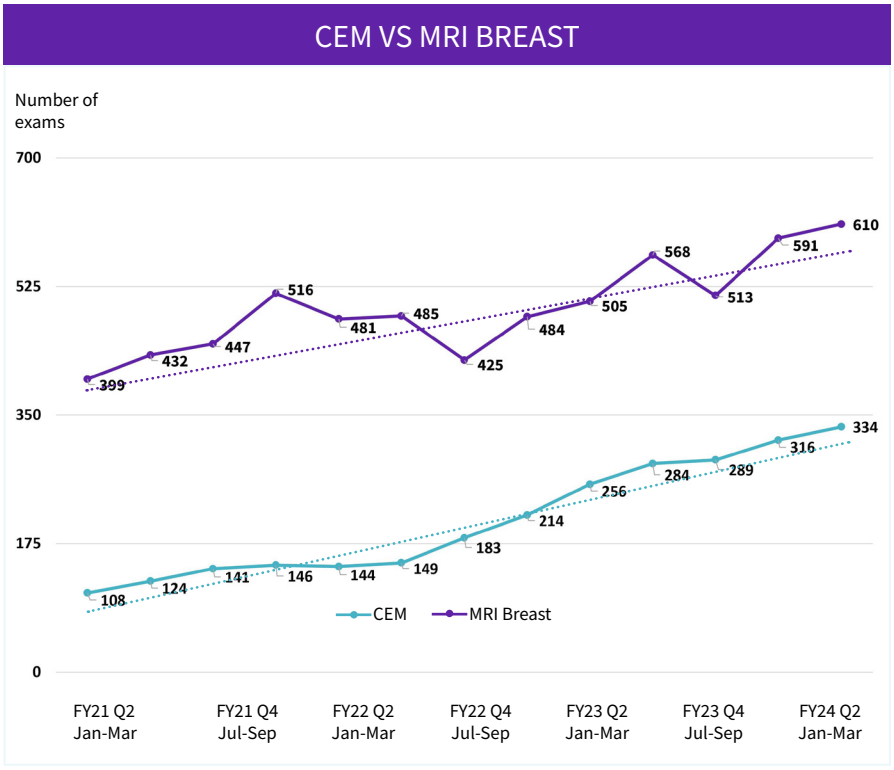
- It is easier to compare CEM and DBT images than DBT and MRI images.[13]
- Significantly more women in the US have access to mammography services than MRI.[14]

Growth: CEM and MRI

An initial concern we had in our practice was whether shifting patients to CEM would affect our overall MRI volume and revenue. Actually, the opposite has been true, we have been able to maintain, and even grow, our MRI breast volume while consistently growing CEM exams.

In fact, we found by integrating CEM into our protocol we opened our practice to a new population of patients and those who couldn't or wouldn't get an MRI.[15]

As you can see from Graph 1 below, our MRI volume increased 53% during this period while our CEM volumes more than tripled. And, during this time our overall practice volume did not significantly increase, nor did we add additional equipment to achieve these results.



Cost Differential Between CEM and MRI

Contrast-enhanced mammography is available as an upgrade to a new or otherwise existing mammography unit making it more accessible for practices than MRI.

An in-depth analysis of the capital and ongoing costs related to CEM vs MRI demonstrates significantly lower expenses to both implement and perform CEM. Total capital costs for CEM are $424,862 (including the mammography unit) versus $795,062 for an MRI with a breast coil, a 48% difference. Annual costs for maintenance are $100,695 and $211,580 for CEM and MRI, respectively, another 53% of cost savings.[16]

Reimbursement

A key misunderstanding with regards to CEM is that there is no reimbursement, and reimbursement for MRI is significantly higher. Although there is not a specific Current Procedural Terminology (CPT) code for CEM, there are codes for the injection and contrast media that can be billed in addition to the diagnostic mammogram. Patients with traditional Medicare pay a 20% coinsurance after meeting the Part B deductible and they have similar out-of-pocket costs with private health insurance. As demonstrated in table 2 our analysis shows we have higher reimbursement for CEM ($312.29) under Medicare as compared to diagnostic DBT and ultrasound, $142.41 and $104.41, respectively, with similar reimbursement for MRI $352.72.

The additional benefit with regards to costs are those for the patient. table 3 demonstrates average out of pocket costs, under the same considerations as noted below, to be $200, $500, $1,000, and $200 for a diagnostic DBT, ultrasound, MRI and CEM respectively. This shows a significant advantage for patients with an 80% out of pocket cost reduction for a CEM as compared to MRI.

DEPARTMENT FINANCIALS					
Medicare Allowable	3D Screening Mammo	3D Dx Mammo	U/S	MRI	CEM
Payment	$122.55	$142.41	$104.41	$352.72	$312.29

PATIENTS FINANCIALS					
Patient	Screening Mammo	Dx Mammo	U/S	MRI	CEM
Out of Pocket Expense	$0	$200	$500	$1,000	$200

CEM biopsy capability

The FDA cleared CEM guided biopsy in 2020 and since then several real-world studies confirm that CEM offers an effective option for biopsy compared to MRI-guided biopsy with high success rate, and median time per procedure of 15 minutes.[17,18,19]

As an early adopter of CEM we were eager and one of the first sites to implement CEM biopsy in the U.S. upon release in March of 2021. We understood the benefit to have the technique for our CEM findings and started to move from MRI-guided biopsy to CEM-guided biopsy during the pandemic when there was a shortage of MRI coil disposables due to supply chain issues.[20] Graph on the next page highlights the change in biopsy method over the past 3 years in our practice.

We found lower costs to implement and perform biopsies with CEM than MRI. Through our work, we found the total cost of CEM diagnosis followed by CEM biopsy was $584, whereas the cost of an MRI scan plus biopsy was $1,184, resulting in a total savings of $599 per exam. The cost of CEM-guided biopsy alone was 60% lower than MRI ($500 vs $847).[16]

Much of the savings is due to the time for each procedure. An analysis of the two procedures found a technologist time savings per exam of more than 3 hours for the diagnostic exam and biopsy with CEM vs MRI, and more than an hour of radiologist time.[16]

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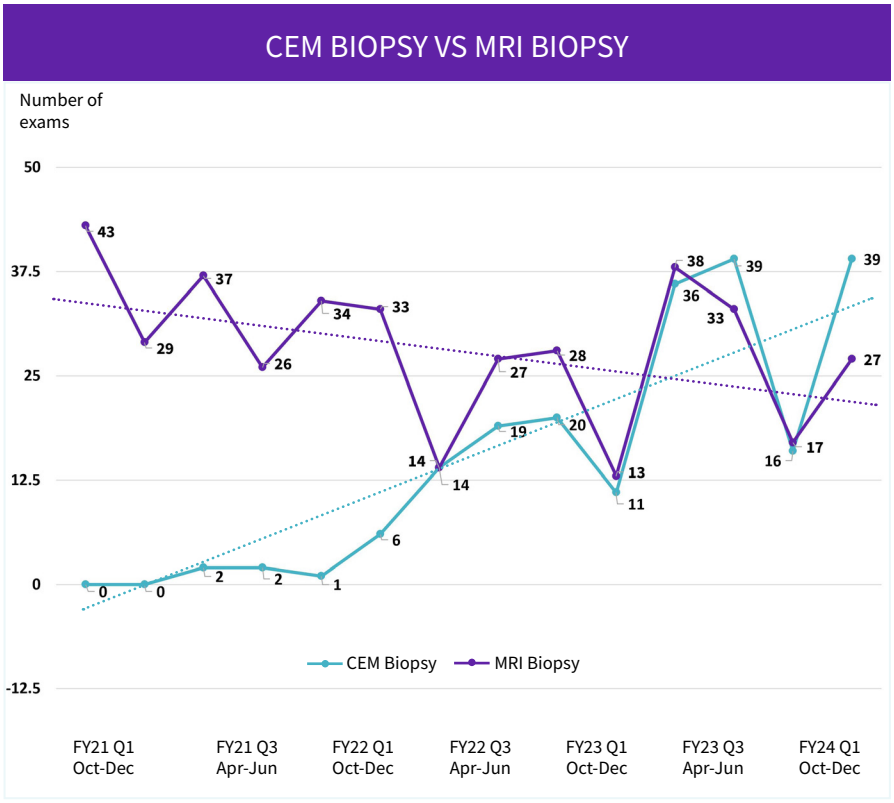
This move to CEM biopsy also proved to be a cost benefit and opportunity to free up the MRI magnet and interventional technologists from lengthy and costly MRI-biopsies. As we became more comfortable with CEM biopsy, we started moving our MRI findings direct to CEM biopsy where procedures were 61% less time and 51% less costly. Given the lesions identified on the MRI, we can opt to perform a CEM biopsy as an alternative to an MRI biopsy.

Our experience has been positive, with time and cost savings, improved workflow, and with greater patient preference and satisfaction.



Conclusion

As a dedicated breast imaging professional, it is my interest to increase access and remove both physical and financial barriers to care for all women. Looking into the future, we anticipate huge growth potential with CEM. The cost and availability of equipment, reduced cost for the facility and patient, reduced time to perform and interpret the exam, improved patient preference and satisfaction, and enhanced provider acceptance are among the reasons we have integrated and will continue to utilize CEM and CEM biopsy in our practice.

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