

## Comparative study of the performance of CE Mammography vs CE breast MRI

A recently published paper describes a systematic review and meta-analysis of Contrast-Enhanced Mammography (CEM versus Contrast-Enhanced Breast MRI (CE-MRI) [1].

Contrast-enhanced mammography (CEM) is a more accessible alternative to contrast-enhanced MRI (CE-MRI) in breast imaging; CEM is a much more recent technology, but has already been the subject of several studies and papers describing its performance. Many reports have described the sensitivity of CEM in the detection of lesions to be approximately similar to that of MRI. With breast MRI being a much more established technology its performance characteristics have been fully described

However until now a summary comparison of published studies has been lacking.

A group of research radiologists from Vienna, Austria set out to address this issue, with the precise aim of their study being to directly compare the performance of CEM and CE-MRI regarding sensitivity, specificity, and negative predictive value in detecting breast cancer. The meta study covered all publicly available studies in the English language.

### METHODS

Two readers extracted the characteristics of studies investigating the comparative diagnostic performance of CEM and CE-MRI in detecting breast cancer, with all studies published up until April 2021 being considered eligible. Sensitivity, specificity, negative predictive value, and positive and negative likelihood ratios were calculated using bivariate random effects models. A Fagan nomogram was used to identify the maximum pretest probability at which posttest probabilities of a negative CEM or CE-MRI examination were in line with the 2% malignancy rate benchmark for downgrading a Breast Imaging Reporting and Data System (BI-RADS) category 4 to a BI-RADS category 3 result. I2

statistics, Deeks funnel plot asymmetry test for publication bias, and meta-regression were used.

### RESULTS

Seven studies investigating a total of 1137 lesions (654 malignant, 483 benign) with an average cancer prevalence of 65.3% (range: 47.3%–82.2%) were included. No publication bias was found ( $P = .57$ ). While the positive likelihood ratios for the two techniques were similar, at a value of 3.1 for CE-MRI and 3.6 for CEM, the negative likelihood ratio of CE-MRI (0.04) was lower than that with CEM (0.12).

CE-MRI had higher sensitivity for breast cancer than CEM (97% [95% CI: 86, 99] vs 91% [95% CI: 77, 97], respectively;  $P < .001$ ) but lower specificity (69% [95% CI: 46, 85] vs 74% [95% CI: 52, 89];  $P = .09$ ). A Fagan



CEM is carried out in a similar way to classical mammography. Like mammography, CEM is based on the use of ionizing radiation but also involves the administration of contrast medium. The physiological basis of the detection of lesions is different from mammography and is analogous to that of breast MRI, which involves the administration of MRI-specific contrast agents. There are many more mammography systems available than breast MRI installations so CEM is in general much more accessible.

However, like mammography, CEM involves compression of the breast. Many women find this uncomfortable and even painful. On the other hand in CEM there is no problem with claustrophobia as occurs occasionally with MRI



Breast MRI is carried out without compression of the breast. However the installed base of MRI machines is much smaller than that of mammography systems, especially in Europe, so accessibility to MRI is relatively more restricted than CEM.

nomogram demonstrated that the maximum pretest probability at which both tests could rule out breast cancer was 33% for CE-MRI and 14% for CEM.

“... While contrast-enhanced mammography and contrast-enhanced MRI (CE-MRI) showed comparable diagnostic performance, CE-MRI had superior sensitivity and negative likelihood ratios with higher pretest probabilities to rule out malignancy...”

Furthermore, iodine concentration was positively associated with CEM sensitivity

and negatively associated with its specificity ( $P = .04$  and  $P < .001$ , respectively).

### CONCLUSION

While contrast-enhanced mammography and contrast-enhanced MRI (CE-MRI) showed comparable diagnostic performance, CE-MRI had superior sensitivity and negative likelihood ratios with higher pretest probabilities to rule out malignancy.

### REFERENCES

1. Pötsch, N *et al.* Contrast-enhanced Mammography versus Contrast-enhanced Breast MRI: A Systematic Review and Meta-analysis. *Radiology* Jun 2022; <https://doi.org/10.1148/radiol.212530>