When compared with MRI, CESM is simple, relatively inexpensive, fast to perform, easy to interpret and has few contraindications. CESM and CEMRI share many clinical indications and if CESM is confirmed to be diagnostically non-inferior, it could replace CEMRI in some circumstances.

**CONTRAST ENHANCED MRI**

CEMRI is the current gold standard breast imaging technique because it offers a radiation-free, three dimensional, highly sensitive method of assessing the presence of breast cancer. However, it has many drawbacks, including high cost, low accessibility, relatively long scan and interpretation times and many contraindications. Even more importantly, many patients are simply unable to tolerate CEMRI. These factors have led to development of several alternative techniques, including CESM.

**CONTRAST-ENHANCED SPECTRAL MAMMOGRAPHY**

Like CEMRI, CESM is able to show areas of abnormal blood flow and neovascularity by virtue of the visible accumulation of contrast material. The patient is given an injection of iodinated contrast material followed by the standard four mammographic views taken in quick succession. A low and high energy X-ray exposure is taken for each view, one just above and the other just below the k-edge of iodine, to take advantage of the differential X-ray absorption by iodine. These paired images undergo logarithmic subtraction to remove non-enhancing background “noise”, giving images of iodine uptake in the breasts. The study can be performed in the clinic on the day the patient presents and takes 10 minutes to perform. Interpretation is fast and does not require special training. Two companies now have FDA approval for this equipment, sold as an add-on to current mammography machines at relatively low cost compared with the costs of installing an MRI machine. CESM has superior diagnostic accuracy to standard full field mammography with or without ultrasound in the detection of breast cancer, particularly in women with dense breasts [1, 2]. It is feasible to include CESM in a busy clinic as part of the diagnostic work-up of patients recalled with an abnormal screening mammogram, where its high negative predictive value may make supplementary ultrasound
unnecessary, other than to target suspicious lesions for core biopsy [3]. The diagnostic performance of CESM in comparison with CEMRI for local staging of breast cancer has also been evaluated. Research has shown that CESM is either non-inferior or significantly stronger at detecting malignant index cancers [4-7]. Two studies have found that CEMRI has higher sensitivity in the detection of additional malignant lesions; however it also generates more false positives when compared with CESM [4 6]. From the patient's perspective, this could mean that CESM translates into fewer unnecessary extra tests and biopsies, an aspect of the patient experience not evaluated in our study.

**PATIENTS’ PREFERENCES**

Despite its strong diagnostic performance, MRI induces a high rate of anxiety-related reactions, including claustrophobia, with 1-15% of patients either requiring sedation to undergo the scan or having to abort it altogether [8]. MRI of the breast has been shown to be relatively well tolerated compared with that of other body regions. However compared with conventional mammography, it has been shown to induce a significantly higher level of distress [9].

Our research is the first to compare CESM against CEMRI in terms of patient preference [10]. Prior to this, the literature had centred exclusively on the diagnostic capacity of these two modalities.

In our study [10], 49 participants in the CESM V trial (protocol available at the ANZCTR website [11]) with biopsy-proven breast cancer underwent both CESM and CEMRI as staging investigations after which they completed a five-point Likert questionnaire. This contained 7 questions about their preference towards the overall experience, as well as individual aspects of either imaging modality.

In terms of overall patients’ experience, our research found that our patients preferred CESM to CEMRI (n=49, p<0.001). Participants were given the opportunity to explain this preference by free-text: they cited faster procedure time, greater comfort and lower noise level as the commonest reasons for preferring CESM.

When investigating the individual parameters of the patient experience, our findings indicated a lower level of anxiety associated with CESM compared with CEMRI (n=36, P=0.009). For the other aspects of patient experience, which were namely comfort during breast compression and the sensation of IV contrast injection, participants preferred CEMRI at a significantly higher rate (n=49, p=0.001; n=49, p=0.003, respectively).

**STUDY LIMITATIONS**

Our research carried a number of limitations, most importantly that of the small sample size. A larger study is needed to confirm our findings.
It was brought to light late in the trial that anxiolytic medication prior to CESM or CEMRI could influence the participants’ perception of either technique, which could bias results if taken prior to one and not the other. Therefore, these data are now being collected for the remainder of the trial.

Finally, the lack of use of a validated questionnaire, such as State Trait Anxiety Inventory (STAI), limits the extrapolation of our study results to those of others.

REFERENCES