

# FEASIBILITY OF BREAST MRI AFTER SENTINEL LYMPH NODE PROCEDURE OF BREAST CANCER USING SUPERPARAMAGNETIC TRACERS

Michelle Cheung, Tina Lam  
Department of Radiology, Queen Mary Hospital



## OBJECTIVES

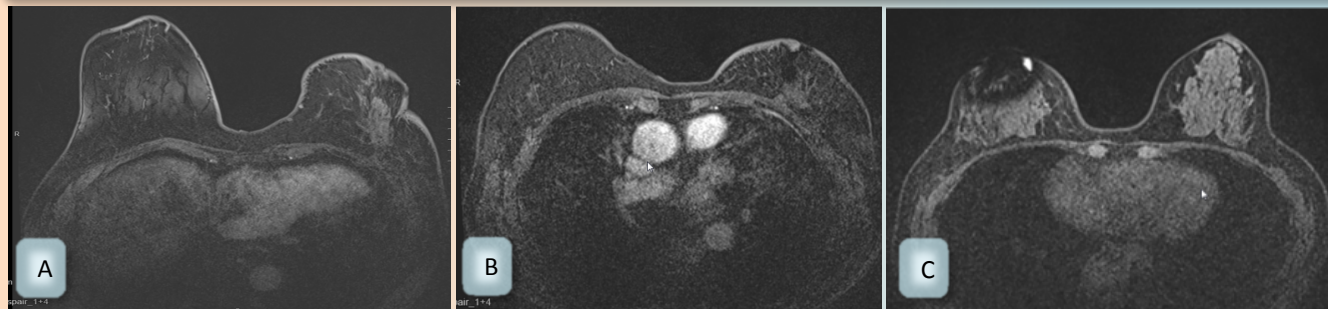
To investigate the applicability of breast magnetic resonance imaging (MRI) as a means of post-operative imaging modality in the follow up assessment of patients with breast cancer who underwent sentinel lymph node procedure using superparamagnetic iron oxide tracer Sienna®. This is a sub-study of an ongoing randomised controlled trial conducted by the Department of Surgery, Queen Mary Hospital, on use of SPIO versus conventional radioisotope and patent blue dye in sentinel lymph node detection for breast cancer.

## MATERIALS AND METHODS

Patients recruited by the Department of Surgery that had undergone sentinel lymph node procedure using Sienna® were assessed with MRI at field strengths of 1.5 Tesla (MAGNETOM Aera; Siemens Healthineers, Erlangen, Germany) at 18 months after surgery. Pre-contrast axial FSE T2W and dynamic contrast Axial 3D GR T1W scans were performed. In an attempt to reduce susceptibility artifacts, bandwidth was increased to 340 Hz/pixel, and echo time was reduced to 2.39msec for 3D GR T1W acquisitions. All MRI were analysed with respect to susceptibility artifacts due to iron remnants. Three categories were used for interpretation of the MRI and artefacts: 1) breast imaging possible without restrictions (A) , 2) image quality impaired but readable (B), 3) interpretation was impossible to interpret due to artefacts (C).

## RESULTS

A total of 10 patients had been recruited. 5 patients have completed MR exam so far. Mean number of days between OT date to MR exam is 549.4 days. In 4 out of 5 patients (80%) imaging was impaired but readable. Only in 1 patient image interpretation was impossible due to artifacts. No tracer residues were found in the axilla region of the investigated patients.



## CONCLUSION

Magnetic susceptibility artifacts results from distortions or local signal change due to local magnetic field inhomogeneities from a variety of compounds. Superparamagnetic materials such as superparamagnetic iron oxide (SPIO) contain nanoparticles of iron oxide crystals which leads to shortening of spin-spin relaxation time (T<sub>2</sub>), resulting in darkening of MR images.

The interim results from our study shows that interpretations of the MR scans using a 1.5T MR coil with an adapted protocol was still possible in 80% of patients. This study is limited by a very small sample size. However, our interim results remain hopeful. Ongoing recruitment with MRI scanning using the altered protocol will continue, and a larger sample size will reveal more convincing results. Patients with SPIO procedures performed may potentially benefit from having breast MRI of diagnostic quality after using an adapted protocol.

## References

- Forte S, Kubik-Huch RA, Leo C. Improvement in breast magnetic resonance imaging after a sentinel procedure for breast cancer with superparamagnetic tracers. *Eur J Radiol Open*. 2019 Jun 7;6:215-219.
- Ahmed M, Purushotham AD, Douek M. Novel techniques for sentinel lymph node biopsy in breast cancer: a systematic review. *Lancet Oncol*. 2014 Jul; 15(8):e351-62.