" Simplifying something that until yesterday seemed complex. Fusion imaging allows us to enhance our capabilities, thanks to Artificial Intelligence, and to make increasingly accurate diagnoses."

BREAST

Breast Ultrasound Advanced Solution
BreastNav™ MRI: MRI-US fusion imaging

Case studies courtesy of

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In recent years, fusion imaging with MRI and ultrasound has proven to be a **valuable aid** for the identification and characterization of findings that are difficult to detect with conventional breast imaging methods.

Thanks to a sophisticated algorithm, based on 3D adaptive modelling Artificial Intelligence technology, **BreastNav™ MRI** allows to co-register a breast MRI, performed in the prone position in a fairly **accurate way**, with ultrasound acquisitions in supine decubitus, thus avoiding the implementation of further MRI sequences in the supine position with not dedicated coils.

BreastNav™ MRI enables **MRI-US fusion imaging** by means of an electromagnetic transmitter plus an antenna receiver, which is attached to the ultrasound probe using a dedicated holder. The registration procedure requires 5 fixed anatomical landmarks to be set on the MRI and then two sweeps in the ultrasound environment, on the patient's breast profile, performed with an ultrasound probe without pressing the skin, to define the spatial coordinates in the ultrasound without applying MRI-visible fiducial markers on the cutaneous plane, which could alter the mammary skin profile and, as a result, the co-registration procedure.

This technology could be used as an **alternative guide** to a VABB MRI-guided biopsy, which is often difficult to perform, more invasive and highly limited due to the patient's physical characteristics or to the location of the lesion (not suitable for deep and superficial lesions).
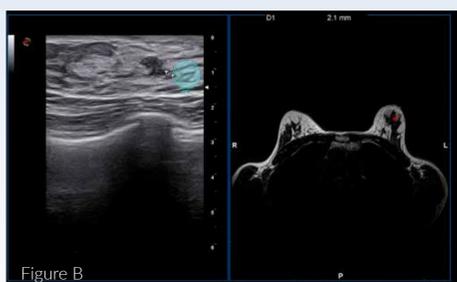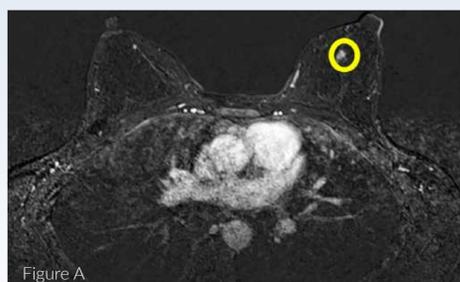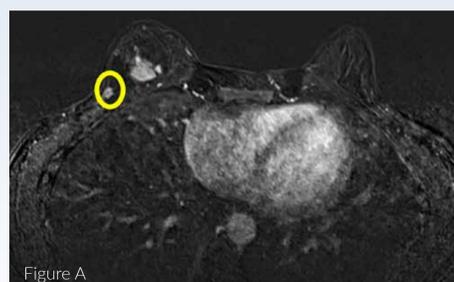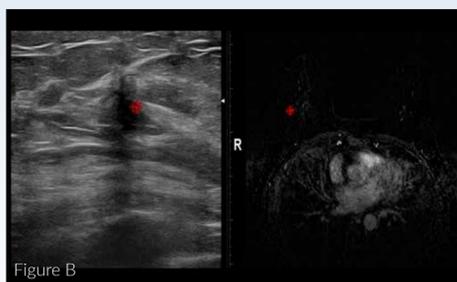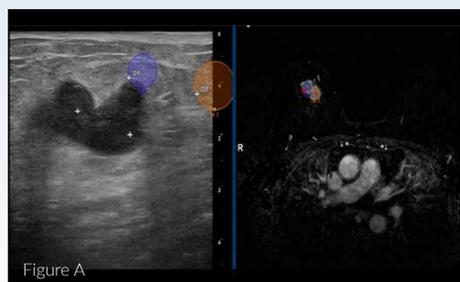
Case 1

Figure A
Figure B

Figure A shows the first minute of the CE-MRI dynamic sequence with a millimetric area of questionable contrast enhancement, not found in the mammography, in a patient with a large contralateral infiltrating lobular carcinoma. BreastNav™ MRI (**figure B**) helped to detect and then also biopsy the second focus, which was found to have the same histotype as the contralateral one.
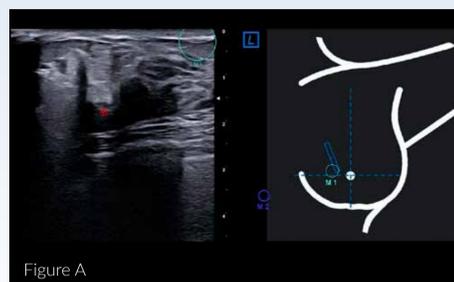
Case 2

Figure A
Figure B

On LOQ, adjacent to an identified infiltrating lobular carcinoma, the patient's CE-MRI showed a second focus with suspicious contrast enhancement, not found in the mammography and in the US (**figure A**). In **figure B**, the lesion highlighted in the MRI was identified in the ultrasound with a very small overlap (4 millimeters) thanks to BreastNav™ MRI and then characterized.

Case 3

Figure A
Figure B

The first minute of the CE-MRI dynamic sequence showed a massive bilobed cancer lesion, namely a ductal carcinoma infiltrating the upper-right quadrant (**figure A**). Moreover, the MRI examination showed, homolaterally, a millimetric second focal point of the disease, identified in the ultrasound only after BreastNav™ MRI fusion imaging with real-time navigation.

Case 4

Figure A
Figure B

BreastNav™ MRI technology enabled to find, in a very simple way, a lesion in the left LIQ, compatible with DCI, previously detected in the MRI (**figure A**). Moreover, CE-MRI (**figure B**) showed, contralaterally (right IQ), a suspicious contrast-enhanced area, not reported in the first ultrasound examination. The Second-look Fusion Imaging MRI-Ultrasound allowed to identify the area in the ultrasound as well, which turned out to be compatible with DCIS.

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