

## **Breast MRI using TWIST: Doubling the spatial resolution “for free”**

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### **Purpose:**

To evaluate a dynamic sequence in breast MRI that combines the advantage of high spatial and temporal resolution for its reliability and stability in diagnosis.

### **Material and Methods:**

61 women with a mean age of 51 years (range 29 to 84 years) underwent breast MRI for different reasons (n=16, exclusion of multicentric breast cancer; n=11, positive family history; n=16, differential diagnosis scar versus recurrent disease; n=18 unclear finding in other breast imaging modalities).

All exams were performed on a 1.5 T scanner (Siemens MAGNETOM Espree) using a dedicated breast array coil. The TWIST sequence (time-resolved angiography with stochastic trajectories, [1,2]) was used for the evaluation of dynamic and morphological criteria, which divides k-space in two radial regions and samples it using a pseudo-stochastic trajectory at adjustable density. While the central region is sampled at the full temporal resolution, the periphery is sampled with reduced density along complementary trajectories and the peripheral data is shared between time points. In order to have water and fat in phase, TR/TE was 9.1ms/4.8ms. 128 slices were acquired in axial orientation at 6 subsequent time points with a temporal resolution of ~65s and a spatial resolution of 0.8x0.7x1.5mm at a FOV of 340mm covering both breasts at the same time.

### **Results:**

All breast MRIs could be evaluated regarding morphological features and dynamic features. Follow-up of all women has been more than 9 months and no new breast lesions have been diagnosed in either of the women. In 34 women the MRI was classified as BI-RADS 1 or 2 and so no histological work-up was necessary. 27 women had 35 lesions that were histologically verified and which resulted in 16 benign and 19 malignant findings. In comparison to a conventional FLASH sequence, the slice thickness could be reduced from 3.0 (Figure 1) to 1.5mm (Figure 2), however different optimizations are possible such as doubling the temporal resolution.

### **Conclusion:**

The new TWIST sequence seems to be a reliable and powerful tool also in breast imaging. With modern sequences in breast MRI, high quality exams that fulfil the requirements of both high temporal and spatial resolution can be achieved with high flexibility.

### **References**

1. Laub et al, Proc ISMRM 2007, 3058
2. Lim et al, Am J Neuroradiol, 2008, 29

Figure 1

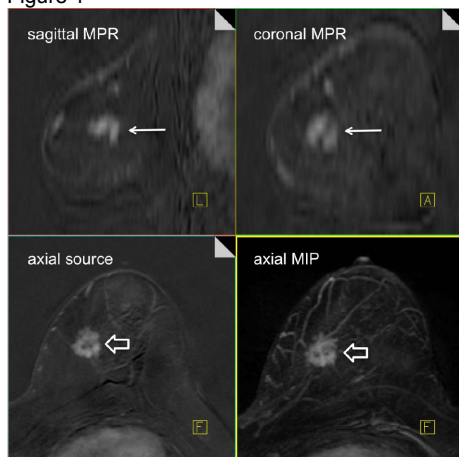
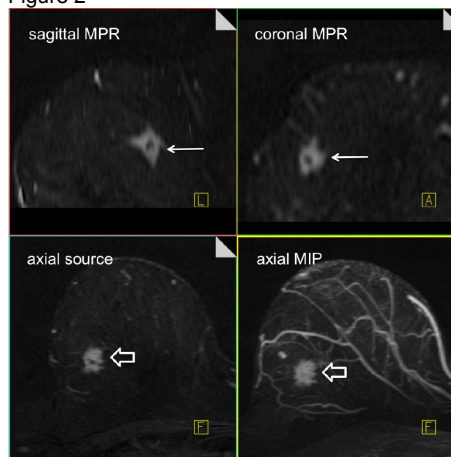


Figure 2



Axial source images, sagittal and coronal reconstructions of an invasive ductal carcinoma of two different women. Good delineation of the tumor (open arrows) in the source images of the classic dynamic sequence (Figure 1, slice thickness 3mm) and the TWIST sequence (Figure 2, slice thickness 1.5mm). Due to the slice thickness, the sagittal and coronal reconstructions result in blurred borders of the tumor in the classic sequence (Figure 1, white arrows) compared to the new sequence (Figure 2, white arrows).