In breast cancer patients with pathologically involved lymph nodes, wide field axillary +/- periclavicular lymph node radiotherapy (RT) is performed.

A new T2-FFE MRI method has been developed which provides an excellent tool for direct lymph node localization. Its application might result in extreme small target volumes and thus improved sparing of normal tissues. It opens the possibility of stereotactic targeting accuracy of individual lymph nodes using the MRI linac design. The method may also be applied to most other lymph node regions.

Presently direct visualization of lymph nodes with MRI is generally performed with T1 weighted MRI (T1w MRI) or diffusion weighted MR (DW-MRI). In T1w MRI, lymph nodes close to blood vessels might be obscured and DW-MRI suffers from geometrical distortions, and is characterized by low resolution. We introduce a novel 3D high-resolution MRI technique for direct lymph node imaging, T2 weighted Fast Field Echo (T2-FFE).

The method was tested on a 1.5T Philips Ingenia in healthy volunteers in supine RT position. The Flexcoverage anterior receive coil was positioned on a PMMA support to prevent deformation of the outer body contour. We applied a 3D T2-FFE using binomial RF pulses (ProSet 121) for water-selective excitation. The T2 contrast in this sequence is enhanced by the intrinsic diffusion weighting produced by imaging gradients particularly in the read-out direction. The resolution was 0.7x0.7x1 mm³ and the field of view covered the entire breast, axillary, periclavicular and cervical region up to mandible in a scan time of 8m40s. For clear visualization, 7 mm thick maximum intensity projections (MIPs) were constructed in three orthogonal directions.

T2-FFE showed excellent visualisation of lymph nodes (LN) in the axillary, periclavicular and the deep cervical region. Excellent fat suppression and black blood imaging was achieved. Besides lymph nodes also the brachial plexus was visualized in detail.

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