# Abstract

Coregistration of MR spectroscopic (SI), diffusion (DTI), relaxation images and their subsequent correlations based on pixel-by-pixel quantitative analysis have the potential to distinguish between pathological states and healthy tissue and therefore can help assessing brain pathology extent. Patients with brain tumours and temporal lobe epilepsy (TLE) were involved in the study to validate the use of this method in clinical practice.

30 patients with a new diagnosed brain lesion, 22 patients with a treated tumour (diagnosis assessed by histology or by radiological follow-up), 20 TLE patients and 59 healthy subjects were examined on a 3T system. The measurement protocol consisted of T2-weighted MR images, SI, DTI and T2 relaxometry. Correlations were analysed with the CORIMA programme with automatic identification of pixels in the normal tissue according to control data.

Brain lesions: Specific correlation patterns between metabolites, MD and T2 relaxation times (T2) were found for a given lesion localisation and tumour type. The patterns depend on different tissue states involved in the examined area. Recurrent tumours exhibited the same patterns as untreated ones but with changed parameter values caused by therapy. Metabolic values did not correlate with MD and T2 in radiation necrosis.

TLE: MR parameters gradually changed in anteroposterior direction of HC in all subjects; however, slopes in patients significantly exceeded those in controls.

Correlations of the following MR parameters are suitable for tissue differentiation: MD, T2, choline, N-acetylaspartate, creatine, inositol, lactate, macromolecules, lipids and their ratios.

A quantitative analysis of different MR methods is able to describe the complexity of a highly heterogeneous tissue in the pathology and its vicinity and determine crucial parameters for tissue differentiation and lesion extension.

**Keywords**

1H MR spectroscopic imaging, MR diffusometry, MR relaxometry, Correlations, Tumour, Temporal lobe epilepsy