Magnetisation transfer ratio of choline is reduced following epileptic seizures

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The purpose of this study was to characterise the concentration and magnetisation transfer ratio (MTR) of brain metabolites following epileptic seizures. Magnetic resonance spectroscopy was performed in 10 patients with temporal or extra-temporal lobe epilepsy as soon as possible after a seizure, with a second interictal scan between 1 and 3 days after the postictal scan and 10 healthy controls were scanned twice. Voxels (26 +/- 2 mL) were placed in the frontal lobe in all patients and controls, on the side of seizure focus in the patient group. Spectra were obtained using a modified PRESS sequence (TE 30 ms, TR 3 s, with three hard pulses offset from the water frequency by 2,500 Hz for MT presaturation). Mean metabolite concentrations and median metabolite MTRs of N-acetylaspartate (NAA), creatine, choline (Cho), myo-inositol (Ins) and glutamate plus glutamine were compared between the first and second scans in each group. A significant decrease in the MTR of Cho was seen postictally in the patient group, but the metabolite concentrations showed no significant difference between interictal and postictal scans and in the control group there was no difference between the two scans. Inter-group comparison showed significantly reduced concentrations of NAA and Ins in the patients. Reduced MTR of Cho indicates a shift from a bound to a more mobile fraction. These changes might indicate membrane perturbation in areas of seizure spread.