

Proton MR Spectroscopic Imaging of the Mesial Temporal Lobe

C. Kesavadas, B. Thomas, A. K. Gupta, T. Krishnamoorthy, T.R. Kapilamoorthy, N. Bodhey

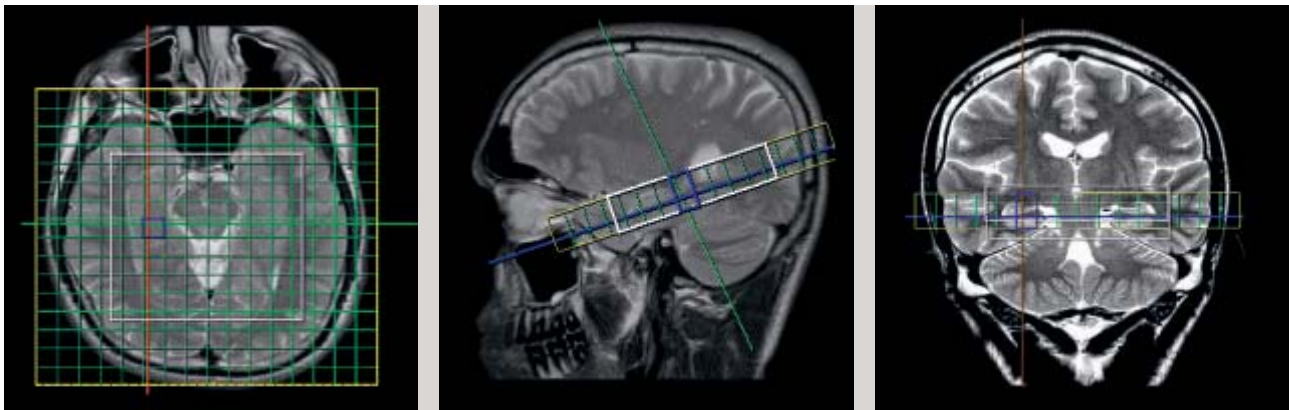
Sree Chitra Tirunal Institute for Medical Sciences and Technology,
Trivandrum, Kerala, India

Purpose

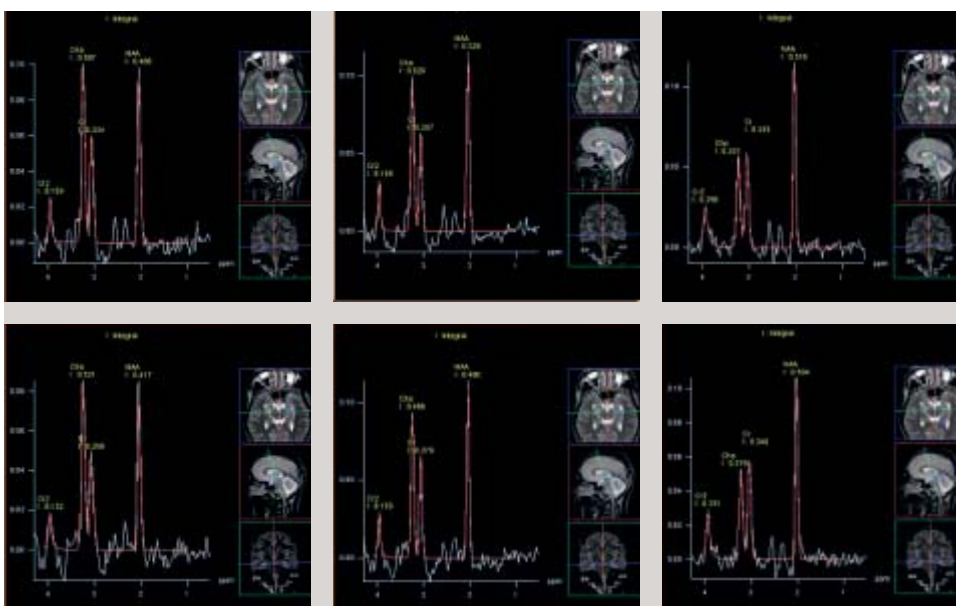
To evaluate variations in regional metabolite concentrations in the mesial temporal lobe (MTL) using Proton MR Spectroscopic Imaging (MRSI) in normal individuals and in patients with mesial temporal sclerosis (MTS).

Materials and methods

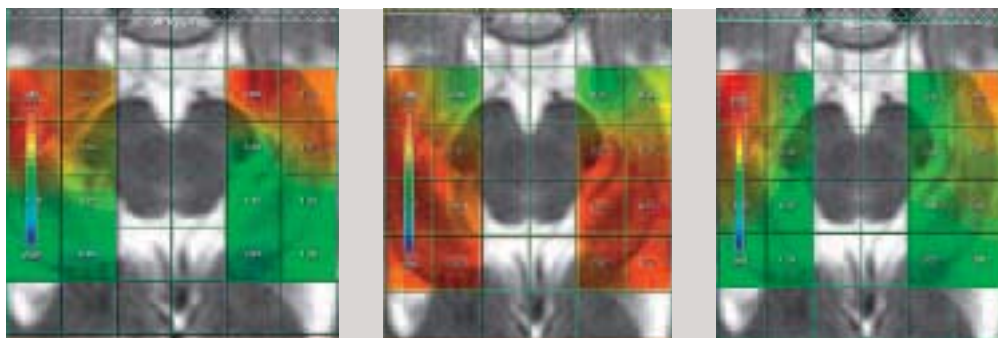
Metabolite concentrations and ratios were measured in 10 healthy people and in 10 patients with MTS using the 12-channel Head Matrix coil (phased array) on a 1.5T MR unit (Siemens MAGNETOM Avanto [76 x 18], SQ-engine, Erlangen,



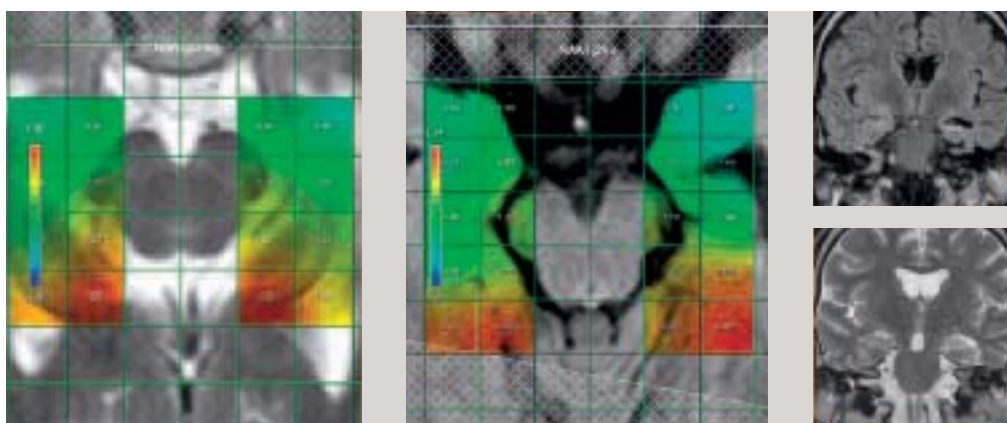
[Figure 1] Plane of acquisition was along the hippocampus.



[Figure 2] Spectra from the anterior, middle and posterior hippocampus show gradual decrease in choline from the anterior to the posterior hippocampus.



[Figure 3] The color metabolite maps of the Cho/Cr ratio, the NAA and Cho maps allow easy interpretation of the spectroscopy data.



[Figure 4] Decrease in NAA in the anterior hippocampus on the side of MTS. The normal MRI is given as a reference.

Germany). In all the ten patients the clinical criteria, MRI with conventional seizure protocol and video EEG data lateralized the TLE (Temporal Lobe Epilepsy) to the same side. We used PRESS sequences with a TR of 1500 ms and TE of 30 ms and 135 ms. The acquisition was planned along the hippocampal plane (Fig. 1). Since the mesial temporal lobe is a difficult region of the brain for spectroscopy, we used 6 saturation bands and third order shimming to avoid magnetic field inhomogeneity. A spectral map and a metabolite image were created for the hippocampus on both sides.

Results

In the normal individuals the highest choline concentration was found in the Anterior Mesial Temporal Lobe (AMTL) than MMTL (Middle Mesial Temporal Lobe) and PMTL (Posterior Mesial Temporal Lobe) (Fig. 2). The N-Acetylaspartate (NAA) concentration was just the reverse. The Anterior Mesial Tem-

poral Lobe also had a higher Cho/Cr ratio compared to the middle and posterior mesial temporal lobe (Fig. 3).

In patients with MTS the NAA map showed areas of decrease in NAA in areas of sclerosis. The map obtained from normal individuals served as reference (Fig. 4).

Conclusion

The MTL shows regional metabolite changes along its antero-posterior course. This has to be considered in the interpretation of pathologies involving the MTL.

The MRSI technique used in this study gives good and easily interpretable information about the metabolite concentrations in the normal and diseased hippocampus.

In patients with MTS an assessment of the metabolite image will define the severity and extent of involvement along the hippocampal head, body and tail.