

## PROGNOSTIC VALUE OF PROTON MAGNETIC RESONANCE SPECTROSCOPY FOR EPILEPSY SURGERY OUTCOME

### H-1 MRSI Predicts Surgical Outcome in MRI-negative Temporal Lobe Epilepsy

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Neurology 2002;58:821–823

H-1 MRS imaging (MRSI) was performed on 15 patients with MRI-negative temporal lobe epilepsy (TLE) who underwent seizure surgery. The nonseizure-free patients (NSF) ipsilateral hippocampal N-acetylaspartate (NAA)/ (Cr+Cho) z scores were lower than the contralateral scores ( $p=0.04$ ), and the NSF ipsilateral z scores were lower than the seizure-free patients' (SF) ipsilateral z scores ( $p=0.0049$ ). Similarly, NSF contralateral scores were lower than contralateral SF ( $p=0.02$ ). These findings suggest NAA predicts the surgical outcome in patients with TLE without evidence of mesial temporal sclerosis on MRI.

### COMMENTARY

There is a marked dichotomy between the prognosis of patients with a temporal lobe focus, identified on EEG, who do and do not have increased hippocampal T2 signal or hippocampal atrophy on structural magnetic resonance imaging. The former are much more likely to benefit from anterior temporal lobectomy. Several functional imaging modalities, including fluorodeoxyglucose-positron emission tomography (FDG-PET), and ictal single photon emission computed tomography (SPECT), can identify temporal lobe foci and have been used to predict the outcome of surgery. However, these techniques add additional complexity, expense, and radiation exposure to presurgical evaluation.

Magnetic resonance spectroscopy (MRS) has been used to

measure *N*-acetyl aspartate (NAA), which may be a measure of neuronal function as well as number. The NAA/creatine ratio is reduced consistently in mesial temporal foci, but bilateral abnormalities are common. Moreover, MRS has been less successful than structural magnetic resonance (MR), FDG-PET, or ictal SPECT, as a predictor of outcome after temporal lobectomy. There have been inconsistent reports that bilateral NAA/Cr reduction predicts a poor outcome. Several previous studies have found that normal NAA/Cr contralateral to the resection is a predictor of good outcome. Some studies found, however, that contralateral or extrafocal abnormalities may resolve after successful temporal lobectomy, further complicating interpretation of the significance of the measurements.

The study by Suhy et al. is particularly interesting, since it included only patients with normal structural MR studies. They found that patients who became seizure-free after surgery tended to have NAA/Cr values that were close to normal both ipsilateral and contralateral to the focus, while patients whose surgery was unsuccessful tended to have bilateral reductions, even though the ipsilateral mean was lower than the contralateral mean. Unlike MR volume or PET hypometabolism, NAA/Cr did not appear to be a reliable indicator of focus lateralization. The authors suggest that contralateral NAA/Cr reduction may indicate the presence of epileptogenic tissue beyond the limits of the proposed resection. They suggest as well that their patients, with normal structural MRI, may have a different pathological process than those with mesial temporal sclerosis, and are thus less likely to have relatively reduced ipsilateral NAA/Cr.

The number of patients in this study was small. In future investigations, technical issues such as partial volume effects should be addressed. However, imaging investigations using new techniques such as MRS may make it possible to tease out the variety of pathological processes that must underlie mesial temporal lobe epilepsy.

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