

POSTER #1175

**Brain-Functioning Mapping with Magnetic Resonance
Imaging for Neurosurgical Planning**

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Echo-planar imaging with magnetic resonance (MR) technology is able to show areas of brain function associated with specific tasks. The advantages to positron emission tomography scanning include very fast acquisition time and the type of anatomic detail inherent in MR imaging. We have studied patients with functional mapping using echo-planar MR imaging, who later underwent awake craniotomy with direct cortical stimulation mapping for either epilepsy surgery or tumor removal. The echo-planar technique proved to give accurate localization of function when compared to the data from direct stimulation mapping.

Imaging was performed on a standard clinical General Electric 1.5 Tesla Signa system using a locally derived 30.5-cm three-axis local gradient coil. Three subjects were imaged while undergoing activation tasks including finger movement, lip movement, tongue movement, speech, and sensory stimulation. Each task began and ended with a baseline period in which the subjects were not performing the tasks interspersed with areas of specific task performance. Subtraction images were produced subtracting the activation images from the resting images to determine the change in deoxyhemoglobin. This change in deoxyhemoglobin is assumed to correlate with blood flow changes. The subjects were later operated on with awake craniotomy with cortical stimulation mapping for either epilepsy surgery or tumor removal. We found good correlation between the results of echo-planar imaging and the direct cortical stimulation.

Thus it is possible with standard MR imaging equipment and a special head coil to produce anatomical images with a functional overlay. As the technique improves, it should prove to be very helpful in planning neurosurgical procedures.