

In its expanding infancy, fMRI is becoming an integral part of neurosurgical planning by providing a means to noninvasively image the brain without use of exogenous tracers or exposure to radiation. While clinical MRI scanners are used, paradigm design under constant revision and image processing is far from routine.

When a neurosurgical patient has a lesion in eloquent cortex, the physician's first concern is whether excising the lesion will leave the patient with a neurological deficit. Language is the most frequently requested function mapped and is done for epilepsy surgery and resections of various lesions. For these applications as well as biopsy guidance, motor mappings are almost as commonly performed with visual and sensory mappings rare. Integration of functional images with the intra-operative Stealth system is being considered.

Because such critical decisions are based on this information a variety of methods are used to assess robustness and accuracy. The results of Wada exams compared fMRI language mappings caused us to revise our paradigm and start a second study. Motor mappings of hand and foot have been successfully compared with expected locations and those given by transcranial magnetic stimulation. Finally, when surgery permits, fMRI studies are compared with direct cortical stimulation in awake patients. Thus far, no related deficits have been reported after our studies.

Three years of experiences at our center collaborating with the neurosurgeons and neurologists to develop clinically useful fMRI studies will be discussed. One or two cases will be traced from initial consult through surgery.