

Clinical Policy: Functional MRI

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Description

Functional magnetic resonance imaging (fMRI) is an imaging procedure in which an MRI is used to localize regions of activity in the brain by measuring blood flow and/or metabolism following task activation. It localizes areas for critical functions such as thought, speech, movement and sensation. It is most appropriately used in preoperative planning when the lesion is located near eloquent areas of the brain.

Policy/Criteria

- I. It is the policy of PA Health and Wellness[®] (PHW) that fMRI is **medically necessary** when performed for either A, B, C, or D:
 - A. Assessment of intracranial neoplasm and other targeted lesions for one of the following:
 1. Pre-surgical planning and operative risk assessment, or
 2. Assessment of eloquent cortex (e.g. language, sensory motor, visual centers) in relation to tumor or other focal lesions, or
 3. Surgical planning (biopsy or resection), or
 4. Therapeutic follow-up.
 - B. Evaluation of preserved eloquent cortex.
 - C. Assessment of eloquent cortex for epilepsy surgery.
 - D. Assessment of radiation treatment planning and post-treatment evaluation of eloquent cortex.

- II. It is the policy of PHW that fMRI for any indication not listed above is considered **not medically necessary**.

Background

fMRI using blood oxygenation level dependent imaging (BOLD) technique is a proven and useful tool for the evaluation of eloquent cortex in relation to a focal brain lesion, such as a neoplasm or vascular malformation.

There are several methods that are used to identify eloquent areas of the brain, including the Wada test and electrocortical stimulation mapping (ESM). The Wada test consists of a cerebral angiogram followed by the injection of a drug to evaluate which side of the brain is responsible for speech and memory. ESM involves the surgical placement of electrodes on the brain to identify and mark specific areas of importance. Both tests are invasive, time consuming and involve multiple resources.

fMRI has been proposed as an alternative to these methods. During fMRI, the patient is asked to conduct specific language, memory or motor activities while sequential MRI images are collected. The activities cause an increase in blood flow to the areas of the brain being used, allowing for their identification and location.

CLINICAL POLICY

Functional MRI

Evidence in published, peer-reviewed scientific literature indicates a good correlation between fMRI pre-surgical brain mapping and invasive pre-surgical brain mapping. Current literature supports fMRI as a valuable adjunct tool when used in conjunction with other brain mapping techniques because the fMRI provides information that aids the surgical team in pre-surgical planning.

Woermann et al (2003) compared the determination of language dominance using fMRI with results of the Wada test in 100 patients with different localization-related epilepsies. The concordance between both tests was 91% with an overall rate of false categorization by fMRI of 9%. It was concluded that language fMRI might reduce the necessity of the Wada test for language lateralization, especially in temporal lobe epilepsy.

Another study by Medina and colleagues (2005) looked at the effect of fMRI on diagnostic work-up and treatment planning in 60 patients with seizure disorders who were candidates for surgical treatment. The study revealed change in anatomic location or lateralization of language-receptive and language-expressive areas (28% and 21% of patients respectively). Statistically significant increases were found in confidence levels after fMRI in regard to motor and visual cortical function evaluation. In 63% of patients, fMRI results helped to avoid further studies, including Wada test. In 52% and 42% of patients, intraoperative mapping and surgical plans, respectively, were altered because of fMRI results. They concluded fMRI results influenced diagnostic and therapeutic decision making of the seizure team; results indicated language dominance change, confidence level in identification of critical brain function areas increased, patient and family counseling were altered, and intraoperative mapping and surgical approach were altered.

Patrella et al (2006) evaluated the effect of preoperative fMRI localization of language and motor areas on therapeutic decision making in 39 patients with potentially resectable brain tumors. Results showed treatment plans before and after fMRI differed in 19 patients ($P < .05$), with a more aggressive approach recommended after imaging in 18 patients. fMRI resulted in reduced surgical time (estimated 15-60 minutes) in 22 patients who underwent surgery, a more aggressive resection in six, and a smaller craniotomy in two. They concluded fMRI enables the selection of a more aggressive therapeutic approach than might otherwise be considered because of functional risk. In certain patients, surgical time may be shortened, the extent of resection increased, and craniotomy size decreased.

Coding Implications

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CPT®* Codes	Description
70554	MRI, brain, functional MRI; including test selection and administration of repetitive body part movement and/or visual stimulation; not requiring physician or psychologist administration
70555	requiring physician or psychologist administration of entire neurofunctional testing

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Reviews, Revisions, and Approvals	Date	Approval Date

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