Clinical Policy: Functional MRI

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Effective Date: 01/18
Last Review Date: 2/26/2021

Coding Implications
Revision Log

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 intracarotid amobarbital procedure (IAP), known as 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.

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 in confidence levels were found after fMRI for 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.

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- The use of fMRI may be considered an option for lateralizing language functions in place of intracarotid amobarbital procedure (IAP) in patients with medial temporal lobe epilepsy (MTLE), temporal epilepsy in general or extratemporal epilepsy (Level C). For patients with temporal neocortical epilepsy or temporal tumors, the evidence is insufficient (Level U).
- fMRI may be considered to predict postsurgical language deficits after anterior temporal lobe resection (Level C).
- The use of fMRI may be considered for lateralizing memory functions in place of IAP in patients with MTLE (Level C) but is of unclear utility in other epilepsy types (Level U).
- fMRI of verbal memory or language encoding should be considered for predicting verbal memory outcome (Level B).

- fMRI using nonverbal memory encoding may be considered for predicting visuospatial memory outcomes (Level C).
- Presurgical fMRI could be an adequate alternative to IAP memory testing for predicting verbal memory outcome (Level C).
- Clinicians should carefully advise patients of the risks and benefits of fMRI vs IAP during discussions concerning choice of specific modality in each case.

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

HCPCS Codes	Description
N/A	

ICD-10-CM Diagnosis Codes that Support Coverage Criteria

+ Indicates a code requiring an additional character

ICD-10-CM Code	Description
C71.0-C71.9	Malignant neoplasm of brain
C79.31	Secondary malignant neoplasm of brain
C79.32	Secondary malignant neoplasm of cerebral meninges
D33.0	Benign neoplasm of brain, supratentorial
D33.1	Benign neoplasm of brain, infratentorial
D33.2	Benign neoplasm of brain, unspecified
D43.0	Neoplasm of uncertain behavior of brain, supratentorial
D43.1	Neoplasm of uncertain behavior of brain, infratentorial
D43.2	Neoplasm of uncertain behavior of brain, unspecified
G40.001-G40.919	Epilepsy and recurrent seizures
Q28.2	Arteriovenous malformation of cerebral vessels

ICD-10-CM Code	Description
Q28.3	Other malformations of cerebral vessels
R56.1	Post traumatic seizures
R56.9	Unspecified convulsions

Reviews, Revisions, and Approvals	Date	Approval Date
Policy Developed	10/17	1/18
Background updated with AAN 2017 Practice Parameter. ICD-10 codes added. References reviewed and updated.	10/18	
Annual review completed. Codes reviewed. References reviewed and updated. Specialty review completed.	11/19	1/3/2020
Annual review completed. Codes reviewed. References reviewed and updated. Specialty review completed.	2/26/2021	

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