Clinical Policy: Functional MRI

Reference Number: PA.CP.MP.43
Effective Date: 01/18
Date of Last Revision: 09/23

Coding Implications
Revision Log

Description
Functional magnetic resonance imaging (fMRI) is a noninvasive neuroimaging 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.[1] It localizes areas for critical functions such as thought, speech, movement and sensation. It is most appropriately used in preoperative planning when the patient has a lesion located in or near eloquent areas of the brain.[1,2]

Policy/Criteria

I. It is the policy of PA Health and Wellness® (PHW) that functional magnetic resonance imaging (fMRI) is **medically necessary** when performed for one of the following:
- A. Assessment of intracranial neoplasm, vascular malformations, and other targeted lesions for one of the following:
  1. Pre-surgical planning and operative risk assessment;
  2. Assessment of eloquent cortex (eg, language, sensory motor, visual centers) in relation to tumor or other focal lesions;
  3. Surgical planning (biopsy or resection);
  4. Therapeutic follow-up;
- B. Evaluation of preserved eloquent cortex;
- C. Assessment of eloquent cortex and language lateralization for epilepsy surgery;
- D. Assessment of radiation treatment planning and post-treatment evaluation of eloquent cortex;
- E. Assessment of cerebral vascular reactivity for consideration of revascularization procedures.

II. It is the policy of PHW that fMRI for any indication not listed above is not supported by current evidence.

Background
Functional magnetic resonance imaging (fMRI) using the blood oxygenation level dependent imaging (BOLD) technique has proven to be an effective tool for the assessment of eloquent cortex in relation to a focal brain lesion, such as a neoplasm or vascular malformation.[3]

There are several methods 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.[4] ESM involves the surgical placement of electrodes on the brain to identify and mark specific areas of importance.[2] Both tests are invasive, time consuming and involve multiple resources.[2,5] fMRI is now used as an alternative to these methods and is preferred over IAP since it is less invasive and has a high safety profile.[4]

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.[2]

Evidence in published, peer-reviewed scientific literature indicates a good correlation between fMRI pre-surgical brain mapping and invasive pre-surgical brain mapping.[1,2,6] 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.[7,8,9]

A 2003 study by Woermann et al[10] 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 a 9% overall rate of false categorization by fMRI. It was concluded that language evaluation using fMRI may reduce the necessity of the Wada test for language lateralization, particularly in temporal lobe epilepsy.[10]

A 2005 study by Medina et al[5] examined 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) and showed a considerable increase in confidence levels with the use of fMRI when assessing motor and visual cortical function. In 63% of patients, the utilization of fMRI eliminated the need for additional testing, including the Wada test. Additional results concluded that information gained from the use of fMRI altered intraoperative mapping in 52% of patients and altered surgical plans in 42% of patients included in this study.[5]

In 2006 Patrella et al[11] 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. The study showed that the use of fMRI resulted in reduced surgical time (estimated 15 to 60 minutes) in 22 patients and showed a more aggressive resection in six patients and a smaller craniotomy in two patients. The outcomes illustrate how fMRI enables the option of a more aggressive therapeutic approach than might otherwise be considered because of functional risk. Results of the study indicate that in certain patients there may be a reduction in surgical time, an increase in the extent of resection, and a decrease in craniotomy size.[11]

American Academy of Neurology
The following are the results and recommendations per the American Academy of Neurology for the use of fMRI in the presurgical evaluation of patients with epilepsy[12]:

- 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

This clinical policy references Current Procedural Terminology (CPT®). CPT® is a registered trademark of the American Medical Association. All CPT codes and descriptions are copyrighted 2022, American Medical Association. All rights reserved. CPT codes and CPT descriptions are from the current manuals and those included herein are not intended to be all-inclusive and are included for informational purposes only. Codes referenced in this clinical policy are for informational purposes only. Inclusion or exclusion of any codes does not guarantee coverage. Providers should reference the most up-to-date sources of professional coding guidance prior to the submission of claims for reimbursement of covered services.

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	

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	
Annual review. References reviewed and updated. Updated description and background with no clinical significance. "Not medically necessary" verbiage replaced in criteria II. with descriptive language. Reviewed by specialist.	04/22/2022	

Reviews, Revisions, and Approvals	Date	Approval Date
Annual review. Criteria I.A. updated to include vascular malformations. Criteria I.C. updated to include assessment of language lateralization. Criteria I.E. added per ACR-ASNR-SPR practice parameters and states, "Assessment of cerebral vascular reactivity for consideration of revascularization procedures." Removed ICD-10 codes. Background updated with no impact on criteria. References reviewed and updated.	09/2023	

References

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