

Clinical Policy: Functional MRI

Reference Number: CP.MP.43

Last Review Date: 09/20

[Coding Implications](#)

[Revision Log](#)

See [Important Reminder](#) at the end of this policy for important regulatory and legal information.

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 health plans affiliated with Centene Corporation® 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 health plans affiliated with Centene Corporation 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 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.

American Academy of Neurology

- 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).

CLINICAL POLICY

Functional MRI

- 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 2020, 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	

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
Q28.3	Other malformations of cerebral vessels

ICD-10-CM Code	Description
R56.1	Post traumatic seizures
R56.9	Unspecified convulsions

Reviews, Revisions, and Approvals	Date	Approval Date
Clarified policy/criteria language into bullet points	10/13	10/13
Added criteria A.4 and B per ACR-ASNR-SPR Practice parameters	10/14	10/14
Converted into new template References reviewed and updated	10/15	10/15
Template updated References reviewed and updated	10/16	10/16
In I.A changed “brain tumor” to “intracranial neoplasm and other targeted lesions” based on ACR guidelines updated in 2017. Added I.D “Assessment of radiation treatment planning and post-treatment evaluation of eloquent cortex” based on ACR guidelines updated in 2017.	10/17	10/17
Background updated with AAN 2017 Practice Parameter. ICD-10 codes added. References reviewed and updated.	09/18	09/18
Annual review completed. Codes reviewed. References reviewed and updated. Specialty review completed.	09/19	09/19
References reviewed and updated. Replaced “members” with “members/enrollees” in all instances.	08/20	09/20

Bibliography

1. ACR-ASNR-SPR Practice parameter for the performance of functional magnetic resonance Imaging (fMRI) of the brain. Amended 2017 (Resolution 20).
2. Bookheimer S. Pre-surgical language mapping with functional magnetic resonance imaging. *Neuropsychol Rev.* 2007;17(2):145-155.
3. Brown GG. Functional magnetic resonance imaging in clinical practice: look before you leap. *Neuropsychol Rev,* 2007; 17:103-106.
4. Brown GG, Perthen JE, Liu LT, Buxton RB. A primer on functional magnetic resonance imaging. *Neuropsychol Rev,* 2007; 17:107-125.
5. Cascino GD. Surgical treatment of epilepsy in adults. In: UpToDate, Garcia P (Ed), UpToDate, Waltham, MA, 2014. Accessed 08/17/20.
6. Haider HA, Hirsch LJ. Neuroimaging in the evaluation of seizures and epilepsy. In: UpToDate, Schachter SC (Ed), UpToDate, Waltham, MA. Accessed 08/17/20.
7. Hunter JV. Approach to neuroimaging in children. In: UpToDate, Nordli DR, (Ed), UpToDate, Waltham, MA, 2014. Accessed 08/17/20.
8. Medina LS, Bernal B, Dunoyer C, et al. Seizure disorders: Functional MR imaging for diagnostic evaluation and surgical treatment – prospective study. *Radiology.* 2005; 236:247-253.
9. Petrella JR, Shah LM, Harris KM, et al. Preoperative functional MR imaging localization of language and motor areas: Effect on therapeutic decision making in patients with potentially resectable brain tumors. *Radiology.* 2006; 240:793-802.

CLINICAL POLICY

Functional MRI

10. Stancanello J, Cavedon C, Francescon P, et al. BOLD fMRI integration into radiosurgery treatment planning of cerebral vascular malformations [Abstract]. *Med Phys*. 2007; 34(4):1176-1184.
11. Stippich C, Rapps N, Dreyhaupt J, et al. Localizing and lateralizing language in patients with brain tumors: Feasibility of routine preoperative functional MR imaging in 81 consecutive patients. *Radiology*. 2007;243(3):828-836.
12. Woermann FG, Jokeit H, Luerding R, et al. Language lateralization by Wada test and fMRI in 100 patients with epilepsy. [Abstract] *Neurology*. 2003; 61(5):699-701.
13. Wong ET, Wu JK. Overview of the clinical features and diagnosis of brain tumors in adults. In: *UpToDate*, Loeffler JS, Wen PY (Ed), *UpToDate*, Waltham, MA, 2014. Accessed 08/17/20.
14. Szaflarski JP, Gloss D, Binder JR. et al. Practice guideline summary: Use of fMRI in the presurgical evaluation of patients with epilepsy. Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. *Neurology* 2017;88:395–402. Reaffirmed January 11, 2020.

Important Reminder

This clinical policy has been developed by appropriately experienced and licensed health care professionals based on a review and consideration of currently available generally accepted standards of medical practice; peer-reviewed medical literature; government agency/program approval status; evidence-based guidelines and positions of leading national health professional organizations; views of physicians practicing in relevant clinical areas affected by this clinical policy; and other available clinical information. The Health Plan makes no representations and accepts no liability with respect to the content of any external information used or relied upon in developing this clinical policy. This clinical policy is consistent with standards of medical practice current at the time that this clinical policy was approved. “Health Plan” means a health plan that has adopted this clinical policy and that is operated or administered, in whole or in part, by Centene Management Company, LLC, or any of such health plan’s affiliates, as applicable.

The purpose of this clinical policy is to provide a guide to medical necessity, which is a component of the guidelines used to assist in making coverage decisions and administering benefits. It does not constitute a contract or guarantee regarding payment or results. Coverage decisions and the administration of benefits are subject to all terms, conditions, exclusions and limitations of the coverage documents (e.g., evidence of coverage, certificate of coverage, policy, contract of insurance, etc.), as well as to state and federal requirements and applicable Health Plan-level administrative policies and procedures.

This clinical policy is effective as of the date determined by the Health Plan. The date of posting may not be the effective date of this clinical policy. This clinical policy may be subject to applicable legal and regulatory requirements relating to provider notification. If there is a discrepancy between the effective date of this clinical policy and any applicable legal or regulatory requirement, the requirements of law and regulation shall govern. The Health Plan retains the right to change, amend or withdraw this clinical policy, and additional clinical policies may be developed and adopted as needed, at any time.

CLINICAL POLICY

Functional MRI

This clinical policy does not constitute medical advice, medical treatment or medical care. It is not intended to dictate to providers how to practice medicine. Providers are expected to exercise professional medical judgment in providing the most appropriate care, and are solely responsible for the medical advice and treatment of members/enrollees. This clinical policy is not intended to recommend treatment for members/enrollees. Members/enrollees should consult with their treating physician in connection with diagnosis and treatment decisions.

Providers referred to in this clinical policy are independent contractors who exercise independent judgment and over whom the Health Plan has no control or right of control. Providers are not agents or employees of the Health Plan.

This clinical policy is the property of the Health Plan. Unauthorized copying, use, and distribution of this clinical policy or any information contained herein are strictly prohibited. Providers, members/enrollees and their representatives are bound to the terms and conditions expressed herein through the terms of their contracts. Where no such contract exists, providers, members/enrollees and their representatives agree to be bound by such terms and conditions by providing services to members/enrollees and/or submitting claims for payment for such services.

Note: For Medicaid members/enrollees, when state Medicaid coverage provisions conflict with the coverage provisions in this clinical policy, state Medicaid coverage provisions take precedence. Please refer to the state Medicaid manual for any coverage provisions pertaining to this clinical policy.

Note: For Medicare members/enrollees, to ensure consistency with the Medicare National Coverage Determinations (NCD) and Local Coverage Determinations (LCD), all applicable NCDs, LCDs, and Medicare Coverage Articles should be reviewed prior to applying the criteria set forth in this clinical policy. Refer to the CMS website at <http://www.cms.gov> for additional information.

©2016 Centene Corporation. All rights reserved. All materials are exclusively owned by Centene Corporation and are protected by United States copyright law and international copyright law. No part of this publication may be reproduced, copied, modified, distributed, displayed, stored in a retrieval system, transmitted in any form or by any means, or otherwise published without the prior written permission of Centene Corporation. You may not alter or remove any trademark, copyright or other notice contained herein. Centene® and Centene Corporation® are registered trademarks exclusively owned by Centene Corporation.