



Cohere Medical Policy – Magnetic Resonance Imaging (MRI), Brain Functional

Clinical Guidelines for Medical Necessity Review

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Guideline Information:

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Guideline Name: Cohere Medical Policy - Magnetic Resonance Imaging (MRI), Brain Functional

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Type: Adult (18+ yo) | Pediatric (0-17yo)

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Medical Necessity Criteria

Service: Magnetic Resonance Imaging (MRI), Brain (Functional)

Recommended Clinical Approach

fMRI localizes areas for critical functions such as thought, speech, movement, and sensation, typically in relation to a focal brain lesion, such as a neoplasm or vascular malformation. fMRI is a non-invasive alternative to other invasive methods to identify eloquent brain areas, including the intracarotid amobarbital procedure (IAP), known as a Wada test, and electrocortical stimulation mapping (ESM). 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.¹

Medical Necessity Criteria

Indications

→ **Functional magnetic resonance imaging (fMRI) of the brain** is considered appropriate for the assessment of **ALL** of the following are

TRUE:

- ◆ Ultrasound and CT/CTA are contraindicated or inconclusive (e.g., body habitus for ultrasound, anaphylactic reaction due to IV contrast reaction, pregnancy, pediatric); **AND**
- ◆ **ANY** of the following:
 - Evaluation of cerebral vascular reactivity when considering revascularization procedures¹; **OR**
 - Evaluation of eloquent cortex and language lateralization for epilepsy surgery¹; **OR**
 - Evaluation of preserved eloquent cortex¹⁻²; **OR**

- Failure or poor response to 2 or more anticonvulsant medications (maximal dose) – includes refractory or drug-resistant epilepsy³; **OR**
- Radiation treatment planning of eloquent cortex¹⁻²; **OR**
- Radiation post-treatment evaluation of eloquent cortex¹⁻²; **OR**
- Targeted lesions (including intracranial neoplasms, and vascular formations) for **ANY** of the following¹:
 - Presurgical planning and operative risk assessment; **OR**
 - Assessment of eloquent cortex (e.g, language, sensory, motor, visual centers) in relation to a tumor or another focal lesion; **OR**
 - Surgical planning (biopsy or resection); **OR**
 - Therapeutic follow-up; **OR**
- Repeat imaging of a specific area or structure using the same imaging modality (in the absence of an existing follow-up guideline) is considered appropriate when **ALL** of the following is **TRUE**:
 - There is documented clinical necessity; **AND**
 - Prior imaging results of the specific area or structure, obtained using the same imaging modality, must be documented and available for comparison; **AND**
 - **ANY** of the following is **TRUE**:
 - ◆ A change in clinical status, such as worsening symptoms or the emergence of new symptoms, that may influence the treatment approach; **OR**
 - ◆ The requirement for interval reassessment, which may alter the treatment plan; **OR**
 - ◆ One-time follow-up of a prior indeterminate finding to assess for interval change; **OR**

- ◆ The need for re-imaging either before or after performing an invasive procedure.

Non-Indications

→ **Functional magnetic resonance imaging (fMRI) of the brain** may not be considered appropriate if **ANY** of the following is **TRUE**:

- ◆ The patient has undergone advanced imaging of the same body part and for the same indication within 3 months, without being on treatment; **OR**
- ◆ If contrast is used, history of anaphylactic allergic reaction to gadolinium contrast media with detailed guidelines for use in patients with renal insufficiency; **OR**
- ◆ The patient has metallic clips on vascular aneurysms; **OR**
- ◆ Incompatible implantable devices (e.g., pacemakers, defibrillators, cardiac valves); **OR**
- ◆ Metallic foreign body in orbits/other critical area(s) or within the field of view and obscuring area of concern.

*NOTE: MRI in patients with claustrophobia should be requested at the discretion of the ordering provider.

**NOTE: MRI in pregnant patients should be requested at the discretion of the ordering provider and obstetric care provider.

Level of Care Criteria

Inpatient or Outpatient

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
70554	Magnetic resonance imaging, brain, functional MRI; including test selection and administration of repetitive body part movement and/or visual stimulation, not requiring physician or psychologist administration
70555	Magnetic resonance imaging, brain, functional MRI; requiring physician or psychologist administration of entire neurofunctional testing

Medical Evidence

Kaptan et al. (2024) discuss current developments in functional MRI (fMRI) and the impact on facilitating the creation of clinically significant biomarkers for disorders impacting sensorimotor processing in the central nervous system. Research has focused on corticospinal fMRI to evaluate sensorimotor projections at various hierarchical levels of the neuroaxis. This includes the cervical spinal cord, brainstem, cerebellum, subcortical structures, and cortical regions. Unlike imaging the brain or spinal cord separately, corticospinal fMRI can identify neural activity in important CNS areas related to upper limb sensorimotor processing. The authors note that the technique requires further research as it applies to neural activity from lower limb stimulations or tasks.⁴

Luna et al. (2021) performed a meta-analysis to evaluate the comparative postoperative morbidity in patients with brain tumors undergoing surgery with preoperative fMRI guidance versus those undergoing surgery without fMRI guidance or with the use of standard (non-functional) neuronavigation. A total of 68 observational studies and existing data demonstrate a decrease in postoperative morbidity when utilizing preoperative fMRI for planning brain resections. This benefit is particularly notable when combined with other advanced imaging modalities like diffusion-tensor imaging, intraoperative MRI, or cortical stimulation.⁵

Liu et al. (2021) conducted a study to refine and assess resting-state (RS) cerebrovascular reactivity (CVR) MRI methodology and its correlation to neurosurgical intervention outcomes. Data from 170 health controls identify the optimal frequency range of temporal filtering based on spatial correlation with the reference standard CVR map obtained with CO₂ inhalation. The refined RS approach was implemented in a new cohort with 50 individuals diagnosed with Moyamoya disease. Comparative analysis of CVR values between cerebral hemispheres with and without revascularization surgery was conducted using the Mann-Whitney U test. The authors conclude that utilizing resting-state blood oxygen level-dependent (BOLD) functional MRI, CVR mapping offered a non-task-based approach for quantifying

cerebrovascular reserve. This method effectively illustrated the therapeutic impact of revascularization surgery in Moyamoya disease patients, demonstrating comparable results to the established CO₂ inhalation MRI reference standard.⁶

References

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Clinical Guideline Revision History/Information

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Review History

Version 2	7/26/2024	Annual review and policy restructure.