MEDICAL POLICY

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Medical Policy Title	**Magnetic Resonance Spectroscopy (MRS)**
Policy Number	**6.01.03**
Current Effective Date	**May 15, 2026**
Next Review Date	**January 2027**

Our medical policies are guides to evaluate technologies or services for medical necessity. Criteria are established through the assessment of evidence based, peer-reviewed scientific literature, and national professional guidelines. Federal and state law(s), regulatory mandates and the member's subscriber contract language are considered first in the determination of a covered service.
(Link to Product Disclaimer)

POLICY STATEMENT(S)

I. Magnetic resonance spectroscopy (MRS) is considered **medically appropriate** when:

   A. Conventional imaging by magnetic resonance imaging (MRI) or computed tomography (CT) provides limited information and **ONE** (1) of the following:

      1. Distinguish recurrent brain tumor from radiation necrosis as an alternative to positron emission tomography (PET);
      2. Diagnosis of certain rare inborn errors of metabolism affecting the Central Nervous System (CNS) (primarily pediatric individuals);
      3. Evidence or suspicion of primary or secondary neoplasm (pretreatment and posttreatment);
      4. Grading of primary glial neoplasm, particularly high-grade versus low-grade glioma;
      5. Evidence or suspicion of brain infection, especially cerebral abscess (pretreatment and posttreatment) and human immunodeficiency virus (HIV)-related infections;
      6. Seizures, especially temporal lobe epilepsy.

II. MRS is considered **not medically necessary** for all spine uses.

III. MRS is considered **investigational** for all other indications.

RELATED POLICIE(S)

Corporate Medical Policy

6.01.29 Positron Emission Tomography (PET) Oncologic Applications

11.01.03 Experimental or Investigational Services

POLICY GUIDELINE(S)

Some indications may be determined by positron emission tomography (PET) or MRS, only one technique (PET or MRS) should be performed, not both.

DESCRIPTION

MRS is a non-invasive procedure used to measure the concentrations of different low molecular weight chemicals within tissues. It is also known as nuclear magnetic resonance (NMR) spectroscopy. MRS utilizes the same equipment as magnetic resonance imaging (MRI), modified with additional software and hardware, but applies different signals or frequencies to acquire information. In MRI, the frequency is determined by spatial position, whereas, in MRS, the chemical content of the substance scanned determines the frequency. While an MRI provides an anatomic image, MRS provides a functional image related to underlying dynamic physiology. It has become possible to integrate MRS with routine MRI, so that local abnormalities detected by MRI can also be biochemically examined by MRS before and after therapeutic interventions. An MRI image is first generated, and then MRS spectra are developed at the site of interest, termed the voxel.

In normal brain tissue, MRS depicts the following principal spectral peaks: N-acetyl groups, especially N-acetylasparate (NAA); choline-containing compound (Cho), such as a membrane phospholipid (e.g., phosphocholine or glycerophosphocholine); and creatine and phosphocreatine.

MRS has been studied most extensively in a variety of brain pathologies. Different spectral patterns in both healthy and diseased brains are the basis of clinical applications of MRS. MRS findings characteristically associated with non-necrotic brain tumors include elevated Cho levels and reduced NAA levels. Peripheral applications of MRS include the study of myocardial ischemia, peripheral vascular disease, and skeletal muscle. Applications in non-CNS oncologic evaluation have also been explored.

SUPPORTIVE LITERATURE

Cui et al 2023 conducted a meta-analysis to investigate the role of MRS to detect temporal lobe epilepsy (TLE). A total of 16 studies were included with a total of 645 epileptic patients of different ages. Patients were chosen randomly and scanned with MRS along with EEG or MRI. In this study MRS had a high sensitivity at 84.8% showing high efficacy. The researchers concluded that MRS is accurate and able to detect minor changes in the different regions of the temporal lobe in the brain of individuals with TLE and highly recommends MRS when evaluating these individuals.

Moreno-Acosta et al (2025) conducted a prospective study evaluating 44 previously treated glioma patients-20 low-grade (LG) and 24 high-grade (HG)—using MRI combined with magnetic resonance spectroscopy (MRS) and magnetic resonance spectroscopy imaging (MRSI) on a 1.5T magnet. Distinct metabolic profiles were identified, with stable LG tumors showing lower choline (Cho)/N-Acetyl Aspartate (NAA) and Cho/creatine (Cr) ratios compared to those that progressed to HG. Similar patterns were observed in HG tumors, while gliosis and radiation necrosis was observed in 14 tumors and exhibited significant spectroscopic changes. Tumor recurrence was detected in 20 cases through MRSI metabolic mapping. Overall, MRS and MRSI provided critical metabolic insights that complemented MRI, improving detection of recurrence, progression, and treatment-related changes, thereby aiding clinical decision-making and patient management. Valizadeh et al (2025) conducted a systematic review of clinical trials assessing how anti-inflammatory agents influence Magnetic Resonance Spectroscopy (MRS) measures in individuals with or at risk for mood disorders.

Ten studies were included (seven were randomized, double-blind, placebo-controlled trials and two were single arm, open label studies; the remaining was an open label , randomized, non-placebo-controlled, double-arm study), revealing that agents such as omega-3, N-acetylcysteine, ebselen, infliximab, and lovastatin produce measurable neurochemical changes, including alterations in N-acetyl aspartate, glutamate, glutamine, choline, and myo-inositol across brain regions like the anterior cingulate cortex and prefrontal cortex. These findings suggest that anti-inflammatory treatments may modulate neurophysiology and contribute to symptom improvement, though further research is needed to clarify underlying mechanisms. This study had limitations including the limited number of studies included, heterogeneity amongst studies regarding patient population, interventions, treatment duration, and imaging protocols.

PROFESSIONAL GUIDELINE(S)

National Comprehensive Cancer Network (NCCN) guidelines Version 3.2025 for Central Nervous System Cancers states:

- MRS may be useful in differentiating tumors from radiation necrosis; maybe helpful in grading tumors or assessing response.
- Not recommended for routine brain tumor imaging.
- MRS is primarily used to provide additional diagnostics when other imaging modalities are inconclusive. Interpretation of results should be interpreted with caution as certain anatomical regions; poor results occur in tumors that are near boney structures or air within the posterior fossa or spine.
- The use of MRS to identify and estimate the tissue concentration of 2-hydroxyglutarate (2HG), which is a metabolite that accumulates in tumors harboring mutations in the IDH genes. IDH mutations have a crucial role in classification, prognostication and management for gliomas. Barriers still exist in order to adopt 2HG MRS, including feasibility of certain tumors based on anatomical location or features, interpretation of results, data acquisition and post processing of data.

In the 2018 National Institute for Health and Care Excellence (NICE) guideline (NG99), last updated in 2021, brain tumors (primary) and brain metastases in over 16 years of age states:

- Consider advanced MRI techniques, such as MR perfusion and MR spectroscopy, to assess the potential of a high-grade transformation in a tumor appearing to be low grade on standard structural MRI for suspected gliomas.
- Consider advanced MRI techniques, such as MR perfusion, diffusion tensor imaging and MR spectroscopy, if findings from standard imaging are unclear about whether there is recurrence and early identification is potentially clinically useful as a follow up for brain metastases or gliomas.

In 2019 (revised 2024), the American College of Radiology (ACR) and American Society of Neuroradiology (ASNR) issued practice parameters for the performance and interpretation of MRS of the central nervous system. The document states that “when conventional imaging by MRI or CT

provides limited information regarding specific clinical questions, MRS is appropriate for specific indications". The indications include, but are not limited to, grading of primary glial neoplasm, evidence or suspicion of brain infection, seizures.

REGULATORY STATUS

Not Applicable

CODE(S)

- Codes may not be covered under all circumstances.
- Code list may not be all inclusive (AMA and CMS code updates may occur more frequently than policy updates).
- (E/I)=Experimental/Investigational
- (NMN)=Not medically necessary/appropriate

CPT Codes

Code	Description
76390	Magnetic resonance spectroscopy
0609T (NMN)	Magnetic resonance spectroscopy, determination and localization of discogenic pain (cervical, thoracic, or lumbar); acquisition of single voxel data, per disc, on biomarkers (i.e., lactic acid, carbohydrate, alanine, laal, propionic acid, proteoglycan, and collagen) in at least 3 discs
0610T (NMN)	transmission of biomarker data for software analysis
0611T (NMN)	postprocessing for algorithmic analysis of biomarker data for determination of relative chemical differences between discs
0612T (NMN)	interpretation and report

HCPCS Codes

Code	Description
Not Applicable	

ICD10 Codes

Code	Description
C71.0-C71.9	Malignant neoplasm of brain (code range)
C79.31-C79.49	Secondary malignant neoplasm of brain and other parts of the nervous system (code range)
G03.9	Meningitis, unspecified
G04.90	Encephalitis and encephalomyelitis, unspecified
G04.91	Myelitis, unspecified
G06.0	Intracranial abscess and granuloma
G37.4	Subacute necrotizing myelitis of central nervous system
G46.0-G46.8	Vascular syndromes of brain in cerebrovascular diseases (code range)
I67.89	Other cerebrovascular disease
I68.0	Cerebral amyloid angiopathy
I68.8	Other cerebrovascular disorders in diseases classified elsewhere
R56.9	Unspecified convulsions

REFERENCES

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CENTERS FOR MEDICARE AND MEDICAID SERVICES (CMS)

Electromagnetic navigation bronchoscopy is not addressed in National or Regional CMS coverage determinations or policies.

SEARCH TERMS

Not Applicable

PRODUCT DISCLAIMER

- Services are contract dependent; if a product does not cover a service, medical policy criteria do not apply.
- If a commercial product (including an Essential Plan or Child Health Plus product) covers a specific service, medical policy criteria apply to the benefit.
- If a Medicaid product covers a specific service, and there are no New York State Medicaid guidelines (eMedNY) criteria, medical policy criteria apply to the benefit.
- If a Medicare product (including Medicare HMO-Dual Special Needs Program (DSNP) product) covers a specific service, and there is no national or local Medicare coverage decision for the service, medical policy criteria apply to the benefit.
- If a Medicare HMO-Dual Special Needs Program (DSNP) product DOES NOT cover a specific service, please refer to the Medicaid Product coverage line.

POLICY HISTORY/REVISION

Committee Approval Dates

07/19/01, 09/19/02, 09/18/03, 07/15/04, 01/05/05, 07/21/05, 05/18/06, 05/17/07, 08/16/07, 06/19/08, 06/18/09, 11/18/10, 11/17/11, 11/15/12, 01/18/24, 01/23/25, 01/22/26

Date	Summary of Changes
01/22/26	• Annual review, policy statement added for MRS for the spine as not medically necessary.
01/23/25	• Annual review. Policy intent unchanged.
01/01/25	• Summary of changes tracking implemented.

11/18/10	• Policy was made active.
05/27/10	• Policy Deleted.
09/16/99	• Original effective date.