BlueCross BlueShield Federal Employee Program.

FEP Medical Policy Manual

FEP 6.01.24 Magnetic Resonance Spectroscopy

Annual Effective Policy Date: January 1, 2024

Original Policy Date: June 2012

Related Policies:

6.01.55 - Selected Positron Emission Tomography Technologies for Evaluation of Alzheimer Disease

Magnetic Resonance Spectroscopy

Description

Description

Magnetic resonance spectroscopy (MRS) is a noninvasive technique that can be used to measure the concentrations of different chemical components within tissues. The technique is based on the same physical principles as magnetic resonance imaging (MRI) and the detection of energy exchange between external magnetic fields and specific nuclei within atoms.

OBJECTIVE

The objective of this evidence review is to evaluate whether magnetic resonance spectroscopy improves health outcomes in patients with brain tumors, breast cancer, prostate cancer, and various non-cancer indications.

POLICY STATEMENT

Magnetic resonance spectroscopy is considered **investigational**.

POLICY GUIDELINES

None

BENEFIT APPLICATION

Experimental or investigational procedures, treatments, drugs, or devices are not covered (See General Exclusion Section of brochure).

FDA REGULATORY STATUS

Multiple software packages for performing proton MRS have been cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process since 1993. Single-voxel MRS is available on all modern MRI scanners. FDA product code: LNH.

RATIONALE

Summary of Evidence

For individuals who have brain tumors who receive magnetic resonance spectroscopy (MRS), the evidence includes a number of non-randomized studies and systematic reviews. Relevant outcomes are test accuracy, change in disease status, morbid events, and functional outcomes. Small studies have evaluated detection, characterization, grading, prognosis, and differentiation of tumor recurrence versus necrosis. Most studies included in the meta-analyses were small, retrospective, and used various ratios of MRS spectra. The largest prospective studies found that combining MRS with magnetic resonance imaging (MRI) resulted in a greater percentage of correct diagnoses of pediatric brain tumor type. These reports had limited information on the specific MRS spectra associated with different tumor types. Additional study is needed to better define the spectra associated with tumor characteristics, to evaluate the diagnostic accuracy, and to determine the effect on health outcomes. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have breast cancer, prostate cancer, dementia, liver disease, multiple sclerosis (MS), or psychiatric disorders who receive MRS, the evidence includes prospective studies on diagnostic accuracy and systematic reviews. Relevant outcomes are test accuracy, change in disease status, morbid events, and functional outcomes. A number of studies have examined the use of MRS for localized prostate cancer for biopsy, for diagnosis, and for the monitoring of patients with prostate cancer. However, the cumulative evidence remains uncertain. Data comparing the diagnostic accuracy of MRS with alternative imaging strategies are limited. A systematic review of MRS to identify dementia concluded that to characterize Alzheimer disease-associated neurochemical changes effectively, future approaches need to analyze interactively multiple quantifiable metabolites from different brain regions. A study of MRS as a noninvasive alternative to liver biopsy indicated that dual-gradient echo MRI outperforms MRS. Data on the use of MRS in MS has indicated that the measure is not sufficiently reliable to predict the future disease course. Research assessing MRS for the management of bipolar disorder has thus far failed to demonstrate its ability to predict treatment response. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

SUPPLEMENTAL INFORMATION

Practice Guidelines and Position Statements

Guidelines or position statements will be considered for inclusion in 'Supplemental Information' if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

American Association of Neurological Surgeons and Congress of Neurological Surgeons

The American Association of Neurological Surgeons and Congress of Neurological Surgeons (2015) gave a level III recommendation (reflecting unclear clinical certainty) for the addition of MRS to anatomic imaging for the management of diffuse low-grade glioma because the diagnostic accuracy is not well-defined and the role in clinical practice is still being defined.[60,]

American College of Radiology et al

The American College of Radiology, American Society of Neuroradiology, and Society for Pediatric Radiology (2019) updated their joint practice parameters on MRS of the central nervous system.[61,] Most of the update addressed the actual performance of MRS, but it also listed 25 possible indications for MRS when magnetic resonance imaging or computed tomography is inadequate for answering specific clinical questions.

MRS of the head without IV contrast is considered "usually not appropriate" in dementia (including cognitive decline and suspected Alzheimer disease), head trauma in adults and children, movement disorders, and neurodegenerative diseases.[62,]

Congress of Neurological Surgeons

The Congress of Neurological Surgeons (2016) published an evidence-based guideline on preoperative imaging assessment of patients with suspected nonfunctioning pituitary adenomas.[63,] The Congress found that although the results were promising, there was insufficient evidence to recommend the use of MRS formally.

National Comprehensive Cancer Network

The National Comprehensive Cancer Network (NCCN) clinical guidelines on central nervous system cancers (v.1.2023) identifies magnetic resonance spectroscopy (MRS) as 1 of several modalities that can be considered to rule out radiation necrosis, as compared with recurrence of brain tumors.[64,] The guidelines also state that MRS may be helpful in grading tumors or assessing response and that the most abnormal area on MRS would be the best target for biopsy. The limitations include tumors near vessels, air spaces, or bone, and the extra time required in a magnetic resonance imaging machine.

The NCCN clinical guidelines on prostate cancer (v.4.2023) list MRS as an advanced imaging technique but make no recommendations for its use.[65,]

The NCCN clinical guidelines on breast cancer (v.4.2023) do not mention MRS.[66,]

National Institute for Health and Care Excellence

The National Institute for Health and Care Excellence (NICE) guidance on primary brain tumors and brain metastases in adults, updated in 2021, includes the following recommendations regarding the use of MRS:[67,]

- In patients undergoing imaging for suspected glioma, advanced magnetic resonance imaging (MRI) techniques, such as MR perfusion and MRS may be considered to assess the potential of a high-grade transformation in a tumor appearing to be low grade on standard structural MRI.
- In patients undergoing follow-up for glioma or brain metastases, advanced MRI techniques such as MR perfusion, diffusion tensor imaging and MRS may be considered if findings from standard imaging are unclear regarding whether there is recurrence and early identification is potentially clinically useful.

The NICE guidance on Parkinson's disease in adults, published in 2017, states that MRS should not be used in the differential diagnosis of parkinsonian syndromes.[68,]

U.S. Preventive Services Task Force Recommendations

Not applicable.

Medicare National Coverage

There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

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68. National Institute for Health and Care Excellence (NICE). NICE Guidance: Parkinson's disease in adults [NG71]. 2017; https://www.nice.org.uk/guidance/ng71. Accessed September 14, 2023.

POLICY HISTORY - THIS POLICY WAS APPROVED BY THE FEP® PHARMACY AND MEDICAL POLICY COMMITTEE ACCORDING TO THE HISTORY BELOW:

Date	Action	Description
June 2012	New policy	
March 2013	Replace policy	Policy updated with literature search. References 13, 14, 31-33 and 40 added. No change to policy statement.
March 2014	Replace policy	Policy updated with literature review. References 28, 31, 35-36, 49 and58-59 added. No change to policy statement.
March 2015	Replace policy	Policy updated with literature review; references 31 and 36 added. Policy statement unchanged.
December 2017	Replace policy	Policy updated with literature review through July 21, 2017; references 1, 12, 36, and 41-42 added; notes 44-45 updated. Policy statement unchanged.
December 2018	Replace policy	Policy updated with literature review through July 9, 2018; references 3, 8, 23, and 44-45 added; reference 43 updated. Policy statement unchanged.
December 2019	Replace policy	Policy updated with literature review through June 26, 2019; references added. Indication on 'individuals with psychiatric disorders' added. Guidelines updated. Policy statement unchanged.
December 2020	Replace policy	Policy updated with literature review through June 19, 2020; references added. Policy statement unchanged.
December 2021	Replace policy	Policy updated with literature review through August 17, 2021; references added. Policy statement unchanged.
December 2022	Replace policy	Policy updated with literature review through August 15, 2022; reference added. Policy statements unchanged.
December 2023	Replace policy	Policy updated with literature review through September 14, 2023; no references added. Removed outdated clinical input. Policy statement unchanged.