

AmeriHealth Caritas Louisiana

National Imaging Associates, Inc.*	
Clinical guidelines BRAIN (HEAD) MRS	Original Date: April 2007
CPT Codes: 76390	Last Revised Date: May 2020
Guideline Number: NIA_CG_003	Implementation Date: January 2021 TBD

GENERAL INFORMATION:

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. All prior relevant imaging results, and the reason that alternative imaging (gold standard, protocol, contrast, etc.) cannot be performed must be included in the documentation submitted.

INDICATIONS FOR BRAIN MRS (ACR, 2018~~9~~);

~~Barajas, 2009; Lin, 2005; Smith, 2009; Sundgren, 2009~~);

- For the evaluation of a recurrent or residual brain tumor from post-treatment changes e.g., radiation necrosis (Chuang, 2016~~Smith, 2009~~)
- For further evaluation a brain lesion to distinguish a brain tumor from other non-tumor diagnoses (e.g. abscess or other infectious or inflammatory process) (Alam, 2011; Majos 2009; ~~Mishra, 2004~~)

BACKGROUND:

(Alam 2011; Hellström 2018; ~~Alam 2011~~); ~~Majos 2009; Debnam, 2007; Vezina, 2008~~)

Magnetic resonance spectroscopy (MRS) is a noninvasive imaging technique that determines the concentration of brain metabolites such as N-acetylaspartate, choline, creatine, and lactate within the body tissue examined. Radiofrequency waves are translated into biochemical composition of the scanned tissue; the resulting metabolic profile is useful in identifying brain tumors, e.g., differentiating neoplastic and non-neoplastic brain lesions. In selected cases, MRS may be a valuable supplement to MRI. It is sensitive, but nonspecific. This modality should be considered as an adjunct to conventional imaging rather than replacement for histopathological evaluation.

In terms of imaging of brain tumors carefully designed, multi-center trials complying with criteria of evidence-based medicine have not yet been completed (Horska, 2010)

* National Imaging Associates, Inc. (NIA) is a subsidiary of Magellan Healthcare, Inc.

Tumor Recurrence vs. Radiation Necrosis – Differentiation between recurrent brain tumors and treatment related injury, e.g., radiation necrosis, is difficult using conventional MRI. The typical appearance of radiation necrosis is similar to that of recurrent brain tumors. MRS is a new, quantitative approach, measuring various brain metabolic markers, to help in the differentiation of recurrent tumors and radiation necrosis. This differentiation is important as additional radiation can benefit recurrent disease but can be detrimental to radiation necrosis. ~~MRS~~ may help in determining treatment options and in preventing unnecessary surgery. In addition, a tumor recurrence diagnosed by MRS allows the surgeon to begin treatment early instead of having to wait for symptoms of recurrence or biopsy confirmation (~~Smith, 2009; Barajas, 2009; Chuang, 2016; Smith, 2009~~). However, no consensus exists regarding the value of this in clinical decision making and no approach has yet been validated to be sufficiently accurate (~~Chuang, 2016; Sundgren, 2009; Sundgren, 2009; Walker, 2014; Chuang, 2016~~).

Glioma – MRS has been proposed for pre-operative grading of gliomas and differentiating high-grade gliomas (HGGs) from low-grade gliomas. It has been found to have moderate diagnostic value and should be combined with other advanced imaging techniques to improve accuracy. Currently, the data is limited; more research is need for a definite conclusion for the utility of MRS for this indication. Therefore, it remains experimental/investigational (~~Abrigo, 2018; Wang, 2016; Abrigo, 2018~~).

Cystic lesions vs. cystic metastasis or cystic primary neoplasm – MRS may determine the concentration of certain brain metabolites whose ratios help in distinguishing abscesses from cystic necrotic tumors. For example, an increased choline signal or the ratio of certain brain metabolites may indicate the presence of cancerous cells. MRS may be used to diagnose the disease and to determine appropriate treatment (Mishra, 2004).

MRS in other diseases (~~Oz, 2014~~) – A role for MRS has been suggested in the management of neurodegenerative disease, epilepsy, and stroke. However, to better define this role, it will be necessary to standardize the MRS methodology, as well as the collection, analysis, and interpretation of data so it can be consistently translated to the applicable clinical settings. Currently, these potential applications remain experimental/investigational (~~Oz, 2014~~).

POLICY HISTORY:

Review Date: July 2019

Review Summary:

- Deleted therapeutic f/u indication
- Added tumor versus non tumor indication
- Updated background info and refs

Review Date: May 2020

Review Summary:

- **Updated references**

REFERENCES

Abrigo JM, Fountain DM, Provenzale JM, et al. Magnetic resonance perfusion for differentiating low-grade from high-grade gliomas at first presentation. *Cochrane Database Syst Rev*. 2018 Jan 22; 1(1):CD011551.

~~American College of Radiology (ACR). ACR Appropriateness Criteria[®]. Published 2017.~~

~~ACR–ASNR–SPR practice parameter for the performance and interpretation of magnetic resonance spectroscopy of the central nervous system. Revised 2019.~~

Alam MS, Sajjad Z, Hafeez S, et al. Magnetic resonance spectroscopy in focal brain lesions. *J Pak Med Assoc*. 2011 Jun; 61(6):540-3.

American College of Radiology (ACR). ACR–ASNR–SPR practice parameter for the performance and interpretation of magnetic resonance spectroscopy of the central nervous system. Revised 2019.

Barajas RF, Chang JS, Sneed PK, et al. Distinguishing recurrent intra-axial metastatic tumor from radiation necrosis following gamma knife radiosurgery using dynamic susceptibility-weighted contrast-enhanced perfusion MR imaging. *AJNR Am J Neuroradiol*. 2009; 30:367-372. doi: 10.3174/ajnr.A1362.

Chuang MT, Liu YS, Tsai YS, et al. Differentiating radiation-induced necrosis from recurrent brain tumor using MR perfusion and spectroscopy: A meta-analysis. *PLoS One*. 2016 Jan 7; 11(1):e0141438.

~~Debnam JM, Ketonen L, Hamberg LM, et al. Current techniques used for the radiologic assessment of intracranial neoplasms. *Archives of Pathology & Laboratory Medicine*. 2007; 131(2):252-60.~~

Hellström J, Romanos Zapata R, Libard S, et al. The value of magnetic resonance spectroscopy as a supplement to MRI of the brain in a clinical setting. *PLoS One*. 2018 Nov 15; 13(11):e0207336.

Horská A, Barker PB. Imaging of brain tumors: MR spectroscopy and metabolic imaging. *Neuroimaging Clin N Am*. 2010; 20(3):293–310.

Lin A, Ross BD, Harris K, et al. Efficacy of proton magnetic resonance spectroscopy in neurological diagnosis and neurotherapeutic decision making. *NeuroRx*. 2005; 2(2):197-214.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1064986>.

Majós C, Aguilera C, Alonso J, et al. Proton MR spectroscopy improves discrimination between tumor and pseudotumoral lesion in solid brain masses. *AJNR Am J Neuroradiol*. 2009 Mar; 30(3):544-51. Epub 2008 Dec 18.

Mishra AM, Gupta RK, Jaggi RS, et al. Role of diffusion-weighted imaging and in vivo proton magnetic resonance spectroscopy in the differential diagnosis of ring-enhancing intracranial cystic mass lesions. *J Comput Assist Tomogr*. 2004 Jul-Aug; 28(4):540-7.

Oz G, Alger JR, Peter B, et al. Clinical proton MR spectroscopy in central nervous system disorders. *Radiology*. March 2014; 270(3):658-679.


Smith EA, Carlos RC, Junck LR, et al. Developing a clinical decision model: MR spectroscopy to differentiate between recurrent tumor and radiation change in patients with new contrast-enhancing lesions. *Am J Roentgenol*. 2009; 192(2):W45-52. doi: 10.2214/AJR.07.3934.

Sundgren PC. MR spectroscopy in radiation injury. *AJNR Am J Neuroradiol*. 2009; 30:1469-1476. <http://www.ajnr.org/content/30/8/1469.full>.

~~Vezina LG. Imaging of central nervous system tumors in children: Advances and limitations. *J Child Neurol*. 2008; 23:1128-1135. doi: 10.1177/0883073808320753.~~

Walker AJ, Ruzevick J, Malayeri AA, et al. Postradiation imaging changes in the CNS: How can we differentiate between treatment effect and disease progression? *Future Oncol*. 2014; 10(7):1277-1297.

Wang Q, Zhang H, Zhang J, et al. The diagnostic performance of magnetic resonance spectroscopy in differentiating high-from low-grade gliomas: A systematic review and meta-analysis. *Eur Radiol*. 2016; 26(8):2670-2684.

Reviewed / Approved by  M. Atif Khalid, M.D., Medical Director, Radiology

Reviewed/Approved by



Patrick Browning, VP, Medical Director

Disclaimer: Magellan Healthcare service authorization policies do not constitute medical advice and are not intended to govern or otherwise influence the practice of medicine. These policies are not meant to supplant your normal procedures, evaluation, diagnosis, treatment and/or care plans for your patients. Your professional judgement must be exercised and followed in all respects with regard to the treatment and care of your patients. These policies apply to all Magellan Healthcare subsidiaries including, but not limited to, National Imaging Associates (“Magellan”). The policies constitute only the reimbursement and coverage guidelines of Magellan. Coverage for services varies for individual members in accordance with the terms and conditions of applicable Certificates of Coverage, Summary Plan Descriptions, or contracts with governing regulatory agencies. Magellan reserves the right to review and update the guidelines at its sole discretion. Notice of such changes, if necessary, shall be provided in accordance with the terms and conditions of provider agreements and any applicable laws or regulations.