

Subject: Magnetic Resonance Neurography, (76498) <i>(re: MCP-238)</i>		Original Effective Date: 2/5/15
Policy Number: MCR-659	Revision Date(s):	
Review Date: (re: MCP-238) 12/16/15, 9/15/16, 6/22/17, 12/19/18		

DISCLAIMER

This Molina Clinical Policy (MCP) is intended to facilitate the Utilization Management process. It expresses Molina's determination as to whether certain services or supplies are medically necessary, experimental, investigational, or cosmetic for purposes of determining appropriateness of payment. The conclusion that a particular service or supply is medically necessary does not constitute a representation or warranty that this service or supply is covered (i.e., will be paid for by Molina) for a particular member. The member's benefit plan determines coverage. Each benefit plan defines which services are covered, which are excluded, and which are subject to dollar caps or other limits. Members and their providers will need to consult the member's benefit plan to determine if there are any exclusion(s) or other benefit limitations applicable to this service or supply. If there is a discrepancy between this policy and a member's plan of benefits, the benefits plan will govern. In addition, coverage may be mandated by applicable legal requirements of a State, the Federal government or CMS for Medicare and Medicaid members. CMS's Coverage Database can be found on the CMS website. The coverage directive(s) and criteria from an existing National Coverage Determination (NCD) or Local Coverage Determination (LCD) will supersede the contents of this Molina Clinical Policy (MCP) document and provide the directive for all Medicare members.¹

DESCRIPTION OF PROCEDURE/SERVICE/PHARMACEUTICAL

Magnetic resonance neurography (MR neurography) is a new imaging modality, a modification of MRI that has been proposed for the diagnosis of peripheral nerve disorders involving the use of a standard MRI machine augmented with special software and hardware upgrades. These upgrades allow the device to emit special magnetic sequences, which are detected by specialized custom-built phased-array imaging surface coils. The development of MR neurography has made possible direct, high-resolution images of peripheral nerves, as well as associated intraneural and extraneural lesions. The developers of MR neurography define it as “tissue-selective imaging directed at identifying and evaluating characteristics of nerve morphology: internal fascicular pattern, longitudinal variations in signal intensity and caliber, and connections and relations to other nerves or plexuses”.

Proposed clinical applications of MR neuropathy include entrapment neuropathies such as carpal tunnel syndrome, cubital tunnel syndrome, and cervical radiculopathy; sciatica, traumatic peripheral nerve injuries; and peripheral nerve lesions such as neurofibromatosis and cysts. Other clinical applications suggested include brachial plexopathy, due to abnormalities of the brachial plexus, and lumbosacral plexopathy, due to abnormalities of the lumbosacral plexus.^{2 3}

RECOMMENDATION

Magnetic resonance neurography is considered investigational/experimental and unproven due to insufficient evidence in the peer reviewed medical literature that have not established safety, efficacy and effect on net health outcomes.

SUMMARY OF MEDICAL EVIDENCE

There is insufficient published evidence to assess the role of MR neurography in diagnosis and presurgical planning for peripheral nerve disorders, the safety and/or impact on health outcomes or patient management. The published evidence is from a very limited number of studies with small patient populations and is insufficient to provide definitive proof that MR neurography is accurate or clinically useful. There are no randomized controlled trials and no studies comparing MR neurography with other methods of diagnosing peripheral nerve injuries (EEG, nerve conduction studies, ultrasound, clinical exam). The published evidence consists of prospective, retrospective studies and case series. Below is a summary of the most relevant evidence based studies.

Back Pain⁴⁻⁷

The published evidence evaluating MR neurography for back pain is limited and consists of a controlled study⁴, 2 case series⁶⁻⁷ and a retrospective review⁵ that present conflicting findings regarding magnetic resonance neurography for low back pain. The number of participants in these studies ranged from 161-239 and reported that MRN may be a useful tool for localization of nerve root, brachial plexus, and peripheral nerve lesions however, the sensitivity and specificity of identification of abnormalities in comparison to other diagnostic tests, and the impact on the management of the individual has not been defined. Well-designed, large population, randomized, controlled studies are needed to supply sufficient evidence of efficacy and to establish the appropriate clinical applications of MRN when used either as a single diagnostic tool or in conjunction with other examinations, studies and/or procedures.

The largest study identified reported on MRN in 239 consecutive participants with sciatica of unknown etiology for whom standard diagnosis and treatment failed. These individuals, who had similar symptoms, underwent conventional MRI and MR neurography followed by MR-guided marcaine injection into the piriformis muscle. The diagnostic efficacy revealed that piriformis muscle asymmetry and sciatic nerve hyperintensity at the sciatic notch exhibited a 93% specificity and 64% sensitivity in distinguishing individuals with from those without piriformis syndrome.⁶

A retrospective review reported on the use of MR neurography in the management of spinal and peripheral nerve disorders in 191 individuals who had undergone MR neurography. Ninety-one of those individuals also underwent comparative EMG/NCS. When the MR neurography was compared to EMG/NCS, 29 individuals received the same diagnostic information, 41 individuals received additional diagnostic information, 15 individuals received less diagnostic information

and 6 individuals received a different diagnosis altogether. The median timeframe of imaging was 12 months following the onset of symptoms. The authors noted that MR neurography is less useful if done greater than 1 year after the onset of symptoms and that MR neurography is limited due to its ability to only image a selected region of the nerve pathway. ⁵

Other⁸⁻¹⁶

There is very limited published evidence evaluating MR neurography for others disorders including brachial plexus injuries, ulnar nerve entrapment, neuropathic pain in sjogrens syndrome, thoracic outlet syndrome, and carpal tunnel. The sensitivity and specificity of identification of abnormalities with MR neurography in comparison to other diagnostic tests, and the impact on the management of the individual has not been defined.

CODING INFORMATION THE CODES LISTED IN THIS POLICY ARE FOR REFERENCE PURPOSES ONLY. LISTING OF A SERVICE OR DEVICE CODE IN THIS POLICY DOES NOT IMPLY THAT THE SERVICE DESCRIBED BY THIS CODE IS A COVERED OR NON-COVERED. COVERAGE IS DETERMINED BY THE BENEFIT DOCUMENT. THIS LIST OF CODES MAY NOT BE ALL INCLUSIVE.

CPT	Description
76498	Unlisted magnetic resonance procedure (eg, diagnostic, interventional) [when specified as magnetic resonance neurography]

HCPCS	Description
	N/A

ICD-9	Description: [For dates of service prior to 10/01/2015]
	Any/All

ICD-10	Description: [For dates of service on or after 10/01/2015]
	Any/All

REFERENCES

- Centers for Medicare & Medicaid Services (CMS). Medicare Coverage Database. National coverage determination (NCD) Search. Accessed at: <http://www.cms.gov/medicare-coverage-database/>
- Hayes Search & Summary. Magnetic Resonance Neurography for Low Back Pain. Winifred Hayes Inc. Lansdale, PA. Oct 2014.
- Hayes Medical Technology Directory. Magnetic Resonance Neurography. Winifred Hayes Inc. Lansdale, PA. Last updated Aug 2007.

4. Zhang Z, Song L, Meng Q, Li Z, et al. Morphological analysis in patients with sciatica: a magnetic resonance imaging study using three-dimensional high-resolution diffusion-weighted magnetic resonance neurography techniques. *Spine*. 34 (7) (pp E245-50), 2009.
5. Du R, Auguste K.I, Chin C.T, et al. Magnetic resonance neurography for the evaluation of peripheral nerve, brachial plexus, and nerve root disorders: Clinical article. *Journal of Neurosurgery*. 112 (2) (pp 362-371), 2010. Accessed at: <http://thejns.org/doi/full/10.3171/2009.7.JNS09414>
6. Filler AG, Haynes J, Jordan SE., et al. Sciatica of nondisc origin and piriformis syndrome: diagnosis by magnetic resonance neurography and interventional magnetic resonance imaging with outcome study of resulting treatment. *Spine*. 2 (2) (pp 99-115), 2005.
7. Filler A.G. Diagnosis and treatment of pudendal nerve entrapment syndrome subtypes: imaging, injections, and minimal access surgery. *Neurosurgical focus*. 26 (2) (pp E9), 2009
8. Birnbaum J, Duncan T, Owoyemi K et al. Use of a novel high-resolution magnetic resonance neurography protocol to detect abnormal dorsal root ganglia in sjogren patients with neuropathic pain: Case series of 10 patients and review of the literature. *Medicine (United States)*. 93 (3) (pp 121-134), 2014.
9. Vargas MI, Viallon M, Nguyen D, et al. New approaches in imaging of the brachial plexus. *Eur J Radiol*. 2010;74(2):403-410.
10. Chhabra A, Wadhwa V et al. Recurrent ulnar nerve entrapment at the elbow: Correlation of surgical findings and 3-Tesla magnetic resonance neurography. *Can J Plast Surg*. 2013 Fall;21(3):186-9.
11. Baumer P, Kele H, Kretschmer T et al. Thoracic outlet syndrome in 3T MR neurography- fibrous bands causing discernible lesions of the lower brachial plexus. *Eur Radiol*. 2014 Mar;24(3):756-61. doi: 10.1007/s00330-013-3060-2. Epub 2013 Nov 22.
12. Cudlip SA, Howe FA, et al. Magnetic resonance neurography studies of the median nerve before and after carpal tunnel decompression. *J Neurosurg*. 2002 Jun;96(6):1046-51.
13. Keen NN, Chin CT, Engstrom JW, et al. Diagnosing ulnar neuropathy at the elbow using magnetic resonance neurography. *Skeletal Radiol*. 2012; 41(4):401-407.
14. Lee PP, Chalian M, Bizzell C, et al. Magnetic resonance neurography of common peroneal (fibular) neuropathy. *J Comput Assist Tomogr*. 2012; 36(4):455-461.
15. Wolf M, Bäumer P, Pedro M, et al. Sciatic nerve injury related to hip replacement surgery: imaging detection by MR neurography despite susceptibility artifacts. *PLoS One*. 2014; 9(2):e89154.
16. Luigetti M, Pravatà E, Colosimo C et al. MRI neurography findings in patients with idiopathic brachial plexopathy: correlations with clinical-neurophysiological data in eight consecutive cases. *Intern Med*. 2013;52(18):2031-9.
17. Pheripheral Nerve Imaging Guidelines ©2014 MedSolutions, Inc. Accessed at: http://www.medsolutions.com/documents/guidelines/guideline_downloads/PERIPHERAL%20NERVE%20DISORDERS-PND%20IMAGING%20GUIDELINES.pdf.

18. Washington State Department of Labor and Industries. Medical Treatment Guidelines. Work-Related Proximal Median Nerve Entrapment (PMNE) Diagnosis and Treatment. Effective Date August 1, 2009, updated August 2014. Accessed at:
<http://www.lni.wa.gov/claimsins/Files/OMD/MedTreat/PMNE073114.pdf>