MEDICAL COVERAGE GUIDELINES	**ORIGINAL EFFECTIVE DATE:**	**10/10/16**
SECTION: RADIOLOGY	**LAST REVIEW DATE:**	**07/19/18**
	LAST CRITERIA REVISION DATE:	
	ARCHIVE DATE:	

MAGNETIC RESONANCE (MR) NEUROGRAPHY

Non-Discrimination Statement and Multi-Language Interpreter Services information are located at the end of this document.

Coverage for services, procedures, medical devices and drugs are dependent upon benefit eligibility as outlined in the member's specific benefit plan. This Medical Coverage Guideline must be read in its entirety to determine coverage eligibility, if any.

This Medical Coverage Guideline provides information related to coverage determinations only and does not imply that a service or treatment is clinically appropriate or inappropriate. The provider and the member are responsible for all decisions regarding the appropriateness of care. Providers should provide BCBSAZ complete medical rationale when requesting any exceptions to these guidelines.

The section identified as "Description" defines or describes a service, procedure, medical device or drug and is in no way intended as a statement of medical necessity and/or coverage.

The section identified as "Criteria" defines criteria to determine whether a service, procedure, medical device or drug is considered medically necessary or experimental or investigational.

State or federal mandates, e.g., FEP program, may dictate that any drug, device or biological product approved by the U.S. Food and Drug Administration (FDA) may not be considered experimental or investigational and thus the drug, device or biological product may be assessed only on the basis of medical necessity.

Medical Coverage Guidelines are subject to change as new information becomes available.

For purposes of this Medical Coverage Guideline, the terms "experimental" and "investigational" are considered to be interchangeable.

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Description:

Magnetic resonance (MR) neurography has been investigated as a tool to diagnose nerve disorders. The technology involves modifying conventional MR imaging to enable high resolution longitudinal and cross sectional images of peripheral nerves in order to view nerve morphology. This may or may not require specialized MRI equipment or software. Brachial plexus exams require specialized coils. Extremity MR neurography may also be referred to as MRI of the extremity.

MAGNETIC RESONANCE (MR) NEUROGRAPHY (cont.)

Criteria:

- MR neurography is considered ***experimental or investigational*** for all diagnoses based upon:

  1. Insufficient scientific evidence to permit conclusions concerning the effect on health outcomes, and
  2. Insufficient evidence to support improvement of the net health outcome, and
  3. Insufficient evidence to support improvement of the net health outcome as much as, or more than, established alternatives.

Resources:

Literature reviewed 07/19/18. We do not include marketing materials, poster boards and non-published literature in our review.

Resources prior to 07/19/18 may be requested from the BCBSAZ Medical Policy and Technology Research Department.

1. Agnollitto PM, Chu MWK, Simao MN, Nogueira-Barbosa MH. Sciatic neuropathy: findings on magnetic resonance neurography. *Radiologia brasileira.* May-Jun 2017;50(3):190-196.

2. Andreisek G, Bolog NV. Getting Started with Magnetic Resonance Neurography. *Seminars in musculoskeletal radiology.* Jul 2018;22(3):334-343.

3. Apostolidis L, Schwarz D, Xia A, et al. Dorsal root ganglia hypertrophy as in vivo correlate of oxaliplatin-induced polyneuropathy. *PLoS One.* 2017;12(8):e0183845.

4. Cejas CP, Bordegaray S, Stefanoff NI, Rollan C, Escobar IT, Consigliere Rodriguez P. [Magnetic resonance neurography for the identification of pudendal neuralgia]. *Medicina.* 2017;77(3):227-232.

5. Chaves H, Bendersky M, Goni R, Gomez C, Carnevale M, Cejas C. Lumbosacral Plexus Root Thickening: Establishing normal root dimensions using magnetic resonance neurography. *Clinical anatomy (New York, NY).* Mar 25 2018.

MAGNETIC RESONANCE (MR) NEUROGRAPHY (cont.)

Resources: (cont.)

6. Chhabra A, Madhuranthakam AJ, Andreisek G. Magnetic resonance neurography: current perspectives and literature review. *Eur Radiol.* Feb 2018;28(2):698-707.

7. Dessouky R, Khaleel M, Khalifa DN, Tantawy HI, Chhabra A. Magnetic Resonance Neurography of the Lumbosacral Plexus in Failed Back Surgery Syndrome. *Spine.* Jun 15 2018;43(12):839-847.

8. Dessouky R, Xi Y, Scott KM, et al. Magnetic Resonance Neurography in Chronic Lumbosacral and Pelvic Pain: Diagnostic and Management Impact-Institutional Audit. *World neurosurgery.* Jun 2018;114:e77-e113.

9. Eastlack J, Tenorio L, Wadhwa V, Scott K, Starr A, Chhabra A. Sciatic neuromuscular variants on MR neurography: frequency study and interobserver performance. *The British journal of radiology.* Nov 2017;90(1079):20170116.

10. Gimber LH, Garland L, Krupinski EA, et al. Diffusion Tensor Imaging of the Ankle as a Possible Predictor of Chemotherapy Induced Peripheral Neuropathy: Pilot Study. *Current problems in diagnostic radiology.* Jan 6 2018.

11. Godel T, Baumer P, Pham M, et al. Human dorsal root ganglion in vivo morphometry and perfusion in Fabry painful neuropathy. *Neurology.* Sep 19 2017;89(12):1274-1282.

12. Godel T, Mautner VF, Farschtschi S, et al. Dorsal root ganglia volume differentiates schwannomatosis and neurofibromatosis 2. *Annals of neurology.* Apr 2018;83(4):854-857.

13. Hilgenfeld T, Jende J, Schwarz D, et al. Somatotopic Fascicular Lesions of the Brachial Plexus Demonstrated by High-Resolution Magnetic Resonance Neurography. *Investigative radiology.* Dec 2017;52(12):741-746.

14. Jende JME, Groener JB, Oikonomou D, et al. Diabetic neuropathy differs between type 1 and type 2 diabetes: Insights from magnetic resonance neurography. *Annals of neurology.* Mar 2018;83(3):588-598.

15. Jende JME, Hauck GH, Diem R, et al. Peripheral nerve involvement in multiple sclerosis: Demonstration by magnetic resonance neurography. *Annals of neurology.* Nov 2017;82(5):676-685.

16. Kehrer-Sawatzki H, Kordes U, Seiffert S, et al. Co-occurrence of schwannomatosis and rhabdoid tumor predisposition syndrome 1. *Molecular genetics & genomic medicine.* May 20 2018.

MAGNETIC RESONANCE (MR) NEUROGRAPHY (cont.)

Resources: (cont.)

17. Kollmer J, Sahm F, Hegenbart U, et al. Sural nerve injury in familial amyloid polyneuropathy: MR neurography vs clinicopathologic tools. *Neurology.* Aug 1 2017;89(5):475-484.

18. Kronlage M, Baumer P, Pitarokoili K, et al. Large coverage MR neurography in CIDP: diagnostic accuracy and electrophysiological correlation. *Journal of neurology.* Jul 2017;264(7):1434-1443.

19. Kronlage M, Pitarokoili K, Schwarz D, et al. Diffusion Tensor Imaging in Chronic Inflammatory Demyelinating Polyneuropathy: Diagnostic Accuracy and Correlation With Electrophysiology. *Investigative radiology.* Nov 2017;52(11):701-707.

20. Kronlage M, Schwehr V, Schwarz D, et al. Magnetic Resonance Neurography : Normal Values and Demographic Determinants of Nerve Caliber and T2 Relaxometry in 60 healthy individuals. *Clinical neuroradiology.* Oct 13 2017.

21. Leon Cejas L, Binaghi D, Socolovsky M, et al. Intraneural perineuriomas: diagnostic value of magnetic resonance neurography. *Journal of the peripheral nervous system : JPNS.* Mar 2018;23(1):23-28.

22. Li P, Liu P, Chen C, Duan H, Qiao W, Ognami OH. The 3D reconstructions of female pelvic autonomic nerves and their related organs based on MRI: a first step towards neuronavigation during nerve-sparing radical hysterectomy. *Eur Radiol.* May 4 2018.

23. Miyagi T, Higa K, Kido M, Ishihara S, Nakachi R, Suwazono S. The Sequential Ultrasonographic, Electrophysiological and MRI Findings in a Patient with the Pharyngeal-cervical-brachial Variant of Guillain-Barre Syndrome from the Acute Phase to the Chronic Phase. *Internal medicine (Tokyo, Japan).* 2017;56(10):1225-1230.

24. Muniz Neto FJ, Kihara Filho EN, Miranda FC, Rosemberg LA, Santos DCB, Taneja AK. Demystifying MR Neurography of the Lumbosacral Plexus: From Protocols to Pathologies. *BioMed research international.* 2018;2018:9608947.

25. Nakamura T, Kawarabayashi T, Seino Y, Shoji M. A case of hereditary neuropathy with liability to pressure palsies due to push-up exercise. *Rinsho shinkeigaku = Clinical neurology.* Jul 29 2017;57(7):383-386.

26. Pitarokoili K, Kronlage M, Baumer P, et al. High-resolution nerve ultrasound and magnetic resonance neurography as complementary neuroimaging tools for chronic inflammatory demyelinating polyneuropathy. *Therapeutic advances in neurological disorders.* 2018;11:1756286418759974.

27. Plante-Bordeneuve V. Transthyretin familial amyloid polyneuropathy: an update. *Journal of neurology.* Apr 2018;265(4):976-983.

MAGNETIC RESONANCE (MR) NEUROGRAPHY (cont.)

Resources: (cont.)

28. Ram R, Oliphant SS, Barr SA, Pandey T. Imaging of Pelvic Floor Reconstruction. *Seminars in ultrasound, CT, and MR.* Jun 2017;38(3):200-212.

29. Schwarz D, Kele H, Kronlage M, et al. Diagnostic Value of Magnetic Resonance Neurography in Cervical Radiculopathy: Plexus Patterns and Peripheral Nerve Lesions. *Investigative radiology.* Mar 2018;53(3):158-166.

30. Silveira CRS, Vieira CGM, Pereira BM, Pinto Neto LH, Chhabra A. Cystic degeneration of the tibial nerve: magnetic resonance neurography and sonography appearances of an intraneural ganglion cyst. *Skeletal radiology.* Dec 2017;46(12):1763-1767.

31. Sollmann N, Weidlich D, Cervantes B, et al. High Isotropic Resolution T2 Mapping of the Lumbosacral Plexus with T2-Prepared 3D Turbo Spin Echo. *Clinical neuroradiology.* Jan 10 2018.

32. Terumitsu M, Matsuzawa H, Seo K, et al. High-contrast high-resolution imaging of posttraumatic mandibular nerve by 3DAC-PROPELLER magnetic resonance imaging: correlation with the severity of sensory disturbance. *Oral surgery, oral medicine, oral pathology and oral radiology.* Jul 2017;124(1):85-94.

33. Upadhyaya V, Upadhyaya DN, Mishra B. MR neurography in traumatic, non-obstetric paediatric brachial plexopathy. *Eur Radiol.* Jun 2018;28(6):2417-2424.

34. UpToDate.com. Brachial plexus syndromes 04/17/2018.

35. UpToDate.com. Traumatic mononeuropathies. 02/27/2017.

36. Vaeggemose M, Vaeth S, Pham M, et al. Magnetic resonance neurography and diffusion tensor imaging of the peripheral nerves in patients with Charcot-Marie-Tooth Type 1A. *Muscle & nerve.* Dec 2017;56(6):E78-e84.

37. Weissman E, Boothe E, Wadhwa V, Scott K, Chhabra A. Magnetic Resonance Neurography of the Pelvic Nerves. *Seminars in ultrasound, CT, and MR.* Jun 2017;38(3):269-278.

38. Zuniga JR, Mistry C, Tikhonov I, Dessouky R, Chhabra A. Magnetic Resonance Neurography of Traumatic and Nontraumatic Peripheral Trigeminal Neuropathies. *Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons.* Apr 2018;76(4):725-736.

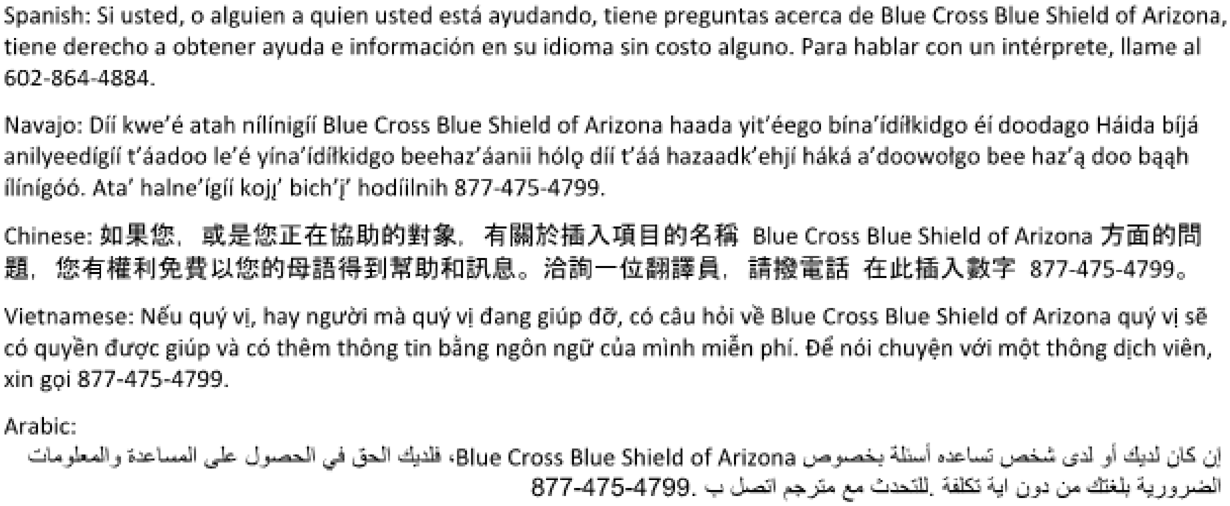
MAGNETIC RESONANCE (MR) NEUROGRAPHY (cont.)

Non-Discrimination Statement:

Blue Cross Blue Shield of Arizona (BCBSAZ) complies with applicable Federal civil rights laws and does not discriminate on the basis of race, color, national origin, age, disability or sex. BCBSAZ provides appropriate free aids and services, such as qualified interpreters and written information in other formats, to people with disabilities to communicate effectively with us. BCBSAZ also provides free language services to people whose primary language is not English, such as qualified interpreters and information written in other languages. If you need these services, call (602) 864-4884 for Spanish and (877) 475-4799 for all other languages and other aids and services.

If you believe that BCBSAZ has failed to provide these services or discriminated in another way on the basis of race, color, national origin, age, disability or sex, you can file a grievance with: BCBSAZ's Civil Rights Coordinator, Attn: Civil Rights Coordinator, Blue Cross Blue Shield of Arizona, P.O. Box 13466, Phoenix, AZ 85002-3466, (602) 864-2288, TTY/TDD (602) 864-4823, crc@azblue.com. You can file a grievance in person or by mail or email. If you need help filing a grievance BCBSAZ's Civil Rights Coordinator is available to help you. You can also file a civil rights complaint with the U.S. Department of Health and Human Services, Office for Civil Rights electronically through the Office for Civil Rights Complaint Portal, available at https://ocrportal.hhs.gov/ocr/portal/lobby.jsf, or by mail or phone at: U.S. Department of Health and Human Services, 200 Independence Avenue SW., Room 509F, HHH Building, Washington, DC 20201, 1–800–368–1019, 800–537–7697 (TDD). Complaint forms are available at http://www.hhs.gov/ocr/office/file/index.html

Multi-Language Interpreter Services:



Spanish: Si usted, o alguien a quien usted está ayudando, tiene preguntas acerca de Blue Cross Blue Shield of Arizona, tiene derecho a obtener ayuda e información en su idioma sin costo alguno. Para hablar con un intérprete, llame al 602-864-4884.

Navajo: Díí kwe'é atah nílínigíí Blue Cross Blue Shield of Arizona haada yit'éego bína'ídíłkidgo éí doodago Háida bíjá anilyeedígíí t'áadoo le'é yína'ídíłkidgo beehaz'áanii hóló díí t'áá hazaadk'ehjí háká a'doowołgo bee haz'ą doo bąąh ílínígóó. Ata' halne'ígíí kojį' bich'į' hodíilnih 877-475-4799.

Chinese: 如果您，或是您正在協助的對象，有關於插入項目的名稱 Blue Cross Blue Shield of Arizona 方面的問題，您有權利免費以您的母語得到幫助和訊息。洽詢一位翻譯員，請撥電話 在此插入數字 877-475-4799。

Vietnamese: Nếu quý vị, hay người mà quý vị đang giúp đỡ, có câu hỏi về Blue Cross Blue Shield of Arizona quý vị sẽ có quyền được giúp và có thêm thông tin bằng ngôn ngữ của mình miễn phí. Để nói chuyện với một thông dịch viên, xin gọi 877-475-4799.

Arabic:
إن كان لديك أو لدى شخص تساعده أسئلة بخصوص Blue Cross Blue Shield of Arizona، فلديك الحق في الحصول على المساعدة والمعلومات
الضرورية بلغتك من دون اية تكلفة. للتحدث مع مترجم اتصل ب 877-475-4799.

MAGNETIC RESONANCE (MR) NEUROGRAPHY (cont.)

Multi-Language Interpreter Services: (cont.)

Tagalog: Kung ikaw, o ang iyong tinutulangan, ay may mga katanungan tungkol sa Blue Cross Blue Shield of Arizona, may karapatan ka na makakuha ng tulong at impormasyon sa iyong wika ng walang gastos. Upang makausap ang isang tagasalin, tumawag sa 877-475-4799.

Korean: 만약 귀하 또는 귀하가 돕고 있는 어떤 사람이 Blue Cross Blue Shield of Arizona 에 관해서 질문이 있다면 귀하는 그러한 도움과 정보를 귀하의 언어로 비용 부담없이 얻을 수 있는 권리가 있습니다. 그렇게 통역사와 얘기하기 위해서는 877-475-4799 로 전화하십시오.

French: Si vous, ou quelqu'un que vous êtes en train d'aider, a des questions à propos de Blue Cross Blue Shield of Arizona, vous avez le droit d'obtenir de l'aide et l'information dans votre langue à aucun coût. Pour parler à un interprète, appelez 877-475-4799.

German: Falls Sie oder jemand, dem Sie helfen, Fragen zum Blue Cross Blue Shield of Arizona haben, haben Sie das Recht, kostenlose Hilfe und Informationen in Ihrer Sprache zu erhalten. Um mit einem Dolmetscher zu sprechen, rufen Sie bitte die Nummer 877-475-4799 an.

Russian: Если у вас или лица, которому вы помогаете, имеются вопросы по поводу Blue Cross Blue Shield of Arizona, то вы имеете право на бесплатное получение помощи и информации на вашем языке. Для разговора с переводчиком позвоните по телефону 877-475-4799.

Japanese: ご本人様、またはお客様の身の回りの方でも、Blue Cross Blue Shield of Arizona についてご質問がございましたら、ご希望の言語でサポートを受けたり、情報を入手したりすることができます。料金はかかりません。通訳とお話される場合、877-475-4799 までお電話ください。

Farsi:
اگر شما، یا کسی که شما به او کمک میکنید ، سوال در مورد Blue Cross Blue Shield of Arizona ، داشته باشید حق این را دارید که کمک و
اطلاعات به زبان خود را به طور رایگان دریافت نمایید 877-475-4799
تماس حاصل نمایید.]

Assyrian:
[illegible] Blue Cross Blue Shield of Arizona [illegible]
[illegible] 877-475-4799.

Serbo-Croatian: Ukoliko Vi ili neko kome Vi pomažete ima pitanje o Blue Cross Blue Shield of Arizona, imate pravo da besplatno dobijete pomoć i informacije na Vašem jeziku. Da biste razgovarali sa prevodiocem, nazovite 877-475-4799.

Thai: หากคณ หรอคนทคณกาลงชวยเหลอมคาถามเกยวกบ Blue Cross Blue Shield of Arizona
คณมสทธทจะไดรบความชวยเหลอและขอมลในภาษา ของคณไดโดยไมมคาใชจาย พดคยกบลาม โทร 877-475-4799