Name of Policy:
Magnetic Resonance Neurography

Policy #: 177        Latest Review Date: July 2015
Category: Radiology        Policy Grade: C

Background/Definitions:
As a general rule, benefits are payable under Blue Cross and Blue Shield of Alabama health plans only in cases of medical necessity and only if services or supplies are not investigational, provided the customer group contracts have such coverage.

The following Association Technology Evaluation Criteria must be met for a service/supply to be considered for coverage:

1. The technology must have final approval from the appropriate government regulatory bodies;
2. The scientific evidence must permit conclusions concerning the effect of the technology on health outcomes;
3. The technology must improve the net health outcome;
4. The technology must be as beneficial as any established alternatives;
5. The improvement must be attainable outside the investigational setting.

Medical Necessity means that health care services (e.g., procedures, treatments, supplies, devices, equipment, facilities or drugs) that a physician, exercising prudent clinical judgment, would provide to a patient for the purpose of preventing, evaluating, diagnosing or treating an illness, injury or disease or its symptoms, and that are:

1. In accordance with generally accepted standards of medical practice; and
2. Clinically appropriate in terms of type, frequency, extent, site and duration and considered effective for the patient’s illness, injury or disease; and
3. Not primarily for the convenience of the patient, physician or other health care provider; and
4. Not more costly than an alternative service or sequence of services at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of that patient’s illness, injury or disease.
Description of Procedure or Service:
Magnetic resonance neurography (MRN) is a novel imaging technique recently developed for direct imaging of spinal and peripheral nerves. Modifications are made to standard MRI technology using special software and hardware upgrades that enable direct high-resolution longitudinal and cross-sectional images of peripheral nerves such that the morphology of the nerve can be visualized. MRN has been studied to supplement diagnostic evaluations by electromyography (EMG) and nerve conduction studies in patients with suspected peripheral nerve tumors, traumatic injury, post-irradiation neuritis, chronic compression, and pain syndromes where an anatomic lesion is suspected.

Policy:
Magnetic resonance neurography does not meet Blue Cross and Blue Shield of Alabama’s medical criteria for coverage and is considered investigational.

Blue Cross and Blue Shield of Alabama does not approve or deny procedures, services, testing, or equipment for our members. Our decisions concern coverage only. The decision of whether or not to have a certain test, treatment or procedure is one made between the physician and his/her patient. Blue Cross and Blue Shield of Alabama administers benefits based on the member’s contract and corporate medical policies. Physicians should always exercise their best medical judgment in providing the care they feel is most appropriate for their patients. Needed care should not be delayed or refused because of a coverage determination.

Key Points:
Available published studies lack direct and timely comparisons of magnetic resonance neurography (MRN) to examinations/other imaging procedures, with established reference standards; the sensitivity, specificity, positive and negative predictive values remain unknown. Due to the lack of well-designed controlled trials, the accuracy and clinical utility of MRN in peripheral nerve disorders has not been established. It remains unclear if MRN would be utilized as a single imaging tool or in conjunction with other imaging techniques including other MR imaging techniques. Additionally, the accuracy and clinical utility of MRN will vary by diagnosis, and thus remains unknown.

Filler et al 2005 prospectively evaluated 239 consecutive patients experiencing leg pain in the distribution of the sciatic nerve and in whom a diagnosis could not be established or in whom lumbar spine surgery did not relieve pain were evaluated. Results of these imaging evaluations combined with those of physical examinations were used as indications either for fluoroscopically guided diagnostic spinal injections or for MR imaging–guided injections of muscle or nerve near lumbar soft tissues or in the pelvis. Patients in whom physical examination findings and medical history were consistent with piriformis syndrome and in whom magnetic resonance neurography (MRN) did not rule out piriformis syndrome were considered to have probable piriformis syndrome and were referred for injection. The reference standard for a diagnosis of piriformis syndrome was if the individual’s treatment was successful. The authors noted that when piriformis muscle asymmetry alone is used as a criterion to identify individuals with piriformis syndrome, criterion sensitivity and specificity are 46% and 64%, respectively.
unilateral sciatic nerve hyperintensity at the level of the sciatic notch is added as a criterion to identify individuals with piriformis syndrome, criteria sensitivity and specificity are 64% and 93%, respectively.

In a prospective observational study of patients with sciatica, Zhang and colleagues in 2009 investigated the effectiveness of 3-D high-spatial resolution diffusion-weighted magnetic resonance neurography (MRN) based on steady state free precession (3-D diffusion-weighted steady-state free precession [DW-SSFP]) in the diagnosis of sciatica. The 3-D DW-SSFP sequence was performed on 137 patients with sciatica and 32 patients in control group. The post-processing techniques were used to generate images of lumbo-sacral plexus and sciatic nerve, and the images acquired were assessed based on the presence or absence of nerve abnormality. The certainty of identifying the lumbo-sacral plexus and main branches from all cases was determined in each of the reconstruction planes for each case individually and assessed by using a 3-score scale. The sciatic nerve and its main branches were differentiated and a clear picture was obtained in all subjects. Compared with the control group, the presence of nerve root compression or increased T2 signal intensity changes can be observed in all patients. The mean score of certainty of identifying the sciatic nerve and main branches was 1.76 +/- 0.4, which indicates that the sciatic nerve and main branches can be identified with certainty. The authors concluded that the 3-D DW-SSFP MRN with high spatial and sufficient contrast is an excellent technique to define the nature of sciatica and assists in prognostication and possibly in management.

Du et al in 2010 retrospectively compared magnetic resonance neurography (MRN) and NCS/EMG in 91 patients with spinal and/or peripheral nerve disorders. MRN was obtained a median of twelve months after the onset of symptoms. The median interval from onset of symptoms to NCS/EMG was eight months. The most common diagnoses were radiculopathy (in 31% of patients), peripheral neuropathy (19%), and brachial plexopathy (in 12%). Radiculopathies were evaluated most frequently in the cervical and lumbar regions (58 and 38%, respectively). Peripheral mononeuropathies most commonly involved the sciatic nerve (in 61% of patients). Compared to NCS/EMG, MRN was found to give the same information in 29 patients (32%), additional diagnostic information in 41 (45%), less information in 15 (17%), and a different diagnosis in 6 (7%). The authors noted that cases in which MRN provides more diagnostic information than NCS/EMG are important in determining when MRNs can be expected to be helpful. For example, MRN was helpful when traditional MRI and NCS/EMG results was inconclusive; but not helpful if the time from onset of symptoms was > one year.

Although current evidence supports MRN as a promising technique, the outcome data which would determine the efficacy of this technology is limited to studies involving a small number of patients, making it premature to offer conclusions regarding its effectiveness for the general population. Additionally, large-scale, well-conducted, controlled studies with this approach are warranted to determine its efficacy in imaging neurofibromas and distinguishing benign from malignant lesions.

**Key Words:**
Magnetic resonance neurography, MRN, magnetic resonance neurogram
**Approved by Governing Bodies:**
Not applicable

**Benefit Application:**
Coverage is subject to member’s specific benefits. Group specific policy will supersede this policy when applicable.

ITS: Home Policy provisions apply.
FEP: Special benefit consideration may apply. Refer to member’s benefit plan. FEP does not consider investigational if FDA approved and will be reviewed for medical necessity.

**Coding:**
CPT Codes:
- **76498** Unlisted magnetic resonance procedure (e.g., diagnostic, interventional)
- **64999** Unlisted Procedure, Nervous System

**References:**
Policy History:
Medical Policy Group, June, 2011 (1): Policy created
Medical Policy Administration Committee, July, 2011
Available for comment July 6 through August 22, 2011
Medical Policy Group, July 2015 (3): Policy reviewed by consensus with radiology CMO at CCN; no new literature to add; service remains investigational; no change in policy statement

This medical policy is not an authorization, certification, explanation of benefits, or a contract. Eligibility and benefits are determined on a case-by-case basis according to the terms of the member’s plan in effect as of the date services are rendered. All medical policies are based on (i) research of current medical literature and (ii) review of common medical practices in the treatment and diagnosis of disease as of the date hereof. Physicians and other providers are solely responsible for all aspects of medical care and treatment, including the type, quality, and levels of care and treatment.

This policy is intended to be used for adjudication of claims (including pre-admission certification, pre-determinations, and pre-procedure review) in Blue Cross and Blue Shield’s administration of plan contracts.