AMERICAN COLLEGE OF
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LOW BACK DISORDERS

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These panel members represent expertise in neurology, neurosurgery, neurophysiology, occupational medicine, orthopedic surgery, pain medicine, physical medicine and rehabilitation, chiropractic medicine, family practice, and physical therapy. As required for quality guidelines – Institute of Medicine's (IOM's) Standards for Developing Trustworthy Clinical Practice Guidelines and Appraisal of Guidelines for Research and Evaluation (AGREE) – a detailed application process captured conflicts of interest. The above Panel has none to declare relevant to this guideline.

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There are no quality epidemiological studies that support the theory that degenerative spondylolisthesis, spinal stenosis, degenerative facet disease, or sciatica/radiculopathy are occupational conditions. However, there is a biomechanical theory that physical factors may contribute through degenerative disease in the discs with resulting theoretically altered biomechanical forces in the facets resulting in or accelerating degenerative facet osteoarthrosis. Yet, there also is evidence that these conditions may have a genetic basis.(214, 215)

Follow-up Visits

It is recommended that patients with potentially work-related low back disorders should follow-up every 3 to 5 days with a health care provider who can offer subsequent assessments and counseling regarding advancing activity levels, avoiding static positions or inactivity, medication use, anticipated favorable prognosis, and other concerns [**Recommended Insufficient Evidence (I)**]. Interactive sessions may assist involving the patient fully in his or her recovery. If the patient has returned to work, these interactions may be conducted on site or by telephone to avoid interfering with work activities. Subsequent follow-up can occur when there is need for: 1) altered treatment; 2) release to modified, increased, or full duty; or 3) after appreciable healing or recovery can be expected. Typically, this will be no later than 1 week into the acute pain period. At the other extreme, in the stable chronic LBP setting, follow-up may be infrequent, such as every 6 months.

Special Studies and Diagnostic and Treatment Considerations.....

Detailed discussion of various imaging studies follows this section. Lumbar spine x-rays are not recommended in patients with LBP in the absence of red flags for serious spinal pathology within the first 4 to 6 weeks. Among patients with evidence of radiculopathy, imaging in the acute pain setting is also not recommended as the natural history is for such problems to resolve with conservative care. Table 5 provides a general comparison of the abilities of different techniques to identify physiologic insult and define anatomic defects. An imaging study may be appropriate for a patient whose limitations due to consistent symptoms have persisted for 1 month or more to further evaluate the possibility of potentially serious pathology such as a tumor.

Table 5. Ability of Various Techniques to Identify and Define Low Back Pathology and Sequela

Technique	Low Back Pain	Disc Herniation/ Protrusion	Cauda Equina Syndrome	Spinal Stenosis	Post-laminectomy Syndrome
History	++++	+ + +	+ + +	+ + +	+ + +
Physical examination	+ +	+ + +	+ + + +	+ +	+ +
Laboratory studies	0	0	0	0	0
Imaging studies					
Radiography[1]	0	+	+	+	+
Computerized tomography (CT)[1,2]	0	+ + +	+ + +	+ + +	+ +
Magnetic resonance imaging (MRI)[1,2]	0	+ + + +	+ + + +	+ + +	+ + + +
Electromyography (EMG), sensory evoked potentials (SEPs)[3]	0	+ + +	0 / +	+ +	+

[1]Risk of complications (e.g., infection, radiation) highest for myeloCT, second highest for myelography, and relatively less for bone scan, radiography, and CT.

[2]False-positive results in up to 30% of people over age 30 who do not have symptoms and may be over 50% in those over age 40.

[3]EMG is generally unhelpful in the first month of symptoms other than to document prior disease or injury status.

Note: Number of plus signs indicates relative ability of technique to identify or define pathology.

Diagnostic Testing and Other Testing

Diagnostic tests can be categorized into three broad categories: 1) anatomical; 2) functional; and 3) physiological. Anatomical tests help to define anatomy and include roentgenograms, magnetic resonance imaging (MRI), bone scans, computerized tomography (CT), and myelograms. Functional tests include those that assess voluntary lifting or pushing or pulling capacities. Physiological tests include electromyography and thermography. Tests such as discography attempt to bridge the gap

between two of these testing domains and are organizationally included in this document in one domain. In considering which test to order, it is important to be able to address two key questions:

1. What is the specific question to be addressed?
2. What will be done with the results?

The first question must be clearly addressed and the second must result in an unequivocal answer used for a decision point with the results having a significant probability of altering the clinical management. Otherwise, the test is almost never indicated.

The operant characteristics of the test being ordered are critical to the proper interpretation of the results. For example, lumbosacral spine MRIs are more likely to be "abnormal" by age 40 in normal individuals (show normal aging changes), and herniated discs are not infrequently found in screening studies of asymptomatic teenagers. The pre-test probability of disease, determined by a careful clinical evaluation is critical to address the probability that the abnormality identified on the image is actually causing the individual's symptoms. At present, there is not one type of imaging method that shows a clear advantage over others. Generally, MRI is superior for imaging soft tissue including intervertebral disc herniations.

There are many additional diagnostic tests possible for the evaluation of LBP and spinal conditions. In the absence of moderate- to high-quality studies, other tests are **Not Recommended, Insufficient Evidence (I)**.(9)

FUNCTIONAL CAPACITY EVALUATIONS

Functional capacity evaluations (FCEs) consist of a comprehensive battery of performance-based tests to attempt to determine an individual's ability for work and activities of daily living.(36, 119, 216-237) The goals of FCEs include:

- determine individual's readiness to work after injury or illness at Maximum Medical Improvement (MMI),
- assist with goal-setting and treatment planning for rehabilitation or to monitor the progress of a patient in a rehabilitation program,
- estimate potential vocational status and provide a foundation for effective vocational rehabilitation,
- provide information to assist in disability determinations,
- provide information for hiring decisions (post-offer or fit-for-duty testing),
- assess the extent of disability in litigation cases, and
- provide information regarding a patient's level of effort and consistency of performance.

1. *Recommendation: Functional Capacity Evaluations for Chronic Disabling Low Back Pain*
   Functional capacity evaluations (FCEs) are a recommended option for evaluation of disabling chronic LBP where the information may be helpful to attempt to objectify worker capability, function, motivation, and effort vis-à-vis either a specific job or general job requirements. There are circumstances where a patient is not progressing as anticipated at 6 to 8 weeks and an FCE can evaluate functional status and patient performance in order to match performance to specific job demands, particularly in instances where those demands are medium to heavy. If a provider is comfortable describing work ability without an FCE, there is no requirement to do this testing.

   Harms – Medicalization, worsening of LBP with testing; may have misleading results that understate capabilities.
   Benefits – Assess functional abilities and may facilitate greater confidence in return to work.
   Strength of Evidence – **Recommended, Insufficient Evidence (I)**
   Level of Confidence – **Moderate**

2. *Recommendation: Functional Capacity Evaluations for Chronic Stable Low Back Pain or Post-Operative Recovery*

ELECTROMYOGRAPHY

Electromyography (EMG) is a physiological test that assesses the function of the motor unit (including the neuron's anterior horn cell, its axon, the neuromuscular junctions, and muscle fibers it supplies).(381, 382) It differs from surface EMG which is discussed below. EMG technically refers to the needle electromyogram and the term "EMG" is usually misused as a euphemism for an electrodiagnostic exam that includes both needle EMG and peripheral nerve conduction testing. Among spine patients, EMG has been used primarily to evaluate radiculopathy.(383)

1. *Recommendation: EMG with Leg Symptoms*
   Electrodiagnostic studies, which must include needle EMG, are recommended where a CT or MRI is equivocal and there is ongoing pain that raise questions about whether there may be a neurological compromise that may be identifiable (i.e., leg symptoms consistent with radiculopathy, spinal stenosis, peripheral neuropathy, etc.). Also, may be helpful for evaluation of chronicity and/or aggravation of a pre-existing problem.

   Indications – Failure to resolve or plateau of suspected radicular pain without resolution after waiting 4 to 6 weeks (to provide for sufficient time to develop EMG abnormalities as well as time for conservative treatment to resolve the problems), equivocal imaging findings such as CT or MRI, and suspicion by history and physical examination that a neurologic condition other than radiculopathy may be present instead of, or in addition to radiculopathy.
   Harms – Medicalization or worsening of otherwise benign back condition; pain; hematoma, or misinterpretation if not done by an appropriately trained person.
   Benefits – Diagnosis of neurological compromise.
   Strength of Evidence – **Recommended, Evidence (C)**
   Level of Confidence – High

2. *Recommendation: EMG without Leg Symptoms*
   Electrodiagnostic studies are not recommended for patients with acute, subacute, or chronic back pain who do not have significant leg pain or numbness.

   Strength of Evidence – **Not Recommended, Evidence (C)**
   Level of Confidence – Moderate

Rationale for Recommendations

Needle EMG may help determine if radiculopathy and/or spinal stenosis is present and can help address acuity.(384) EMG requires full knowledge of the anatomy and precise innervation of each muscle to properly perform and interpret the test results. Needle EMG also requires the skills of an experienced physician who can reliably spot abnormal motor potentials and recruitment patterns. Nerve conduction studies are usually normal in radiculopathy (except for motor nerve amplitude loss in muscles innervated by the involved nerve root in more severe radiculopathy and H-wave studies for unilateral S1 radiculopathy). Nerve conduction studies rule out other causes for lower limb symptoms (generalized peripheral neuropathy, peroneal compression neuropathy at the proximal fibular, etc.) that can mimic sciatica.

An abnormal EMG that persists after anatomic resorption of the herniation and that correlates with the patient's symptoms is generally considered proof the symptoms are due to radiculopathy. Thus, the EMG study documents that management for chronic neuropathic pain appears appropriate.

As imaging studies (especially CT and MRI) have progressed, the need for EMG has declined. However, EMG remains helpful in certain situations. These include ongoing pain suspected to be of neurological origin, but without clear neurological compromise on imaging study. EMG can then be used to attempt to rule in/out a physiologically important neurological compromise. An abnormal study confirming radiculopathy permits a diagnosis of neuropathic pain (helping with pain management decisions). This test should not be performed in the first month unless there is a desire to document pre-existing neurological compromise, as it requires time (generally at least 3 weeks) to develop the needle EMG abnormalities. EMG is minimally invasive, and has no long-term adverse effects

(although it is somewhat painful), and it is costly. To result in reliable measures, it must be performed by a practitioner well skilled in the appropriate anatomy and testing procedures. Post-operative changes may persist in normal individuals without clinical significance, thus also requiring careful interpretation.

Evidence for the Use of Electromyography
There are no quality studies regarding the use of electromyography.

We searched PubMed, EBSCO, Cochrane Review, and Google Scholar with limits on publication dates from 2011-2012. We used the following terms: electromyography, EMG, surface EMG, intramuscular EMG, acute low back pain, subacute low back pain, chronic low back pain, diagnostic testing, sensitivity, specificity, positive predictive value, negative predictive value, efficacy, efficiency, and low back pain to find 10,054 articles. Of the 10,054 articles, we reviewed zero articles and included zero articles.

SURFACE ELECTROMYOGRAPHY

Surface electromyography (sEMG) has been used to diagnose LBP(385-401) and involves the recording of summated muscle electrical activity by skin electrodes (such as those used in an electrocardiogram or EKG). Unlike traditional needle EMG (see above), no needle is used to explore specific portions of specific muscles for motor unit potentials.

Surface EMG has also been used for many neuropathies, myopathies, myotonic dystrophy, Duchenne muscular dystrophy, Becker muscular dystrophy, spinal muscular atrophy, hereditary motor and sensory neuropathy, amyotrophic lateral sclerosis, McArdle's disease, postpoliomyelitis, familial hypokalemic periodic paralysis, limb girdle dystrophy, Steinert disease, and Charcot-Marie-Tooth.(402-418) These disorders are beyond the scope of this guideline.

Recommendation: Surface EMG for Diagnosing Low Back Pain
Surface EMG is not recommended to diagnose low back pain.

Strength of Evidence – **Not Recommended, Insufficient Evidence (I)**
Level of Confidence – High

Rationale for Recommendation
There are no quality studies demonstrating that the use of surface EMG results in improved diagnosis or evaluation of patients with LBP. Available studies have methodological weaknesses, including poor descriptions of patients, small sample sizes, types of machine, electrode placement, and analysis of the output making outcomes difficult to compare across studies.(385, 392, 396, 400, 419)

Surface EMG primarily measures the muscle activity of the nearest muscle group and over a wide geographic area rather than measuring deep and/or individual muscles,(409, 420) although some research suggests it may be possible to obtain measurements from deeper muscles.(421) Surface EMG is highly sensitive to the placement of the electrode, as well as quite sensitive to changes in posture. Thus it is technically demanding to obtain valid and reliable data. Common uses of sEMG are in research laboratory studies (e.g., physiology, kinesiology, gait analysis, ergonomics) and small scale-ergonomics studies in employment settings. Research studies of sEMG have suggested some differences between normal and chronic LBP patients and in pre- and post-intervention populations.(385, 386, 389, 393-396, 400, 401) A meaningful application to the clinical setting resulting in improved outcomes is not as clear.

The American Association of Neuromuscular and Electrodiagnostic Medicine's position is that there are no clinical indications for the use of sEMG in the diagnosis and treatment of disorders of nerve and muscle, although potential future uses are possible.(405, 422) Surface EMG is not invasive, has few adverse events, is moderately costly, but has a lack of quality evidence of benefits for the clinical evaluation or treatment of back disorders and thus is not recommended.