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Electromyogram (EMG) for Diagnosis | Medstar Health URL of this page: Electromyography (EMG) and nerve conduction studies are tests that check how well your muscles and the nerves that control them are working. These nerves control your muscles by sending out electrical signals to make your muscles move. As your muscles react by tightening (contracting), they give off electrical activity, which can then be measured. An EMG test looks at the electrical signals your muscles make when they are at rest and when used. A healthy muscle should not give off any electrical signals when you aren't moving it. If your muscle is damaged, it may show electrical activity while at rest or activity that is not normal while using it. A nerve conduction study measures how fast and how well your body's electrical signals move along your nerves. A damaged nerve has a slower and weaker signal. This test can help check for nerve damage. EMG tests and nerve conduction studies can help find out if you have a health condition that has damaged your muscles or nerves or how they work together. These tests can be done separately, but they are usually done at the same time. Other names: electrodiagnostic study, EMG test, electromyogram, NCS, nerve conduction velocity, NCV EMG and nerve conduction studies are used to help check for many kinds of muscle and nerve disorders. An EMG test helps find out if muscles are responding the right way to nerve signals. Nerve conduction studies help to check for nerve damage or disease. When EMG tests and nerve conduction studies are done together, it helps providers tell if your symptoms are caused by a muscle or a nerve disorder. You may need these tests if you have symptoms of a muscle or nerve disorder. These symptoms include: Muscle weakness Tingling or numbness in arms, legs, hands, feet, and/or face Muscle cramps, spasms, and/or twitching Paralysis of any muscles For an EMG test: You will sit or lie on a table or bed. Your provider will clean the skin over the muscle being tested. Your provider will place a small needle with an electrode into the muscle. This is connected to a machine used to record your muscle's electrical activity when you move and relax it. You may have slight pain or discomfort when the electrode is inserted. You will stay still while the machine records your muscle activity at rest. You will tighten (contract) the muscle slowly while the machine records this muscle activity. The electrode may be moved to record activity in different muscles. The electrical activity is recorded and shown on a video screen. It looks like wavy and spiky lines. The activity may also be recorded and sent to an audio speaker. The audio may make popping sounds when you're contracting your muscles. An EMG test may take from 30 to 60 minutes. For a nerve conduction study: You will sit or lie on a table or bed. Your provider will stick electrodes to your skin above a nerve they're checking. The electrodes, called stimulating electrodes, deliver a mild electrical pulse. Your provider will attach recording electrodes to the muscles controlled by those nerves. These electrodes will record the muscles' response to the electrical stimulation from the nerve. Your provider will send a small pulse of electricity through the stimulating electrodes. This stimulates the nerve to send a signal to the muscle. This may cause a mild tingling feeling. Your provider will write down how long it takes for your muscle to respond to the nerve signal. The speed of the muscle response is called the conduction velocity. A nerve conduction test may take from 15 minutes to over an hour. The length of time depends on how many nerves and muscles are tested. If you are having both tests, the nerve conduction study will be done first. Tell your provider if you have a pacemaker or cardiac defibrillator. Special steps will need to be taken before the test if you have one of these devices. Tell your provider if you take blood thinner medicines. If you're taking blood thinners, you may need to watch for more bleeding from the needle. Wear loose, comfortable clothing for easy access to the test area. It can be easily removed if you need to change into a hospital gown. Make sure your skin is clean. Don't use lotions, creams, or perfumes for a day or two before the test. They can change the results of the test. You may feel mild pain during an EMG test. Let your provider know if your pain becomes very uncomfortable because this may change your test results. You may have a tingly feeling, like mild static electricity, during a nerve conduction study. The muscles that were tested may be sore for a few days after the test. You may also have some bruises on your skin where the needles were placed. If your results are not normal, it can be a sign of many different conditions. Depending on which muscles or nerves are affected, it could mean one of the following: Carpal tunnel syndrome, a common condition that affects nerves in the hand and arm. It causes numbness, tingling, weakness, or pain in your wrist or hand. Herniated disk, a condition that happens when a part of your spine, called a disk, is damaged. Part of the disk bulges or pushes out, putting pressure on the spine which causes pain and numbness. Guillain-Barré syndrome, a rare disorder that causes your immune system to attack your nerves. It can lead to numbness, tingling, and paralysis. Myasthenia gravis, a rare disease that causes weakness in the muscles you can control. They may include your muscles for eye movement, facial expressions, or other muscles. Muscular dystrophy (MD), a group of genetic diseases that cause muscle weakness. This weakness can lead to trouble walking and the ability to care for yourself. Charcot-Marie-Tooth disease (CMT), a group of nerve disorders that are inherited (passed down through families). CMT causes nerve damage and muscle weakness, mostly in the arms and legs. Amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease. It is a disorder that attacks nerve cells in your brain and spinal cord. It affects all the muscles you use to move, speak, eat, and breathe. There is no cure for ALS, and it gets worse over time. To understand the results of an EMG test or nerve conduction study, your provider will consider your symptoms, medical history, and the results of other tests. If you have questions about your results, talk to your provider. Learn more about laboratory tests, reference ranges, and understanding results. Learn how to cite this page To understand how an EMG test works, it helps to understand how your muscles work.Your motor nerves (motor neurons) send electrical signals to your muscles to tell them what to do. (These signals originate in your brain, travel down your spinal cord, through your motor nerves and to your muscles.) This electrical stimulation causes electrical activity in your muscles, which causes them to contract (tighten). The muscle contraction itself also produces electrical activity.Normally, a muscle at rest has no electrical activity. A slight contraction of the muscle results in some electrical activity, which increases as the muscle contracts more intensely.In electromyography, a healthcare provider inserts a small needle with an electrode into one of your muscles to record its electrical activity. The provider doesn’t deliver electrical stimulation through the needle. Instead, you can think of the needle as being similar to a microphone — it’s only a recording device.As you rest or contract your muscle, the needle electrode records the electrical activity. The needle is attached through a cable to a computer that allows the provider to see what your muscle is doing both at rest and with movement. It appears as waves on a screen. They may also use an audio amplifier so they can hear the pulses of electrical activity.The provider then analyzes these readings to look for signs of issues. For example, if your muscle is damaged, it may have abnormal electrical activity when it’s resting. When it contracts, its electrical activity may make abnormal wave patterns.How do I prepare for an EMG test?Before you have an EMG, you should:Bathe or shower and wear comfortable, loose-fitting clothing.Avoid putting cream, lotion or perfume on your skin. Creams and lotions can affect the test’s accuracy.Tell the healthcare provider who’s performing the EMG if you’re taking a blood thinner medication (anticoagulant) such as warfarin. Blood thinners may increase your risk of bleeding after an EMG. But don’t stop taking your medication without talking to the provider who prescribes the medication.Tell the provider if you have a pacemaker or any other electrical medical device.In some cases, your provider may instruct you to not smoke cigarettes or drink caffeinated beverages, such as coffee or tea, two to three hours before testing. These substances may interfere with the test.What happens during an EMG test?Neurologists usually perform an EMG test right after a nerve conduction study. During the nerve conduction study, a provider will put electrodes (stickers) on the surface of your skin. They’ll then deliver a small electrical impulse that will feel like a shock to nerves and record the response. In most cases, they’ll test several different nerves.The process can vary for an EMG, depending on the reason for the test and which muscles and nerves the provider is assessing. But in general, you can expect the following during an EMG test:You’ll sit or lie down for the test.A provider will locate the muscle(s) they want to test.They’ll then insert a small needle with an electrode through your skin and into your muscle. These needles will stay in your muscles, and the duration of the examination for each muscle generally takes one to two minutes. You may feel slight discomfort or pain when they insert the needles.The provider will ask you to relax and then use your muscles in certain ways, such as lifting or flexing one of your limbs, at certain times. A machine will measure and display the electrical activity of your working muscle. There will also be an audio (sound) component to the machine.After the provider has recorded enough data from your muscle, they’ll remove the needle. They’ll repeat the same process in the next muscle until the test is concluded.How painful is an EMG test?You may feel some pain or discomfort when your provider inserts the needle into your skin and muscles. But most people can complete the test without issues.After the test, the muscles they tested may feel tender for a few days.How long does an EMG test take?The test usually takes 60 to 90 minutes. It depends on how many muscles your provider needs to test.What should I expect after an EMG test?You may have sore or tender muscles for a few days after the test. The muscle soreness isn’t usually severe and should get better in less than a week. You may also see some bruising where the needles entered your skin.What are the risks of an EMG?EMG is generally safe. Complications are rare. Some people (especially people who take blood thinner medications) may bleed after the test. An Electromyogram (EMG) is a diagnostic test designed to evaluate the health of muscles and the nerves that control them. This test plays a crucial role in identifying neuromuscular conditions such as nerve damage, muscle disorders, carpal tunnel syndrome, and neuropathy. By measuring the electrical activity within muscles, an EMG provides valuable insights into how effectively your muscles and nerves are functioning.First introduced in the mid-20th century, the EMG has become an essential tool in diagnosing a wide range of neuromuscular conditions. Often performed in conjunction with a nerve conduction study (NCS), it offers a comprehensive assessment of nerve and muscle health. This article will walk you through the purpose of an EMG, its significance, and how it can help you and your healthcare provider better understand your symptoms. Whether you’re experiencing muscle weakness, unexplained pain, or nerve-related issues, learning about the EMG test can empower you to feel more informed and prepared.In this guide, we’ll break down the EMG test in simple terms, explain its importance in healthcare, and address common concerns. Let’s start by exploring what an Electromyogram is and how it works.What is an Electromyogram (EMG)?An Electromyogram, commonly referred to as an EMG, is a diagnostic procedure that measures the electrical activity of muscles. Muscles are controlled by nerves, which send signals that prompt muscles to contract. The EMG test records these electrical signals, enabling healthcare providers to identify abnormalities in muscle or nerve function.The procedure is typically performed by a neurologist or a trained technician. During the test, small, thin needles (electrodes) are inserted into specific muscles to detect electrical activity. These electrodes are connected to a machine that records the signals, displaying them as waveforms on a monitor. In many cases, the EMG is paired with a nerve conduction study (NCS), which evaluates how efficiently electrical signals travel along your nerves. Together, these tests provide a thorough evaluation of neuromuscular health.Electromyography is used to diagnose a variety of conditions, including:Carpal tunnel syndrome: A condition caused by compression of the median nerve in the wrist.Neuropathy: Damage to peripheral nerves, often associated with diabetes or other systemic conditions.Muscle disorders: Conditions such as muscular dystrophy or myopathy.Nerve root compression: Often linked to herniated discs or spinal issues.The EMG test is generally safe, though some individuals may experience mild discomfort when the needles are inserted. Despite this, it is highly effective in pinpointing the root cause of symptoms such as muscle weakness, numbness, or unexplained pain, making it an invaluable tool in diagnosing neuromuscular conditions.Why is an Electromyogram (EMG) Important?The Electromyogram is a vital diagnostic tool in modern medicine, particularly for identifying and managing conditions that affect muscles and nerves. If you’re experiencing symptoms such as persistent muscle weakness, tingling, numbness, or chronic pain, an EMG can provide critical insights that other diagnostic methods might overlook.One of the key advantages of an EMG is its ability to differentiate between muscle disorders and nerve disorders. For example, if you have symptoms of carpal tunnel syndrome, the EMG can confirm whether the issue stems from nerve compression or another underlying condition. Similarly, for individuals with neuropathy, the test can determine the extent and location of nerve damage, which is essential for developing an effective treatment plan.Beyond diagnosis, the EMG is invaluable for monitoring the progression of neuromuscular conditions. For patients with chronic conditions such as muscular dystrophy or amyotrophic lateral sclerosis (ALS), regular EMG tests help track disease progression and assess the effectiveness of treatments. This makes the EMG not only a diagnostic tool but also a critical resource for long-term patient care.The EMG also plays a significant role in pre-surgical planning. For instance, if you’re considering surgery for a herniated disc or other spinal issues, an EMG can help your healthcare provider determine whether surgery is likely to alleviate your symptoms. This ensures that surgical interventions are both targeted and effective.Additionally, the EMG is widely accessible and can often be performed in outpatient settings, making it a convenient option for patients. If you’re searching for an “EMG test near me,” you’ll likely find several clinics or hospitals offering this procedure. While the cost of an EMG test can vary, many insurance plans cover it when it is deemed medically necessary. Be sure to consult your healthcare provider to understand the costs and benefits specific to your situation.In summary, the EMG test is a cornerstone in diagnosing, managing, and treating a wide range of neuromuscular conditions. Its ability to provide detailed insights into muscle and nerve function makes it an indispensable tool in patient care.What Does an Electromyogram (EMG) Diagnose?An Electromyogram (EMG) is a diagnostic tool used to identify a variety of neuromuscular and nerve disorders by measuring the electrical activity of muscles and the nerves that control them. To better understand how effective an EMG is at diagnosing specific conditions, it’s helpful to know two important terms: positive predictive value (PPV) and negative predictive value (NPV). PPV refers to how often a positive test result correctly identifies a condition, while NPV indicates how often a negative result correctly rules out a condition. High PPV and NPV values signify that the test is highly accurate. Below, we’ll explore the conditions an EMG can diagnose and how it contributes to understanding these disorders.Amyotrophic Lateral Sclerosis (ALS)Amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig’s disease, is a progressive neurological disorder that affects nerve cells in the brain and spinal cord. An EMG test is a critical component in diagnosing ALS, as it detects abnormalities in muscle electrical activity that indicate nerve degeneration. By identifying these abnormalities early, the EMG helps healthcare providers confirm a diagnosis and create a personalized treatment plan.Gehrig’s Disease (ALS)Gehrig’s disease, also known as amyotrophic lateral sclerosis (ALS), is a progressive neurodegenerative condition that affects nerve cells in the brain and spinal cord. ALS leads to muscle weakness, twitching, and eventually the loss of voluntary muscle control. An EMG test plays a pivotal role in diagnosing ALS by detecting abnormal electrical activity in muscles, even during the early stages of the disease. This test helps differentiate ALS from other neuromuscular disorders by identifying widespread patterns of denervation and reinnervation across multiple muscle groups. When combined with clinical findings, EMG has a positive predictive value (PPV) of approximately 85% for ALS.Myasthenia GravisMyasthenia gravis is a chronic autoimmune disorder that impairs communication between nerves and muscles, resulting in muscle weakness. Common symptoms include drooping eyelids, difficulty swallowing, and muscle fatigue. A specialized EMG procedure, particularly a repetitive nerve stimulation test, evaluates how muscles respond to repeated nerve signals. This test often reveals a characteristic decline in muscle activity, known as a decremental response, which aids in diagnosis. The negative predictive value (NPV) of EMG for myasthenia gravis is high, often exceeding 90%, making it a reliable tool for ruling out the condition.Peripheral NeuropathyPeripheral neuropathy refers to damage to the peripheral nerves, which can cause symptoms such as numbness, tingling, and muscle weakness, typically in the hands and feet. Common causes include diabetes, infections, and exposure to toxins. An EMG nerve test, often performed alongside a nerve conduction study (NCS), evaluates the function of nerves and muscles. EMG can identify patterns of nerve damage, such as axonal loss or demyelination, which help determine the type and severity of neuropathy. When used together, EMG and NCS have a combined PPV of approximately 88% for diagnosing peripheral neuropathy.Carpal Tunnel SyndromeCarpal tunnel syndrome occurs when the median nerve is compressed as it passes through the wrist, leading to symptoms such as numbness, tingling, and weakness in the hand and fingers. An EMG test for carpal tunnel syndrome, often paired with a nerve conduction study, is used to confirm the diagnosis. The EMG detects muscle denervation in the hand, while the NCS measures slowed nerve conduction across the carpal tunnel. With a PPV of approximately 90%, EMG is a highly effective diagnostic tool for this condition.Muscular DystrophyMuscular dystrophy encompasses a group of genetic disorders characterized by progressive muscle weakness and degeneration. While genetic testing remains the gold standard for diagnosis, an EMG test provides valuable supportive evidence by detecting abnormal electrical activity in affected muscles. EMG findings in muscular dystrophy typically reveal low-amplitude, short-duration motor unit potentials. This test helps distinguish muscular dystrophy from other neuromuscular conditions. When combined with clinical and genetic evaluations, the NPV of EMG for muscular dystrophy often exceeds 85%.Guillain-Barré Syndrome (GBS)Guillain-Barré syndrome (GBS) is a rare autoimmune disorder in which the immune system attacks the peripheral nerves, causing symptoms such as weakness, tingling, and, in severe cases, paralysis. An EMG test, combined with a nerve conduction study, is essential for diagnosing GBS. It identifies slowed nerve conduction velocities and prolonged latencies, which are hallmark indicators of the condition. The PPV of EMG for Guillain-Barré syndrome is approximately 80%, with a similarly high NPV, making it a valuable diagnostic tool when used alongside clinical findings and cerebrospinal fluid analysis.RadiculopathyRadiculopathy occurs when a nerve root in the spine becomes compressed or irritated, often due to a herniated disc or spinal stenosis. Symptoms may include pain, numbness, and weakness that radiate along the affected nerve. An EMG test for radiculopathy evaluates the electrical activity of muscles controlled by the affected nerve root. It detects signs of denervation and helps pinpoint the specific nerve root involved. When combined with imaging studies such as MRI, the PPV of EMG for radiculopathy is approximately 85%.PolymyositisPolymyositis is an inflammatory muscle disease that causes progressive weakness, particularly in the shoulders, hips, and thighs. An EMG test is a critical diagnostic tool for polymyositis, as it detects abnormal spontaneous activity, such as fibrillations and positive sharp waves, in affected muscles. These findings, when combined with elevated muscle enzyme levels and muscle biopsy results, confirm the diagnosis. The NPV of EMG for polymyositis is high, often exceeding 90%, ensuring that a negative result effectively rules out the condition.NeuropathyNeuropathy is a broad term encompassing conditions that affect peripheral nerves, leading to symptoms such as pain, weakness, and sensory disturbances. An EMG test, often conducted alongside a nerve conduction study, helps identify the type, location, and severity of nerve damage. For example, it can distinguish between axonal and demyelinating neuropathies. With a PPV of approximately 88%, EMG is a reliable tool for confirming neuropathy.Spinal Muscular Atrophy (SMA)Spinal muscular atrophy (SMA) is a genetic disorder that affects motor neurons in the spinal cord, leading to muscle weakness and atrophy. While genetic testing is the primary method for diagnosis, an EMG test provides additional insights by detecting reduced motor unit recruitment and abnormal spontaneous activity in affected muscles. EMG findings help differentiate SMA from other neuromuscular disorders. When combined with genetic testing and clinical evaluation, the NPV of EMG for SMA often exceeds 85%.How is an Electromyogram (EMG) Performed?An Electromyogram (EMG) is a diagnostic test designed to evaluate the health of your muscles and the nerves that control them. Familiarizing yourself with the procedure can help reduce anxiety and ensure you feel well-prepared.Preparation for the EMG TestBefore your EMG test, your healthcare provider will provide specific instructions to follow. These may include:Wearing loose, comfortable clothing to allow easy access to the areas being tested.Avoiding lotions, oils, or creams on your skin, as these substances can interfere with the electrodes.Informing your doctor about any medications or supplements you are taking, as certain substances may influence the test results.Discussing any medical conditions, such as bleeding disorders or implanted devices like pacemakers, which may require special precautions.On the day of the test, you may be asked to remove jewelry or accessories that could interfere with the equipment. The procedure is typically conducted in a medical office or hospital setting and usually takes between 30 and 60 minutes.The EMG ProcedureThe EMG test involves two primary components: surface electrodes and needle electrodes. Here’s what you can expect:Surface Electrode Testing: Small, flat electrodes are placed on your skin over the muscles being examined. These electrodes measure the electrical signals your muscles produce both at rest and during movement.Needle Electrode Testing: A thin, sterile needle electrode is gently inserted into the muscle to assess electrical activity within the muscle tissue. While you may feel a slight pinch or mild discomfort, most people find the procedure manageable.During the test, you may be asked to perform specific movements, such as bending your arm or lifting your leg, to evaluate how your muscles and nerves respond. The healthcare provider will observe the electrical activity on a monitor and record the data for further analysis.After the test, you can typically return to your normal activities right away. If needle electrodes were used, you might experience mild soreness in the tested muscles, which usually resolves within a day or two.Understanding Electromyogram (EMG) ResultsThe results of an Electromyogram (EMG) provide valuable information about the health of your muscles and nerves. Your healthcare provider will carefully review the findings and explain their significance to you.What EMG Results MeanEMG results are generally classified as either normal or abnormal:Normal Results: Healthy muscles and nerves produce consistent electrical signals both at rest and during activity. Normal results suggest there are no significant issues with your muscles or nerves.Abnormal Results: Irregular electrical activity may indicate conditions such as nerve damage, muscle disorders, or diseases affecting the connection between nerves and muscles. Examples include carpal tunnel syndrome, neuropathy, or amyotrophic lateral sclerosis (ALS).Discussing Your ResultsYour healthcare provider will explain the results in clear, understandable terms and discuss what they mean for your overall health. If abnormalities are detected, additional tests or treatments may be recommended, such as:Nerve Conduction Studies (NCS): Often performed alongside an EMG, this test evaluates how efficiently electrical signals travel through your nerves.Imaging Tests: Tests like MRI or ultrasound may be used to provide a more detailed view of the affected area.Treatment Plans: Depending on the diagnosis, treatment options may include physical therapy, medications, or lifestyle adjustments.During your follow-up appointment, don’t hesitate to ask questions or share any concerns. Understanding your results empowers you to make informed decisions about your care and next steps.Limitations and RisksWhile an Electromyogram (EMG) is a highly effective diagnostic tool, it’s important to be aware of its limitations and potential risks. Your healthcare provider will take every precaution to ensure your safety and comfort throughout the procedure.Limitations of the EMG TestAlthough EMG tests are excellent for diagnosing muscle and nerve conditions, they may not provide a complete picture on their own. Additional tests, such as nerve conduction studies or imaging, may be necessary to confirm a diagnosis or uncover the root cause of your symptoms.Risks and Potential ComplicationsEMG tests are generally safe, but minor risks include:Mild Discomfort: The insertion of needle electrodes may cause temporary soreness or bruising at the test site.Bleeding or Infection: Rarely, minor bleeding or a small risk of infection may occur at the needle insertion points. Using sterile techniques minimizes this risk.Electrical Sensitivity: Some individuals may experience slight tingling or discomfort from the electrical impulses used during the test.If you notice prolonged pain, swelling, or signs of infection after the test, contact your healthcare provider promptly. Following pre-test instructions and informing your doctor about any medical conditions can help reduce the likelihood of complications.ConclusionAn Electromyogram (EMG) is a powerful diagnostic tool that helps identify muscle and nerve conditions, guiding effective treatment plans. While the procedure may seem intimidating at first, understanding the steps involved and the potential outcomes can help put your mind at ease. If you’re experiencing symptoms such as muscle weakness or nerve pain, an EMG test could provide the answers you need.As an online urgent care and primary care practice, we’re here to support you every step of the way. Whether you need guidance on preparing for an EMG or follow-up care after your test, our compassionate team is ready to assist. Schedule your consultation today to take the next step toward better health. Your muscles move when nerve signals from the brain tell them to get to work. Electromyography (EMG), a diagnostic test, measures how well your muscles respond to those signals.Movement is a complex interaction between your central nervous and muscular systems. Your doctor can use the results of an EMG to determine whether you have a muscular problem, a nerve problem, or both.Motor neurons are the nerve cells that send signals to your muscles to move. During the test, a needle probe is inserted into your muscle to measure its electrical activity. The EMG turns the electrical activity into sounds, graphs, or numbers for your doctor to interpret.If the test picks up a problem, you may be diagnosed with what is called a neuromuscular disorder.Nerve signals are electrical impulses that travel quickly throughout your nervous system. Sometimes, problems with the electrical activity in your nerves can cause pain, tingling, or weakness in your muscles.A nerve conduction study (NCS) tests the health of your peripheral nerves, the nerves located outside your central nervous system (the brain and spinal cord). An NCS measures how fast and how strong the electrical activity is in your motor (muscle) and sensory nerves. The test can tell whether a nerve has been damaged.It’s natural to have soreness or numbness in a muscle once in a while. You might strain a wrist muscle by lifting something heavy, for example.However, for many people, a sore wrist is caused by an injured nerve, not an injured muscle. When it’s not clear why you’re having problems with your wrist, back, legs, or any other body part, one or both of these tests (EMG and NCS) may be helpful.The tests may be given to people who have the following symptoms that don’t go away:Pain or crampingTingling or numbnessMuscle weaknessBoth EMG and NCS can help doctors diagnose what’s wrong with you. They can also help rule out conditions that you don’t have. EMG and NCS can help diagnose:Neuromuscular diseases, such as muscular dystrophyNerve problems in the spine, such as a herniated diskNerve problems elsewhere in the body, such as carpal tunnel syndromePeripheral nerve problems in your arms or legsPinched nervesGuillain-Barré syndrome, a disease in which your immune system attacks the nerves in your legs and armsNCS can also help your doctor see how well you’re recovering from a nerve injury.An EMG is generally safe to undergo and there are few complications.Very rarely, there may be:An infection at the insertion site, especially if your skin is swollen thereBleeding, typically if you have a bleeding disorder or are on blood thinners or certain other medicines, including some herbal supplementsNerve injury in certain "high-risk" muscle areas, such as your diaphragm (the muscle you use to breathe), rib cage, rotator cuff, back and spine.Is having an EMG painful?When the EMG needle pricks your skin, it may feel uncomfortable. Most people expect the test to be painful but later report that the pain was much less intense than they had feared.After the test, you may have some bruising or muscle soreness, but both should go away in about a week.You don’t need to do anything special before either test. Doctors do recommend that on the morning of EMG monitoring, you:Bathe or shower, but don’t put on any lotions or moisturizersDon’t smoke You should also talk with your doctor about taking medications before a test. There may be certain medicines you should avoid taking until after the test.If you have a pacemaker or implanted cardiac defibrillator (ICD), you should tell your doctor before they schedule an EMG, as it may affect how they work.What to wear. Loose-fitting clothing that you can easily remove or that won't restrict your movement. Avoid wearing any shaping underwear, pantyhose, or long underwear.Food and drink. You can eat as usual, but your doctor may ask that you avoid caffeine and sugary beverages for at least 2 or 3 hours before a test.Medication. Tell your doctor what prescription, over-the-counter, or herbal medicines you take.EMG and NCS are done in a hospital or office setting. They can be "outpatient procedures," meaning you don’t have to stay overnight and can go home the same day, or they can be done during a hospital stay.Several types of doctors may oversee the procedures. That includes neurologists, who specialize in the brain and nervous system. A hospital technician may be the person who actually does the NCS or EMG test. Nerve conduction study. An NCS detects damage to nerves the way an EMG tests muscle function. During the test, the technician puts electrode patches on your skin over the nerve that may be causing your symptoms. A stimulating electrode sends a mild electrical impulse to the nerve. The other electrodes record the nerve’s response.If the signal travels at a slower rate than it should in a healthy nerve, it means the nerve is probably damaged. More tests may be needed to learn whether the nerve can become healthy again.Sometimes, nerves injured in an accident or surgery just need time to improve. In other cases, surgery may be needed to repair an injured nerve.An NCS is usually done before an EMG if both procedures are done in the same session.Electromyography. This is more complex than NCS.An EMG uses an electrode on the skin, too. However, the test uses a very thin needle that penetrates the skin and goes into your muscles. You will be asked to relax and to contract (or flex) your muscles. You’ll be given instructions on how and when to contract the muscle being studied.If the EMG shows that your muscles responded well to nerve signals, your doctor may look for other causes of your muscle soreness or weakness.Some common causes are:A lack of muscle fitnessAn infection (such as the flu)Circulation problemsA disease such as diabetes or anemiaThe neurologist supervising either or both procedures will review the results and write a summary for your doctor.If the studies suggest you have a neuromuscular disorder or a damaged nerve, you will probably be referred to a specialist.They may order further tests to learn more about your condition. Then a treatment plan will be drawn up. It may include medications, operations, or lifestyle changes.Neither NCS nor EMG will solve your muscle or nerve problems, but they will give doctors key information about how to help you start feeling better soon.Getting the results of your EMG should take 1 or 2 days. Your doctor usually won't rely solely on the results of your EMG to make a diagnosis but will instead consider it along with other tests.Normal EMG resultsYour muscles display little activity at rest. When the EMG needles are inserted, your muscles may show some electrical activity that should fade quickly. As you move and contract your muscles, an electrical pattern becomes evident. Your doctor will be able to detect normal electrical activity.Abnormal EMG resultsIf your EMG results are abnormal, your doctor should be able to arrive at a diagnosis by looking at how your muscles react at rest or with activity. For example, if your EMG results are abnormal and your NCS results are normal, it may indicate a muscle condition such as myopathy, a group of disorders that cause muscle weakness. In diseases that affect your motor neurons, your EMG may show abnormal muscle activity at rest. Abnormal EMG results can indicate numerous conditions such as carpal tunnel syndrome, sciatica, peripheral neuropathy, myasthenia gravis, amyotrophic lateral sclerosis (ALS), and various forms of muscular dystrophy.Post-EMG complicationsCall your doctor if you have any of these symptoms:Continued bleedingTenderness or pain at any puncture siteMuscle warmth, redness, and swelling, or feverYour muscles move because of a complex connection between them and your nervous system. The EMG and NCS tests help determine if one or both of these systems are not working well. Both these tests are usually outpatient procedures and done together, and they typically have minimal or no side effects.What does an EMG test diagnose?An EMG examines how well your muscles and the nervous system's motor neurons are working together.What does a positive EMG mean?A positive EMG indicates that you do have a condition affecting your muscles or the nerves that control them. Your doctor will follow up to make a definitive diagnosis.Is a nerve conduction study painful?A nerve conduction study uses mild electrical stimulation to test your nerve function. It may tingle intensely or mildly, but any discomfort should go away after your test is over. What does a nerve conduction study diagnose?An NCS diagnoses peripheral nerve conditions that may affect the nerves beyond your central nervous system (the spinal cord and brain).How long does a nerve conduction study take?It may take about 15 minutes to an hour, sometimes longer, depending on how many nerves are examined.Are nerve conduction studies worth it?Nerve conduction studies are just one of the tools your doctor will use to diagnose what type of nerve damage or nerve injury you have. EMG tests measure electrical activity in muscles to diagnose neuromuscular diseases.Before an EMG test, tell your doctor if you use a pacemaker or blood thinners.EMG tests typically cause short-term soreness or bruising where the electrodes are placed. An electromyography (EMG) test measures electrical activity within the muscles. Although it can be done independently, an EMG is usually performed alongside nerve conduction studies, which measure how electrical signals within the body travel down the nerves. EMG and nerve conduction studies may also be called electrodiagnostic studies, EMG tests, electromyograms, or nerve conduction velocity tests. Specific symptoms, like constant muscle weakness or tingling in the hands or feet, should be evaluated by a healthcare provider. Depending on your medical history and physical assessment findings, a qualified healthcare provider might order an EMG and nerve conduction study to identify potential causes for the symptoms. This article will review what you can expect during an electromyography test. Arlette Lopez / Getty Images If you are experiencing any of the following symptoms, your healthcare provider may recommend an EMG test: The EMG test helps healthcare providers identify whether you have a problem with how your muscles respond to nerve impulses. EMGs and nerve conduction studies can help healthcare providers determine whether there is nerve damage or nerve disease. It can be challenging to determine if the symptoms are caused by electrical activity in a a nerve vs. a muscle, which is why these two tests are often done together. Before scheduling an EMG and nerve conduction study, inform your healthcare provider if you have a pacemaker or cardiac defibrillator. You can still undergo testing; however, a provider will take extra steps to protect you (and the device) from injury or damage. Other considerations to discuss with your provider before EMG testing include the following: Illness: It is challenging for healthcare providers to accurately assess muscle and nerve readings when you are ill. Also, to minimize the spread of your illness, it is better to reschedule EMG testing when the illness is absent. Risk of infection: Certain medications, like long-term steroids, or disease conditions, like cellulitis, increase the risk of infection. Blood-thinning medications: The risk of bruising or slight bleeding under the skin increases when taking blood thinners. Informing the healthcare professional before testing so they can consider different techniques to prevent complications. A healthcare provider will do one or more of the following before ordering an EMG or nerve conduction test: Obtain your medical history Perform a physical examination Evaluate your heart's electrical system (electrophysiology study) Once EMG tests or nerve conduction studies are ordered, there are other considerations to be aware of: EMG tests and nerve conduction studies are typically covered by insurance; however, it is important to verify coverage as well as any co-payments required.EMG tests can cause anxiety; when placed correctly on the muscles, the electrodes can be uncomfortable.If your provider prescribes you pain or anxiety medications, arrange for assistance with transportation home after the procedure. There is no special preparation for EMG testing; you can exercise, eat, drink, and do other typical daily activities. On the day of your test, wear loose-fitting clothing. Depending on the area being tested, you might be asked to change into a hospital gown. Ensure your skin is clean and free of lotions, creams, and perfumes since they can interfere with EMG testing. Bring an official form of identification, such as a driver's license or passport, and if you have health insurance, bring your insurance card to ensure a smooth check-in. EMGs are done by a physician trained in needle EMG testing. EMG testing specialists often include neurologists and physiatrists, although any residency-trained physician can seek specialty training with EMG testing. A trained technologist can do nerve conduction studies with an appropriately trained physician supervising the testing. EMGs are typically done in a location where an EMG machine can be installed. Many healthcare providers have EMG testing available in their office but also may use a shared outpatient space at a larger healthcare organization, like a hospital. Testing will occur in an area with a table or bed to recline or lie on and usually takes between 20 and 90 minutes, depending on how many muscles are tested. Typical next steps include: Cleaning the skin: A qualified healthcare provider will clean the test site on your skin and apply an electrode to the muscle.Connecting electrodes: The electrode is connected to a machine, which sends a mild electrical current to the muscle to assess for any muscle dysfunction and record muscle activity while your muscle is relaxed.Engaging your muscle: You'll be asked to brace or tighten your muscle slowly, and the machine will record muscle activity when the muscle is active. The machine will record your muscle activity as wavy and spiky lines. Some devices record muscle activity, so you may hear "popping" sounds made by active and resting muscles. When the EMG test is complete, the healthcare provider removes the electrodes, which can cause soreness or bruising. This will fade within a few days. There are no long-term side effects associated with EMG testing. Depending on symptoms and EMG test results, a healthcare provider may recommend additional testing, including: Neuromuscular ultrasound: Using an ultrasound machine, an appropriately trained healthcare provider can see tendon or joint problems that could be causing symptoms.Muscle biopsy: A muscle biopsy involves removing a small piece of muscle via a hollow needle. The muscle sample is then sent to a laboratory to determine the presence of specific proteins associated with neuromuscular disorders and diseases.Laboratory testing: Some neuromuscular diseases and disorders are genetically inherited and can be identified through laboratory testing. Side effects from EMG testing include soreness or bruising where the electrodes were inserted into the muscles. These symptoms generally fade within a few days. Although there are no long-term side effects associated with EMG testing, if any of these symptoms occur, discuss them with your healthcare provider: Soreness or pain that does not fade away in a few daysBruising that worsens or spreadsAny signs of infection, such as reddened skin or drainage from the electrode insertion sites If the healthcare provider performing the test does not review your results with you immediately, the provider will send the results to the ordering provider. In that situation, you may need to schedule a follow-up appointment with the ordering healthcare provider to review EMG test results. EMG testing can indicate different neuromuscular diseases or disorders, such as: Your healthcare provider will guide you toward further testing and specialist consultations based on your test results and symptoms. The American Association of Neuromuscular and Electrodiagnostic Medicine recommends testing only a minimal number of muscles needed to identify the clinical concern or determine a diagnosis. There is no standard recommendation for follow-up testing. Your provider will make recommendations based on your health history, symptoms, and progression of any related underlying diseases. PurposeProcedureRisksResultsSummaryElectromyography (EMG) is a diagnostic test that measures how well the muscles respond to the electrical signals emitted to specialized nerve cells called motor nerves. EMG tests are safe and pose minimal risks.A doctor may order an EMG test if a person has symptoms of a muscular or neurological condition, such as numbness or unexplained weakness in the limbs. Doctors often conduct EMG tests in conjunction with nerve conduction velocity (NCV) tests. An NCV test is another type of electrodiagnostic test that doctors can use to identify damaged or impaired nerves.EMG and NCV tests are safe procedures that pose little risk of serious side effects or complications. However, they may cause discomfort and bruising at the entry point of the needle.In this article, learn more about their purpose, what to expect during the procedure, and how to prepare for it.Share on PinterestA person may have an EMG to help diagnose a muscular or neurological condition.Motor nerve cells, or neurons, transmit electrical signals from the central nervous system to the muscles. The electrical signals from the nerves trigger muscle contractions. Motor nerves control skeletal muscle activity, such as walking, speaking, and breathing. Damaged or diseased muscle fibers do not function or respond to nerve impulses appropriately. If the motor nerves are damaged or diseased, they can send abnormal electrical signals to the muscles.A doctor may order an EMG test if a person has symptoms of a muscle or nerve condition. Such symptoms may include:muscle weakness or stiffnessmuscle wastingtwitching, cramping, or spasmsloss of fine motor control difficulty speaking, chewing, or swallowingpersistent pain in the feet, legs, arms, or handsnumbness, tingling, or paralysis in the limbsEMG tests also provide information that doctors can use to determine the location and extent of muscle and nerve damage.EMG is an outpatient procedure that can take place at a hospital or an office clinic. Neurologists and physical medicine and rehabilitation physicians perform EMG tests. Neurologists specialize in treating, diagnosing, and managing conditions affecting the nervous system. A neurologist can administer an EMG test alone or with the help of a specially trained technician. A neurologist will explain how the procedure works and what to expect during and after the test. At this point, a person can bring up any questions they have with the neurologist. A person should notify the neurologist if they:take any over-the-counter or prescription medications, especially blood thinnershave a bleeding disorderhave a cardiac defibrillator or pacemakerTo prepare for the test, a person should:Bathe or take a shower the night before or the morning of the test to remove excess oil from the skin.Avoid applying lotions, creams, or body oils for a few days before the test. Dress in comfortable, loose-fitting clothes.Remove any jewelry, watches, eyewear, or other metal objects before the procedure.The following sections describe what to expect from needle EMG and NCV tests.A needle EMG test measures how well the muscles respond to electrical impulses. A neurologist or assisting technician will insert one or more thin, sterile needles into the muscle. This may cause some minor discomfort in some people. The needles detect the electrical activity of muscles at rest and while contracted. The needle electrodes transmit this information to a device called an

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