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Electromyography (EMG)

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Overview

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Electromyography (EMG) is a diagnostic procedure to assess the health of muscles and the nerve cells that control them (motor neurons). EMG results can reveal nerve dysfunction, muscle dysfunction or problems with nerve-to-muscle signal transmission.

Motor neurons transmit electrical signals that cause muscles to contract. An EMG uses tiny devices called electrodes to translate these signals into graphs, sounds or numerical values that are then interpreted by a specialist.

During a needle EMG, a needle electrode inserted directly into a muscle records the electrical activity in that muscle.

A nerve conduction study, another part of an EMG, uses electrode stickers applied to the skin (surface electrodes) to measure the speed and strength of signals traveling between two or more points.

Why it's done

Your doctor may order an EMG if you have signs or symptoms that may indicate a nerve or muscle disorder. Such symptoms may include:

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- Tingling
- Numbness
- Muscle weakness
- Muscle pain or cramping
- Certain types of limb pain

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EMG results are often necessary to help diagnose or rule out a number of conditions such as:

- Muscle disorders, such as muscular dystrophy or polymyositis
- Diseases affecting the connection between the nerve and the muscle, such as myasthenia gravis
- Disorders of nerves outside the spinal cord (peripheral nerves), such as carpal tunnel syndrome or peripheral neuropathies
- Disorders that affect the motor neurons in the brain or spinal cord, such as amyotrophic lateral sclerosis or polio
- Disorders that affect the nerve root, such as a herniated disk in the spine

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Risks

EMG is a low-risk procedure, and complications are rare. There's a small risk of bleeding, infection and nerve injury where a needle electrode is inserted.

When muscles along the chest wall are examined with a needle electrode, there's a very small risk that it could cause air to leak into the area between the lungs and chest wall, causing a lung to collapse (pneumothorax).

How you prepare

Food and medications

When you schedule your EMG, ask if you need to stop taking any prescription or over-the-counter medications before the exam. If you are taking a medication called Mestinon (pyridostigmine), you should specifically ask if this medication should be discontinued for the examination.

Bathing

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Take a shower or bath shortly before your exam in order to remove oils from your skin. Don't apply lotions or creams before the exam.

Other precautions

The nervous system specialist (neurologist) conducting the EMG will need to know if you have certain medical conditions. Tell the neurologist and other EMG lab personnel if you:

- Have a pacemaker or any other electrical medical device
- Take blood-thinning medications
- Have hemophilia, a blood-clotting disorder that causes prolonged bleeding

What you can expect

Before the procedure

You'll likely be asked to change into a hospital gown for the procedure and lie down on an examination table. To prepare for the study, the neurologist or a technician places surface electrodes at various locations on your skin depending on where you're experiencing symptoms. Or the neurologist may insert needle electrodes at different sites depending on your symptoms.

During the procedure

When the study is underway, the surface electrodes will at times transmit a tiny electrical current that you may feel as a twinge or spasm. The needle electrode may cause discomfort or pain that usually ends shortly after the needle is removed.

During the needle EMG, the neurologist will assess whether there is any spontaneous electrical activity when the muscle is at rest — activity that isn't present in healthy muscle tissue — and the degree of activity when you slightly contract the muscle.

He or she will give you instructions on resting and contracting a muscle at appropriate times. Depending on what muscles and nerves the neurologist is examining, he or she may ask you to change positions during the exam.

If you're concerned about discomfort or pain at any time during the exam, you may want to talk to the neurologist about taking a short break.

After the procedure

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You may experience some temporary, minor bruising where the needle electrode was inserted into your muscle. This bruising should fade within several days. If it persists, contact your primary care doctor.

Results

The neurologist will interpret the results of your exam and prepare a report. Your primary care doctor, or the doctor who ordered the EMG, will discuss the report with you at a follow-up appointment.

Clinical trials

[Explore Mayo Clinic studies](#) testing new treatments, interventions and tests as a means to prevent, detect, treat or manage this disease.

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