Health Library

Guide to the diagnosis, treatment and prevention of conditions from A to Z.

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Electromyography (EMG)

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Electromyography (EMG) measures muscle response or electrical activity in response to a nerve's stimulation of the muscle. The test is used to help detect neuromuscular abnormalities. During the test, one or more small needles (also called electrodes) are inserted through the skin into the muscle. The electrical activity picked up by the electrodes is then displayed on an oscilloscope (a monitor that displays electrical activity in the form of waves). An audio-amplifier is used so the activity can be heard.EMG measures the electrical activity of muscle during rest, slight contraction and forceful contraction. Muscle tissue does not normally produce electrical signals during rest. When an electrode is inserted, a brief period of activity can be seen on the oscilloscope, but after that, no signal should be present.

After an electrode has been inserted, you may be asked to contract the muscle, for example, by lifting or bending your leg. The action potential (size and shape of the wave) that this creates on the oscilloscope provides information about the ability of the muscle to respond when the nerves are stimulated. As the muscle is contracted more forcefully, more and more muscle fibers are activated, producing action potentials.

A related procedure that may be performed is nerve conduction study (NCS). NCS is a measurement of the amount and speed

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of conduction of an electrical impulse through a nerve. NCS can determine nerve damage and destruction, and is often performed at the same time as EMG. Both procedures help to detect the presence, location, and extent of diseases that damage the nerves and muscles.

About the procedure (EMG)

Before the procedure:

- Your doctor will explain the procedure to you and offer you the opportunity to ask any questions that you might have about the procedure.
- Generally, fasting is not required before the test. In some cases, cigarettes and caffeinated beverages, such as coffee, tea, and cola may be restricted two to three hours before testing.
- Notify your doctor of all medications (prescribed and over-the-counter) and herbal supplements that you are taking.
- Notify your doctor if you have a pacemaker.
- Dress in clothes that permit access to the area to be tested or that are easily removed.
- Stop using lotions or oils on your skin for a few days before your procedure, or at least stop using them on the day of the exam.
- Based on your medical condition, your doctor may request other specific preparation.

During the procedure:

An EMG procedure may be performed on an outpatient basis or as part of your stay in a hospital. Procedures may vary depending on your condition and your doctor's practices. The EMG is performed by a neurologist (a doctor who specializes in brain and nerve disorders), although a technologist may also perform some portions of the test. The EMG is usually performed immediately following a nerve conduction study (a test that measures the flow of current through a nerve before it reaches the muscle rather than the response of muscle itself).

Generally, an EMG procedure follows this process:

- You will be asked to remove any clothing, jewelry, hairpins, eyeglasses, hearing aids, or other metal objects that may interfere with the procedure.If you are asked to remove

clothing, you will be given a gown to wear.

- You will be asked to sit or lie down for the test.
- A neurologist will locate the muscle(s) to be studied.
- The skin will be cleansed with an antiseptic solution. Next, a fine, sterile needle will be inserted into the muscle. A ground electrode will be positioned under your arm or leg.
- Five or more needle insertions may be necessary for the test. You may experience slight pain with the insertion of the electrode, but it is usually painless.
- If the test is painful you must tell your examiner because this can interfere with the results.
- You will be asked to relax and then perform slight or full-strength muscle contractions.
- The electrical activity from your working muscle will be measured and displayed on the oscilloscope.
- An audio amplifier may also be used so that both the appearance and sound of the electrical potentials can be evaluated. If the recorder is attached to an audio amplifier, you may hear a sound like hail on a tin roof when you contract your muscle.

After the procedure:

- Some muscle soreness may persist for a day or so following the procedure. Notify your doctor if you experience increasing pain, tenderness, swelling, or pus at the needle insertion sites.Your physician may give you additional or alternate instructions after the procedure, depending on your particular situation.

About the procedure (NCS)

Before the procedure:

- Your doctor will explain the procedure to you and offer you the opportunity to ask any questions that you might have about the procedure.
- Generally, no fasting or sedation is required prior to the procedure.
- Notify your doctor of all medications (prescribed and over-the-counter) and herbal supplements that you are taking.

- Dress in clothes that permit access to the area to be tested or that are easily removed.
- Stop using lotions or oils on your skin for a few days before your procedure, or at least stop using them on the day of the exam.
- Based on your medical condition, your doctor may request other specific preparation.

During the procedure:

A nerve conduction study may be performed on an outpatient basis or as part of your stay in a hospital. Procedures may vary depending on your condition and your doctor's practices. The NCS is performed by a neurologist (a doctor who specializes in brain and nerve disorders), although a specially trained technician may also perform some portions of the test.

Generally, a NCS procedure follows this process:

- You will be asked to remove any clothing, jewelry, hairpins, eyeglasses, hearing aids, or other metal objects that may interfere with the procedure.If you are asked to remove clothing, you will be given a gown to wear.
- You will be asked to sit or lie down for the test.
- A neurologist or a technologist will locate the nerve(s) to be studied.
- A recording electrode will be attached to the skin over the nerve with a special paste and a stimulating electrode will be placed at a known distance away from the recording electrode.
- The nerve will be stimulated by a mild and brief electrical shock given through the stimulating electrode.
- You may experience minor discomfort for a few seconds.
- The stimulation of the nerve and the detected response will be displayed on an oscilloscope (a monitor that displays electrical activity in the form of waves).

After the procedure:

- The paste used to attach the electrodes will be removed from your skin.

- After the test, you may return to your previous activities, unless your doctor advises you differently.Your physician may give you additional or alternate instructions after the procedure, depending on your particular situation.