EMG/NCS
AN OVERVIEW

by Roderica E. Cottrell, MD

If your doctor has recommended an EMG/NCS test, you may have many questions: What is it? Why do I need it? Is it painful? How long does it take? Not knowing what to expect can provoke unnecessary anxiety. This article will serve as a general overview of the tests, including how to prepare for them and what to expect at your appointment.

WHAT IS IT?

A nerve conduction study (NCS) is a neurological test that evaluates the conduction of electrical impulses down the nerves by stimulating specific nerves and recording their ability to send the impulse to the muscle. Nerves control muscles via electrical signals, and these signals make the muscles react in specific ways. Nerve conduction studies are usually performed in conjunction with an electromyogram (EMG). An EMG measures the electrical activity of muscles at rest and during contraction. Nerve and muscle disorders cause the muscles to react abnormally, and by measuring the electrical activity, physicians are able to diagnose diseases that damage nerves and muscles.

WHY DO I NEED AN EMG/NCS?

Nerve conduction studies are done to evaluate potential damage to nerves starting with the branches leaving the spinal cord and terminating in the fingers or toes. They can also help localize the cause of abnormal sensations such as numbness, tingling or pain. The test provides your physician with information about the functioning of peripheral nerves, including the type of dysfunction and the location of a blockage in the nerve pathway. Some common conditions that can lead to nerve damage include disk herniations, diabetic neuropathy and carpal tunnel syndrome. The information obtained from the study can aid in the diagnosis of these disorders as

well as direct both surgical and non-surgical treatment.

HOW IS THE TEST DONE?

In nerve conduction studies, a shock-emitting stimulator is placed directly on the skin over the nerve, and recording electrodes are placed over the muscle that the nerve controls. Several quick electrical pulses are administered to the nerve, and the time it takes for the muscle to contract from this impulse is recorded. You will feel a very brief tingling sensation and a twitching of the muscle when the electrical pulse is applied. Multiple nerves will be tested including the same nerve(s) on the opposite side for comparison. While the testing can be uncomfortable for some, it is important to know that the voltage of the current is very low, and each pulse is very brief; you should feel no pain once the test is completed.

Before the EMG, the skin is cleansed with soap or alcohol. A very small needle electrode attached to wires is inserted into specific muscles. There is no shock or stimulus going through the needle; instead, the electrical activity in that muscle is recorded while the muscle is at rest and during a contraction — your doctor or technologist will ask you to tighten specific muscles to record the contraction. The needle electrode may be moved a number of times to record activity in different areas of the same muscle as well as in different muscles. The electrical activity is shown as wavy and spiky lines and may also be heard on a speaker as machine-gun-like popping sounds as you contract the muscle. You may feel a quick, sharp pain when the needle electrode is placed into the muscle, and you may have soreness or feel tingling in the muscle one to two hours after the EMG test. If the pain worsens, or if you experience swelling, tenderness or pus at any of the needle sites, you should notify your doctor.

Generally, the entire test may take 30 minutes to more than an hour, depending on the number of muscles and nerves being studied.

HOW DO I PREPARE FOR THE TEST?

Notify your physician of all medications you are taking, as these may need to be stopped days prior to the test. Your doctor also needs to know if you have a pacemaker or a defibrillator. Some physicians advise that you refrain from smoking or consuming foods/beverages with caffeine two to three hours prior to the test. You should wear loose-fitting clothes and make sure all areas of the body to be tested are free of any oils or lotions. Your hands or feet may need to be warmed prior to the test, as lower body temperature affects the accuracy of the results. You may be asked to lie on a table or sit in a chair so that your muscles are in the most relaxed position.

Factors that may affect the outcome of the test include bleeding, swelling, too much adipose tissue (fat) under the skin at the site of the nerves or muscles being tested and the patient not being able to follow commands during the test. It is also important to remember that certain enzymes in the blood may be elevated up to 10 days after an EMG test and, therefore, should not be evaluated for five to 10 days after an EMG. These enzymes include aspartate aminotransferase (AST), lactate dehydrogenase (LDH) and creatine phosphokinase (CPK).

WHAT ABOUT THE RESULTS?

Your doctor may be able to tell you some of the results immediately following the test. However, your results are used along with your history, symptoms, physical and neurological exams and results of other tests to help in the diagnosis, and, therefore, a full report may not be available for two to three days.

IS THE TEST SAFE?

An EMG/NCS is very safe. You may experience some bruising or swelling at some of the needle sites, but the chance of developing an infection is minimal because the needles are sterile. There is no risk of complications with nerve conduction studies since nothing is put into your skin, and the voltage of electrical pulses is not high enough to cause injury.

CONCLUSION

An EMG/NCS can be an extremely useful tool aiding in the diagnosis of neuromuscular disorders. It is important to notify your doctor with any questions or concerns prior to the test.

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