

October 2022 Newsletter

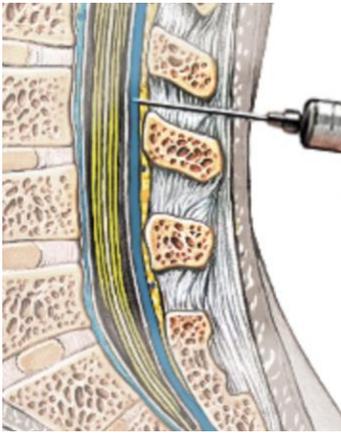


Diagnosing MS – Lumbar Puncture

A spinal tap, or lumbar puncture, is a procedure that's done to collect a sample of cerebrospinal fluid (CSF). CSF is a clear, colorless liquid that surrounds the brain and spinal cord. Its primary function is to cushion the brain within the skull and serve as a shock absorber for the central nervous system. CSF also circulates nutrients to and removes waste products from the brain. In MS, damage to myelin causes certain types of proteins to be released into the spinal fluid. When these proteins are identified in the spinal fluid, but not in the blood, MS is thought to be a possible cause.



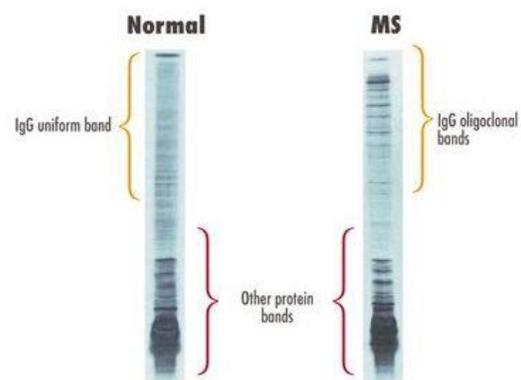
Lumbar puncture is used to help diagnose a number of conditions, including [meningitis](#), [encephalitis](#), bleeding in the brain, dementia, [myelitis](#), [leukemia](#) and autoimmune diseases like MS. Sometimes it is also used for treatments, for example, to inject local anesthetics, antibiotics or chemotherapy drugs into the CSF. This allows the drug to enter the nervous system directly, instead of through the bloodstream. When local anesthetics are given this way, it is called spinal anesthesia.



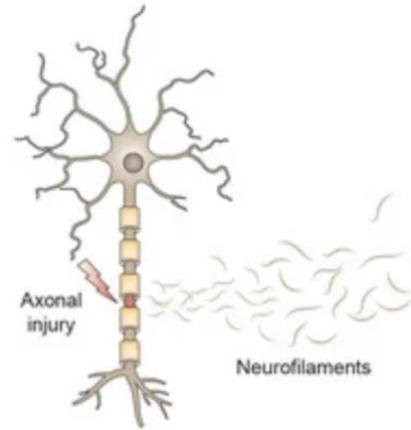
A spinal tap may be done on an outpatient basis or as part of a hospital stay. The procedure typically takes 15 – 30 minutes. A thin, hollow needle is inserted into the lower part of the lumbar spine, usually between the third and fourth, or the fourth and fifth, lumbar vertebrae. To make enough room for the needle, the vertebrae must be spread as far apart as possible. To accomplish this, the person undergoing the procedure is asked to lean forward and arch their back. This can be done while they are sitting down or lying on their side. The skin around the site of insertion is disinfected and numbed using a local anesthetic.

Once the needle is inserted between the two vertebrae, the doctor pushes it toward the spinal cord. In some cases, such as obese individuals or those with a spinal deformity, an ultrasound may be used as a guide. Once in place, the CSF trickles through the hollow needle into a sterile container. Approximately one tablespoon of the fluid is typically collected. The needle is carefully removed and the site of insertion is covered with a bandage. Individuals undergoing a spinal tap often have blood drawn for testing, too.

CSF samples are sent to a lab for analysis and results are typically available two to three days after the procedure. The immune system produces [antibodies](#) to fight infection. In MS, antibodies cross the [blood-brain barrier](#) and attack the myelin that surrounds the nerves. As a result, the level of antibodies in the CSF of someone with MS is higher than normal. The test that shows the presence of antibodies is called [electrophoresis](#). A sample of CSF is placed on a gel and an electric current is applied to it. This causes antibodies of the same size to bunch together, forming visible “bands.” [Immunoglobulin G](#) (IgG) antibodies are the most common antibody in the body. They are important for fighting infections from bacteria and viruses. One IgG band (monoclonal) in the CSF is normal. Two or more IgG bands ([oligoclonal](#)) indicate inflammation in the central nervous system. A [recent study](#) shows that oligoclonal bands are found in the CSF of the vast majority of people with MS (over 95%) and are considered to be a “immunological hallmark of the disease.” It’s important to note that oligoclonal bands are present in other diseases, too.



There are a number of other CSF biomarkers for MS. For example, [research](#) shows over half of people with the disease have elevated white blood cells in their CSF. Other proteins resulting from the breakdown of myelin may also be present in the CSF of someone with MS. [Neurofilaments](#) are fragments of the structural support that normally surround the nerve axons. If neurofilaments are found in the CSF, this is evidence that the myelin has been damaged.



A doctor usually takes a thorough medical history and performs a physical exam prior to a lumbar puncture. It's important to provide your healthcare provider with a complete list of medications as some may need to be stopped a few days prior to the procedure. For example, blood thinners like aspirin or warfarin should be stopped to prevent bleeding that could damage the nerves around the site of needle insertion. Bloodwork to check for bleeding or clotting disorders may be necessary for the same reason. [Research](#) shows that performing a spinal tap in the presence of raised intracranial pressure is not advised. A physician may recommend a [CT scan](#) or [MRI](#) beforehand to check for causative factors like abnormal swelling in or around the brain.

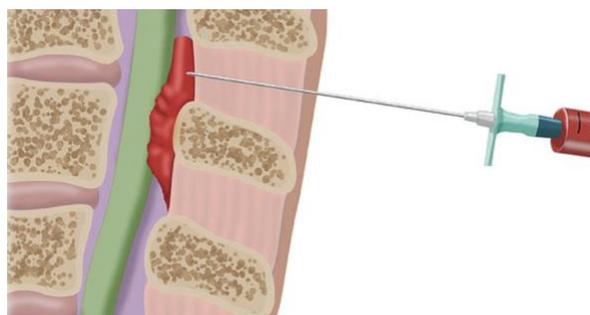


Although lumbar puncture is considered safe, it does carry some risks. It should not be performed if the skin at the site of insertion is inflamed, intracranial pressure is too high, or there is an increased risk of bleeding. The administration of local anesthesia beforehand often stings and it isn't unusual to feel pressure in the lower back during the procedure. There are many nerves in the spinal canal and, if the needle touches one of them, a sudden, sharp pain may shoot down the leg and immediately go away. Burning or nerve twinges are also possible. Some people experience lower back pain after the test which is usually confined to where the needle penetrated. Other potential complications of a spinal tap include infection and bleeding, both of which are rare.

The most common side effect of a spinal tap is a severe headache. A [2020 study](#) shows that this is more likely in those who are younger and have a lower volume of CSF. This occurs because of a pressure drop in the CSF and can be due to the removal of the sample or a leak

from an unclosed puncture site. The headache usually starts a day or two after the procedure and lasts anywhere from a few hours to a week or more. It is usually worse while standing or sitting, and can be accompanied nausea, vomiting or dizziness. To reduce the risk of headaches, it helps to lie flat for a few hours following a spinal tap and drink plenty of water. It's also a good idea to avoid intense exercise for a day or so afterward.

Most post-lumbar puncture headaches resolve on their own. They are best treated with bed rest, drinking fluids, and pain medications. [Research](#) shows that caffeine can also be helpful. In severe cases, a physician may perform a [blood patch](#). To apply a blood patch, a small volume of



[autologous](#) blood is injected at the original puncture site. The blood restores the pressure in the spinal cord and helps seal any leak that may still be there. Many people feel better right away, but it could take a day or two. Occasionally, a second blood patch is necessary.

It is important to note that a lumbar puncture by itself cannot confirm or exclude an MS diagnosis. A number of other diseases cause oligoclonal bands and other biomarkers of MS in the CSF. Approximately [5 to 10 percent](#) of people with confirmed MS have normal spinal tap results. In order to make an accurate [MS diagnosis](#), lumbar puncture should be used in combination with a complete medical history, neurological exam, [MRI](#) and other necessary tests.

