RadiologyInfo.org
For patients

Lumbar Puncture

A lumbar puncture uses a thin, hollow needle and a special form of real-time x-ray called fluoroscopy to remove a small amount of cerebrospinal fluid for lab analysis. It may also be used to deliver an injection of chemotherapy or other medication into the lower spinal canal.

Your doctor will instruct you on how to prepare, including any changes to your medication schedule. Tell your doctor if there's a possibility you are pregnant and discuss any recent illnesses, medical conditions, allergies and medications you're taking, including herbal supplements, blood thinners, aspirin or other pain relievers. You may be advised to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners several days prior to your procedure. You may be told not to eat or drink anything after midnight before your procedure. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown.

What is a lumbar puncture?

A lumbar puncture (also called a spinal tap) is a minimally invasive (http://www.radiologyinfo.org) , image-guided diagnostic test that involves the removal of a small amount of cerebrospinal fluid (CSF) (http://www.radiologyinfo.org) —the fluid that surrounds the brain and spinal cord—or an injection of medication or other substance into the lumbar (http://www.radiologyinfo.org) (or lower) region of the spinal canal.

CSF serves several important functions in the central nervous system. It cushions the brain and spinal cord against shock and helps to maintain pressure at a constant level inside the skull. CSF also delivers nutrients to the brain and carries waste products away into the bloodstream. Studies of the CSF can be useful in diagnosing conditions of the nervous system like meningitis (http://www.radiologyinfo.org) , hemorrhage and multiple sclerosis (http://www.radiologyinfo.org) .

What are some common uses of the procedure?

A lumbar puncture is typically performed to:

- collect a sample of cerebrospinal fluid to be analyzed in a laboratory
- measure the pressure of fluid in the spinal canal
- remove some cerebrospinal fluid to decrease pressure in the spinal canal
- inject chemotherapy (http://www.radiologyinfo.org) drugs, contrast material, or other medications into the cerebrospinal fluid.

The lumbar puncture procedure helps physicians diagnose:

- bacterial, fungal and viral infections, including meningitis (http://www.radiologyinfo.org) , encephalitis (http://www.radiologyinfo.org) and syphilis (http://www.radiologyinfo.org)
- bleeding around the brain (subarachnoid hemorrhage (http://www.radiologyinfo.org))
- cancers involving the brain and spinal cord
- inflammatory conditions of the nervous system, including Guillain-Barre syndrome (http://www.radiologyinfo.org) and multiple sclerosis.

How should I prepare?

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Prior to your procedure, your doctor may test your blood to check your kidney function and to determine if your blood clots normally.

You may also have a CT scan (http://www.radiologyinfo.org) prior to the lumbar puncture to determine if there is abnormal swelling in and/or around your brain. This is called hydrocephalus. This test will also help confirm the presence of increased intracranial pressure. This may be detected prior to performing the lumbar puncture using CT or magnetic resonance imaging (MRI).

You should report to your doctor all medications that you are taking, including herbal supplements, and if you have any allergies, especially to local anesthetic (http://www.radiologyinfo.org) medications or to general anesthesia (http://www.radiologyinfo.org) . Your physician may advise you to stop taking aspirin, non-steroidal anti-inflammatory drugs (NSAIDs) or a blood thinner for a time before your procedure.

You should tell your doctor if you are taking blood-thinning medications such as Warfarin (Coumadin®), Pradaxa®, Heparin®, Lovenox®, clopidogrel (Plavix®) and over-the-counter pain relievers such as aspirin, ibuprofen or naproxen.

Tell your doctor about recent illnesses or other medical conditions.

Your doctor will likely tell you not to eat or drink anything after midnight before your procedure. Your doctor will tell you which medications you may take in the morning.

Plan to have someone drive you home after your procedure.

The nurse will give you a gown to wear during the procedure.

Women should always tell their doctor and technologist (http://www.radiologyinfo.org) if they are pregnant. Doctors will not perform many tests during pregnancy to avoid exposing the fetus (http://www.radiologyinfo.org) to radiation. If an x-ray is necessary, the doctor will take precautions to minimize radiation exposure to the baby. *See the Radiation Safety (https://www.radiologyinfo.org/en/info/safety-radiation) page for more information about pregnancy and x-rays.*

If your child is having a lumbar puncture, you may be able to stay in the room during the procedure.

What does the equipment look like?

This exam typically uses a radiographic table, one or two x-ray tubes, and a video monitor. Fluoroscopy converts x-rays into video images. Doctors use it to watch and guide procedures. The x-ray machine and a detector suspended over the exam table produce the video.

The length and diameter of the thin, hollow needle used in this procedure varies.

This procedure may use other equipment, including an intravenous (http://www.radiologyinfo.org) line (IV), ultrasound machine and devices that monitor your heart beat and blood pressure.

How does the procedure work?

X-rays are a form of radiation like light or radio waves. X-rays pass through most objects, including the body. The technologist carefully aims the x-ray beam at the area of interest. The machine produces a small burst of radiation that passes through your body. The radiation records an image on photographic film or a special detector.

Different parts of the body absorb the x-rays in varying degrees. Dense bone absorbs much of the radiation while soft tissue (muscle, fat, and organs) allow more of the x-rays to pass through them. As a result, bones appear white on the x-ray, soft tissue

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shows up in shades of gray, and air appears black.

Most x-ray images are electronically stored digital files. Your doctor can easily access these stored images to diagnose and manage your condition.

Fluoroscopy uses a continuous or pulsed x-ray beam to create a sequence of images that are projected onto a fluorescent screen, or television-like monitor. Still images are also captured and stored either on film or electronically on a computer.

How is the procedure performed?

Your doctor will likely do this exam on an outpatient basis.

A nurse or technologist (http://www.radiologyinfo.org) will insert an intravenous (http://www.radiologyinfo.org) (IV) line into a vein in your hand or arm to administer a sedative. This procedure may use moderate sedation. It does not require a breathing tube. However, some patients may require general anesthesia (http://www.radiologyinfo.org) .

You will be positioned lying face down on your stomach on the examining table.

The doctor or nurse may connect you to monitors that track your heart rate, blood pressure, oxygen level, and pulse.

The nurse will sterilize the area of your body where the catheter is to be inserted. They will sterilize and cover this area with a surgical drape.

Your doctor will numb the area with a local anesthetic (http://www.radiologyinfo.org) . This may briefly burn or sting before the area becomes numb.

Guided by real-time x-ray images (fluoroscopy (http://www.radiologyinfo.org)), the physician will insert the needle through the skin between two lumbar vertebrae (http://www.radiologyinfo.org) and into the spinal canal. Once the needle is in place, you may be asked to change your position slightly while fluid pressure in the spinal canal is measured.

Depending on the reason for your lumbar puncture:

- a small amount of fluid may be withdrawn through the needle to be tested in a laboratory
- cerebrospinal fluid may be removed to relieve pressure in the spinal canal
- chemotherapy or other medication may be injected into the spinal canal as prescribed by your physician

The needle is then removed.

The doctor applies pressure to prevent any bleeding and covers the opening in the skin with a bandage. No sutures are necessary.

The doctor or nurse will remove your IV line before you go home.

You may be asked to lie on your back or side for a few hours following the procedure.

This procedure is usually completed within 45 minutes.

What will I experience during the procedure?

You will feel a slight pinch when the nurse inserts the needle into your vein for the IV line and when they inject the local anesthetic. Most of the sensation is at the skin incision site. The doctor will numb this area using local anesthetic. You may feel pressure when the doctor inserts the catheter into the vein or artery. However, you will not feel serious discomfort.

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You will be asked to remain very still during the procedure. A nurse or technician may help children stay still by holding them in place during the procedure. Children may also receive a sedative to help them stay comfortable and still.

You should plan to lay on your back and rest the day following your procedure.

Some patients develop a headache after a lumbar puncture that begins several hours or up to two days after the procedure. The headache may be accompanied by nausea, vomiting and dizziness and can last from a few hours to a week or more. You also may feel pain and tenderness in your lower back, which may radiate down your legs. If your pain continues or becomes severe, contact your doctor immediately.

A pain-relieving medication such as acetaminophen can help reduce headache or back pain following the procedure. If your headache is severe, you should contact your doctor.

Who interprets the results and how do I get them?

Your referring physician will share the results with you.

Your interventional radiologist may recommend a follow-up visit.

This visit may include a physical check-up, imaging exam(s), and blood tests. During your follow-up visit, tell your doctor if you have noticed any side effects or changes.

What are the benefits vs. risks?

Benefits

- No radiation stays in your body after an x-ray exam.
- X-rays usually have no side effects in the typical diagnostic range for this exam.

Risks

- Any procedure that penetrates the skin carries a risk of infection. The chance of infection requiring antibiotic treatment appears to be less than one in 1,000.
- There is a risk of bleeding (epidural hematoma (http://www.radiologyinfo.org) or subarachnoid hemorrhage) following a lumbar puncture.
- In rare cases, compression or herniation of the brainstem may occur following a lumbar puncture because of increased intracranial pressure and the presence of a brain tumor or other lesion. A CT or MRI performed prior to the procedure helps determine if there is increased intracranial (http://www.radiologyinfo.org) pressure in advance of a lumbar puncture.
- There is always a slight chance of cancer from excessive exposure to radiation. However, given the small amount of radiation used in medical imaging, the benefit of an accurate diagnosis far outweighs the associated risk.
- Women should always tell their doctor and x-ray technologist if they are pregnant. *See the Radiation Safety (https://www.radiologyinfo.org/en/info/safety-radiation) page for more information about pregnancy and x-rays.*

A Word About Minimizing Radiation Exposure

Doctors take special care during x-ray exams to use the lowest radiation dose possible while producing the best images for evaluation. National and international radiology protection organizations continually review and update the technique standards radiology professionals use.

Modern x-ray systems minimize stray (scatter) radiation by using controlled x-ray beams and dose control methods. This ensures that the areas of your body not being imaged receive minimal radiation exposure.

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What are the limitations of lumbar puncture?

It may be difficult to obtain a cerebrospinal fluid sample through lumbar puncture on patients with a condition called spinal stenosis and in individuals who are severely dehydrated.

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