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For patients

# Myelography



Myelography uses a real-time form of x-ray called fluoroscopy and an injection of contrast material to evaluate the spinal cord, nerve roots and spinal lining (meninges). It is particularly useful for assessing the spine following surgery and for assessing disc abnormalities in patients who cannot undergo MRI.

You will be instructed on how to prepare. Tell your doctor if there's a possibility you are pregnant and discuss any recent illnesses, medical conditions, medications you're taking and allergies, especially to iodinated contrast materials. You may be advised to stop taking blood thinners or other medications several days prior to your exam. You also may be told to avoid solid food and increase your fluid intake beforehand. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown.

## What is Myelography?

Myelography is an imaging examination that involves the introduction of a spinal needle into the spinal canal and the injection of contrast material (http://www.radiologyinfo.org) in the space around the spinal cord (http://www.radiologyinfo.org) and nerve roots (the subarachnoid space (http://www.radiologyinfo.org) ) using a real-time form of x-ray (http://www.radiologyinfo.org) called fluoroscopy (http://www.radiologyinfo.org) .

An x-ray exam helps doctors diagnose and treat medical conditions. It exposes you to a small dose of ionizing radiation (http://www.radiologyinfo.org) to produce pictures of the inside of the body. X-rays are the oldest and most often used form of medical imaging.

When the contrast material is injected into the subarachnoid space, the radiologist is able to view and evaluate the status of the spinal cord, the nerve roots and the meninges. The meninges are the membranes which surround and cover the spinal cord and nerve roots. Myelography provides a very detailed picture (myelogram (http://www.radiologyinfo.org) ) of the spinal cord, nerve roots, subarachnoid space and spinal column. The radiologist views the passage of contrast material in real-time within the subarachnoid space as it is flowing using fluoroscopy but also takes permanent images, called x-rays or radiographs, of the contrast material around the spinal cord and nerve roots in order to document abnormalities involving or affecting these structures. In many of these cases, the myelogram may be followed by a computed tomography (CT) scan to better define the anatomy and any abnormalities.

## What are some common uses of the procedure?

Magnetic resonance imaging (MRI) is often the first imaging exam done to evaluate the spinal cord and nerve roots. However, on occasion, a patient has a medical device, such as a cardiac pacemaker, that may prevent him or her from undergoing MRI. In such cases, myelography and/or a CT scan, in lieu of MRI, is performed to better define abnormalities.

Myelography is most commonly used to detect abnormalities affecting the spinal cord, the spinal canal (http://www.radiologyinfo.org) , the spinal nerve roots and the blood vessels that supply the spinal cord, including:


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- to show whether a herniation of the intervertebral disk between the successive vertebral bodies is compressing the nerve roots or the spinal cord.
- to depict a condition that often accompanies degeneration of the bones and soft tissues surrounding the spinal canal, termed spinal stenosis. In this condition, the spinal canal narrows as the surrounding tissues enlarge due to the development of bony spurs (osteophytes) and thickening of the adjacent ligaments.

Myelography can also be used to assess the following conditions when MR imaging cannot be performed, or in addition to MRI (when MR does not provide sufficient information):

- tumors involving the bony spine, meninges, nerve roots or spinal cord
- infection involving the bony spine, intervertebral discs, meninges and surrounding soft tissues
- inflammation of the arachnoid membrane (http://www.radiologyinfo.org) that covers the spinal cord
- spinal lesions caused by disease or trauma

Myelography can help with surgical planning decisions. In patients with spinal instrumentation (screws, plates, rods, etc.), MR imaging may not be optimal because of artifacts generated by these instruments. In these cases your doctor may decide to order CT myelography.

## How should I prepare?

Your physician will give you detailed instructions on how to prepare for your myelogram.

Tell your doctor about all the medications you take. List any allergies, especially to iodine contrast materials (http://www.radiologyinfo.org) . Tell your doctor about recent illnesses or other medical conditions.

Specifically, the physician needs to know if (1) you are taking medications that need to be stopped a few days before the procedure and (2) whether you have a history of reaction to the contrast material used for the myelogram.

Some drugs should be stopped one or two days before myelography. These include certain antipsychotic medications, antidepressants, blood thinners, and some other drugs. The most important type of medication that must be stopped is blood thinners (anticoagulants). If you are taking blood thinners, you should speak with your physician about alternative methods of maintaining anticoagulation while you are undergoing a myelogram.

Although reactions to the iodinated contrast material used in the myelogram are extremely uncommon, you should inform your physician if you have previously had an allergic reaction to contrast material or other medication. In addition, please mention if you have any allergies to other non-medical substances or have a history of asthma. If this is the case, you will be watched especially carefully to check for a reaction when injecting the contrast material. Allergy to iodine-containing substances can be especially concerning.

Usually patients are advised to increase their fluid intake the day before a scheduled myelogram, as it is important to be well hydrated. Solid foods should be avoided for several hours before the exam, but fluids may be continued.

You may need to remove some clothing and/or change into a gown for the exam. Remove jewelry, removable dental appliances, eyeglasses, and any metal objects or clothing that might interfere with the x-ray images.

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.*

At the conclusion of the myelogram, the patient usually remains in an observation area for about two hours and is discharged.


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Unless you are to spend the night in hospital, you should arrange to have a relative or friend take you home.

## 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.

## 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 radiologic 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 a special detector.

Fluoroscopy uses a continuous or pulsed x-ray beam to create images and project them onto a video monitor. Your myelogram procedure will use a contrast material to clearly define the area of interest. Fluoroscopy allows your doctor to view joints or internal organs in motion. The exam also captures still images or movies and stores them electronically on a computer.

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

## How is the procedure performed?

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

As the patient lies face-down on the examination table, the radiologist will use the fluoroscope (http://www.radiologyinfo.org) , which projects radiographic images in a movie-like sequence onto the monitor, to visualize the spine and determine the best place to inject the contrast material.

The contrast material usually is injected into the lower lumbar (http://www.radiologyinfo.org) spinal canal, because it is considered easier and safer. Occasionally, if it is deemed safer or more useful, the contrast material will be injected into the upper cervical (http://www.radiologyinfo.org) spine.

At the site of the injection, the skin will be cleaned and then numbed with a local anesthetic (http://www.radiologyinfo.org) . Depending on the location of the puncture, the patient will be positioned on his/her side or on the abdomen (prone position). The needle is advanced, usually under fluoroscopic guidance, until its tip is positioned within the subarachnoid space within the spinal canal, at which time a free slow flow of fluid is obtained. If requested by the referring physician, a small amount of cerebrospinal fluid (http://www.radiologyinfo.org) may be withdrawn and sent for laboratory studies. The contrast material is then injected through the needle, the needle is removed and the skin at the puncture site is again cleaned. The patient is then positioned on the table, usually lying on their abdomen.

Again using the fluoroscope for guidance, the radiologist then slowly tilts the x-ray table allowing the contrast material to flow up or down within the subarachnoid space and to surround the nerve roots or the spinal cord. As the table is tilted, the radiologist monitors the flow of contrast material with fluoroscopy, focusing on the area that correlates with the patient's symptoms. At this point, the patient may be repositioned on his/her side, and additional x-ray images may be obtained by the radiologist and radiologic technologist; while such images are being obtained, it is important for the patient to remain still to reduce the possibility of blurred images. When these images have been completed, the table is returned to the horizontal position, and the patient is allowed to roll onto his/her back and assume a position of greater comfort while the images are checked by the radiologist.

A computed tomography (http://www.radiologyinfo.org) (CT) scan is frequently performed immediately following the conclusion of the myelography while contrast material is still present within the spinal canal. This combination of imaging studies is known as


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CT myelography.

A myelography examination is usually completed within 30 to 60 minutes. A CT scan will add another 15 to 30 minutes to the total examination time.

## What will I experience during and after the procedure?

You will feel a brief sting when local anesthetic is injected under the skin and you will feel slight pressure on your back as the spinal needle is inserted. Positioning the needle can occasionally cause a sharp pain.

During the exam, you will be asked to lay as still as possible while the table is tilted at different angles. A foot rest and straps or supports for your feet and ankles will keep you from sliding out of position. You may find the face-down position uncomfortable, however, you should not have to maintain this position for very long. Rarely, a patient may experience difficulty breathing deeply or swallowing when the table is tilted face down. If this should occur, please tell the radiologist or radiologic technologist and the table will be raised to a more comfortable position.

Headaches, flushing, or nausea may follow contrast injection, though this is rare. Seizures are also possible, but are very rare when the newer contrast materials are used.

Following the conclusion of the myelogram, the patient will be escorted to a recovery area where vital signs and general patient conditions are observed for one to two hours. Some facilities have patients stay in the recovery area resting with the head elevated at a 30- to 45-degree angle for as long as four hours. You may be encouraged to take fluids at this time to help eliminate the contrast material from your body and to prevent headache.

Following your myelogram, you should refrain from strenuous physical activity and from bending over for one to two days.

You should notify your health professional if you experience fever higher than 100.4°F, excessive nausea or vomiting, severe headache for more than 24 hours, neck stiffness or numbness in your legs. You should also report if you have trouble urinating or moving your bowels.

## Who interprets the results and how do I get them?

A radiologist (https://www.radiologyinfo.org/en/info/article-your-radiologist) , a doctor trained to supervise and interpret radiology examinations, will analyze the images. The radiologist will send a signed report to your primary care or referring physician (http://www.radiologyinfo.org) who will discuss the results (https://www.radiologyinfo.org/en/info/all-about-your-radiology-report) with you.

You may need a follow-up exam. If so, your doctor will explain why. Sometimes a follow-up exam further evaluates a potential issue with more views or a special imaging technique. It may also see if there has been any change in an issue over time. Follow-up exams are often the best way to see if treatment is working or if a problem needs attention.

## What are the benefits vs. risks?

### Benefits

- Myelography is relatively safe and painless.
- When a contrast material is injected into the subarachnoid space surrounding the nerve roots and spinal cord, it allows the radiologist to view outlines of the different areas of the spine that usually are not visible or distinguishable on x-rays.
- No radiation remains in a patient's body after an x-ray examination.
- X-rays usually have no side effects when used in the diagnostic range necessary for this procedure.


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### Risks

- 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.
- The radiation dose for this procedure varies. *See the Radiation Dose (https://www.radiologyinfo.org/en/info/safety-xray) page for more information.*
- Although it is uncommon, headache associated with the needle puncture is a risk. The headache, when it occurs following myelography, usually begins when the patient begins to sit upright or stand. One of the common features of this type of headache is that it is improved when the patient lays flat. When present, the headache usually begins within two to three days after the procedure. Rest while laying on one's back and increased fluid intake readily relieve mild headaches, but more severe headaches may call for medication. In rare circumstances some patients may continue to experience headaches, which may necessitate a special, but simple, procedure to help with the headache. This procedure is known as an epidural blood patch.
- Adverse reactions to the injection of contrast material during a myelogram are infrequent and usually mild in nature, including itching, rash, sneezing, nausea or anxiety. The development of hives or wheezing is rare, but may require treatment with medication. More severe reactions involving the heart or lungs are rare.
- Other rare complications of myelography include nerve injury from the spinal needle and bleeding around the nerve roots in the spinal canal. In addition, the meninges covering the spinal cord may become inflamed or infected. Seizures are a very uncommon complication of myelography.
- There is a very small risk that pressure changes within the spinal canal (http://www.radiologyinfo.org) caused by the introduction of a needle below the site of an obstruction will block the flow of fluid within the subarachnoid space of the spinal canal, which can make urgent surgery necessary.
- Women should always tell their doctor and radiologic 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

Radiologic technologists 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.

## What are the limitations of Myelography?

- The most significant limitation of myelography is that it only sees inside the spinal canal and the adjacent spinal nerve roots. Abnormalities outside these areas may be better imaged with MRI or CT. MR is superior to myelography when assessing intrinsic spinal cord disease.
- Myelography usually is avoided during pregnancy because of the potential radiation risk to the baby.
- It may be difficult to inject contrast material in patients with structural defects of the spine or following some forms of spinal injury.
- Myelography should not be performed at an injection site that is infected. A different injection site should be chosen. Alternatively, an MRI may be performed.

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