

SpineFAQs

Low Back Pain Diagnosis and Treatment

Lower back pain is a very common problem in the adult. In fact, approximately 90% of adults will have at least one episode of serious acute low back pain in their lives. Fortunately, for the vast majority, acute lower back pain is self-limited and resolves on its own.

In general, low back pain can be divided into two categories...acute low back pain, and chronic low back pain. Acute (or recent onset) low back pain is most often related to overuse (such as after a long day working in the yard), or an acute injury such as when lifting something too heavy.

Mechanical back pain is caused by wear and tear in the parts of the lumbar spine. This type of pain is similar in nature to a machine that begins to wear out. Mechanical pain usually starts from degenerative changes in the disc. As the disc begins to collapse and the space between the vertebrae narrows, the facet joints may become inflamed. Mechanical pain typically gets worse after activity due to strain on the moving parts of the spine. Mechanical pain is usually felt in the back, but it may spread into the buttocks, hips, and thighs. The pain rarely goes down past the knee. Mechanical back pain usually doesn't cause weakness or numbness in the leg or foot, because the problem is not from pressure on the spinal nerves.

Neurogenic pain means pain from nerve injury. Neurogenic pain occurs when spinal nerves are inflamed, squeezed, or pinched. This can happen when a disc herniates or when a nerve gets pinched where it leaves the spine. Recently it has also become known that when a disc ruptures, chemicals are released that inflame the nerves even if there is no pressure directly on the nerve. Neurogenic symptoms concern doctors more than mechanical pain because they can signal damage to the nerves and lead to weakness or numbness in the lower extremities.

The nerve pressure causes symptoms in the areas where the nerve travels, rather than in the low back. This happens because pressure on the spinal nerve affects structures away from the spine, such as the muscles. As a result, a person's back may not hurt, yet the person feels pain, numbness, or

weakness in the leg or foot. This indicates there's a problem with the body's electrical wiring. The pressure on the nerve affects how the body functions. Muscles weaken. Reflexes slow. Sensations of pins, needles, and numbness may be felt where the nerve travels.

Why do I have low back pain?

There are many causes of low back pain. Doctors are not always able to pinpoint the source of a patient's pain. But I will make every effort to ensure that your symptoms are not from a serious medical cause, such as cancer or a spinal infection. The vast majority of back problems are a result of wear and tear on the parts of the spine over many years. This process is called *degeneration*. Over time, the normal process of aging can result in degenerative changes in all parts of the spine.

The intervertebral disc changes over time. At first, the disc is spongy and firm. The nucleus in the center of the disc contains a great deal of water. This gives the disc its ability to absorb shock and protect the spine from heavy and repeated forces. The first change that occurs is that the annulus around the nucleus weakens and begins to develop small cracks and tears. The body tries to heal the cracks with scar tissue. But scar tissue is not as strong as the tissue it replaces. The torn annulus can be a source of pain for two reasons. First, there are pain sensors in the outer rim of the annulus. They signal a painful response when the tear reaches the outer edge of the annulus. Second, like injuries to other tissues in the body, a tear in the annulus can cause pain due to inflammation. With time, the disc begins to lose water, causing it to lose some of its fullness and height. As a result, the vertebrae begin to move closer together.

As the disc continues to degenerate, the space between the vertebrae shrinks. This compresses the facet joints along the back of the spinal column. As these joints are forced together, extra pressure builds on the articular cartilage on the surface of the facet joints. This extra pressure can damage the facet joints. Over time, this may lead to arthritis in the facet joints. These degenerative changes in the disc, facet joints, and ligaments cause the spinal segment to become loose and unstable. The extra movement causes even more wear and tear on the spine. As a result, more and larger tears occur in the annulus.

The nucleus may push through the torn annulus and into the spinal canal. This is called a *herniated* or *ruptured disc*. The disc material that squeezes out can press against the spinal nerves. The disc also emits enzymes and chemicals that produce inflammation. The combination of pressure on the nerves, and inflammation caused by the chemicals released from the disc causes pain.

As the degeneration continues, *bone spurs* develop around the facet joints and around the disc. No one knows exactly why these bone spurs develop. Most doctors think that bone spurs are the body's attempt to stop the extra motion between the spinal segment. These bone spurs can cause problems by pressing on the nerves of the spine where they pass through the neural foramina. This pressure around the irritated nerve roots can cause pain, numbness, and weakness in the low back, buttocks, and lower limbs and feet. A collapsed spinal segment eventually becomes stiff and immobile. Thickened ligaments and facet joints, scarred and dried disc tissue, and protruding bone spurs prevent normal movement. Typically, a stiff joint doesn't cause as much pain as one that slides around too much. So this stage of degeneration may actually lead to pain relief for some people.

Injuries to the spine, such as a fracture or injury to the disc, can make the changes happen even faster. There is strong evidence that cigarette smoking also speeds up degeneration of the spine. Scientists have found links among family members, showing that genetics plays a role in how fast these changes occur.

How will you find out what's causing my problem?

The diagnosis of low back problems begins with a thorough history of your condition. You will be asked to fill out a questionnaire describing your back problems. I will ask you questions to find out when you first started having problems, what makes your symptoms worse or better, and how the symptoms affect your daily activity. Your answers will help guide the physical examination. I will then physically examine the muscles and joints of your low back. It is important that I see how your back is aligned, how it moves, and exactly where it hurts. I will do some simple tests to check the function of the nerves. These tests are used to measure the strength in your lower limbs, check your reflexes, and determine whether you have numbness in your legs or feet. The information from your medical history

and physical examination will help me decide which further tests to run. The tests give different types of information.

X-rays – These show problems with bones, such as infection, bone tumors, or fractures. X-rays of the spine also can give your doctor information about how much degeneration has occurred in the spine, such as the amount of space in the neural foramina and between the discs. X-rays are usually the first test ordered before any of the more specialized tests.

Flexion and Extension X-rays - Special X-rays called *flexion and extension X-rays* may help to determine if there is instability between vertebrae. These X-rays are taken from the side as you lean as far forward and then as far backward as you can. Comparing the two X-rays allows the doctor to see how much motion occurs between each spinal segment.

MRI Scans – The MRI uses magnetic waves to create pictures of the lumbar spine in slices. The MRI scan shows the lumbar spine bones as well as the soft tissue structures such as the discs, joints, and nerves. MRI scans are painless and don't require needles or dye. The MRI scan has become the most common test to look at the lumbar spine after X-rays have been taken.

CT Scans -The *computed tomography* (CT) scan is a special type of X-ray that lets doctors see slices of bone tissue. The machine uses a computer and X-rays to create these slices. It is used primarily when problems are suspected in the bones.

Myelogram - The myelogram is a special kind of X-ray test where a special dye is injected into the spinal sac. The dye shows up on an X-ray. It helps a doctor see if there is a herniated disc, pressure on the spinal cord or spinal nerves, or a spinal tumor. Before the CT scan and the MRI scan were developed, the myelogram was the only test that surgeons had to look for a herniated disc. The myelogram is still used today but not nearly as often. The myelogram is usually combined with CT scan to give more detail.

Discogram - The *discogram* is another special test. A discogram has two parts. First, a needle is inserted into the problem disc, and saline

is injected into the disc to create pressure inside the disc. If this reproduces your pain, then it suggests that the disc is the source of your pain. During the second part of the test, dye is injected into the disc. The dye can be seen on X-ray. Using both regular X-rays and CT scan images, the dye outlines the inside of the disc. This can show abnormalities of the nucleus such as annular tears and ruptures of the disc.

Bone Scan - A *bone scan* is a special test where radioactive tracers are injected into your blood stream. The tracers then show up on special X-rays of your back. The tracers build up in areas where bone is undergoing a rapid repair process, such as a healing fracture or the area surrounding an infection or tumor. Usually the bone scan is used to locate the problem. Other tests such as the CT scan or MRI scan are then used to look at the area in detail.

What treatments can help me?

Whenever possible, I prefer to use treatments other than surgery. The first goal of these nonsurgical treatments is to ease your pain and other symptoms.

Bed Rest - In cases of severe pain, I may suggest a short period of bed rest, usually no more than two days. Lying on your back can take pressure off sore discs and nerves. Most doctors advise against strict bed rest and prefer that patients do ordinary activities using pain to gauge how much is too much.

Back Brace - A back support belt is sometimes recommended when back pain first strikes. It can help provide support and lower the pressure inside a problem disc. Patients are encouraged to gradually discontinue wearing the support belt over a period of two to four days. Otherwise, back muscles begin to rely on the belt and start to shrink (*atrophy*).

Medications - Many different types of medications are typically prescribed to help gain control of the symptoms of low back pain. There is no medication that will cure low back pain. Medications are prescribed to help with sleep disturbances and to help control pain, inflammation, and muscle spasm.

Physical Therapy and Exercise - In addition to other non-surgical treatments, I often ask my patients to work with a physical therapist. Therapy treatments focus on relieving pain, improving back movement, and fostering healthy posture. A therapist can design a rehabilitation program to address a particular condition and to help the patient prevent future problems. There is a great deal of scientific proof that exercise and increased overall fitness reduce the risk of developing back pain and can improve the symptoms of back pain once it begins.

For acute back pain, you may be prescribed two to four weeks of physical therapy. You might need to continue therapy for two to four months for chronic back problems. Treatments are designed to ease pain and to improve your mobility, strength, posture, and function. You'll also learn how to control your symptoms and how to protect your spine for the years ahead. At first, your therapist may apply various forms of treatment to address your symptoms. These are especially helpful in the early weeks to improve your comfort so you can get back to your normal activities. You'll be shown ways to position your spine for maximum comfort while you move, recline, or sleep. To help calm pain and muscle spasm, your therapist may apply heat or ice packs, electrical stimulation, and ultrasound. If you have severe back pain, your therapist may work with you in a pool. Therapy done in water puts less stress on your low back, and the buoyancy allows you to move easier during exercise.

Hands-on treatments such as massage and specialized forms of soft-tissue mobilization may be used. They can help you begin moving with less pain and greater ease. Medical guidelines also include the early use of *spinal manipulation*, which has shown short-term benefits in people with acute low back pain. Commonly thought of as an *adjustment*, spinal manipulation helps reset the sensitivity of the spinal nerves and muscles, easing pain and improving mobility. It involves a high-impulse stretch of the spinal joints and is often characterized by the sound of popping as the stretch is done. It doesn't provide effective long-term help when used routinely for chronic conditions.

You may be tempted to limit your activity because of your back pain. However, as a result of pain and inactivity, your muscles may become

weak and de-conditioned, and your back won't function optimally. Therapists use active rehabilitation to prevent the harmful effects of de-conditioning. With this active approach, you'll be shown how to lift and move safely. And you'll be shown how to strengthen your back muscles. In addition, aerobic exercises are used to improve your general fitness and endurance. Aerobic exercises may include walking on a treadmill, riding a stationary bike, or swimming. These activities can relieve the stress of low back pain, and they can cause your body to release *endorphins* into the blood stream. Endorphins are your body's own natural painkillers.

An active approach to therapy can help you attain better muscle function, so you can get your activities done easier. Active rehabilitation speeds recovery, reducing the possibility that back pain will become a chronic problem. Activity helps you resume normal activity as swiftly as possible. Though you'll be cautioned about trying to do too much, too quickly, you'll be guided toward a return to your usual activities. This approach gives you a greater sense of control. You'll take an active role in learning how to care for your back pain. Treatment sessions focus on reassuring you that getting back to work and other normal activities swiftly won't cause you harm and can actually help you get better faster.

Your therapist will show you how to keep your spine safe during routine activities. You'll learn about healthy posture and how posture relates to the future health of your spine. And you'll learn about *body mechanics*, how the body moves and functions during activity. Your therapist will also teach safe body mechanics to help you protect your low back as you go about your day. This includes the use of safe positions and movements while lifting and carrying, standing and walking, and performing work duties. As you recover, you will gradually advance in a series of strengthening exercises for the abdominal and low back muscles. Working these core muscles can help you begin moving easier and lessens the chances of future pain and problems. As the rehabilitation program evolves, you will progress with more challenging exercises. The goal is to safely advance your strength and function. Your therapist will work closely with me and your employer to help you get back on the job as quickly as reasonably possible.

You may be required to do lighter duties at first, but as soon as you are able, you'll begin doing your normal work activities. Your therapist can also do a work assessment to make sure you'll be safe to do your job. Your therapist may suggest changes that could help you work safely, with less chance of re-injuring your back.

When needed, you'll be encouraged to take certain actions to improve your spine health. For example, if you smoke, I will encourage to get help to quit. Because of the limited blood supply in the tissues of the low back, smoking speeds the degenerative process and impairs healing. Smokers are known to have higher rates of back pain than non-smokers. If you're out of shape, I encourage you to get fit. This strategy makes it less likely that back pain or injury will strike again in the future.

Injections - Spinal injections are used for both treatment and diagnostic purposes. There are several different types of spinal injections that your doctor may suggest. These injections usually use a mixture of an anesthetic and some type of cortisone preparation. The anesthetic is a medication that numbs the area where it is injected. If the injection takes away your pain immediately, this gives your doctor important information suggesting that the injected area is indeed the source of your pain. The cortisone decreases inflammation and can reduce the pain from an inflamed nerve or joint for a prolonged period of time. I typically have one of my associates known as a Physiatrist perform these injections.

Epidural Steroid Injection (ESI): Back pain from inflamed nerve roots and facet joints may benefit from an *epidural steroid injection* (ESI). In an ESI, the medication mixture is injected into the epidural space around the nerve roots. Generally, an ESI is given only when other non-operative treatments aren't working. ESIs are not always successful in relieving pain. If they do work, they may only provide temporary relief.

Selective Nerve Root Injection: Another type of injection to place steroid medication around a specific inflamed nerve root is called a *selective nerve root injection*.

The fluoroscope is used to guide a needle directly to the painful spinal nerve root. The nerve root is then bathed with the medication. Some doctors believe this procedure gets more medication to the painful spot. In difficult cases, the selective nerve root injection can also help surgeons decide which nerve root is causing the problem before surgery is planned.

Facet Joint Injection: When the problem is thought to be in the facet joints, an injection into one or more facet joints can help determine which joints are causing the problem and ease the pain as well. The fluoroscope is used to guide a needle directly into the facet joint. The facet joint is then filled with medication mixture. If the injection immediately eases the pain, it helps confirm that the facet joint is a source of pain. The steroid medication will reduce the inflammation in the joint over a period of days and may reduce or eliminate your back pain.

Trigger Point Injections: Injections of anesthetic medications mixed with a cortisone medication are sometimes given in the muscles, ligaments, or other soft tissues near the spine. These injections are called *trigger point injections*. These injections can help relieve back pain and ease muscle spasm and tender points in the back muscles.

Will I need surgery?

Only rarely is lumbar spine surgery scheduled right away. I may suggest immediate surgery if you are losing control of your bowels and bladder or if your muscles are becoming weaker very rapidly. For other conditions, I prefer to try non-surgical treatments for a minimum of three months before considering surgery. Most people with back pain tend to get better, not worse. Even people who have degenerative spine changes tend to gradually improve with time. Only one to three percent of patients with degenerative lumbar conditions typically require surgery. Surgery may be suggested when severe pain is not improving.

There are many different operations for back pain. The goal of nearly all spine operations is to remove pressure from the nerves of the spine, stop

excessive motion between two or more vertebrae, or both. The type of surgery that is best depends on that patient's conditions and symptoms.

Laminectomy - The *lamina* is the covering layer of the bony ring of the spinal canal. It forms a roof-like structure over the back of the spinal column. When the nerves in the spinal canal are being squeezed by a herniated disc or from bone spurs pushing into the canal, a laminectomy removes part or all of the lamina to release pressure on the spinal nerves.

Discectomy - When the intervertebral disc has ruptured, the portion that has ruptured into the spinal canal may put pressure on the nerve roots. This may cause pain, weakness, and numbness that radiates into one or both legs. The operation to remove the portion of the disc that is pressing on the nerve roots is called a discectomy. This operation is performed through an incision in the low back immediately over the disc that has ruptured.

Many spine surgeons now perform discectomy procedures that require only small incisions in the low back (*minimally invasive*). This is the approach that I use. The advantage of these minimally invasive procedures is less damage to the muscles of the back and a quicker recovery. I perform minimally invasive discectomy as an outpatient procedure.

Lumbar Fusion - When there is excessive motion between two or more vertebrae, the excess motion can cause both mechanical pain and irritation of the nerves of the lumbar spine. In this case some type of *spinal fusion* is usually recommended. The goal of a spinal fusion is to force two or more vertebrae to grow together, or fuse, into one bone. A solid fusion between two vertebrae stops the movement between the two bones. The pain is reduced because the fusion reduces the constant irritation and inflammation of the nerve roots. There are many different types of spinal fusions.

Posterior Lumbar Fusion: In the past, the traditional operation to perform a fusion of the lumbar spine was to *decorticate* the back surface of the vertebrae. *Decorticate* means to remove the hard outside covering of a bone to create a bleeding bone surface.

Once this was done, bone graft was taken from the pelvis and laid on top of the decorticated vertebrae. The body tries to heal this area just like it would a fractured bone. The bone graft and the bleeding bone grow together and fuse to create one solid bone. Non-instrumented posterior fusion is rarely performed these days.

Posterior Lumbar Instrumented Fusion: Spinal fusions were not always successful, mainly because the vertebrae failed to fuse together in up to 20 percent of cases. Surgeons began looking for ways to increase the success of fusions. For many years, metal plates and screws have been used to treat fractures of other bones. The more rigid two bones can be held together while the healing phase occurs, the more likely the bones are to heal. Spine surgeons began looking for ways to hold the vertebrae together while the fusion took place. Major advances have been made in recent years in developing metal rods, metal plates, and special screws that are designed to hold the vertebrae together while the fusion takes place. These new techniques of spinal fusion are referred to as *instrumented fusions* because of the special devices used to secure the vertebrae to be fused. Today the most common type of posterior fusion is performed using special screws called *pedicle screws* that are inserted into each vertebra and connected to either a metal plate or metal rod along the back of the spine. The vertebrae are still decorticated, and bone graft is still used to stimulate the bones to heal together and fuse into one solid bone.

Anterior Lumbar Interbody Fusion: A fusion of the lumbar spine can be accomplished in other ways. In some cases, surgeons feel that it is best to perform a fusion from the front of the spine. This is termed an *anterior interbody fusion*. This type of fusion requires an incision in the side of the abdomen to allow the surgeon to see the front of the spine. The intervertebral disc is removed between two vertebral bodies and bone graft is inserted where the disc was removed. The two vertebral bodies heal together and fuse.

Anterior Lumbar Discectomy and Fusion with Cages: Degeneration of the intervertebral disc allows the vertebrae to move closer together, which narrows the openings (the *neural*

foramina) where the nerve roots leave the spinal canal. Surgeons realized that restoring the normal separation between the vertebrae would open the foramina and take pressure off the nerve roots. Over the last several years, devices called *fusion cages* have been designed that can be placed between the vertebrae to hold them apart while the fusion occurs. Enlarging the space between two vertebrae widens the opening of the neural foramina, taking pressure off the spinal nerves that pass through them. The extra space also pulls taut the ligaments inside the spinal canal so they don't buckle. Fusion cages are made of metal, bone, or graphite material. Some of these cages are shaped like cylinders and are threaded like a screw on the outside and hollow on the inside. Some are rectangular in shape. The main purpose of the cage, regardless of the shape or material, is to hold the two vertebrae apart while the fusion becomes

Posterior Lumbar Interbody Fusion: Finally, surgeons may combine the two methods of anterior fusion and posterior fusion. Fusing both the anterior and posterior portions of the spine gives the most solid fusion. Placing intervertebral cages between the two vertebrae also allows the surgeon to restore the disc height and help take pressure off of the nerve roots that exit at that spinal segment. A common method of doing this is called a *posterior lumbar interbody fusion*, combined with a posterior lumbar instrumented fusion (described earlier).

Will I need therapy after surgery?

Rehabilitation after surgery can be complex. Depending on what operation you've had, you may leave the hospital shortly after surgery. Some procedures, such as fusion surgery, require that you stay in the hospital for a few days. When you stay in the hospital, a physical therapist may visit you in your hospital room soon after surgery. Physical therapy sessions help you learn to move and begin doing routine activities without putting extra strain on your low back.

During recovery from surgery, you should follow my instructions about wearing a back brace or soft lumbar support belt. You should be cautious about overdoing activities in the first few weeks after surgery.

You may need therapy outside of the hospital. If you had a lumbar fusion, I may have you wait six weeks to three months before starting therapy. Once you start in therapy, you'll usually go for one to three months, depending on your progress and the type of surgery you had.

At first, your therapist may use treatments such as heat or ice, electrical stimulation, massage, and ultrasound to help calm pain and muscle spasm. Pool therapy is often helpful after lumbar surgery. Exercises are used to improve flexibility in your trunk and lower limbs. Strengthening for your abdominal and low back muscles is started. You'll be shown safe ways to sleep, sit, lift, and carry. And you'll be given ideas on how to do your work activities safely. When treatment is well under way, regular visits to the therapist's office will you're your therapist will continue to be a resource. But you are in charge of doing your exercises as part of an ongoing home program.

Ideally, you'll be able to go back to your previous activities. However, you may need to modify your activities to avoid future problems.