

The intervertebral discs in the lower spine are commonly blamed for low back pain. Yet low back pain has many possible causes, and doctors aren't always certain why symptoms occur.

During an office visit for low back pain, your doctor may describe how changes in the discs can lead to back pain. When talking about these changes, your doctor may use the terms *degeneration* or *degenerative disc disease*. Although the parts of the spine do change with time and in some sense degenerate, this does not mean the spine is deteriorating and that you are headed for future pain and problems. These terms are simply a starting point for describing what occurs in the spine over time, and how the changes may explain the symptoms people feel.

What causes disc degeneration?

Our intervertebral discs change with age, much like our hair turns gray. Conditions such as a major back injury or fracture can affect how the spine works, making the changes happen even faster. Daily wear and tear and certain types of vibration can also speed up degeneration in the spine. In addition, strong evidence suggests that smoking speeds up degeneration of the spine. Scientists have also found links among family members, showing that genetics play a role in how fast these changes occur.

Disc degeneration follows a predictable pattern. First, the nucleus in the center of the disc begins to lose its ability to absorb water. The disc becomes dehydrated. Then the nucleus becomes thick and fibrous, so that it looks much the same as the annulus. As a result, the nucleus isn't able to absorb shock as well. Routine stress and strain begin to take a toll on the structures of the spine. Tears form around the annulus. The disc weakens. It starts to collapse, and the bones of the spine compress. This degeneration does not always mean the disc becomes a source of pain. In fact, X-rays and MRI scans show that people with severe disc degeneration don't always feel pain.

Pain caused by degenerative disc disease is mainly mechanical pain, meaning it comes from the parts of the spine that move during activity: the

discs, ligaments, and facet joints. Movement within the weakened structures of the spine causes them to become irritated and painful.

What are the symptoms of disc degeneration?

Pain in the center of the low back is often the first symptom patients feel. It usually starts to affect patients in their twenties and thirties. Pain tends to worsen after heavy physical activity or staying in one posture for a long time. The back may also begin to feel stiff. Resting the back eases pain. At first, symptoms only last a few days.

This type of back pain often comes and goes over the years. Doctors call this *recurring* back pain. Each time it strikes, the pain may seem worse than the time before. Eventually the pain may spread into the buttocks or thighs, and it may take longer for the pain to subside.

How do doctors diagnose the problem?

Diagnosis begins with a complete history and physical exam. I will ask questions about your symptoms and how your problem is affecting your daily activities. I will also want to know what positions or activities make your symptoms worse or better. Then I do a physical examination by checking your posture and the amount of movement in your low back. I check to see which back movements cause pain or other symptoms. Your skin sensation, muscle strength, and reflexes are also tested.

Doctors rely on the history and physical exam to determine which treatments will help the most. X-rays are rarely ordered on the first doctor visit for this problem. This is because over 30 percent of low back X-rays show abnormalities from degeneration, even in people who aren't having symptoms. However, if symptoms are severe and aren't going away, I usually order an X-ray. The test can show if one or more discs has started to collapse. It can also show if there are *bone spurs* in the vertebrae and facet joints. Bone spurs are small points of bone that form with degeneration.

When more information is needed, I may order a *magnetic resonance imaging* (MRI) scan. The MRI machine uses magnetic waves rather than X-rays to show the soft tissues of the body. It is helpful for showing if the tissues in the disc are able to absorb water and whether there are cracks

inside the disc. It can also show if there are problems in other soft tissues, such as the spinal nerves.

Discography can help with the diagnosis. This is a specialized X-ray test in which dye is injected into one or more discs. The dye is seen on X-ray and can give some information about the health of the disc or discs. This test will be done when I am considering surgery, since it can help determine which disc is causing the symptoms.

What treatment is available for disc degeneration?

Whenever possible, we prefer treatment other than surgery. The first goal of non-surgical treatment is to ease pain and other symptoms so the patient can resume normal activities as soon as possible.

Doctors rarely prescribe bed rest for patients with degenerative disc problems. Instead, patients are encouraged to do their normal activities using pain as a gauge for how much is too much. If symptoms are severe, a maximum of two days of bed rest may be prescribed.

Back braces are sometimes prescribed. Keeping the moving parts of the low back still can help calm mechanical pain. When a doctor issues a brace, he or she normally asks that the patient only wear it for two to four days. This lessens the chance that the trunk muscles will shrink (*atrophy*) from relying on the belt. Patients may also be prescribed medication to help them gain control of their symptoms so they can resume normal activity swiftly.

If symptoms continue to limit a person's ability to function normally, the doctor may suggest an *epidural steroid injection* (ESI). Steroids are powerful anti-inflammatories, meaning they help reduce pain and swelling. In an ESI, medication is injected into the space around the lumbar nerve roots. This area is called the *epidural space*. Some doctors inject only a steroid. Most doctors, however, combine a steroid with a long-lasting numbing medication. Generally, an ESI is given only when other treatments aren't working. But ESIs are not always successful in relieving pain. If they do work, they often only provide temporary relief.

In addition, patients often work with a physical therapist. After evaluating a patient's condition, the therapist can assign positions and exercises to ease symptoms. The therapist can design an exercise program to improve

flexibility of tight muscles, to strengthen the back and abdominal muscles, and to help a patient move safely and with less pain.

Is surgery an option?

People with degenerative disc problems tend to gradually improve over time. Most do not need surgery. In fact, only one to three percent of patients with degenerative disc problems typically require surgery. Doctors prefer to try non-surgical treatment for a minimum of three months before considering surgery. If, after this period, non-surgical treatment hasn't improved symptoms, the doctor may recommend surgery. The main types of surgery for degenerative disc problems include

Fusion - *Fusion* surgery joins two or more bones into one solid bone. This prevents the bones and joints from moving. The procedure is sometimes done with a discectomy. Mechanical pain is eased because the fusion holds the moving parts steady, so they can't cause irritation and inflammation.

Anterior Lumbar Interbody Fusion - *Anterior lumbar interbody fusion* surgery is done through the abdomen, allowing the surgeon to work on the *anterior* (front) of the lumbar spine. Removing the disc (discectomy) leaves a space between the pair of vertebrae. This interbody space is filled with a *bone graft*. One method is to take a graft from the pelvic bone and tamp it into place. Another method involves inserting two hollow titanium screws packed with bone, called *fusion cages*, into the place where the disc was taken out. The bone graft inside the cages fuses with the adjacent vertebrae, forming one solid bone.

Posterior Lumbar Fusion - A *posterior lumbar fusion* is done through an incision in the back. In this procedure, the surgeon lays small grafts of bone over the problem vertebrae. Most surgeons will also apply metal plates or rods and screws to hold the vertebrae in place while they heal. This protects the graft

Combined Fusion - A *combined fusion* involves fusing the *anterior* (front) and *posterior* (back) surfaces of the problem vertebrae. By locking the vertebrae from the front and back,

some surgeons believe the graft stays solid and is prevented from collapsing. Results do show improved fusion of the graft, though patients seem to fare equally well with other methods of fusion.

Disc Replacement – In 2004, the FDA approved the first lumbar disc replacement for use in the US. Disc replacement, as compared to fusion, attempts to maintain normal motion of the disc space. This may allow less pain, and possibly less adjacent segment degeneration that is seen with fusion. The results are still relatively preliminary, but there is encouraging data suggesting that disc replacement is a useful option for some patients with symptomatic lumbar disc degeneration.