

What is Degenerative Disc Disease?



Fig. 1: Degenerative disc disease

Degenerative disc disease is one of the most common causes of [low back pain](#), and also one of the most misunderstood. Many patients diagnosed with low back pain caused by degenerative disc disease are left wondering exactly what this diagnosis means for them. Common questions that are often on patients' minds include:

Degenerative disc disease is a misnomer

A large part of many patients' confusion is that the term "degenerative disc disease" sounds like a progressive, very threatening condition. However, this condition is not strictly degenerative and is not really a disease:

Part of the confusion probably comes from the term "**degenerative**", which implies to most people that the symptoms will get worse with age. The term applies to the disc degenerating, but does not apply to the symptoms. While it is true that the disc degeneration is likely to progress over time, the low back pain from degenerative disc disease usually does not get worse and in fact *usually gets better* over time.

- Another source of confusion is probably created by the term "**disease**", which is actually a misnomer. Degenerative disc disease is not really a disease at all, but rather a degenerative condition that at times can produce pain from a damaged disc.

Disc degeneration is a natural part of aging and over time all people will exhibit changes in their discs consistent with a greater or lesser degree of degeneration. However, not all people will develop symptoms. In fact, degenerative disc disease is quite variable in its nature and severity.

Medical practitioners disagree on degenerative disc disease

Finally, many patients are confused about degenerative disc disease because many medical professionals don't agree on what the phrase describes. In practical terms, this means that few practitioners agree on what does and does not constitute a diagnosis of degenerative disc disease. Even medical textbooks don't usually attempt to give an accurate description. Therefore, while many practitioners believe that degenerative disc disease is a common cause of low back pain in young adults, very few agree on the implications.

While there is still a lot of debate in the medical community about degenerative disc disease, a few aspects of the condition are known. This article will discuss aspects of degenerative disc disease that are more commonly accepted, such as the theory of the degenerative cascade, as well as some areas of theory that are still a source of debate in the medical community.

The lumbar disc is a unique and well-designed structure in the spine. It is strong enough to resist terrific forces in multiple different planes of motion, yet it is still very mobile. The disc has several functions, including acting as a shock absorber between the vertebral bodies.

The lumbar disc has been likened to a jelly donut. It is comprised of a series of bands that form a tough outer layer and soft, jelly-like material contained within:

Annulus fibrosus—the disc's firm, tough outer layer

Nerves to the disc space only penetrate into the very outer portion of the annulus fibrosus. Even though there is little innervation to the disc, it can become a significant source of back pain if a tear in the annulus reaches the outer portion and the nerves become sensitized. With continued degeneration, the nerves on the periphery of the disc will actually grow further into the disc space and become a source of pain.

Nucleus pulposus—the jelly-like inner disc material

The nucleus pulposus contains a great deal of very inflammatory proteins. If this inner disc material comes in contact with a nerve root, it will inflame the nerve root and create pain down the leg (sciatica or [radiculopathy](#)). In the same manner, if any of the inflammatory proteins within the disc space leak out to the outer annulus and touch the pain fibers in this area, it can create a lot of low back pain.

Source of the pain

Generally, the pain associated with [degenerative disc disease](#) is thought to stem from two different factors:

- Inflammation
- Abnormal micromotion instability

The proteins in the disc space can cause a lot of inflammation, and inflammation in the disc space can lead to low back pain radiating to the hips. The associated pain can also travel down the back of the legs.

If the annulus—the outer rings of the intervertebral disc - becomes damaged or worn down, it is not as effective in resisting motion in the spine. This condition has been termed “micromotion” instability because it is usually not associated with gross instability (such as a slipped vertebral body or [spondylolisthesis](#)).

Both the inflammation and micromotion instability can cause muscular spasm in the low back. The muscle spasm is the body's attempt to stabilize the low back. It is a reflex, and although the body's response of muscle spasm is not necessary for the safety of the nerve roots, it can be quite painful.

There is minimal blood supply to the disc, and blood is what brings healing nutrients and oxygen to damaged structures in the body. This means that the spinal disc lacks any significant reparative powers. Unlike muscles, which have good blood supply, once a spinal disc is injured it cannot repair itself.

Stages of degenerative disc disease

In the 1970's, Kirkaldy-Willis first described the "degenerative cascade" of [degenerative disc disease](#). He postulated that after an individual suffers a torsional (twisting) injury to the disc, the disc would degenerate in three general stages.

- First, there is significant dysfunction caused by the acute back pain of the injury.
- Next, there is a long phase of relative instability at that particular vertebral segment and the patient will be prone to intermittent bouts of back pain.
- Finally, the body re-stabilizes the segment and the patient experiences fewer episodes of back pain.

Based on the observation that demographic studies show less back pain from degenerative disc disease in elderly adults (over 60 years) than in younger adults (30 to 50 year-olds), he also concluded that this process happened over a period of 20 to 30 years. Although elderly patients may have pain from facet osteoarthritis, it is uncommon for them to have disc problems.

While this summary is a simplification of Kirkaldy-Willis's extensive work, it lays the framework for what is known today. We do know that lumbar disc degeneration is a very common and natural process, and only in limited cases does it become painful.

Degenerative disc disease and low back pain

The natural history of lumbar degenerative disc disease is relatively benign. The pain tends to be intermittent, and although at times the pain may seem to be getting worse, the painful symptoms are generally not progressive. While the disc degeneration will progress, the low back pain and other symptoms do not tend to get worse with the progression of the degeneration.

Many patients worry that if they have a lot of low back pain when they are only 35 years old, the pain will become much worse and they may be in a wheelchair by the time they're in their sixties. However, if patients can find a way to manage their back pain and maintain their function, the natural history is really quite favorable. With continued disc degeneration, all the inflammatory proteins within the disc space will eventually burn out, and the disc will usually become stiffer, thus decreasing micro-motion. In fact, someone who is 65 years old is actually less likely to have discogenic back pain than someone who is 35 years old.

Along with MRI scan results that show disc degeneration, there are some common symptoms that are fairly consistent for people with [low back pain](#) from **degenerative disc disease**.

The typical individual with degenerative disc disease is an active and otherwise healthy person who is in their thirties or forties. In general, the patient's pain should not be continuous and severe. If it is, then other diagnoses must be considered. Degenerative disc disease pain is usually more related to activity and will flare up at times but then return to a low grade pain level or the pain will go away entirely.

Common symptoms of degenerative disc disease include:

- The low back pain is generally made worse with sitting, since in the seated position the lumbosacral discs are loaded three times more than standing.
- Certain types of activity will usually worsen the low back pain, especially bending, lifting and twisting.
- Walking, and even running, may actually feel better than prolonged sitting or standing.
- Patients will generally feel better if they can change positions frequently, and lying down is usually the best position since this relieves stress on the disc space.

Types of pain from degenerative disc disease

Most patients with degenerative disc disease will have some underlying chronic low back pain, with intermittent episodes of severe low back pain. The exact cause of these severe episodes of pain is not known, but it has been theorized that it is due to abnormal micro-motion in the degenerated disc that spurs an inflammatory reaction. In an attempt to stabilize the spine and decrease the micro-motion, the body reacts to the disc pain with muscle spasms. The reactive spasms are what make patients feel like their back has "gone out".

The severe episodes of low back pain from degenerative disc disease will generally last from a few days to a few months before the patient goes back to their baseline level of chronic pain. The amount of chronic pain is quite variable and can range from a nagging level of irritation to severe and disabling pain, although severe, disabling pain is quite rare.

In addition to low back pain from degenerative disc disease, there may be **leg pain, numbness and tingling**. Even without pressure on the nerve root (a "pinched nerve"), other structures in the back can refer pain down the rear and into the legs. The nerves can become sensitized with inflammation from the proteins within the disc space and produce the sensation of numbness/tingling. Generally, the pain does not go below the knee.

These sensations, although worrisome and annoying, rarely indicate that there is any ongoing nerve root damage. However, any weakness in the leg muscles (such as foot drop) is an indicator of some nerve root damage.

Chronic pain versus acute pain

One very important tenet in chronic pain is that the level and extent of pain does not equal tissue damage. Severely degenerated discs may not produce much pain at all, and discs with little degeneration can produce severe pain.

In this manner, chronic pain is very different from acute pain. With acute pain, the severity of pain directly correlates to the level of tissue damage. This provides us with a protective reflex, such as the reflex to remove your hand immediately if you put it on something hot.

In chronic pain, the pain does not have the same meaning—it is not protective and does not mean there is any ongoing tissue damage.