

Degenerative Disc Disease basic level

Overview

Degenerative disc disease (DDD) is a spinal condition caused by the breakdown of your intervertebral discs. As you age, your spine begins to show signs of wear and tear as your discs dry out and shrink. These age-related changes can lead to arthritis, disc herniation, or spinal stenosis, which can put pressure on your spinal cord and nerves and may cause back pain. Several treatments can help relieve the pain. Each treatment offers benefits, but each has limitations. You and your doctor should determine which treatment is best for you.

Vertebrae & intervertebral discs

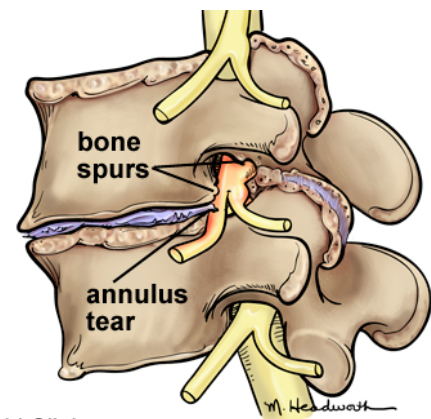
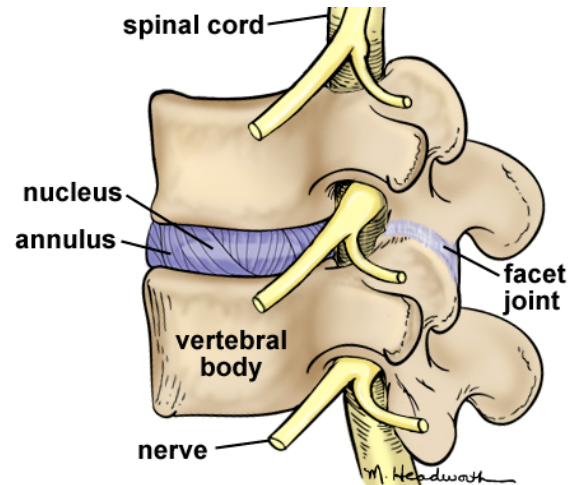
To understand a degenerative disc, it is helpful to understand a little about how your spine works (see Anatomy of the Spine).

Your spine is made up of a column of bones called vertebrae. Between each vertebra is a gel-filled disc that acts as a shock absorber, keeping your vertebrae from rubbing together. Discs are often compared to a jelly doughnut—they have a tough outer wall (annulus) and a soft center (nucleus). Your discs are made up of about 80% water, and as you get older, they slowly lose water, and with it their ability to act as shock absorbers.

What is a degenerative disc?

Degenerative disc disease (also called spondylosis) is a general term used to describe changes that can occur along any area of the spine (cervical, thoracic, lumbar) as you age, but is most common in the lumbar area. It's not actually a disease, but rather a condition in which your discs "degenerate," or lose their flexibility and ability to cushion your spine. Your discs don't have a good blood supply, so once injured they can't repair themselves. These age-related changes include:

- **Discs dry out and shrink** – your discs are made of about 80% water; as you get older they slowly lose water. This loss of flexibility puts more stress on the annulus.
- **Small tears occur in the annulus** – sometimes some of the gel-like material, or nucleus pulposus, comes out through a tear in the wall and touches the nerves. This material has many inflammatory proteins that can inflame the



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Figure 1. (top) Normal disc. (bottom) Degenerative disc disease causes the discs (purple) to dry out and shrink, reducing the disc space between vertebrae. Bone spurs and tears in the annulus may develop which can lead to spinal stenosis and disc herniations, respectively.

nerves and cause pain (see Herniated Lumbar Disc). These tears also affect the nerves in the annulus, and small movements, called micro-movements, can cause discogenic pain. Over the years the proteins eventually dry up, and the discs become stiffer; in many people this results in less pain by the time they are in their sixties.

- **Disc space gets smaller** – due to the loss of water in the discs, the distance between vertebrae begin to collapse, which is why we get shorter as we age.

- **Bone spurs (osteophytes) grow** – without the discs holding apart the vertebrae, they can rub on each other and cause abnormal bone growths.
- **Spinal canal narrows** – the stresses of all the above changes causes the ligaments and facet joints to enlarge (hypertrophy) as they try to compensate and spread the load over a larger area. This overgrowth causes the spinal canal to narrow, which can compress the spinal cord and nerves and result in pain (see Spinal Stenosis).

What are the symptoms?

The symptoms of DDD vary from person to person. Many people with deterioration have no pain, while others may experience pain so intense that it interferes with daily activities. Interestingly, even though this condition affects people starting in their twenties or thirties, people in their sixties are less likely to have back pain caused by deteriorated discs.

Pain often starts in one of three ways: (1) a major injury followed by sudden and unexpected pain, (2) a trivial injury followed by sudden back pain, and (3) pain that starts gradually and gets progressively worse. Usually, the pain begins in the lower back, and may be felt in one or both of your legs and buttocks (sciatica). It's often described as pressure or burning pain. You may also feel numbness or tingling in your leg and foot, which usually is not a cause for concern unless you have weakness in your leg muscles.

You may have chronic underlying pain that is a nagging annoyance, and occasional episodes of intense muscle pain from time to time. These episodes last from a few days to a few months.

Sitting usually causes the most pain because in this position your discs have more weight on them. Activities such as bending or twisting usually make your pain worse, and lying down tends to relieve the pain. You may actually feel better if you walk or run rather than sit or stand for too long.

What are the causes?

Doctors don't exactly know what causes DDD. In addition to age and injury, arthritis and osteoporosis, both degenerative conditions, contribute to degenerative disc disease.

Most abnormalities relating to DDD can be seen on an MRI—an imaging scan that shows the parts of your spine in clear detail. While a large portion of people with back pain have abnormalities confirmed by MRI, studies on healthy young adults have shown that as many as 30% of people without pain also have abnormalities seen on an MRI scan. (1)

It's not known why some people have pain and others don't, but various factors contribute to disc degeneration including: genetic, environmental,

autoimmune, inflammatory, and traumatic factors in combinations and ways that aren't yet understood.

Who is affected?

This condition usually affects young adults or middle-aged people who lead active lifestyles and are in otherwise good health. Studies have shown that people who smoke are at greater risk for developing degenerative disc disease, as are people who work in certain occupations. People with DDD are more likely to have family members who also have the condition (2, 3, 4).

How is a diagnosis made?

When you first experience pain, consult your family doctor. Your doctor will take a complete medical history to understand your symptoms, any prior injuries or conditions, and determine whether any lifestyle habits are causing the pain. Next a physical exam is performed to determine the source of the pain and test for any muscle weakness or numbness.

Your doctor may order one or more of the following imaging studies: X-ray, MRI scan, discogram, myelogram, or CT scan to identify a tumor, herniated disc, or other conditions that compress the nerve roots. Based on the results, you may be referred to a neurologist, orthopedist, or neurosurgeon for treatment.

What treatments are available?

Many people in their thirties wonder if their degenerative condition will cause even more pain by the time they are in their sixties. But by the time you are 60, your discs may have dried out to the point that they cause less pain. While disc degeneration can't be reversed, there is evidence that exercise and careful management of your back can contribute to better quality of life.

Nonsurgical treatment is the first step to recovery. If you don't respond to this treatment, your doctor may recommend surgery; however, the long-term effectiveness of surgical treatment for degenerative disc disease as opposed to natural history, conservative treatment, or placebo has yet to be studied. (5)

Nonsurgical treatments

Nonsurgical treatment for degenerative disc disease may include medication, rest, physical therapy, home exercises, hydrotherapy, chiropractic, and pain management.

Self care: Using correct posture (see Posture for a Healthy Back) and keeping your spine in alignment are the most important things you can do for your back. You may need to make adjustments to your daily standing, sitting, and sleeping habits and learn proper ways to lift and bend (see Self

Care for Neck & Back Pain). Your workspace may need to be rearranged to keep your spine from being under stress.

Stress is the number one obstacle to pain control. Pain increases when you are tense and stressed. Relaxation exercises are one way of reclaiming control of your body. Deep breathing, visualization, and other relaxation techniques can help you to better manage the pain you live with (see Pain Management).

Physical therapy: The goal of physical therapy is to help you return to full activity as soon as possible. Exercise is very helpful for the pain of degenerative disc disease, and it can help you heal faster (see Exercise for a Healthy Back). Physical therapists can instruct you on proper lifting and walking techniques, and they'll work with you to strengthen and stretch your muscles (see Self Care for Neck & Back Pain). They'll also encourage you to increase the flexibility of your spine and arms. Activity modification, rest, pain medication, muscle relaxants, and application of ice may be helpful in the acute stages. Although your physical therapist may show you strengthening exercises, it's your responsibility to follow them.

Chiropractic manipulation: Chiropractic manipulation, or spinal adjustment, is a primary treatment that chiropractors use for patients with back or neck pain. The chiropractor applies pressure to the area that is immobile or not moving properly. Some people have very good results after being treated by a chiropractor.

The philosophy behind chiropractic adjustment is to return the joints to more normal motion. Good joint motion is essential for the health and nutrition of the discs and joints because it permits the exchange of nutrients, fluids, and waste. Good motion helps reduce pain, muscle spasms or imbalance, and improves nervous system function and overall health. Without movement, discs and joints may degenerate more quickly than normal. Motion also reduces the formation of scar tissue, which can lead to stiffness and degeneration (see Chiropractic Care).

Medication: Your doctor may prescribe pain relievers, nonsteroidal anti-inflammatory medications (NSAIDs), and steroids. Sometimes muscle relaxers are prescribed for muscle spasms.

Nonsteroidal anti-inflammatory drugs (NSAIDs)— aspirin, ibuprofen (Motrin, Nuprin, Advil), naproxen (Naprosyn, Aleve), and celecoxib (Celebrex) are examples of nonsteroidal anti-inflammatory drugs used to reduce inflammation and relieve pain.

Analgesics, such as acetaminophen (Tylenol) can relieve pain but don't have the anti-inflammatory effects of NSAIDs. Long-term use of analgesics and NSAIDs may cause stomach ulcers as well as kidney and liver problems.

Steroids can be used to reduce the swelling and inflammation of the nerves. They are taken orally (as a Medrol Dose Pack) in a tapering dosage over a five-day period or as an injection directly into the source of pain. See epidural steroid injections and facet injections. Steroids have the advantage of providing almost immediate pain relief within a 24-hour period.

Alternative therapies: Some patients want to try holistic therapies such as acupuncture, acupressure, nutritional supplements, and biofeedback. The effectiveness of these treatments for degenerative disc disease is unknown but they may aid you in learning coping mechanisms for managing pain as well as improving your overall health. For resources in your area visit:

National Center for Complementary and Alternative Medicine (NCCAM) nccam.nih.gov
Ask NOAH About: Alternative (Complementary) Medicine www.noah-health.org/english/alternative/alternative.html
Whole Health MD www.WholeHealthMD.com
The Natural Pharmacist www.tnp.com

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Surgical treatments

Surgery is rarely recommended unless you have a proven disc herniation or instability and your symptoms do not significantly improve with nonsurgical treatments. The goal of surgery is to stop the movement of the painful motion segment and decompress any spinal nerves. It is important to remember that while 80% of people will experience back pain during their lifetime, the pain tends to be brief and resolves with little or no medical treatment. You should understand what surgery can and can't do, and whether it can relieve your particular symptoms. Talk to your doctor about whether surgery is right for you.

Interbody fusion is a surgical procedure in which one or more of the bony vertebrae of the spine are permanently joined together to provide stability to the spine. Spinal fusion can be performed at any level of the spine but is most common in the lumbar and cervical regions where it is most moveable. At each level of the spine, there is a disc space in the front and paired facet joints in the back (see Anatomy of the Spine). Working together, these structures define a motion segment and permit range of motion. Two vertebral segments need to be fused to stop the motion at one segment.

Intradiscal electrothermal therapy (IDET) uses a thin catheter to deliver heat directly into the spinal discs to shrink the tears and fissures in the annulus and thermocoagulate nerves to overcome discogenic back pain.

Clinical trials

Clinical trials are research studies in which new treatments - drugs, diagnostics, procedures, vaccines, and other therapies - are tested in people to see if they are safe and effective. Research is always being conducted to improve the standard of medical care and explore new drug and surgical treatments. You can find information about current clinical investigations, including their eligibility requirements, protocol, and participating locations on the web: the National Institutes of Health (NIH) at clinicaltrials.gov, sponsors many trials; private industry and pharmaceutical companies also sponsor trials <http://www.centerwatch.com/>

Current studies

Go to www.mayfieldclinic.com/ClinicalTrials.htm for information about clinical trials conducted by our doctors at local Cincinnati hospitals or call 1-800-325-7787 ext. 5260.

Sources & links

If you have more questions, please contact the Mayfield Spine Institute at 800-325-7787 or 513-221-1100. Additional information is available on the web.

www.spine-health.com
www.yoursurgery.com
www.neurosurgery.org/health/patient

Sources

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4. The Influence of Occupation on Lumbar Degeneration. *Spine* 24:1164, 1999.
5. Chronic pain-the end of the welfare state? *Qual Life Res* 3 Suppl 1:S11-7, 1994.

Glossary

annulus (annulus fibrosis): tough fibrous outer wall of an intervertebral disc.

arthritis: joint inflammation caused by infection, immune deficiency (rheumatoid arthritis), or degeneration of the cartilage that causes pain, swelling, redness, warmth, and restricted movement.

degeneration: the gradual deterioration of specific tissues, cells, or organs resulting in a loss of function, caused by injury, disease, or aging.

disc (intervertebral disc): a fibrous cushion that separates spinal vertebrae. Has two parts, a soft gel-like center called the nucleus and a tough fibrous outer wall called the annulus.

discogenic pain: pain arising from degenerative changes in the intervertebral discs.

nucleus (nucleus pulposus): soft gel-like center of an intervertebral disc.

osteoporosis: a depletion of calcium in the bones making them weak, brittle, and prone to fracture. Common in elderly women after menopause.

osteophyte: (bone spur) a bone projection that occurs near cartilage degeneration in joints. Often related to osteoarthritis.

radiculopathy: refers to any disease affecting the spinal nerve roots. Also used to describe pain along the sciatic nerve that radiates down the leg.

spondylosis: a spinal condition resulting from degeneration of the intervertebral discs in the spine causing narrowing of the space occupied by the disc and the presence of bone spurs.

spinal stenosis: the narrowing of the spinal canal and nerve-root canal along with the enlargement of the facet joints.

vertebra: (plural vertebrae): one of 33 bones that form the spinal column, they are divided into 7 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 4 coccygeal. Only the top 24 bones are moveable.

updated > 2.2009

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