

Your Aching Back

Searching for Better Pain Relief

If warmer spring weather lures you outside for heavy yard work, now's a good time to learn about how to prevent and treat low back pain. Four out of every five people have had low back pain at one time or another. With symptoms ranging from a dull ache to absolute agony, low back pain can put your life on hold. In fact, it's second only to the common cold in causing missed work days for adults under age 45.

Most low back pain clears up in a few days or weeks with a combination of rest, appropriate exercise, and over-the-counter pain medicines. But pain that persists for more than three months—chronic back pain—is more difficult to treat, in part because there are many different possible causes.

The lower, or lumbar, spine is a complex structure made up of powerful muscles, **ligaments**, bones, and joints. It provides the strength for standing, walking, lifting and other activities, and allows the body to turn, twist, and bend.

Definitions

Ligaments

Tough bands of tissue that attach bones to each other.

Osteoporosis

Condition where bones become thin and fragile and are more likely to break.

Nerves (also called Neurons)

Cells responsible for sending and receiving signals between the body and brain.

Back pain can be caused by a number of things, from sports injuries and other damage to simple wear and tear. If muscles are poorly conditioned or overworked, they are more easily strained. Someone who works all week at a desk, for example, can strain their back muscles doing heavy yard work on the weekend. Likewise, if the ligaments that help stabilize the low back are weak from inactivity or stiff from overuse, a sudden wrenching movement can cause a ligament sprain.

Aging can also bring low back pain. Bones lose strength over time. In someone with **osteoporosis**, the bones of the lumbar vertebrae can break or compress in a fall or even during some everyday activities. Arthritis can inflame joints, causing pain and stiffness. And “slipped disks,” in which the rubbery cartilage between disks bulge outward, can press against the spinal **nerves** to cause pain.

Keeping your back healthy is the best way to prevent low back injury. There are several practical things you can do:

- Don't try to lift objects too heavy for you. Lift by bending your knees, not your back; keep your back straight and

your head down and in line with your back. Keep the object close to your body, and don't twist when lifting.

- Regular, low-impact exercises like walking, swimming, or stationary bike riding 30 minutes a day can increase muscle strength and flexibility. Yoga

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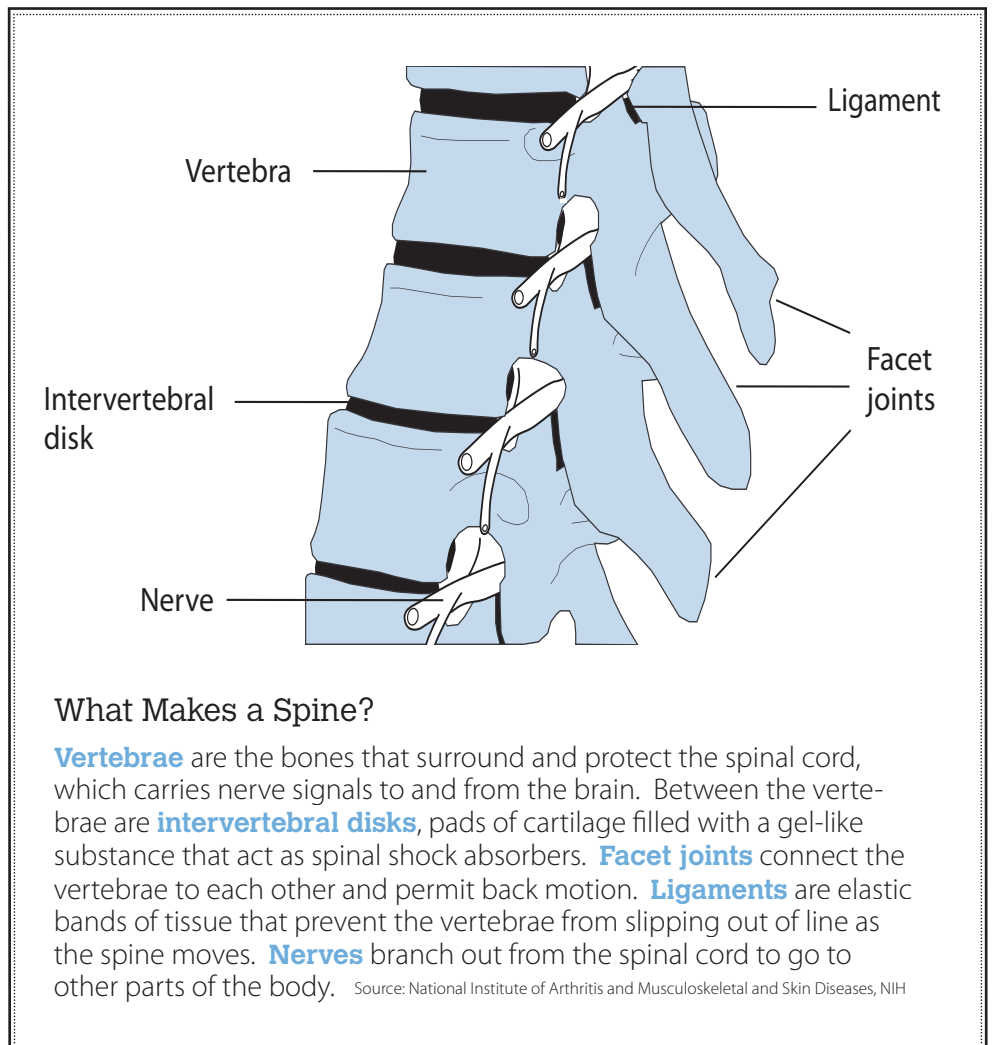
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can also help stretch and strengthen muscles and improve posture. Always stretch before exercise or other strenuous physical activity to prevent back injury.

- Try to practice good posture. Your back supports your weight most easily when it is straight. Wear comfortable, low-heeled shoes. When standing, keep your weight balanced on both feet. Keep your shoulders back and don't slouch.
- When sitting, try to use a chair with good lower back support. A pillow or rolled-up towel placed behind the small of your back might help. Make sure your work surfaces, like your keyboard, are at a comfortable height. If you have to sit for a long period of time, rest your feet on a low stool or a stack of books. Switch sitting positions often, and walk around the office and gently stretch your muscles every so often to relieve tension.
- Sleeping on a firm surface on your side helps your back.
- Eat a healthy diet with enough calcium, phosphorus, and vitamin D to help promote new bone growth.
- Keep extra weight off your waistline, where it can strain your lower back.
- If you smoke, quit; smoking reduces blood flow to the lower spine and causes the spinal discs to degenerate.

Since not every back injury can be prevented, researchers are always looking for new ways to treat low



What Makes a Spine?

Vertebrae are the bones that surround and protect the spinal cord, which carries nerve signals to and from the brain. Between the vertebrae are **intervertebral disks**, pads of cartilage filled with a gel-like substance that act as spinal shock absorbers. **Facet joints** connect the vertebrae to each other and permit back motion. **Ligaments** are elastic bands of tissue that prevent the vertebrae from slipping out of line as the spine moves. **Nerves** branch out from the spinal cord to go to other parts of the body. Source: National Institute of Arthritis and Musculoskeletal and Skin Diseases, NIH

back pain. For example, NIH's National Center for Complementary and Alternative Medicine (NCCAM) is funding the study of "chiropractic," an ancient method of adjusting and manipulating body parts, to see if it helps with low back pain. So far, NCCAM says

that studies of chiropractic treatment are not conclusive. Chiropractic treatment and conventional medical treatments seem to be about equally helpful. NCCAM is continuing to study this and other alternative treatments.

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NIH News in Health

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Definitions

Nervous System

System that receives and interprets sensations (like touches, sounds, and sights), and coordinates activities (like muscle movements) throughout the body.

Receptor

Molecule on the outside of a cell that receives chemical signals from other parts of the body.

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Dr. Jon Levine, director of the NIH Pain Center at the University of California at San Francisco, is particularly interested in the first sensory nerve cell that begins the pain signal to the brain. Many patients with pain, including chronic low back pain, say that although their medication relieves pain, they don't want to take it because of side effects like cloudy thinking, sleepiness, fatigue, or even addiction. Levine explains that many of the side effects from pain medications originate in the brain, not in the outlying areas of the **nervous system** that reach out to various parts of the body.

"If we can make drugs that target mechanisms outside the brains such as the first sensory nerve cell," he explains, "we can prevent those side effects." His continuing work is supported by funds from NIH's National Institute of Neurological Disorders and Stroke.

Another aspect of pain relief that Levine and his colleagues study is how men and women respond differently to pain medications. They discovered that one medication works at two different sites in the brain, a pain-relieving site and a pain-enhancing site, and that men have more of the pain-enhancing effect than women. They were able to find the pain-enhancing **receptor** and block it, reducing the pain-causing effect of the drug in men. This receptor-block-

ing technique also helped relieve pain in women at lower doses of the drug than before. Thanks to this research, a commercial biotechnology company is now doing further studies to see if the new drug proves to be safe and effective against pain.

Levine emphasizes that the cost of low back pain to society is immense. "Our ability to understand and control this problem—and prevent the recurrence of back pain—would be a major breakthrough for public health in this country," he says. ■



Low Back Pain Fact Sheet:

www.ninds.nih.gov/disorders/backpain/detail_backpain.htm

Chiropractic and Low-Back Pain:

www.nccam.nih.gov/health/chiropractic/index.htm



Wise Choices

If you've hurt your back:

- **Apply ice and heat.** As soon as possible after the trauma, apply ice to the tender spot several times a day for up to 20 minutes. After two to three days of cold treatment, apply heat (such as a heating pad) for short periods to relax muscles and increase blood flow to the area.
- **Get exercise.** Back-healthy activities can include stretching, swimming and walking. Ask your health care provider for advice about gentle exercises.
- **Try bed rest,** but only for a day or two. Too much bed rest can make back pain worse, so get back to your regular activities as soon as possible. The best position is on one side with a pillow between your knees.
- **Take pain relievers.** Over-the-counter pain relievers can ease mild to moderate low back pain. For more than occasional use or more severe pain, be sure to talk to your doctor.

Health Capsules

Needle-Free Injections

For the millions of Americans afraid of needles, help may be on the way. A new medical device now available in some hospitals and clinics can inject medicines without the jab of a needle. The device, called SonoPrep®, is being used to numb skin for painful procedures such as the insertion of **catheters** or **intravenous** tubing.

Definitions

Anesthetic

Medicine that can block pain and other sensations.

Catheter

A hollow, flexible tube put into the body to let fluids or air through.

Example: catheters are used to drain urine from the bladder.

Intravenous

Inside a vein.

Ultrasound

Sound waves that can't be heard by the human ear.

Traditionally, doctors numb skin by injecting a local **anesthetic** through a needle. This method can take some time and it hurts, whereas SonoPrep does the job painlessly in just five minutes.

SonoPrep works through **ultra-sound** technology. Developed with NIH funding to Dr. Robert Langer of the Massachusetts Institute of Technology, the device uses battery power to apply sound waves to skin for 15 seconds. This ultrasonic energy subtly rearranges the fat molecules in skin to create tiny channels that small amounts of liquid can flow through. The skin isn't harmed by the process, and within a day it returns to normal.

Langer has licensed the technology to a company, Sontra Medical Corp., that plans to test the system for various other medical uses, including vaccination. They are also trying to develop a device that measures blood sugar in people with diabetes and gives them just the right amount of insulin at the right time. ■



Featured Web Site

The Cool Spot

www.thecoolspot.gov

The young teen's place for info on alcohol. Games and graphics deal with the risks of underage drinking and how to resist peer pressure. Based on a curriculum developed by researchers supported by NIH's National Institute on Alcohol Abuse and Alcoholism.



Gene Increases Risk of Blindness

Scientists have found a **gene** that affects a person's risk of developing age-related macular degeneration (AMD), the leading cause of blindness in people over age 60. The finding was made by three independent teams supported by NIH's National Eye Institute (NEI). The discovery may lead to early detection methods and new ways of preventing and treating the debilitating eye disease.

There is no known cure for AMD, which blurs or destroys sharp, central vision. Most scientists think it's caused by the interplay of genes and other factors.

The three teams used different methods to study the **genomes** of different groups of AMD patients. All three teams found a link between a

variation of a gene called complement factor H (CFH) and AMD. One team, which included NEI's own researchers, found that people with this variant of the CFH gene are more than seven times more likely to develop the disease.

CFH, it turns out, helps regulate **inflammation** in part of the **immune system** that attacks diseased and damaged cells. This CFH variant, the researchers believe, might contribute to the development of AMD by affecting the level of inflammation in the eyes. This insight suggests new avenues for researchers to pursue in developing ways to diagnose and treat AMD. ■



Definitions

Gene

Stretches of DNA, a substance you inherit from your parents, that define characteristics like height and eye color.

Genome

Full set of genes (in a person or any other living thing).

Immune system

System that protects the body from invading viruses, bacteria, and other microscopic threats.

Inflammation

Swelling of tissue, often accompanied by redness and pain.



www.nei.nih.gov/health/maculardegen/armd_facts.asp