How is back pain treated?

Most low back pain can be treated without surgery. Treatment involves using analgesics, reducing inflammation, restoring proper function and strength to the back, and preventing recurrence of the injury. Most patients with back pain recover without residual functional loss. Patients should contact a doctor if there is not a noticeable reduction in pain and inflammation after 72 hours of self-care.

Although *ice and heat* (the use of cold and hot compresses) have never been scientifically proven to quickly resolve low back injury, compresses may help reduce pain and inflammation and allow greater mobility for some individuals. As soon as possible following trauma, patients should apply a cold pack or a cold compress (such as a bag of ice or bag of frozen vegetables wrapped in a towel) to the tender spot several times a day for up to 20 minutes. After 2 to 3 days of cold treatment, they should then apply heat (such as a heating lamp or hot pad) for brief periods to relax muscles and increase blood flow. Warm baths may also help relax muscles. Patients should avoid sleeping on a heating pad, which can cause burns and lead to additional tissue damage.

Bed rest — 1–2 days at most. A 1996 Finnish study found that persons who continued their activities without bed rest following onset of low back pain appeared to have better back flexibility than those who rested in bed for a week. Other studies suggest that bed rest alone may make back pain worse and can lead to secondary complications such as depression, decreased muscle tone, and blood clots in the legs. Patients should resume activities as soon as possible. At night or during rest, patients should lie on one side, with a pillow between the knees (some doctors suggest resting on the back and putting a pillow beneath the knees).

Exercise may be the most effective way to speed recovery from low back pain and help strengthen back and abdominal muscles. Maintaining and building muscle strength is particularly important for persons with skeletal irregularities. Doctors and physical therapists can provide a list of gentle exercises that help keep muscles moving and speed the recovery process. A routine of back-healthy activities may include stretching exercises, swimming, walking, and movement therapy to improve coordination and develop proper posture and muscle balance. Yoga is another way to gently stretch muscles and ease pain. Any mild discomfort felt at the start of these exercises should disappear as muscles become stronger. But if pain is more than mild and lasts more than 15 minutes during exercise, patients should stop exercising and contact a doctor.

Medications are often used to treat acute and chronic low back pain. Effective pain relief may involve a combination of prescription drugs and over-the-counter remedies. Patients should always check with a doctor before taking drugs for pain relief. Certain medicines, even those sold over the counter, are unsafe during pregnancy, may conflict with other medications, may cause side effects including drowsiness, or may lead to liver damage.

- *Over-the-counter analgesics*, including nonsteroidal anti-inflammatory drugs (aspirin, naproxen, and ibuprofen), are taken orally to reduce stiffness, swelling, and inflammation and to ease mild to moderate low back pain. *Counter-irritants* applied topically to the skin as a cream or spray stimulate the nerve endings in the skin to provide feelings of warmth or cold and dull the sense of pain. Topical analgesics can also reduce inflammation and stimulate blood flow. Many of these compounds contain salicylates, the same ingredient found in oral pain medications containing aspirin.
- *Anticonvulsants* — drugs primarily used to treat seizures — may be useful in treating certain types of nerve pain and may also be prescribed with analgesics.
- Some *antidepressants*, particularly tricyclic antidepressants such as amitriptyline and desipramine, have been shown to relieve pain (independent of their effect on depression) and assist with sleep. Antidepressants alter levels of brain chemicals to elevate mood and dull pain signals. Many of the new antidepressants, such as the selective serotonin reuptake inhibitors, are being studied for their effectiveness in pain relief.
- *Opioids* such as codeine, oxycodone, hydrocodone, and morphine are often prescribed to manage severe acute and chronic back pain but should be used only for a short period of time and under a physician's supervision. Side effects can include drowsiness, decreased reaction time, impaired judgment, and potential for addiction. Many specialists are convinced that chronic use of these drugs is detrimental to the back pain patient, adding to depression and even increasing pain.

Spinal manipulation is literally a "hands-on" approach in which professionally licensed specialists (doctors of chiropractic care) use leverage and a series of exercises to adjust spinal structures and restore back mobility.

When back pain does not respond to more conventional approaches, patients may consider the following options:

Acupuncture involves the insertion of needles the width of a human hair along precise points throughout the body. Practitioners believe this process triggers the release of naturally occurring painkilling molecules called peptides and keeps the body's normal flow of energy unblocked. Clinical studies are measuring the effectiveness of acupuncture in comparison to more conventional procedures in the treatment of acute low back pain.

Biofeedback is used to treat many acute pain problems, most notably back pain and headache. Using a special electronic machine, the patient is trained to become aware of, to follow, and to gain control over certain bodily functions, including muscle tension, heart rate, and skin temperature (by controlling local blood flow patterns). The patient can then learn to effect a change in his or her response to pain, for example, by using relaxation techniques. Biofeedback is often used in combination with other treatment methods, generally without side effects.

Interventional therapy can ease chronic pain by blocking nerve conduction between specific areas of the body and the brain. Approaches range from injections of local anesthetics, steroids, or narcotics into affected soft tissues, joints, or nerve roots to more complex nerve blocks and spinal cord stimulation. When extreme pain is involved, low doses of drugs may be administered by catheter directly into the spinal cord. Chronic use of steroid injections may lead to increased functional impairment.

Traction involves the use of weights to apply constant or intermittent force to gradually "pull" the skeletal structure into better alignment. Traction is not recommended for treating acute low back symptoms.

Transcutaneous electrical nerve stimulation (TENS) is administered by a battery-powered device that sends mild electric pulses along nerve fibers to block pain signals to the brain. Small electrodes placed on the skin at or near the site of pain generate nerve impulses that block incoming pain signals from the peripheral nerves. TENS may also help stimulate the brain's production of endorphins (chemicals that have pain-relieving properties).

Ultrasound is a noninvasive therapy used to warm the body's internal tissues, which causes muscles to relax. Sound waves pass through the skin and into the injured muscles and other soft tissues.

Minimally invasive outpatient treatments to seal fractures of the vertebrae caused by osteoporosis include *vertebroplasty* and *kyphoplasty*. Vertebroplasty uses three-dimensional imaging to help a doctor guide a fine needle into the vertebral body. A glue-like epoxy is injected, which quickly hardens to stabilize and strengthen the bone and provide immediate pain relief. In kyphoplasty, prior to injecting the epoxy, a special balloon is inserted and gently inflated to restore height to the bone and reduce spinal deformity.

In the most serious cases, when the condition does not respond to other therapies, surgery may relieve pain caused by back problems or serious musculoskeletal injuries. Some surgical procedures may be performed in a doctor's office under local anesthesia, while others require hospitalization. It may be months following surgery before the patient is fully healed, and he or she may suffer permanent loss of flexibility. Since invasive back surgery is not always successful, it should be performed only in patients with progressive neurologic disease or damage to the peripheral nerves.

- *Discectomy* is one of the more common ways to remove pressure on a nerve root from a bulging disc or bone spur. During the procedure the surgeon takes out a small piece of the lamina (the arched bony roof of the spinal canal) to remove the obstruction below.
- *Foraminotomy* is an operation that "cleans out" or enlarges the bony hole (*foramen*) where a nerve root exits the spinal canal. Bulging discs or joints thickened with age can cause narrowing of the space through which the spinal nerve exits and can press on the nerve, resulting in pain, numbness, and weakness in an arm or leg. Small pieces of bone over the nerve are removed through a small slit, allowing the surgeon to cut away the blockage and relieve the pressure on the nerve.
- *IntraDiscal Electrothermal Therapy (IDET)* uses thermal energy to treat pain resulting from a cracked or bulging spinal disc. A special needle is inserted via a catheter into the disc and heated to a high temperature for up to 20 minutes. The heat thickens and seals the disc wall and reduces inner disc bulge and irritation of the spinal nerve.
- *Nucleoplasty* uses radiofrequency energy to treat patients with low back pain from contained, or mildly herniated, discs. Guided by x-ray imaging, a wand-like instrument is inserted through a needle into the disc to create a channel that allows inner disc material to be removed. The wand then heats and shrinks the tissue, sealing the disc wall. Several channels are made depending on how much disc material needs to be removed.

- *Radiofrequency lesioning* is a procedure using electrical impulses to interrupt nerve conduction (including the conduction of pain signals) for 6 to12 months. Using x-ray guidance, a special needle is inserted into nerve tissue in the affected area. Tissue surrounding the needle tip is heated for 90-120 seconds, resulting in localized destruction of the nerves.
- *Spinal fusion* is used to strengthen the spine and prevent painful movements. The spinal disc(s) between two or more vertebrae is removed and the adjacent vertebrae are "fused" by bone grafts and/or metal devices secured by screws. Spinal fusion may result in some loss of flexibility in the spine and requires a long recovery period to allow the bone grafts to grow and fuse the vertebrae together.
- *Spinal laminectomy* (also known as spinal decompression) involves the removal of the lamina (usually both sides) to increase the size of the spinal canal and relieve pressure on the spinal cord and nerve roots.

Other surgical procedures to relieve severe chronic pain include *rhizotomy*, in which the nerve root close to where it enters the spinal cord is cut to block nerve transmission and all senses from the area of the body experiencing pain; *cordotomy*, where bundles of nerve fibers on one or both sides of the spinal cord are intentionally severed to stop the transmission of pain signals to the brain; and *dorsal root entry zone operation, or DREZ*, in which spinal neurons transmitting the patient's pain are destroyed surgically.

Can back pain be prevented?

Recurring back pain resulting from improper body mechanics or other nontraumatic causes is often preventable. A combination of exercises that don't jolt or strain the back, maintaining correct posture, and lifting objects properly can help prevent injuries.

Many work-related injuries are caused or aggravated by stressors such as heavy lifting, contact stress (repeated or constant contact between soft body tissue and a hard or sharp object, such as resting a wrist against the edge of a hard desk or repeated tasks using a hammering motion), vibration, repetitive motion, and awkward posture. Applying ergonomic principles — designing furniture and tools to protect the body from injury — at home and in the workplace can greatly reduce the risk of back injury and help maintain a healthy back. More companies and homebuilders are promoting ergonomically designed tools, products, workstations, and living space to reduce the risk of musculoskeletal injury and pain.

The use of wide elastic belts that can be tightened to "pull in" lumbar and abdominal muscles to prevent low back pain remains controversial. A landmark study of the use of lumbar support or abdominal support belts worn by persons who lift or move merchandise found no evidence that the belts reduce back injury or back pain. The 2-year study, reported by the National Institute for Occupational Safety and Health (NIOSH) in December 2000, found no statistically significant difference in either the incidence of workers' compensation claims for job-related back injuries or the incidence of self-reported pain among workers who reported they wore back belts daily compared to those workers who reported never using back belts or reported using them only once or twice a month.

Although there have been anecdotal case reports of injury reduction among workers using back belts, many companies that have back belt programs also have training and ergonomic awareness programs. The reported injury reduction may be related to a combination of these or other factors.

Quick tips to a healthier back

Following any period of prolonged inactivity, begin a program of regular low-impact exercises. Speed walking, swimming, or stationary bike riding 30 minutes a day can increase muscle strength and flexibility. Yoga can also help stretch and strengthen muscles and improve posture. Ask your physician or orthopedist for a list of low-impact exercises appropriate for your age and designed to strengthen lower back and abdominal muscles.

- Always stretch before exercise or other strenuous physical activity.
- Don’t slouch when standing or sitting. When standing, keep your weight balanced on your feet. Your back supports weight most easily when curvature is reduced.
- At home or work, make sure your work surface is at a comfortable height for you.
- Sit in a chair with good lumbar support and proper position and height for the task. Keep your shoulders back. Switch sitting positions often and periodically walk around the office or gently stretch muscles to relieve tension. A pillow or rolled-up towel placed behind the small of your back can provide some lumbar support. If you must sit for a long period of time, rest your feet on a low stool or a stack of books.
- Wear comfortable, low-heeled shoes.
- Sleep on your side to reduce any curve in your spine. Always sleep on a firm surface.
- Ask for help when transferring an ill or injured family member from a reclining to a sitting position or when moving the patient from a chair to a bed.
- Don’t try to lift objects too heavy for you. Lift with your knees, pull in your stomach muscles, and keep your head down and in line with your straight back. Keep the object close to your body. Do not twist when lifting.
- Maintain proper nutrition and diet to reduce and prevent excessive weight, especially weight around the waistline that taxes lower back muscles. A diet with sufficient daily intake of calcium, phosphorus, and vitamin D helps to promote new bone growth.
- If you smoke, quit. Smoking reduces blood flow to the lower spine and causes the spinal discs to degenerate.

What research is being done?

The National Institute of Neurological Disorders and Stroke, a component of the National Institutes of Health (NIH) within the U.S. Department of Health and Human Services, is the nation’s leading federal funder of research on disorders of the brain and nervous system and one of the primary NIH components that supports research on pain and pain mechanisms. Other institutes at NIH that support pain research include the National Institute of Dental and Craniofacial Research, the National Cancer Institute, the National Institute on Drug Abuse, the National Institute of Mental Health, the National Center for Complementary and Alternative Medicine, and the National Institute of Arthritis and Musculoskeletal and Skin

Diseases. Additionally, other federal organizations, such as the Department of Veterans Affairs and the Centers for Disease Control and Prevention, conduct studies on low back pain.

Scientists are examining the use of different drugs to effectively treat back pain, in particular daily pain that has lasted at least 6 months. Other studies are comparing different health care approaches to the management of acute low back pain (standard care versus chiropractic, acupuncture, or massage therapy). These studies are measuring symptom relief, restoration of function, and patient satisfaction. Other research is comparing standard surgical treatments to the most commonly used standard nonsurgical treatments to measure changes in health-related quality of life among patients suffering from spinal stenosis. NIH-funded research at the Consortial Center for Chiropractic Research encourages the development of high-quality chiropractic projects. The Center also encourages collaboration between basic and clinical scientists and between the conventional and chiropractic medical communities.

Other researchers are studying whether low-dose radiation can decrease scarring around the spinal cord and improve the results of surgery. Still others are exploring why spinal cord injury and other neurological changes lead to an increased sensitivity to pain or a decreased pain threshold (where normally non-painful sensations are perceived as painful, a class of symptoms called *neuropathic pain*), and how fractures of the spine and their repair affect the spinal canal and intervertebral foramena (openings around the spinal roots).

Also under study for patients with degenerative disc disease is artificial spinal disc replacement surgery. The damaged disc is removed and a metal and plastic disc about the size of a quarter is inserted into the spine. Ideal candidates for disc replacement surgery are persons between the ages of 20 and 60 who have only one degenerating disc, do not have a systemic bone disease such as osteoporosis, have not had previous back surgery, and have failed to respond to other forms of nonsurgical treatment. Compared to other forms of back surgery, recovery from this form of surgery appears to be shorter and the procedure has fewer complications.