



Pain

Pain is a normal sensation triggered in the nervous system to alert you to possible injury and the need to take care of yourself. **Acute pain** usually results from sudden disease, inflammation, or injury to tissues. The cause of acute pain can usually be diagnosed and treated, and the pain confined to a given period of time and severity.

Chronic pain doesn't go away— it persists over a longer period of time than acute pain and is resistant to most medical treatments. Pain signals keep firing in the nervous system for weeks, months, even years, after an initial painful mishap. There may be an ongoing cause of pain -- arthritis, cancer, ear infection, etc. -- but some people suffer chronic pain in the absence of any past injury or evidence of body damage. Chronic pain, ironically, often accompanies paralysis.

Pain is a complex perception that differs enormously among individuals, even those who appear to have identical injuries or illnesses. People who are paralyzed often have what is called neurogenic pain (resulting from damage to nerves in the body or to the spinal cord or brain itself). Treatment options for chronic pain include medications, acupuncture, local electrical stimulation, brain stimulation and surgery. Psychotherapy, relaxation and medication therapies, biofeedback, and behavior modification may also be employed.

The goal of pain management is to improve function, enabling individuals to work, attend school, or participate in other day-to-day activities. The following are among the most common treatments:

Acupuncture dates back 2,500 years to China and involves the application of needles to precise points on the body. Acupuncture remains controversial but is quite popular and may one day prove to be useful for a variety of conditions as it continues to be explored.

Analgesic refers to the class of drugs that includes most painkillers, such as aspirin, acetaminophen, and ibuprofen. Nonprescription or over-the-counter pain relievers are generally used for mild to moderate pain.

Anticonvulsants are used for the treatment of seizure disorders but are also sometimes prescribed for the treatment of pain. Carbamazepine, in particular, is used to treat a number of painful conditions, including trigeminal neuralgia. Another antiepileptic drug, gabapentin, is being studied for its pain-relieving properties, especially as a treatment for neuropathic pain.

Antidepressants are sometimes used for the treatment of pain. In addition, anti-anxiety drugs called benzodiazepines also act as muscle relaxants and are sometimes used as pain relievers.

Biofeedback is used for the treatment of many common pain problems. 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. The individual can then learn to effect a change in his or her responses to pain, for example, by using relaxation techniques.

Capsaicin is a chemical found in chili peppers that is also a primary ingredient in pain-relieving creams.

Chiropractic refers to hand manipulation of the spine, usually for relief of back pain. It has never been without controversy. Chiropractic's usefulness as a treatment for back pain is, for the most part, restricted to a select group of individuals with uncomplicated acute low back pain who may derive relief from the massage component of the therapy.

Cognitive-behavioral therapy involves a wide variety of coping skills and relaxation methods to help prepare for and cope with pain.

Counseling can give a patient suffering from pain much needed support, whether it is derived from family, group, or individual counseling. Support groups can provide an important adjunct to drug or surgical treatment.

COX-2 inhibitors ("superaspirins") Nonsteroidal anti-inflammatory drugs (NSAIDs) work by blocking two enzymes, cyclooxygenase-1 and cyclooxygenase-2, both of which promote the production of hormones called prostaglandins, which in turn cause inflammation, fever, and pain. Newer drugs, called COX-2 inhibitors, primarily block cyclooxygenase-2 and are less likely to have the gastrointestinal side effects sometimes produced by NSAIDs. In 1999, the Food and Drug Administration approved two COX-2 inhibitors-rofecoxib (Vioxx) and celecoxib (Celebrex). On 9/30/04 Merck & Co. Inc., voluntarily withdrew Vioxx from the market. Further information about the Vioxx withdrawal may be found at:

<http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm103420.htm>

Electrical stimulation, including transcutaneous electrical stimulation (TENS), implanted electric nerve stimulation, and deep brain or spinal cord stimulation, is the modern-day extension of age-old practices in which the nerves of muscles are

subjected to a variety of stimuli, including heat or massage. Electrical stimulation is not for everyone, nor is it 100 percent effective. The following techniques each require specialized equipment and personnel trained in the specific procedure being used:

- **TENS** uses tiny electrical pulses, delivered through the skin to nerve fibers, to cause changes in muscles, such as numbness or contractions. This, in turn, produces temporary pain relief.
- **Spinal cord stimulation** uses electrodes surgically inserted within the epidural space of the spinal cord. The patient is able to deliver a pulse of electricity to the spinal cord using a small box-like receiver and an antenna taped to the skin.
- **Deep brain stimulation** is considered an extreme treatment and involves surgical stimulation of the brain, usually the thalamus. It is used for a limited number of conditions, including severe pain, central pain syndrome, cancer pain, phantom limb pain, and other neuropathic pains.

Exercise: Because there is a known link between many types of chronic pain and tense, weak muscles, exercise -- even light to moderate walking or swimming -- can contribute to an overall sense of well-being by improving blood and oxygen flow to muscles. Just as we know that stress contributes to pain, we also know that exercise, sleep, and relaxation can all help reduce stress, thereby helping to alleviate pain.

Hypnosis, first approved for medical use in 1958, continues to grow in popularity, especially as an adjunct to pain medication. In general, hypnosis is used to control physical function or response, that is, the amount of pain an individual can withstand. Hypnosis may result in relief of pain by acting on chemicals in the nervous system, slowing impulses.

Low-power lasers have been used occasionally by some physical therapists as a treatment for pain, but like many other treatments, this method is not without controversy.

Magnets: Usually worn as a collar or wristwatch, the use of magnets as a treatment dates back to the ancient Egyptians and Greeks. While it is often dismissed as quackery and pseudoscience by skeptics, proponents offer the theory that magnets may effect changes in cells or body chemistry, thus producing pain relief.

Nerve blocks employ the use of drugs, chemical agents, or surgical techniques to interrupt the relay of pain messages between specific areas of the body and the brain. Types of surgical nerve blocks include neurectomy; spinal dorsal, cranial, and trigeminal rhizotomy; and sympathectomy, also called sympathetic blockade.

Nonsteroidal anti-inflammatory drugs (NSAIDs) (including aspirin and ibuprofen) are widely prescribed and sometimes called non-narcotic or non-opioid analgesics. They work by reducing inflammatory responses in tissues. Many of these drugs irritate the stomach and for that reason are usually taken with food.

Opioids are derived from the poppy plant and are among the oldest drugs known to humankind. They include codeine and perhaps the most well-known narcotic of all, morphine. Morphine can be administered in a variety of forms, including a pump for patient self-administration. Opioids have a narcotic effect, that is, they induce sedation as well as pain relief, and some patients may become physically dependent upon them. For these reasons, patients given opioids should be monitored carefully; in some cases, stimulants may be prescribed to counteract the sedative side effects. In addition to drowsiness, other common side effects include constipation, nausea, and vomiting.

Physical therapy and rehabilitation date back to the ancient practice of using physical techniques and methods, such as heat, cold, exercise, massage, and manipulation, in the treatment of certain conditions. These may be applied to increase function, control pain, and speed the patient toward full recovery.

Surgery: Operations for pain include rhizotomy, in which a nerve close to the spinal cord is cut, and cordotomy, where bundles of nerves within the spinal cord are severed. Cordotomy is generally used only for the pain of terminal cancer that does not respond to other therapies. Another operation for pain is the dorsal root entry zone operation, or DREZ, in which spinal neurons corresponding to the patient's pain are destroyed surgically. Occasionally, surgery is carried out with electrodes that selectively damage neurons in a targeted area of the brain. These procedures rarely result in long-term pain relief, but both physician and patient may decide that the surgical procedure will be effective enough that it justifies the expense and risk.

Research

Scientists believe that advances in neuroscience will lead to more and better treatments for chronic pain in the years to come.

Clinical investigators have tested chronic pain patients and found that they often have lower-than-normal levels of endorphins in their spinal fluid. Investigations of acupuncture include wiring the needles to stimulate nerve endings electrically (electroacupuncture), which some researchers believe activates endorphin systems. Other experiments with acupuncture have shown that there are higher levels of endorphins in cerebrospinal fluid following acupuncture. Investigators are studying the effect of stress on the experience of chronic pain. Chemists are synthesizing new analgesics and discovering painkilling virtues in drugs not normally prescribed for pain.

In the forefront of pain research, are the scientists supported by the National Institutes of Health (NIH), including the NINDS. Other institutes at NIH that support pain research include the National Institute of Dental and Craniofacial Research, the National Cancer Institute, the National Institute of Nursing Research, the National Institute on Drug Abuse, and the National Institute of Mental Health.

Some pain medications dull the patient's perception of pain. Morphine is one such drug. It works through the body's natural pain-killing machinery, preventing pain messages

from reaching the brain. Scientists are working toward the development of a morphine-like drug that will have the pain-deadening qualities of morphine but without the drug's negative side effects, such as sedation and the potential for addiction. Patients receiving morphine also face the problem of morphine tolerance, meaning that over time they require higher doses of the drug to achieve the same pain relief. Studies have identified factors that contribute to the development of tolerance; continued progress in this line of research should eventually allow patients to take lower doses of morphine.

Blocking or interrupting pain signals, especially when there is no injury or trauma to tissue, is an important goal in the development of pain medications. An increased understanding of the basic mechanisms of pain will have profound implications for the development of future medicines.

The above excerpt is from the Christopher & Dana Reeve Foundation Paralysis Resource Center website.

<https://www.christopherreeve.org/living-with-paralysis/health/secondary-conditions/pain>

Source: National Institute of Neurological Disorders and Stroke (NINDS)

Web Sites

American Chronic Pain Association (ACPA)

<https://www.acpanow.com/>

11937 W. 119th Street, Suite 216,

Overland Park, KS 66213

Phone 913-991-4740

ACPA offers peer support and education in pain management skills to people with pain, their family and friends, and health care professionals.

Chronic Pain Association of Canada (CPAC)

<http://www.chronicpaincanada.com/>

P.O. Box 66017

Heritage Postal Station

Edmonton Alberta T6J 6T4

Phone: 780-482-6727

E-mail: cpac@chronicpaincanada.com

CPAC is dedicated to providing support to people in chronic pain.

CareCure Community

<http://sci.rutgers.edu/>

CareCure forums provide information on spinal cord injury care, caregiving, cure, funding, life, pain, sex, links, research, and trials.

Christopher & Dana Reeve Foundation: Pain Management booklet

<http://s3.amazonaws.com/reeve-assets-production/Pain-MgmtBooklet-FINAL-4-17-19.pdf>

If you would like a free printed copy of this booklet, please call the Reeve Foundation at 800-539-7309.

Craig Hospital: Pain Resources

<https://craighospital.org/resources/topics/pain>

Craig Hospital: Aching Shoulders?

<https://craighospital.org/resources/le-duelen-los-hombros>

Defense & Veterans Center for Integrative Pain Management (DVCIPM)

<http://www.dvcipm.org/>

11300 Rockville Pike, Suite 709

Rockville, MD 20852

Phone: 301-400-4231

DVCIPM seeks to improve the management of pain in military and civilian medicine. It is a collaborative research partnership among Walter Reed National Military Medical Center, Bethesda, MD; the Philadelphia VA Medical Center and Philadelphia Research and Education Foundation, Philadelphia; and the Conemaugh Health System, Johnstown, PA.

International Association for the Study of Pain (IASP)

<http://www.iasp-pain.org>

IASP Secretariat

1510 H Street NW, Suite 600

Washington, DC 20005-1020

Phone: 202-856-7400

E-mail: IASPdesk@iasp-pain.org

IASP is a non-profit professional organization dedicated to furthering research on pain and improving the care of patients with pain. Membership is open to scientists, physicians, dentists, psychologists, nurses, physical therapists, and other health professionals actively engaged in pain research and to those who have special interest in the diagnosis and treatment of pain.

Medtronic

<http://www.medtronic.com>

Medtronic is a medical technology company, which provides therapeutic, diagnostic, and monitoring products for people with chronic disease, including the cardiac rhythm management, other cardiovascular, and neurological markets.

MSKTC: Pain after Spinal Cord Injury

<http://www.msktc.org/sci/factsheets/pain>

<http://www.msktc.org/sci/slideshows/Pain-After-Spinal-Cord-Injury>

MSKTC is a national center that works to put research into practice to serve the needs of people with traumatic brain injuries, spinal cord injuries, and burn injuries.

National Institute of Neurological Disorders and Stroke (NINDS): Central Pain Syndrome

Information Page

<https://www.ninds.nih.gov/Disorders/All-Disorders/Central-Pain-Syndrome-Information-Page>

National Institute of Neurological Disorders and Stroke (NINDS): Chronic Pain Information Page

<https://www.ninds.nih.gov/Disorders/All-Disorders/Chronic-Pain-Information-Page>

This page has information on chronic pain, including treatment, prognosis, research, as well as links to other resources.

National Institute of Neurological Disorders and Stroke (NINDS): Pain: Hope Through Research booklet

https://catalog.ninds.nih.gov/sites/default/files/publications/pain-hope-through-research_0.pdf

National Center on Physical Activity and Disability: Primer on Pain

<https://www.nchpad.org/281/1784/Primer-on~Pain>

This page has information on pain related to spinal cord injury, limb loss, cerebral palsy, fibromyalgia, Parkinson's, rheumatoid arthritis, osteoarthritis, and post-polio syndrome. Aggravating factors, alleviating factors and treatment options, and exercises that can help manage pain are discussed.

Pain Connection

<https://painconnection.org/>

6105 E. Grant Rd.

Tucson AZ 85712

Phone: 800-910-0664

E-mail: info@painconnection.org

A program of the U.S. Pain Foundation, Pain Connection is dedicated to empowering people with chronic pain to improve their quality of life, decrease their sense of isolation, and take a more active role in their treatment.

Spinal Cord Injury Information Network: Pain

<http://www.uab.edu/medicine/sci/daily-living/managing-personal-health/secondary-medical-conditions/pain>

This page has links to articles and videos related to pain among people with spinal cord injury.

U.S. Pain Foundation

www.USPainFoundation.org

15 North Main Street, Unit 100

West Hartford, CT 06107

Phone: 800-910-2462

The U.S. Pain Foundation is a non-profit organization whose mission is to connect, inform, educate and empower those living with pain while advocating on behalf of the entire pain community.

The INvisible Project

<https://uspainfoundation.org/?s=invisible+project>

The goal of the Invisible Project is to create pain awareness through the photographs and stories of real pain survivors. Nearly 100 million Americans deal with pain.

Brigham and Women's Hospital: Translational Pain Research

<http://www.paintrials.org>

Department of Anesthesiology, Perioperative and Pain Medicine

Brigham and Women's Hospital

75 Francis Street

MRB 604

Boston, MA 02115

Phone: 617-535-7246

E-mail: paintrials@partners.org

The Translational Pain Research Group conducts research is to systematically evaluate new drugs for pain and to determine the cause of different types of pain to improve therapy.

*If you would like to take an **alternative medicine** approach, visit these sites:*

National Center for Complementary and Alternative Medicine

<http://nccam.nih.gov/health/>

NCCAM Clearinghouse

Phone: 888-644-6226 (Toll -free), 866-464-3615 (TTY)

Email: info@nccam.nih.gov

NCCAM is the federal government's lead agency for scientific research on the diverse medical and health care systems, practices, and products that are not generally considered part of conventional medicine. The site has information on medical conditions and on alternative therapies. Information Specialists at the NCCAM Clearinghouse can answer questions about the Center and complementary and alternative medicine.

Alternative & Innovative Therapies for Physical Disability

<http://www.healingtherapies.info>

This site provides information on alternative, complementary, energy-based, non-mainstream, or innovative therapies for individuals with physical disability, especially spinal cord injury and dysfunction and multiple sclerosis.

Axiobionics: Wearable Therapy

<http://www.wearabletherapy.com/>

Center for NeuroProsthetics

6111 Jackson Road, Suite 200

Ann Arbor, MI 48103

Phone: 734-327-2946 or 800-552-3539 (Toll free)

Email: info@axiobionics.com

Axiobionics® develops and markets new and innovative medical devices for pain control and neuro rehabilitation, specializing in the design of custom-made electrical stimulation technology and orthotic and prosthetic devices.

Craig Hospital: Complementary & Alternative Medicine Resources

<https://craighospital.org/resources/topics/complementary-alternative-medicine>

Articles and Other Publications

New Mobility: The Pain That Never Stops (Neuropathic Pain). March 2017

www.newmobility.com/2017/03/neuropathic-pain

Northwest Regional Spinal Cord Injury System: Pain and Spinal Cord Injury

http://sci.washington.edu/info/pamphlets/pain_sci.asp

This pamphlet (which can be downloaded as a PDF) discusses neuropathic, musculoskeletal and visceral pain among people with spinal cord injury. It also offers a few suggestions for alternative treatments, prevention and self-care.

Northwest Regional Spinal Cord Injury System: Multidisciplinary Management of Pain in Spinal Cord Injury – An Approach to Improve Pain, Function and Psychological Coping

http://sci.washington.edu/info/forums/reports/pain_2010.asp

This page has text and video of a June 8, 2010 presentation by three chronic pain experts from the Rehabilitation Institute of Washington (RIW): Dr. Kathleen Burgess, physiatrist; Randy Hermans, physical therapist; and Dr. James Moore, psychologist and RIW director.

Spinal Cord Injury Information Network: Pain After Spinal Cord Injury

<http://www.msctc.org/sci/factsheets/Pain>

This InfoSheet has information to help people with spinal cord injuries understand and manage pain.

Internet Discussion Forums and Chat Rooms

NeuroTalk Communities

<https://www.neurotalk.org>

NeuroTalk offers discussion forums and chat rooms on many topics, including chronic pain.

The following video can be streamed online or downloaded:

Spinal Cord Injury Information Network: Secondary Conditions of Spinal Cord Injury Health Education Video Series

<http://www.uab.edu/medicine/sci/uab-scims-information/secondary-conditions-of-sci-health-education-video-series>

The 34-minute video “Pain Management” stresses the importance on QOL. It covers pain subtypes (neuropathic, musculoskeletal, visceral) and offers general medical and psychosocial management techniques.

The information contained in this message is presented for the purpose of educating and informing you about paralysis and its effects. Nothing contained in this message should be construed nor is intended to be used for medical diagnosis or treatment. It should not be used in place of the advice of your physician or other qualified health care provider. Should you have any health care related questions, please call or see your physician or other qualified health care provider promptly. Always consult with your physician or other qualified health care provider before embarking on a new treatment, diet or fitness program. You should never disregard medical advice or delay in seeking it because of something you have read in this message.

This publication is supported by the Administration for Community Living (ACL), U.S. Department of Health and Human Services (HHS) as part of a financial assistance award totaling \$10,000,000 with 100 percent funding by ACL/HHS. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by ACL/HHS, or the U.S. Government.