

Frequently Asked Questions (FAQ's) About Pain And Free Back Pain and Chronic Pain Report

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What is a Pain Medicine Subspecialist and what is the role of Pain Medicine as a specialty of Medicine in the treatment of chronic pain including back pain, neck pain and headaches?

Julia P was a young grandmother. However, when coming home from the office, she could not longer look forward to an occasional jogging with her dog or to the visits down the road to her daughter's home. Her lower back pain and the feelings traveling down into her right leg, which have been bothering her for one and a half years, now totally prevented her from an occasional bike ride or from lifting his 3 year old grandchild. She was always in high spirits, but now she would often cry for no apparent reason. But more about her story later. If your symptoms resemble those of Julia, you are not alone. Nearly everyone at some point has back pain that interferes with work, routine daily activities, or recreation. Americans spend at least \$50 billion each year on low back pain, the most common cause of job-related disability and a leading contributor to missed work. Back pain is the second most common chronic neurological ailment in the United States — only headache is more common.

Fortunately, most occurrences of low back pain can be easily treated and will go away within a few days. Unfortunately, others take much longer to resolve and pain becomes chronic.

A Pain Medicine subspecialist is a medical doctor who treats pain caused by any disease, or trauma. The ultimate goal of the Pain Medicine doctor is to *manage* acute or chronic pain by reducing pain frequency and intensity and increasing function and quality of life for the patient. Most of these doctors are Neurologists, Anesthesiologists or Physiatrists who receive additional further training at specialized accredited centers, usually University Hospitals. Specialty boards certify physicians as having met certain published standards. There are 24 specialty boards that are recognized by the American Board of Medical Specialties (ABMS) and the American Medical Association (AMA). A subspecialist first must be trained and certified as a specialist.

In order to be certified first as a medical specialist by one of these recognized boards, a physician must complete rigorous requirements. Generally, these include: 1. Completion of a course of study leading to the M.D. or D.O. degree from a recognized School of Medicine. 2. After Medical School graduation, completion of three to seven additional years of full-time training in an accredited residency program designed to train specialists. 3. Sitting for Specialty boards examinations which require extensive assessments of individual performance and competence. 4. Specialty boards require that the person who seeks certification has an unrestricted license to practice medicine and no ethics violations in order to take the certification examination. 5. Some boards require that the doctor has a period of experience in full-time practice in the specialty prior to examination for certification, usually two years following training. 6. Finally, each candidate for certification must pass a one to two day long written examination given by the specialty board. Fifteen of the 24 specialty boards (like Neurology) also require a second oral examination after passing the written exam, conducted by senior specialists in that field. Candidates who have passed the exams and other requirements are then given the status of Board Certified as specialists. A similar process is followed for specialists who want to become subspecialists.

Pain Subspecialists undergo all of the above mentioned training to become Board Certified in the field of Pain Medicine after having attained certification in a primary field as specialists (like Anesthesia or Neurology). An important responsibility for a prospective patient is to carefully research the credentials of the treating physician. Is he or she is Board Certified in the subspecialty of Pain Medicine by a body accredited by the American Board of Medical Specialties (ABMS)? Although many health care providers call themselves “pain specialists” or “pain doctors” based on practice styles or preferences, their credentials or training may fall far short of those required by recognized accrediting entities in the United States. To protect the public, the State of Texas for example, prohibits and imposes severe penalties to individuals who call themselves specialists or subspecialists are not certified by the corresponding ABMS accredited medical board (for more detail information visit the website for the State of Texas Medical Board: <http://www.tmb.state.tx.us/>).

Pain is categorized into acute and chronic pain. Acute pain is the pain usually associated with a specific type of injury, like a fracture, burn or an infection in a body part, like a tooth. Another common form of acute pain is that caused by an abnormal forceful stretch or tear of a ligament or a muscle by trauma, heavy lifting or a fall. Chronic pain, instead, is defined as persistent pain lasting more than six months, although some experts take three months or even six weeks as time markers separating chronic from acute pain. There are many reasons why acute pain can become chronic. One is progression of a disease process, like arthritis, a chronic infection or repetitive trauma; another is persistence of the abnormalities caused by the disease process after this has itself resolved. There are other reasons.

For chronic pain patients, obtaining relief from their symptoms is sometimes difficult. Patients are often sent back and forth between specialists of all kinds in search of a solution. Pain Medicine is a growing multidisciplinary specialty area of Medicine primarily dealing with the causes and treatments of the conditions causing chronic pain. Pain physicians use minimally invasive techniques to diagnose and treat an array of painful conditions. In addition to the role in discovering the source of a patient's primary pain, he or she will assist coordinating a multidisciplinary approach for the treatment. This is needed because pain is considered to be a “multidimensional” symptom.

What is a “multidimensional” symptom?

As defined by the International Association for the Study of Pain, pain is "an unpleasant sensory and emotional experience associated with actual or potential tissue damage". Such definition is based on the fact that there are several components contributing to the intensity of pain which are above and beyond the extent of the injury present in a primary pain generator. A primary pain generator is a certain body part or anatomical structure damaged by disease or trauma. Examples of pain generators are joints affected by arthritis, skin damaged by a burn or a fractured bone.

One of the components unrelated to the pain generator, yet playing a large role in the experience of pain is called “pain centralization”. This is a name give to a process whereby there is an abnormal activation of certain nerve cells in the brain and spinal cord that maintain and even augment the sensation of pain. One example of a condition associated with pain centralization is “phantom limb syndrome”; in this situation, the patient experiences pain in a previously amputated limb. In this syndrome, there are brain circuitries that abnormally maintain or even increase the level of perceived pain in an arm or a leg that is no longer there. Research has demonstrated that various degrees of pain centralization may affect not only those patients who underwent a limb amputation but also patients afflicted by many forms of chronic pain such as lower back pain, arthritis, neuropathy or chronic headaches. It is

important that patients understand this phenomenon (which should not be confused with “pain only being on their heads” in a psychiatric sense). In order to achieve effectiveness in the treatment of pain, each component contributing to the pain experience, such as pain centralization, must be addressed differently from the treatment delivered to the primary pain generator.

Another important example of the multidimensional nature of pain is the presence of associated mood abnormalities, such as depression. Take the example of Julia P. again, a person without history of psychiatric or mood problems before her back pain began; however, she was also becoming chronically depressed, she had lost interest in almost everything that was pleasurable in life. She was even told by one of her doctors that “her pain was in her head”. But again Julia’s story was not uncommon with many patients afflicted with chronic pain. Mood is regulated in the brain by the same molecules (mainly norepinephrine and serotonin) that are implicated in pain tolerance. The levels of these substances frequently became diminished in chronic pain, leading not only to a vicious cycle of decreased pain tolerance but also to chronic depression, a condition characterized by persistent feelings of sadness and loss of interest or pleasure in usual activities. Interestingly, the reverse is also true as patients afflicted by depression are also more susceptible to developing chronic pain. Thus, if the treating physician determines that depression is contributing to the patient’s experience of pain, it is critical that additional treatments (pharmacologic and psychological) be prescribed to address the painful condition. Again, the patient must understand that such treatment does not imply that his or her pain “comes only from their head” in the psychiatry sense. Julia’s pain and mood improved substantially after she was prescribed an antidepressant medication that increased the brain levels of norepinephrine and serotonin.

Another factor contributing to the overall patient’s pain intensity is physical de-conditioning. As pain impedes normal physical activities of daily living, the body becomes de-conditioned; muscles atrophy to various degrees and supporting ligaments weaken. Sometimes de-conditioning is the result of other medical conditions, endocrine disorders or obesity. Unlike normal structures, de-conditioned ligaments and muscles are unable of handling the stresses and repetitive micro-trauma brought about by normal life activities and became vulnerable to even normal movements which further aggravate the original injury, the end result being additional pain. Depending on the structure involved body balance may be impaired because certain muscles, ligaments and tendons may play important role in the sense of balance and coordination. Thus, in addition to treating the pain generator, supporting structures like muscles and ligaments must be strengthened and healed. This is usually accomplished by a comprehensive physical therapy and rehabilitation program. When this is insufficient, treatments like prolotherapy may supplement the rehabilitation process.

Finally, there are illnesses different from those *directly* causing the pain, which can contribute substantially to the patient’s pain intensity. Some examples are diabetes with associated neuropathy (which contributes to physical de-conditioning); sleep apnea (which in itself leads to depression and weight gain and sleep deprivation with decreased norepinephrine levels), hypothyroidism, obesity, inflammatory arthritis, smoking and many others. Treatment of these medical conditions is paramount to the management of chronic pain.

How are the sources of pain (“pain generators”) identified?

A thorough physical and neurologic examination is considered the “gold standard” for identifying the primary diseased anatomical structure partly responsible for the patient’s pain. Once a potential pain generator is suspected, confirmation of the precise structure involved

can be achieved by several methods. One commonly used by pain specialists is numbing the pain generator (or the nerves that carry pain signals from such structure) using a local anesthetic like lidocaine. The importance of identifying and treating the pain generator is crucial to decreasing pain but also relevant to interrupting the self-perpetuating cycle contributing to pain centralization and chronicity. For this purpose, the pain physician uses high precision injection techniques guided by imaging methods such as fluoroscopy or computerized tomography.

Once a particular pain generator is identified, such as a painful disc or a joint in the patient's lower back for example, it can be treated in a more specific manner by either applying medications to the afflicted region or by treating the nerves that carry pain signals to the brain with image-guided techniques, as explained in more detail below. Specialized testing may be needed including an MRI (magnetic resonance imaging) or a nerve and muscle study (electromyography) to help the doctor in determining the primary cause or mechanism of the pain. It is important for patients to understand that in many cases, there is no relationship between the intensity of pain and the extent of the injury or the degree of abnormalities present in an MRI or CT scan study. Conversely, many individuals with profound abnormalities detected by these imaging techniques have little pain or no symptoms at all. Therefore, these studies should never be interpreted in isolation (without clinical correlation).

Treatment of pain using interventional modalities. Is chronic pain curable?

Rick P. (a real patient) was a World War II veteran who after having sustained a back injury at the battle field developed chronic back pain which persisted for many years. He saw many physicians for his pain but the medications prescribed to him over the years seemed no longer effective. Over time, he became depressed and irritable. His mood changes interfered with his marriage and his relationships with friends and relatives. Despite taking more powerful antidepressants and pain killers, his pain and mood changes did not improve and he was now frustrated by the side-effects of his medications which he needed to take more frequently and in higher amounts to partially control his symptoms. Rick's story is far too common to many chronic pain patients.

As already mentioned, many studies have demonstrated that in addition to addressing the multidimensional nature of chronic pain, treatment of the involved anatomical structure (once identified) is critical to breaking the cycle leading to chronic pain and also the associated mood abnormalities caused by the pain itself. For this purpose, imaging-guided procedures allow precise delivery of medications to the pain generator. The goals of these treatments are to decrease inflammation and accelerate tissue repair (healing) with the overall objective of providing powerful pain management. Examples of these procedures include injections into painful joints (which in the spine are called "facet" blocks) or selective nerve blocks. These techniques allow the interventional pain specialist to target selectively the particular nerves carrying the pain signals from various diseased structures. In the past, once the sensory nerves carrying pain signals were identified, they were sometimes cut by surgical means. For the most part, this approach has been abandoned because it was sometimes associated with abnormal painful re-growth of the nerve fibers. The abnormal re-growth, called neuroma, could lead to a paradoxical *increase* in pain severity. To reduce this and other potential complications, one technique developed to treat sensory nerves more accurately and effectively is radiofrequency ablation. Radiofrequency current, when delivered to tissues is converted to heat which is highly controlled in space and intensity. Radiofrequency is thus used to treat a small volume of nerve tissue, thereby disrupting transmission of pain signals along a specific nerve. With the help of imaging techniques, the procedure can reduce pain in target areas, leaving other nerves and the supporting structures of the treated nerve intact and

preventing neuroma formation. Currently, radiofrequency therapy has become a mainstream approach in pain medicine and evolved as a safe, proven mean of treating chronic pain.

Rick was referred to Dr. Pappolla, who diagnosed him with painful facet arthropathy (a form of arthritis affecting certain joints in the spine called facets). He treated Rick's pain by stunning the medial branch nerves of the spine (these are the nerves carrying the sensations and pain signals from the facets) using radiofrequency. Although it took four treatments to achieve pain control, his pain began to decrease after a few weeks of therapy and his negative mood dramatically improved. His relationships were revitalized and according to his wife, he was a different person altogether. He also reduced the amount of medications needed to control his pain. Many causes of chronic pain, like arthritic pain afflicting Rick or some forms of invasive cancers, are not curable because the extent of today's medical knowledge is limited. However, pain can be dramatically reduced in intensity and managed very effectively by a multidimensional approach. In other words, although many forms of chronic pain are incurable (by today medical standards of care) it can be made much more tolerable to the point of interfering little with normal activities of daily living.

Many forms of chronic pain, however, are curable when a specific treatable condition underlies its cause. Heather was a physician treated by Dr. Pappolla, who presented with very severe leg pain distributed mainly to her left inner thigh and knee joint. She needed opioids for partial pain control which were clouding her thinking. A neurological investigation disclosed that the pain was the result of a compression of a nerve in the pelvis (the obturator nerve) caused by an enlarged uterine fibroid (called leiomyoma). Removal of the offending mechanism (the enlarged uterus) resulted in complete resolution and permanent improvement of her leg pain. Thus, for chronic pain to be completely curable, three conditions must be met. First, the primary cause of the pain should be identifiable. Second, it must be treatable (example, benign tumor). Third, the damage to tissues produced by the primary condition can be reversed.

What are the most common forms of chronic pain?

Pain is classified as neuropathic (derived from diseased or compressed nerves or nervous tissue structures) or inflammatory (caused by inflammation of tissues). Examples of neuropathic pain include peripheral neuropathies or nerve compressions caused by scars or tumors. Inflammatory pain can be very diverse in its specific cause such as inflammation associated with specific disorders, trauma, surgery, burns or arthritis. Inflammatory conditions can also cause tissue damage and nerve compressions and the pain may be mixed in nature (both, inflammatory and neuropathic). It is important that the physician identifies correctly the neuropathic or inflammatory mechanisms underlying a patient's pain because the medications and strategies used to treat each of these are different.

Effective pain relief may involve a combination of prescription drugs. Patients should always check with a doctor before taking drugs for pain relief. Certain medicines, even those sold over the counter, may be unsafe during pregnancy, may conflict with other medications, may cause side effects including drowsiness, or may lead to liver damage. Your doctor may select medications depending on the cause of your pain and the presence of other associated medical conditions like hypertension, diabetes, sleep apnea or depression. These are usually prescribed in combination with several therapeutic modalities tailored to fit the problem causing the pain and to whether the type of pain is neuropathic or inflammatory. The most frequently use drugs include:

- ***Nonsteroidal anti-inflammatory drugs*** these are taken orally to reduce stiffness, swelling, and inflammation and to ease mild to moderate low back pain. Some medications can be applied topically to the skin as a cream or spray to stimulate 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. NSAIDs are associated with potentially dangerous side effects including gastrointestinal bleeding, renal or liver damage and their long term use should be monitored by your doctor.
- ***Anticonvulsants*** — certain drugs primarily used to treat seizures — may be employed in treating certain types of nerve generated pain and may also be prescribed with analgesics. They are also useful to stabilize mood.
- Some ***antidepressants***, particularly tricyclic antidepressants such as amitriptyline and desipramine or a newer one called duloxetine 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.
- ***Steroids and pain medications***— can be injected directly into the source of pain and inflammation, such as at the intervertebral joints, called facets or in sacroiliac joints.
- ***Opioids*** such as codeine, oxycodone, hydrocodone, and morphine are occasionally 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. Most respected authorities in pain management are convinced that chronic use of these drugs is detrimental to the back pain patient, adding to depression and even increasing pain.

Which are the most common forms of chronic pain seen in clinical practice?

The most common forms of chronic pain are headaches and low back pain. Most cases of low back pain are caused by conditions that are not serious enough to last more than a few days or weeks and usually respond to non-surgical treatments such as simple non-opioid analgesics and anti-inflammatory medications. However, some of these patients develop chronic back pain which may become disabling. Once this happened, it is critical to reach a correct diagnosis of the cause and mechanisms of the pain for its successful management.

Neurologists and certain other medical specialists like Anesthesiologists or Physical Medicine and Rehabilitation doctors and Psychiatrists receive additional formal training in Pain Medicine, a specialty that focus in the diagnosis and treatment of the causes of chronic pain. These doctors can assist patients to reach a decision in determining which form of treatment may be more effective. Neurologists, for example, are Medical Doctors with extensive training in the diagnosis and non-surgical treatment of diseases the brain, nerves and muscles including the muscles and nerves of the back and the causes and treatment of pain.

How is back pain classified?

Classifications are very useful to physicians in guiding diagnostic and treatment strategies. As in many medical conditions, classifications are useful, also in dealing with painful conditions affecting the spine. Usually, criteria for diagnosis (groups of symptoms that define a certain condition) as established by experts in the medical community are matched against the symptoms and signs present in a particular patient. Sometimes, a patient may match more than one condition for the back pain.

Some classifications are based on the causes or specific conditions (“etiologies”) underlying the mechanisms causing the back pain. One common classification is as follows (the examples provided are only few of the most common conditions):

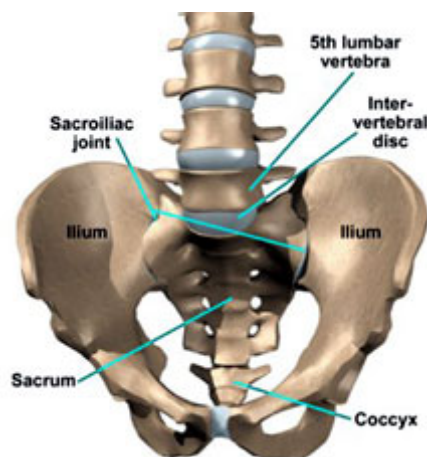
- Mechanical pain:
 - Arthritis
 - Degenerated discs
 - Spinal deformities like scoliosis
 - Spinal disc herniation (slipped disc)
 - Spinal stenosis (narrowing of the internal spinal canal that contains the spinal cord and its nerves)
 - Spondylolisthesis (an abnormal displacement of one vertebra over another causing damage to the spinal nerves)
 - Fractures
 - Non-specific muscular or ligamentous strains or sprains
 - Leg Length Difference
 - Restricted hip motion
 - Misaligned pelvis
 - Muscle or ligament strains.
- Inflammatory:
 - Certain inflammatory forms of arthritis like Rheumatoid arthritis but there are many others.
 - Infections affecting the bone, discs or soft tissues.
 - Arachnoiditis. An inflammatory condition that may follow trauma, tumor, infections, bleeding, or administration of various compounds into the spinal fluid. Arachnoiditis can be cause of neck and back pain, radiating pain in the distribution of the involved nerves, sensory loss in the genital area, occasionally leg weakness or paralysis and loss of the bowel and bladder control.
- Neoplastic:
 - Bone tumors (primary or metastatic)
 - Spinal tumors
- Metabolic:
 - Osteoporotic vertebral fractures (caused by loss of calcium in the bone). The natural effects of normal aging on the body, in general, and low back, in particular, are osteoporosis or decreased amount of bone. Osteoporosis can lead to bone fractures from a fall or even from the stress of lifting or everyday activities. This can be very painful. Minimally invasive outpatient treatments to seal fractures of the vertebrae caused by osteoporosis include vertebroplasty.
 - Other less common conditions
- Psychosomatic
- Paget's disease (a condition characterized by painful overgrowth of bones).
- Referred pain (pain coming from elsewhere but felt in the spine):
 - Pelvic/abdominal disease
 - Prostate Cancer

What are the most common conditions causing back pain and which procedures can the interventional pain physician use to decrease and interrupt the cycle of chronic pain?

Low back pain can be caused by a number of factors from injuries to poor conditioning of muscles and ligaments to the effects of aging or arthritis. Less common causes include specific inflammatory conditions, specific diseases of bone, muscle or nervous tissues and tumors. It comes to a surprise to many patients with chronic back pain that in more than half of the cases, the anatomical structure causing the pain can not be determined with precision. In this situation, sometimes diagnosed as non-specific back pain, it is still important to exclude potentially serious conditions. Many of the cases of non-specific low back pain may result from chronic injury to ligaments and muscles (see below).

Low Back Sprain and Strain - The muscles of the low back provide power and strength for activities such as standing, walking and lifting. As already mentioned, a strain of the muscle can occur when the muscle is poorly conditioned or overworked. The ligaments and muscles of the low back act to interconnect the vertebral bones and provide support or stability. A sprain of the low back can occur when a sudden, forceful movement injures a ligament which has become stiff or weak through overuse. Sometimes the injury is initially overlooked by the patient. Frequently, a combination of other factors may increase and maintain the likelihood of back injury and the duration of the pain. These include: continued improper use, balance or gait problems, associated neurological problems causing rigidity or weakness, obesity or smoking.

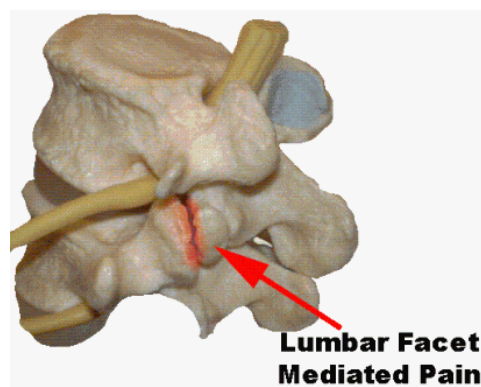
Arthritis. This condition will cause degenerative changes in the joints of the spine. It also affects ligaments and bones. These changes occur to some degree in everyone after middle age. When severe, they can cause low back stiffness and pain from mild all the way to unbearable. The most frequently joints affected by arthritis in the spine are the facet joints and the sacroiliac joints (figure below).



Pain originating in the facets and sacroiliac joints may be the most under diagnosed roots of low back pain. Studies have estimated that up to 30% of all low back pain being severe enough to come to the attention of a physician is originated in the sacroiliac joint. A similar incidence is attributed to painful facet joints. Pain from the sacroiliac joint is frequently localized to the buttock but may spread into the legs. Without additional studies, it is often misdiagnosed as nerve root pain. The diagnosis is made primarily on the physical examination

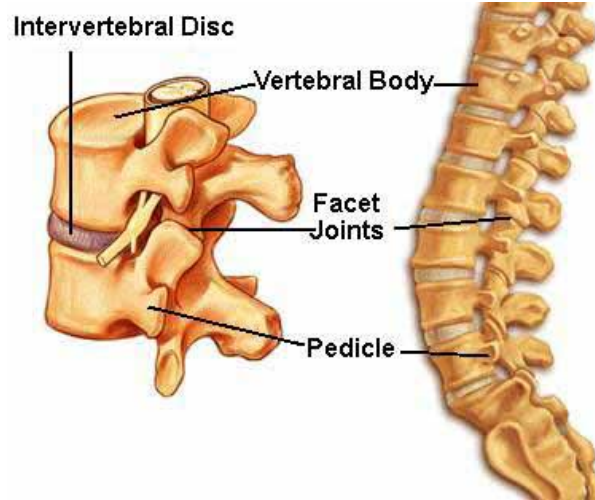
by performing certain exam maneuvers that alert the pain specialist to this possibility. It is then confirmed by injection of local anesthetics into the joint itself using image guided procedures. Typically, the x-ray or MRI appearance of the joints have little correlation with the degree of pain and does not contribute to the diagnosis. Also, pain from a degenerated low back disc, can resemble the pain originated in the sacroiliac joint pain but, in contrast to popular belief, is far less common. Diagnostic injections are therefore, critical for establishing the diagnosis. If the diagnostic injection relieves pain, a therapeutic radiofrequency denervation procedure can then be attempted to achieve longer lasting relief. In selected cases, injections of medications into these structures may also decrease the pain.

The spine has 7 cervical (neck) vertebrae, 12 thoracic (chest area) 5 lumbar (lower back) and the sacrum and coccyx (tail of the spine) which consists of several fused sacral and coccygeal vertebrae. Motion of the cervical, thoracic and lumbar spine is achieved because each vertebra articulates with the next vertebra below by a pair of small joints, one on each side, called facets. Facets are subject with overuse and aging to the same arthritic degeneration that affects the more visible joints like knees, finger and toes. Arthritis can be aggravated by spinal deformities like scoliosis or by obesity. People recognized the popular associations of smoking with conditions like stroke, lung cancer and heart attacks but few know that this addiction is also a very important risk factor for back pain. Heavy smoking can make back pain untreatable. Arthritis of the facets, also called degenerative joint disease of the spine, facet arthropathy or spondylosis can be very painful. Facet arthritis can be the cause of lower back pain in up to 40% of cases after 50 years of age. When cervical facets are involved they may contribute to pain in up to 30% of chronic headaches. As described for the sacroiliac joint, the interventional pain specialist can deliver medications into the painful joint in a very precise manner using imaging guided injections. When these are not effective for long term pain relief, another powerful technique in the armamentarium is facet denervation. First the physician will localize the correct level causing pain by numbing the nerves carrying the pain signals from specific facets by placing a small amount of a local anesthetic (like lidocaine) in a specific anatomical location. Once the culprit joint or joints are identified, these nerves can be treated using radiofrequency lesioning of the nerves as mentioned previously. When the technique is expertly performed, it causes little discomfort; it is safe and should not damage important nerves such as those carrying motor commands to the muscles (see figure below).



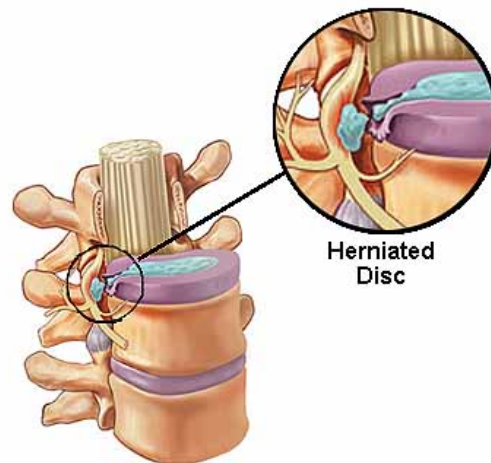
Which are other frequent causes of chronic back pain?

Intervertebral Discs. Frequently, persistent low back pain is attributed to a damaged intervertebral disc. This almost avascular (lacking blood vessels) structure bears some of the highest loads in the human body.

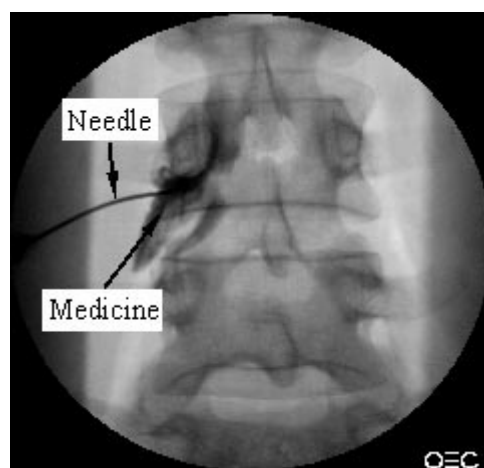


There are two main types of pain that can result from degeneration affecting the intervertebral disc. One is pain coming from inside the disc itself (called discogenic pain) and the other from disc herniation which can compress a nearby spinal nerve. The disc is composed of a soft center or nucleus pulposus surrounded by a tougher outer portion called the annulus. Disc damage, or degeneration, can occur as an ongoing process caused by repetitive trauma or aging in which water content decreases and abnormal fibrous tissue increases. Ultimately, the disc's load bearing capacity is overwhelmed, leading to tears, more abnormal fibrosis and the growth of highly vascular reparative tissue called granulation tissue into the substance of the disc itself. In the past, there was a widespread belief that because discs were avascular, also lacked nerves and thus, could not be the source of pain. More recently, however, careful dissections and microscopic examinations of normal and abnormal discs lead to the discovery of pain specific nerve terminals, called C nerve fibers, within the substance of normal intervertebral discs themselves. Furthermore, it was also found that degenerated discs exhibited an abnormal proliferation of these pain generating nerve terminals, potentially making them more prone to pain than normal discs. With normal aging, the nucleus begins to resemble the annulus. During middle-age, the nucleus start losing water and the annulus starts bearing the burden of spine motion and trauma, no longer cushioned by the nucleus pulposus. The end results are fissures or cracks in the annulus. These may be the source of back pain because the C fibers exist only in the annulus. Although pain originating from degenerated discs can range from mild to unbearable, autopsy and clinical studies also demonstrated, surprisingly, that degenerated discs are common in middle age and more so in old age, and not always accompanied by pain.

The other important form of pain involving a disc results from compression of a nerve living in the vicinity of a degenerated disc. Sometimes tears in the annulus of the disc allow the softer center to come out leading to compression of a nearby spinal nerve root.



This often is referred to as a disc bulge or a herniated disc. When the herniated disc presses a nerve, it may cause pain in the leg frequently referred to as sciatica. Often, there is associated inflammation in the area of compression which is amenable to treatment. Ricardo was a 35 year old construction worker who fell from a second floor and landed in his feet. However, the trauma of the fall was associated with a disc tear and a herniation of the nucleus of a lumbar disc. He developed back pain radiating to the right leg which was very intense to the point that he could not sleep well. After taking prescriptions medication his pain continued and became chronic. After referral to a pain physician, she injected anti-inflammatory medications and anesthetics into the site of herniation, by a procedure often know as “selective nerve root block”. Ricardo’s pain began to improve 3 days after the first injection. He received a second injection 2 weeks thereafter and the pain was improved 80% from his original intensity 3 weeks after beginning treatment. Although Ricardo had an 80-90% chance of improving on his own, it would have taken a year or longer for the disc to heal and his pain to get better.



How is a painful disc diagnosed?

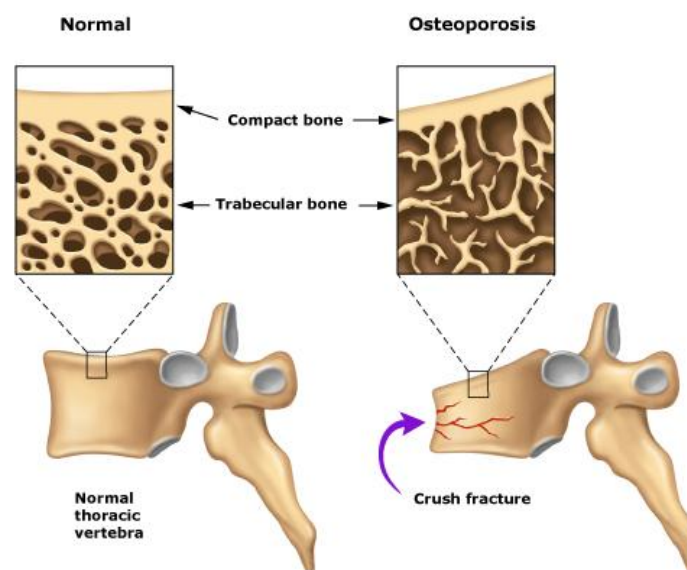
Although the presence of discogenic pain is often suspected by the history and physical examination, a definite diagnosis can be difficult. This is because there are not specific signs in the physical exam or imaging changes in the MRI or CT scan which can lead to an accurate diagnosis. In addition, the specific painful disc may be difficult to identify as the pain originating from a single disc can extend to several levels of the spine. The gold standard for the diagnosis in these cases is a method called provocative discography. This interventional modality, involves stressing the disc by injecting dye into the disc using imaging guidance at a

very specific and controlled pressure. The stressing test should reproduce the pain. At the amount of pressure used by the interventional pain specialist, only painful discs will reproduce the usual patient's pain. The test should cause no pain, produce pain that is dissimilar to the patient's usual pain or reproduce the usual pain. This technique guides the pain physician or surgeon in accurately targeting the painful disc for treatment.

Regarding therapy, there are several good alternatives to surgery for symptomatic discs and small disc herniations. For painful discs they should be considered only after discography shows which disc is the pain generator. For nerve compressions caused by a small herniation, surgery is no longer necessary as there are newer techniques including laser or mechanical disc decompression and nucleoplasty which can be performed through a needle and a small skin puncture. They are simple procedures with minimal side effects and minimal down time aimed at removing approximately one to one and one half cubic centimeters of disc material from the area of bulge or herniation thereby reducing the degree of disc herniation. They are outpatient procedures done under local anesthesia with mild sedation and x-ray guidance. These are relatively new techniques which have gained rapid acceptance in the medical community because of their safety and high success rate.

Aging Effects. Aging causes a decrease in strength and elasticity of muscles and ligaments. Although you cannot totally halt the progress of these effects, they can be slowed.

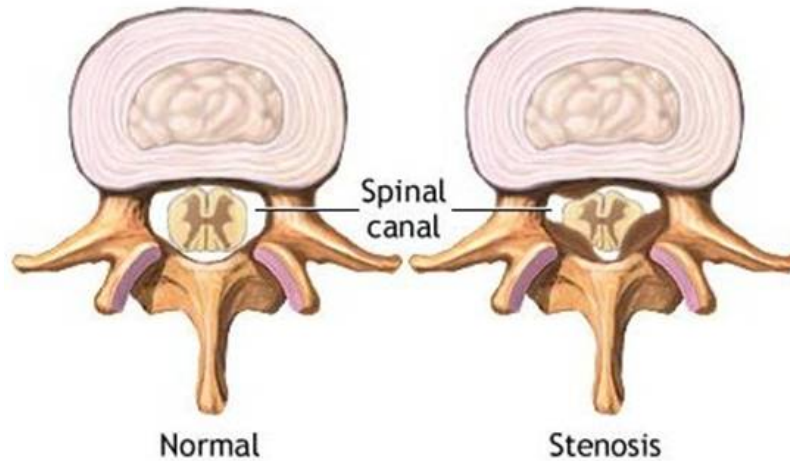
Osteoporosis. The natural effects of normal aging on the body, in general, and low back, in particular, are osteoporosis or decreased amount of bone. Osteoporosis can lead to bone fractures from a fall or even from the stress of everyday activities. Vertebral fractures in particular are common in post-menopausal women with osteoporosis and in patients with tumor infiltrating the backbone. They can be very painful. Minimally invasive outpatient treatments to seal fractures of the vertebrae caused by osteoporosis include *vertebroplasty*. Vertebroplasty uses imaging to help the pain doctor guide a fine needle accurately into the center of the vertebral body. A glue-like substance is then injected, which quickly hardens to stabilize and strengthen the bone and provide immediate pain relief and improve quality of life.



Spinal stenosis related to congenital or acquired narrowing of the bony canal predisposes some people to compression of the spinal cord or its nerves. The most common form occurs in

the elderly from vertebral collapse, arthritis, and chronic misalignment of the facet joints which is where spinal motion occurs. In all of these conditions there is associated inflammation and chemical mediators. Symptoms can be greatly improved in many patients with epidural injections because they reduce the inflammatory component. The period of pain relief from epidural injections ranges from 4 to 10 months. It is a simple outpatient procedure that may eliminate the need for major surgery and provide a safe and effective option for older patients who are not surgical candidates

Spinal stenosis is a narrowing of the spinal canal



Skeletal irregularities produce strain on the vertebrae and supporting muscles, tendons, ligaments, and tissues supported by spinal column. These irregularities include *scoliosis*, a curving of the spine to the side; *kyphosis*, in which the normal curve of the upper back is severely rounded; *lordosis*, an abnormally accentuated arch in the lower back; *back extension*, a bending backward of the spine; and *back flexion*, in which the spine bends forward.

Fibromyalgia is a chronic disorder characterized by widespread musculoskeletal pain, fatigue, and multiple “tender points,” particularly in the neck, spine, shoulders, and hips. Additional symptoms may include sleep disturbances, morning stiffness, and anxiety.

When is surgery needed?

We find that most cases low back pain, whether acute or chronic, can frequently be treated without surgery. The most common reasons for surgery on the lower back is to remove the pressure from a disc when it causes nerve and leg pain and has not responded to other treatments and to stabilize vertebral displacements. Occasionally, back pain can be the result of spinal stenosis or be cause by tumors that can press on the nerve roots or the spinal cord. Once again, the correct diagnosis of the cause of your pain is paramount to treatment.

Conclusion

There are five fundamental aspects of pain management:

1. An accurate diagnosis is of paramount importance.
2. A treatment trial with appropriate medications based on the specific pain mechanism. If an adequate medication trial has not been administered, it should precede other more invasive techniques.

3. An interventional procedure. Once the diagnosis is established, a therapeutic or diagnostic procedure can be pursued always keeping patient safety in mind. Fluoroscopic (x-ray) guidance is essential for safety and precision.

4. Treatment of associated mood disorders which coexist in about two third of patients afflicted by chronic pain. This can be in the form of psychological support or medications. Depression, anxiety, insomnia, and emotional distress all negatively affect the experience of pain and should be addressed by the physician.

5. The final aspect is physical rehabilitation to restore the ability to function. interventional pain procedures are done to facilitate the patient's participation in a rehabilitation program.

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