

Chronic pain

From living with pain to living your life

Every night, you hope you'll wake up feeling better. Maybe it's a migraine that keeps you awake. Or a shooting pain in your back that makes it agony to get out of bed. Nothing seems to help, and your wish goes unanswered. Worse, you're losing the ability to do day-to-day tasks — and the pain has long since robbed you of the activities and relationships you once enjoyed.

Chronic pain refers to pain that doesn't go away with time — despite some fluctuation in intensity. It can affect a specific area, such as with back pain, headaches or facial pain, or it can be more widespread, such as with fibromyalgia — a disorder that causes pain throughout the body.

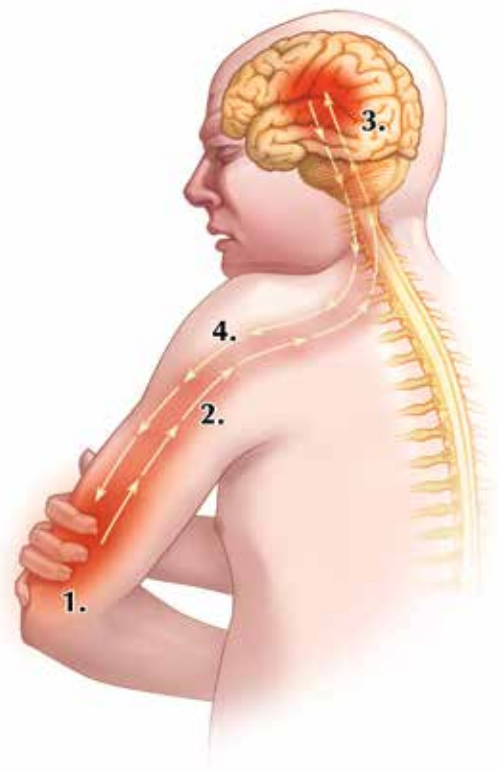
A common problem

It's estimated that at least 100 million U.S. adults experience chronic pain, a number that's higher than the number of people with diabetes, heart disease and cancer combined. Women are more likely than men to have chronic pain. The cumulative cost is huge, in terms of lost time at work and increased medical expenses, to say nothing of the toll it takes on those with chronic pain and their loved ones.

For some with chronic pain, various medical treatments or medications may help. But all too often, pain treatment is not enough, and a downward spiral of frustration, disability, stress, isolation and discouragement — and worsening pain — can develop. Further, some people with chronic pain report they aren't being taken as seriously in the health care system as those who have a condition that's more straight-forward to manage, such as diabetes. Finding a doctor who will listen and developing a trusting relationship with your doctor and health care team are important parts of the healing process.

In recent years, the treatment of chronic pain has taken on a different dimension. Overuse of opioids, a common class of pain-fighting medications, has become a much more prevalent and dangerous problem in American society. Between 1999 and 2014, more than 165,000 Americans died from overdoses related to the use of opioids. In 2016, the Centers for Disease Control and Prevention issued new guidelines for doctors that have changed how these medications are prescribed. As a result, doctors may be more likely to try a variety of nonmedication approaches to help manage chronic pain without the risk of overuse or addiction. It's important to be aware of the new guidelines and the reason they were updated.

Even though chronic pain can leave you feeling out of options, there's help and hope. If you aren't finding the relief you hope for through your current medical provider, you may want to consider enrolling at one of the numerous pain rehabilitation centers across the country, including one at Mayo Clinic. Providers at these centers usually can't make the pain go away completely, but individualized care from a team of pain specialists and others can help you change your focus from living with pain to living a fulfilling life despite pain. ♦



When pain begins near an elbow (1), the pain messages move through the peripheral nerves and up to the spinal cord (2). The brain interprets these messages as pain (3) and sends pain-suppressing chemicals that trigger other responses (4).

Health problems linked to chronic pain

Chronic pain often leads to problems that make pain worse, including:

- *Physical deconditioning* — Loss of strength and stamina and weight gain make it that much harder to perform daily tasks. This increases the likelihood that ordinary activity will wear you out, worsen pain and increase pressure on your joints.

- *Loss of sleep* — It's hard to sleep with chronic pain. Lack of physical activity and medication side effects can make it even harder. When you don't sleep well, your overall health suffers and you lack the energy to cope with pain and stress.

- *Stress* — Pain and stress go hand in hand. The constant fear of pain is stressful in itself, and chronic pain often amplifies ordinary, day-to-day stressors. Stress may cause physical reactions — including a faster heart-beat, increased blood pressure, quickened breathing, muscle tension and increased perspiration — that can cause or worsen your pain. It becomes a vicious cycle in which pain causes stress and stress worsens pain. Learning to manage stress is typically a cornerstone of chronic pain management.

- *Depression* — Up to half of people with chronic pain experience a form of depression, which can make pain even worse.

- *Chemical dependency* — Pain medications often aren't effective in reducing chronic pain, and sometimes medication use may result in drug dependence or cause side effects that can make pain worse. Some people turn to alcohol or other drugs to find relief from pain. This can worsen health and can increase side effect risks when combined with prescription medications.

Why it hurts

Pain involves a complex interaction between your nervous system — specialized nerves, the spinal cord and the brain — and the rest of your body. It's a traffic system with many interacting parts and many variables that determine how you feel. The experience of pain varies from person to person. How you feel and react to pain depends on what's causing it, as well as many personal factors. An impulse that causes you lingering pain might be a minor nuisance for someone else.

There are two major categories of pain:

- *Acute pain* — This is generally short-term pain that's severe or sudden and resolves within a certain amount of time. You might feel acute pain when you have an illness, injury or surgery. With acute pain, you typically know exactly where and even why the area hurts. Your ribs hurt after being accidentally el-bowed while waiting in line, or your knee may throb after having it surgically repaired. Acute pain is triggered by tissue damage. Its purpose is to alert you to the injury and protect you from further harm.

- *Chronic pain* — By contrast, this refers to pain that lasts for months or even longer. Half of the people who participate in the Mayo Clinic Pain Rehabilitation Center have had the pain that they hope to address for five years or longer. Chronic pain can affect any part of your body. About 25 percent of people visiting Mayo's Pain Rehabilitation Center are there due to chronic back pain. About 20 percent of the visitors have fibromyalgia. Other people seek help for headaches, migraines, chronic abdominal pain or neck pain, and generalized pain in multiple places. But for some, the reason for the chronic pain may remain unknown. For example, in some people, pain remains after an injury has healed — and it might even become more intense. Chronic pain can also occur without any indication of an injury or illness.

For both types of pain, the pain begins when particular nerves are stimulated. It's your body's way of alerting you to danger wherever it lurks within the complicated mix of muscles, nerves, vessels and bones in your body.

The nerve cells that respond to pain are part of the peripheral nervous system — which includes all of the body's nerves except those in the spinal cord and brain. Peripheral nerve cells align in a network of fibers that carry messages from skin, muscles and internal organs to your spinal cord and brain. The messages take the form of electrical currents and chemical interactions.

The peripheral nervous system acts as a communication relay. For example, if you hit your thumb with a hammer, the pain signals travel from your thumb to your brain in a split second, with an equally speedy message going the other direction, alerting the thumb to danger. Also, in a flash your brain alerts the muscles near the thumb to move the thumb away.

The peripheral nerve fibers have special endings that can sense harmful interruptions to usual body function — anything that damages or threatens to damage tissues in your body. It could be a cut, pressure, heat, inflammation, even chemical changes. Injuries, illnesses and surgery can all cause tissue damage. These specialized nerve endings are called nociceptors (no-sih-SEP-turs). You have millions of them in your skin, bones, joints, muscles and connective tissues, as well as in the protective membranes around your internal organs.

In response to tissue damage, nociceptors at the source of the injury relay pain messages as electrical impulses. These pain messages travel along a peripheral nerve to your spinal cord. This type of pain is referred to as nociceptive, and most often involves acute pain. The pain can range from mild to severe.

The pain pathway

In your spinal cord, specialized nerve cells filter and prioritize messages from the peripheral nerves. These nerve cells act like gates, controlling which messages get through to your brain — and at what speed and strength. Severe pain, such as from a burn while cooking, is processed as an urgent warning, triggering your muscles to pull your hand away from the hot stove. Some pain messages, such as from a scratch or an upset stomach, are relayed more slowly or with less strength.

From the spinal cord, pain messages travel to the brain. Your brain responds by sending back messages that promote the healing process. For example, the brain can signal your autonomic nervous system, which controls blood flow, to increase the blood supply to the injury site and thereby send additional white blood cells and platelets to help repair tissue. Your brain can also signal the release of pain-suppressing chemicals.

Sometimes, pain results from damage to one or more peripheral or spinal nerves. This can happen as a result of an accident, infection, surgery or disease. The damaged nerves can misfire and send pain signals spontaneously, rather than in response to an injury.

This type of pain, called neuropathic pain, is often described as burning, freezing, numbing or tingling. It can also create a pins and needles sensation. A common form of neuropathic pain occurs when diabetes damages the small nerves in the hands and feet, producing a painful burning sensation.

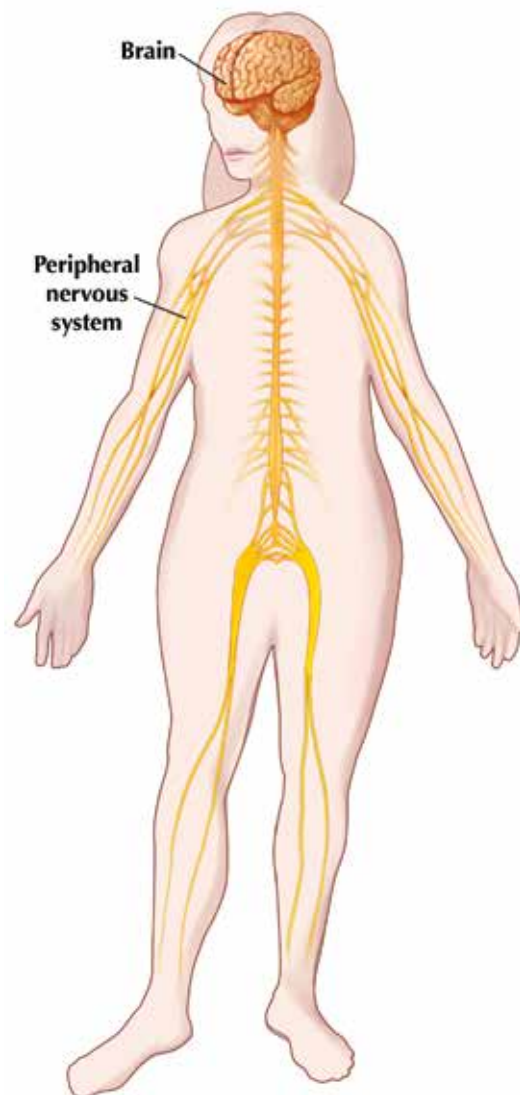
Another form of neuropathic pain happens when pain pathways in the peripheral nerves and spinal cord become persistently activated. This process, called sensitization, amplifies the pain message. It's out of proportion to or even disconnected from the original disease or injury. This can happen with phantom limb pain — even though an injured limb is gone, the pain transmission pathways along the nerves are still activated, as if the limb were still there.

Different responses

Your response to pain is heavily influenced by many individual traits, as well as psychological, emotional and social factors. When pain messages reach your brain, they pass through the emotional and cognitive regions, as well as the physical sensation region. The experience of pain is shaped by a complex emotional and cognitive process. Pain truly is in your head as well as your body.

Factors that can influence how sensitive you are to pain and how you respond to it include:

- **Genetics** — Your genetic makeup affects how sensitive you are to pain signals and how you perceive pain. Some evidence suggests that the tendency to develop neuropathic pain after a nerve injury can have a strong genetic component. Genetics can also influence your response to pain medications.
- **Sex** — Chronic pain sometimes presents differently in men and women. It's not known whether this is due to biological differences or psychological and social factors.
- **Long-term health problems** — Many chronic illnesses and conditions, are associated with pain. These include fibromyalgia, migraines and irritable bowel syndrome.
- **Psychological factors** — Pain is more prevalent in people who have depression, anxiety or low self-esteem. An exaggerated pessimism or "catastrophizing" of pain also can make it worse.
- **Social factors** — Stress and social isolation add to the experience of pain.



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Addiction: Who's at risk?

Addiction can happen quickly or after many years of opioid use. Anyone taking opioids is at risk of becoming addicted, regardless of age, income or race. However, some factors increase people's risk of overuse, whether they're taking the medications legally or not:

- **Age** — Risk is the highest among people in their late teens and 20s but remains elevated into the mid-40s.
- **Life stress** — People who are unemployed and living in poverty are more likely susceptible to addiction. A criminal record — including for driving while impaired — also increases the risk.
- **Genetics** — A family history of substance overuse increases risk.
- **Personal history of substance use** — People who have a history of using tobacco, street drugs or excessive amounts of alcohol are at a higher risk of opioid abuse.
- **Mental health** — People with a history of severe depression, anxiety, post-traumatic stress disorder, bipolar disorder or attention-deficit/hyperactivity disorder (ADHD) are at a higher risk.

Research also suggests that a lower education level, lower income and unemployment are linked to a higher prevalence of pain.

- **Past experiences** — Your memories of past painful experiences can influence your current experiences. If you have had a bad experience with a dentist, or have never been to a dentist and are fearful, even a minor probe can produce a strong pain response. And pain itself can predispose you to more pain.
- **Other individual factors** — Your upbringing, coping strategies and general attitude can affect how you interpret and tolerate pain messages. So can your expectations as to how you think you should feel or react.

When to seek help

For people caught in a downward spiral of chronic pain, a pain rehabilitation center offers tools to break destructive cycles and get the most out of life, even with continued pain. Pain rehabilitation programs also focus on non-medication treatment strategies to help reduce chronic pain. This may include yoga, tai chi, daily exercises, muscle relaxation, biofeedback and meditation.

There's no set point at which it's appropriate for someone with chronic pain to seek help from a pain rehabilitation center. However, the term "pain rehabilitation" implies learning to cope with pain, rather than to completely eliminate it. It typically occurs after you and your doctor have sought an explanation for your pain and have attempted to identify effective medical treatments but were unsuccessful.

Pain rehabilitation centers and the programs they offer vary widely in scope and focus. Programs may range from a series of day classes to a few days — or even several weeks — during which you stay at a facility. What they have in common is they involve a team of professionals, including various physician specialists, psychologists, nurses, pharmacists, physical and occupational therapists, and in many cases even dietitians, social workers, chaplains, yoga instructors and acupuncturists. The team approach helps address the far-reaching effects of chronic pain on your life and on the lives of your loved ones.

Train your brain against chronic pain

Breaking the cycle of chronic pain often requires a comprehensive approach. One often-used tool in the overall treatment approach is a therapy called biofeedback. This involves using a sensor to monitor your physical reactions to stress, which often worsens the sensation of pain. Real-time data of your reactions is displayed on a screen or as a sound, and you gradually train your cortex to control and calm these physical reactions, thus starving pain of the fuel it uses to escalate.

The goal is to eventually be able to calm the unhelpful physical reactions on your own without the aid of a biofeedback device, enabling a greater measure of control over your pain. Essentially, biofeedback therapy is a systematic, machine-assisted way to help you learn how to manage your reaction to stress. It's typically used in conjunction with other treatment approaches, including relaxation techniques.

Some advantages of biofeedback include the following:

- The treatment is considered very safe, especially as it doesn't involve taking a drug or having a procedure performed.
- Biofeedback may reduce or eliminate the need for certain medications and other treatments.
- It can help you take charge of your health.

Considering pain rehab? Questions to ask

Evaluating whether a pain rehabilitation center is right for you often depends on your circumstances and goals. For example, you may be interested in a shorter program or a longer residential program. Some people may want to focus on relieving a specific source of pain, while others may seek a more comprehensive approach to living with pain.

Important questions to ask about any program include:

- *Are staff members friendly and willing to listen?* — It's important to feel comfortable with those around you. The staff should be interested in you and your condition and take time to listen to your concerns.
- *Does the program have a good long-term success rate?* — No program can offer a 100 percent success rate. However, generally about half of the people who visit comprehensive pain centers are able to return to normal activities.
- *Is the program certified or accredited?* — The Commission on Accreditation of Rehabilitation Facilities (CARF) is the main certifier of pain rehabilitation centers.
- *How much does it cost?* — Find out approximately how much the treatment will cost before you start and check with your insurance company to see which expenses are covered.

Be wary of programs that don't include follow-up services, that advocate long-term use of potentially addictive drugs such as opioids, or that routinely include surgery or rely on unproven therapies such as homeopathy or herbal supplements.

Signs of opioid misuse

Opioid overuse can be life-threatening. People who become addicted rely on those closest to them for help. Here are some common indicators of problem use and addiction:

- Regularly taking an opioid at more than the prescribed dose or taking it for a nonprescribed reason, such as to improve the person's mood
- Craving the drug or taking it even when not in pain
- Frequently swinging between extreme moods, such as from anger to elation
- Seeking opioids from multiple doctors
- Losing interest or disengaging from hobbies and people once important to them
- Engaging in high-risk behaviors that put themselves and other people in danger

A trained therapist will start the process by evaluating the characteristics of your chronic pain and how you view and cope with it. You may then be connected to electrical sensors that measure your physical state. Sensors that may be used include:

- *Electromyography (EMG)* — This involves electrodes that are placed on the skin. They measure muscle tension so that you can practice intentionally relaxing specific muscle groups. An EMG is commonly used for back or neck pain, tension headaches, jaw (temporomandibular joint) pain, and fibromyalgia pain. EMGs aren't painful.
- *Temperature (thermal)* — Sensors attached to your fingers or feet measure your skin temperature. Hand or foot temperature often drops with stress due to less blood flow, and learning to warm the hands or feet can lead to a relaxation response. This may help facilitate relaxation with many types of pain, but may be especially beneficial for migraines.
- *Electrodermal (galvanic) skin response* — Sensors measure the activity of your sweat glands and the amount of perspiration on your skin, alerting you to anxiety and stress.
- *Heart rate variability* — A clip is placed on a finger or earlobe that measures your pulse with each heartbeat. The goal is achieving an evenly paced heart rate characteristic of relaxation, rather than the chaotic spikes and dips associated with stress. Improvement may be seen in blood pressure, stress and anxiety.

An interface displays the output of the sensors. It may be graphs, images or games on a monitor, or some kind of sound output. As your body changes —

Know the risks of painkillers

When used appropriately, pain relievers — both prescription and nonprescription — can be very effective at reducing pain and improving quality of life. Still, it's wise to be cautious and understand the risks.

Nonprescription staples for pain — including acetaminophen (Tylenol, others) and nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen (Advil, Motrin IB, others) — are often taken without much thought. They're easy to come by, effective for minor aches and pains, and generally considered safe for most people in low doses over short periods of time.

However, the potential for harm can climb as you take higher doses of pain relievers, or take pain relievers for longer periods. This is especially true in older adults, as natural declines in organ function and reserve — not to mention potential organ disease — may increase susceptibility to side effects. Depending on the drug, possible serious side effects may occur, including:

- Stomach bleeding
- Kidney damage
- Liver disease
- Cardiovascular risks, including high blood pressure and heart attacks
- Ringing in the ears (tinnitus)

Generally, it's best to limit your use of nonprescription pain relievers to reduce your risk of side effects. The maximum dose of acetaminophen is 3,000 milligrams (mg) — no more than nine regular-strength or six

extra-strength tablets — in a 24-hour period and even less if you drink alcohol, have liver issues or take other drugs that affect your liver.

For ibuprofen, limit your use to 1,200 mg a day, broken into doses of 200 to 400 mg every four to six hours. For naproxen sodium (Aleve), the limit is just 660 mg a day, broken into doses of 220 mg every eight to 12 hours. It's recommended that older adults not use NSAIDs for longer than 10 days in a row.

In the case of chronic pain, a stronger medication may be recommended to achieve better pain control and improve your quality of life. This may be in the form of prescription NSAIDs or as other classes of prescription pain medications, including COX-2 inhibitors and opioids, or additional treatments such as antidepressants and anti-seizure drugs. (For more on opioid and non-opioid pain relievers, see our June 2018 issue.)

These medications also carry substantial risks and should be taken only as prescribed. Some drugs, such as muscle relaxants, aren't recommended for adults older than 65. Work with your doctor to target the most appropriate medication to manage pain while also minimizing your risks. Use the guide below to assess the risks of pain medication use.

If your chronic pain isn't relieved through the usual treatments, your doctor may refer you to doctors who specialize in pain rehabilitation, to safely explore other methods of finding relief.

such as a muscle becoming tense or relaxed — the result is displayed in real time. The therapist can guide you toward controlling body responses by watching how your thoughts, actions and intention change the display.

Biofeedback sessions typically last 30 minutes to an hour. The goal is to gradually become proficient in reducing physical responses to stress even when you're not connected to a biofeedback device. The number of sessions you'll need will vary from a single session to 10 or more. The evidence supporting biofeedback is strongest for migraines, tension headaches and jaw pain. The evidence isn't as strong for abdominal pain, fibromyalgia, and back and neck pain. Still, biofeedback is commonly prescribed for these conditions, because doctors often see people who have benefited from it.

However, biofeedback may not work well for those who have heart rhythm problems or certain skin conditions. In addition, the cost may not be covered by insurance, so you may want to check first with your carrier.

Wide range of other treatment approaches

Whether working with your doctor or attending a pain rehabilitation program, your treatment plan may also include the following aspects:



Biofeedback therapy is a systematic, machine-assisted way to help you learn how to manage your reaction to stress.

- *A thorough, upfront evaluation* — A review of your physical and psychological conditions, your use of medications, your work situation, and your relationships with family members help the staff devise a treatment plan and goals that address your specific needs.
- *Medication management* — Many people with chronic pain end up on medications such as opioids — sometimes referred to as narcotics. Unfortunately, these drugs may not help relieve chronic pain, and in fact may be worsening pain, decreasing your tolerance to pain or causing other damaging side effects. Reducing or eliminating unhelpful medications — often with a planned tapering off of the drug — is a common strategy. Certain medications for pain, sleep or depression may still be appropriately used.
- *Physical therapy* — General physical fitness, as well as education on proper body mechanics and pain-related behaviors, helps you get in better overall shape and teaches you to use your body in more efficient and less painful ways.
- *Psychological care* — Depression, anxiety and dependency on alcohol, tobacco or other substances are aspects of psychological health that may be evaluated and addressed.
- *Lifestyle management* — With chronic pain, minor lifestyle issues can become major stressors. Addressing various issues such as nutrition and sleep habits may help your overall health. In addition, you may learn techniques that increase the control you have over what you do, such as how to pace yourself, manage your time and make modifications to daily tasks — such as caring for your grandchildren, shopping or leisure activities — that make them doable.
- *Group therapy* — This allows you to connect with others who are dealing with chronic pain, often with the goal of improving relationships while recognizing and constructively responding to negative changes and emotions.
- *Complementary therapies* — This most often includes therapies — such as acupuncture, massage, biofeedback, mind-body practices and hypnotherapies — that may be beneficial to some people.
- *Family counseling* — Chronic pain in one family member can impact an entire family, leading to miscommunication, resentment, financial strain,

Antidepressants can help, but there are risks

Antidepressant medications have become a mainstay in the treatment of many chronic pain conditions, even when depression isn't a factor. They have been found to have some effectiveness for pain caused by arthritis, nerve damage from diabetes (diabetic neuropathy), nerve damage from shingles (postherpetic neuralgia), tension headaches, migraines, facial pain, fibromyalgia, lower back pain and pelvic pain.

Doctors still don't fully understand how they work in fighting chronic pain, although it's believed the medications may increase neurotransmitters in the spinal cord that reduce pain signals. But they don't work immediately.

You may feel some relief from an antidepressant after a week or so, but maximum relief may take several weeks. People generally experience moderate pain relief from antidepressants. Medications from other drug classes with distinct mechanisms of pain relief — such as antiseizure drugs — may be used in combination with antidepressant class medications if pain relief with antidepressants is incomplete.

Tricyclic antidepressants such as amitriptyline (Elavil) and nortriptyline (Pamelor) are a common type of antidepressant used for pain. Side effects of tricyclic antidepressants may include drowsiness, dry mouth, blurred vision, nausea, weight gain, constipation and lightheadedness on standing up due to a drop in blood pressure. The doses that are effective for pain are generally lower than the doses used for depression. Most people are able to take tricyclic antidepressants, particularly in low doses, with only mild side effects.

What to expect from your doctor

The Centers for Disease Control and Prevention (CDC) provides guidance to doctors for safe prescribing of opioid medications. Following those recommendations, your doctor may do some or all of the following:

- *Try alternatives* — Your doctor can help you evaluate many other therapies — including nondrug treatments and nonopioid medications — before considering a trial of opioids. Studies have shown that alternatives often have similar benefits to opioids with fewer side effects. If opioids are prescribed, expect them to be just one part of a comprehensive therapy package that includes nonmedication treatments such as exercise and psychological and behavior therapy.
- *Work with you to establish realistic treatment goals* — Your doctor can help you determine how much pain relief you need in order to gain function and have a good quality of life. There's no cure for chronic pain and there are risks associated with all pain medications. You and your doctor should be partners in maximizing your enjoyment of life while minimizing health risks.
- *Ask you to sign an opioid therapy agreement* — Typically, these agreements state your responsibilities while using opioid medications. You'll agree to use opioids only as prescribed and to obtain painkillers from only one

physician and one pharmacy. You'll acknowledge that you won't receive additional medication until your prescription runs out, even if your medication is lost or stolen.

- *Check your medication history* — Your doctor may ask you for a detailed history of the medications you're taking now or have taken in the past, and use a state prescription drug monitoring program database.
- *Establish a schedule of follow-up appointments* — Your doctor may request that you submit to periodic urine tests and pill counts. You may be asked to agree to maintain all aspects of your treatment plan — such as physical therapy or behavioral medicine. Your doctor may require a follow-up appointment one to four weeks after you start opioid therapy to evaluate the benefits and risks of these medications for you. If you continue taking opioids, your doctor may need to see you frequently — either with every prescription refill or every three months — for as long as you use these drugs. Violation of any of these terms may prompt termination of opioid therapy.
- *Help you minimize withdrawal when you stop opioids* — If you've taken opioids for chronic pain and you and your doctor decide it's time to stop, there are ways to help you slowly and safely taper off these drugs to avoid potentially severe side effects.

confusion and isolation. Family counseling often helps family members learn how to best respond to a loved one in pain and how to take care of themselves.

Light out of the darkness

With chronic pain that comes and goes — or that never goes away — it's understandable that you may feel as though your pain has control over your life. However, once pain is better managed, the associated frustration often lifts. Keep in mind that some treatments will work right away, some will work only after a while and some may not work at all. Finding the right mix requires perseverance. But the end result — a life in which you're in charge, not your pain — can make it all worthwhile. □