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Understanding and Managing Chronic Pain

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Most of the time pain serves as a critical part of our sensory system, and is therefore a necessary though unpleasant function of a healthy body. However, it is becoming increasingly clear that *chronic* pain may be more like a disease or pathology of the nervous system associated with abnormal responses in the brain and spinal cord. In this light, chronic pain is both a common and serious medical condition. After more than two decades of providing psychological consultation in various chronic pain clinics and programs, I have no doubt about this assertion. Chronic pain is serious because of the impact it has on every facet of patients' lives and because for many patients, cures are unattainable. It is medical because, at its root cause, chronic pain is always connected with the body and the brain.

Acute pain responses

Acute pain is that initial sensation of warning and hurt that we all experience. It tells us immediately when we are injured and lets us know the location and most often even the amount of damage that may have occurred. Pain is one of the most vital of our warning systems because it tells us about tissue damage anywhere in the body, and triggers our protective systems of withdrawal (taking your hand out of the fire), rest (to allow the injured area to heal), protection (tensing up areas around an injury to prevent re-injury), avoidance (fear of the context of the injury to prevent doing it again), and even warning to others (shouting out). These are all critical activities for survival. Those born with a rare condition that prevents the perception of pain (congenital analgesia) have a significantly decreased life expectancy due to unrecognized trauma and infection.

It is important to remember these properties of acute pain in order to better understand chronic pain. Although I will describe below a variety of methods we use to try to help patients manage chronic pain, and how this management approach differs from that of acute pain, keep in mind that the physiological system underlying both is the same. So no matter how much you read or are told about the differences between acute and chronic pain, and no matter how much you tell yourself that chronic pain does not mean something is terribly wrong (it is "hurt but not harm"), chronic pain will still mostly "feel" like tissue damage and injury. This does not mean you cannot better manage and even decrease the severity and impact of pain in your life, since in fact you can. But the optimum pain management approach is not based on willing pain away, or pretending it isn't there, but rather on making best use of the growing scientific knowledge of how pain is communicated and *modulated* (altered or modified) in the body and brain.

Chronic pain

Chronic pain, which is often defined as continuous or intermittent pain lasting longer than six months, afflicts an estimated 30 million to 50 million Americans, with social costs in disability and lost productivity totaling more than $100 billion annually. Pain is the number one complaint that brings patients to doctors, as well as to complimentary or alternative medicine (CAM) practitioners. The tremendous suffering caused by chronic pain is not measurable in dollars and almost all of us know at least one person who is struggling with chronic pain. Pain not only leads to disability and emotional suffering, but more evidence is accumulating that some types of chronic pain may be damaging to both the nervous system and even the

Pain in irritable bowel syndrome

IBS is a disorder with many overlapping unpleasant symptoms including pain or discomfort, bloating, fullness, a sensation of incomplete evacuation, and alterations in bowel habits. Although one does not have to have pain to fit the diagnostic criteria for IBS (either abdominal *discomfort or pain* associated with altered bowel habits is enough) surveys indicate at least 60% of those with IBS report pain as a significant symptom. In a recent survey, we asked a large group of IBS patients which symptom they would most like to be rid of (if they could only pick one); about 25% indicated abdominal pain while about 50% picked the alteration in bowel habits. We have found that patients with pain as a significant symptom show greater *visceral sensitivity* to colonic distension (increased perception of sensations in the gut), suggesting a greater difficulty with pain modulation in this group.

One difficulty in assessing pain in IBS and other functional GI disorders is that pain in the visceral organs is often less clear-cut in its location and quality compared with joint or muscle pain. It is important to note that abdominal pain can be an important problem for patients suffering from constipation, diarrhea, or alternating bowel habits and may occur in the absence of any ongoing change in bowel habit.

What causes the pain in IBS? While we do not have a conclusive answer to this question we can speculate that those with IBS, like many other chronic pain conditions, suffer in part from an increased sensitivity to visceral stimulation. Gut specific causes of hypersensitivity such as changes in the cells of the lining of the GI tract are currently being investigated as well as changes in the pain transmission or modulation system similar to that found in other chronic pain conditions.

Treatment of pain in IBS is usually first targeted at normalizing diarrhea or constipation. Some of the adjunctive pain medications such as antidepressants are also used. Narcotic pain medications are usually not recommended due to having GI side effects and problems with tolerance and dependence. Education and training in the use of positive coping strategies such as abdominal breathing and cognitive restructuring, has also been shown to be very helpful with IBS symptoms, including pain, and should be used in conjunction with any medical management. When persistent pain or difficulty in controlling pain medication use continues to be a major problem in IBS, referral to a pain specialist or clinic is recommended.

immune system. Dr. John Liebeskind, who was a leading pain researcher at UCLA, was one of the first scientists to demonstrate that persistent pain may negatively influence the immune system. In order to wake up the rest of the medical community to the importance of adequate pain management he wrote and spoke on the provocative topic that "pain can kill." Using animal studies, Dr. Liebeskind demonstrated that increased pain after surgery was associated with more rapid spread (metastasis) of several common cancers and that animals given morphine for pain relief actually lived longer than those who did not receive it.

Pain transmission and modulation

Although much remains to be known, research over the past three decades has revealed key information about pain and our bodies' response, and this has led to improved treatment in many areas. Acute pain usually begins with activation of *nociceptors*, which are specialized nerve endings located throughout the body (interestingly, almost everywhere except for the brain) that respond exclusively to tissue-damaging stimuli (e.g., excessive heat, cold, tearing, pressure). Various chemicals, such as prostaglandins and stress related hormones, can sensitize nociceptors. (In fact, aspirin-type pain relief medications (NSAIDs) work by blocking the prostaglandins.) The pain signal then travels along special nerve fibers to the part of the spinal cord called the dorsal horn. From the dorsal horn, the pain ascends to the various brain structures such as the thalamus and then to the cerebral cortex.

Although this pain transmission system was once thought to operate like an old-time telegraph (messages input at one end and arrive at the other), we now know that the system is much more like a powerful computer. In order to enable our body to have the best information when it is needed, signals coming in are highly modulated. This means pain signals from specific areas can be amplified, suppressed, or altered in quality in the spinal cord or brain. Dr. Howard Fields has coined the term "virtual pain" to describe the fact that our experience of pain is often far removed from the reality of what is going on at the nociceptors. For the most part this works to our great advantage. For example, after stubbing your toe, the pain, which is an acute signal to check for damage, quickly dulls. This is an active process of pain suppression to allow us to return to other actions. In a similar way, most of the activity going on in our gastrointestinal tract (including very large muscle contractions) is not felt due to active suppression. On the other hand, pain might continue to remind us to avoid active use in an injury in which movement may be harmful.

The description of our own built-in pain modulation system (called the gate control theory) by Drs. Melzack and Wall in 1965 and the subsequent discovery of internal opiate-type chemicals (such as the endorphins) were major first steps in a fuller understanding of pain control within the body. More recently, many more parts of this complex system have been uncovered, as well as new chemical transmitters and interactions between pain modulation and other parts of our sensory and emotional brain systems.

> The **gate control theory** states that nerve impulses, evoked by injury, are influenced in the spinal cord by other nerve cells that act like gates, either preventing the impulses from getting through, or facilitating their passage. In other words, the brain is not a passive receiver of pain information but can influence the information received.
>
> *—Dr. Ronald Melzack*

Pain and threat

We have known for a long time that pain is not a simple sensation and that it is intimately linked with our inborn emotional systems for detecting and responding to threat. In this way it is closely tied to the same fear or "fight or flight" system that responds to external threats. Any sound or object may be associated with a fear response, but pain is unique in that it always has a negative emotional quality (unpleasantness) and is closely associated with emotions of fear and anxiety.

Dr. Fredrick Lenz and colleagues at Johns Hopkins Hospital recently reported an interesting study that illustrates this close connection. Dr. Lenz is a neurosurgeon who studies pain pathways by stimulating parts of the brain with tiny electrical currents during surgery to relieve epilepsy. The patient is awake during the procedure and if the appropriate area of the brain is stimulated he or she feels a sensation in the part of the body connected with that bit of the brain (e.g., a sensation of warmth or touch on the hand). If a pain-specific part of the brain is stimulated, the patient may feel pain in a particular place. In patients with angina, or chest pain, stimulation of a particular part of the brain (the thalamus) elicits the same pain or discomfort they feel with their angina, but since patients know "where" the pain is coming from, it is not particularly bothersome (i.e., they know they are not having any heart problems). However, in a patient who had severe anxiety and panic attacks associated with chest pain, stimulation of the thalamus led to an immediate sensation of panic, despite the fact that the patient knew the stimulation was only part of the experiment.

Since stimulation of the thalamus does not directly influence emotional areas of the brain, this experiment dramatically illustrates the power of learned associations between specific painful sensations and emotional reactions. Once set in place, these conditioned responses operate regardless of the context and without conscious input. In a similar way, pain or even the context (i.e., the time, place, or circumstances) surrounding a painful episode may perpetuate a pain-fear-pain cycle. Some of the brain circuits underlying this pain-fear cycle have recently been made clear using functional brain imaging for both somatic and visceral pain problems. Connections between the emotional and pain systems may also account for the often successful use of anti-anxiety and anti-depression medications to treat chronic pain.

Chronic pain management

In chronic pain we have strong evidence that our pain modulation system is not working well. Instead of suppression, the system may be over sensitized so that even normal sensations trigger pain transmission and suffering. As a result of the pain, patients may also have increased levels of anxiety and depression, decreased quality of life, fear of further pain and disability, sleep loss, and withdrawal from social and pleasurable activities. Although the above discussion might lead one to feel helpless in the face of such an important and

powerful physiological system that has gone astray, the better news is that both ancient and modern medicine has evolved a variety of ways to help cope with chronic pain and maybe even return the system to more normal functioning. Some of these are discussed below.

The better news is that both ancient and modern medicine has evolved a variety of ways to help cope with chronic pain and maybe even return the system to more normal functioning.

Medications—For many types of pain we fortunately have very good medications. Recent new understandings of the neurophysiology of pain have led to even more specific and effective medications for some pain problems. In migraine headache, for example, new data on the pathophysiology led to development of a class of drugs called triptans, which are highly effective medications for aborting migraine attacks in the majority of patients. New understanding of the different subtypes of receptors involved in *prostaglandin synthesis* (a normal body function that produces inflammation and results in pain) has led to much improved anti-inflammatory medications (the "cox-2" inhibitors). In addition, some medications developed for other conditions have proven to be very effective for some chronic pain conditions. Several medications originally developed as antidepressants and anti-convulsants are now commonly used to treat pain, especially pain associated with nerve damage (such as diabetic neuropathy, or "sciatic" leg pain following a back injury). Unfortunately, for many chronic pain conditions there is no specific medication yet. Therefore, many patients with pain are left with either no good medications for pain control or one of the many narcotic medications that are available.

Due to side effects, especially the development of tolerance, narcotic or opioid mediations have limited utility in chronic pain despite their excellent analgesic properties. While there is new evidence that indicates that addiction per se is not as big a problem for patients with chronic pain as one might fear, tolerance and dependence are still almost inevitable consequences of daily use of these mediations. What this means is that the same amount of the medication will lead to less pain relief over time; and the person may become even more sensitive to pain as their own pain modulation system is suppressed. To limit tolerance, narcotics are best prescribed for use in small doses (the aim is for some, but not complete, pain relief) throughout the day and not only when the pain becomes severe. While use of narcotics for chronic pain is sometimes a viable piece of the overall pain management plan, it is not typically enough in and of itself. In many programs, chronic use of narcotics is recommended only if a small amount of medicine leads to significant pain relief and increased function. However, if increasing daily doses are needed and only a limited amount of pain control is achieved, it is probably time to switch away from narcotics to another pain management strategy.

Self-management—Pain is in our body and our brain, but we can use our mind, our actions, and our spirit to help control pain even when it is not possible to cure it. For this reason, much of the psychological research in pain has focused on what are effective and ineffective coping strategies. It is clear from this research that active coping strategies (such as exercising, seeking out information, and planning ahead for possible exacerbations) are key ingredients in successful pain management. Passive strategies (such as rest, hoping the pain will go away, or waiting for a doctor to find an answer) are typically associated with poorer outcome and increased suffering. Some important positive and active coping strategies for pain are:

Stress is the neurophysiological and subjective response to stimuli.

***Recognize stress*:** Many of us are very good at ignoring our level of stress. This may be adaptive in many circumstances, but given the close relationship between pain and stress it is very important for patients with pain problems to become better observers of their own stress levels. Symptoms such as fatigue, irritability, sleep problems, decreased concentration, or lack of interest in formerly pleasurable activities are signs of stress. Recognition of them will help you take positive action to better control stress.

***Use a relaxation technique*:** Since pain is so strongly connected to the stress system, we can usually decrease the severity and especially the bothersomeness of pain through changing our physiological and psychological stress response. Relaxation exercises, yoga, meditation, and other approaches for decreasing the physiological arousal in our body have been shown to be powerful pain management strategies if done regularly. Relaxation exercises can break the cycle of pain and discomfort in which increased muscle tension leads to increased pain. Several of the most effective relaxation techniques (such as diaphragmatic breathing and progressive muscle relaxation) are very simple to learn and use. Although ideally they are taught to patients in one or two individual or group sessions, some individuals have had good success in learning them from a written description.

Progressive Relaxation

Typically, our breathing is either shallow and irregular (chest or thoracic breathing) or deep and regular (abdominal or diaphragmatic). Shallow chest breathing is often associated with muscle tension and distress. Deeper abdominal breathing, on the other hand, is associated with reduced muscle tension and relaxation.

Here is one simple relaxation technique that uses breathing: Allow about 10–15 minutes. Find a quiet place. Sitting upright or lying on your back with your arms at your side and your palms facing up, close your eyes and remain motionless. Breathing through your nose, take several slow, deep breaths. Turn your attention to your breath and imagine it going deep inside, flowing through your body. Imagine that each inhalation captures tension, and each exhalation carries it away. Feel the breath go into your abdomen so that it gently rises with your inhale and falls with your exhale.

Breathing this way, turn your attention to progressively relaxing every part of your body. Start with your feet, and slowly work your way up through your legs, pelvic area, stomach, chest, back, arms, shoulders, neck, face, and head; consciously think about each area of your body while letting go of muscle tension there. Just let the chair or mat completely support you while you let each area of your body let go and relax. When you feel the muscles relax in one area of your body, move on to the next. After you have finished, remain still and breath quietly for several minutes. Enjoy the calm feeling of relaxation, before slowly opening your eyes.

***Exercise regularly*:** Patients with a variety of pain problems are told to rest, and in fact the best response to many *acute* injuries is rest. However, prolonged rest and inactivity is almost always detrimental. This is because prolonged rest, even in healthy individuals, leads to significant protein and calcium loss, decreased efficiency of the cardiovascular system, and even changes in the nervous system and immune function. In short, as human animals we are built to move and regular, vigorous movement is essential to keep the systems of our body functioning. It is interesting to note that several recent studies by Dr. Wendy F. Sternberg and colleagues from Haverford College in Pennsylvania have scientifically documented what many of us already believed; vigorous exercise leads to decreased pain sensitivity (probably by activation of our own pain control system described above). The opposite is probably also true, namely that very low activity levels increase pain sensitivity and therefore increase the level of discomfort in patients with an ongoing pain problem. Regular exercise is also an excellent way to help decrease depression and anxiety, and help with weight loss. You will need to pace activities if you have a pain problem that makes exercise difficult. Swimming, walking, and riding an exercise bicycle are safe ways to increase fitness and decrease stress. As discussed below, several traditional forms of exercise such as yoga, tai chi, or chi gong may also be of significant benefit for patients with pain.

***Be positive but realistic*:** Research on coping has shown that catastrophizing or focusing only on the worst possible outcome is a common roadblock to patients taking positive control over their problems. In pain management we often ask patients to challenge common but irrational automatic thoughts such as, "I will never be able to ... again," or "My life is now meaningless." It is also not helpful to tell oneself that "Everything will be fine" because that may not be true. Instead we ask patients to substitute a more positive and rational thought such as, "I am having a difficult time but I have survived similar bad periods" or, "There are still some options to try." In a similar way, we ask patients to more clearly define what in their life they can and cannot control. Increased worry and focus on things we cannot control is usually not productive. Instead, efforts should be aimed at those aspects of our condition we can influence or change.

***Try to improve sleep*:** Patients with chronic pain report sleep as their number one problem. While there are a variety of medications that help improve sleep temporarily, most (with the exception of some of the antidepressant medications) are not useful on a chronic basis. *Sleep hygiene* is critical for anyone with sleep problems. This includes having a period of time of relaxation before going to bed; keeping a specific wake up time even if you did not sleep well during the night; not staying in bed for more than 20 minutes without sleeping (get up and do something relaxing until you feel sleepy again); turning the clock away so when you awake you cannot focus on the time; using the bed only for sleep (or sexual activity) and not reading, watching TV, or eating; and avoiding food or drinks with caffeine for at least 4 hours before bedtime. Daytime activities also affect sleep, so regular exercise and avoidance of napping can greatly improve nighttime sleep.

***Seek out social activities and support*:** Unfortunately, many patients with chronic pain withdraw from their social world and even their family. This is often a gradual process that needs active attention to reverse. Many times it is necessary to force oneself to participate in social events even if you do not feel like it.

Complementary and alternative medicine (CAM)

CAM generally refers to modalities, practices, techniques, and systems of healing that are used together with ("complementary to") or instead of ("alternative to") conventional medicine. Among the modalities that are usually included as CAM are chiropractic, acupuncture, massage therapy, mind-body techniques (e.g., biofeedback, guided imagery, yoga, and meditation), some forms of nutritional therapy, dietary supplements (including herbs), as well as homeopathy, naturopathic medicine, various forms of energy healing, and the indigenous healing systems of the many ethnic groups in the United States.

Over the past decade, several nationwide surveys have documented a substantial and growing usage of CAM practices and products by the American public. These surveys have found that most CAM users seek out conventional medical treatment first, and then turn to CAM practitioners. Most people appear to use CAM in conjunction with, not as a replacement for, conventional medical therapy, and many seek out care that integrates the best of a variety of approaches. Up to 42% of the population may use CAM methods. And even higher use of CAM therapies have been found among people with chronic and life-threatening conditions and chronic pain. For example, a recent study at a major cancer center indicated that 69% of patients included CAM approaches as part of their cancer care.

Scientific study of CAM techniques is still in its infancy. For example, in 1997 the National Institutes of Health issued a consensus statement on the use of acupuncture, one of the most common CAM modalities. While there have been hundreds of studies using acupuncture, most were of such poor scientific quality that the panel could only find clear evidence for the effectiveness of acupuncture on various forms of nausea and only one pain condition (postoperative dental pain). Acupuncture is thought to stimulate our internal pain control system and production of endorphins, but this has also not been clearly demonstrated.

Many other CAM modalities have been reported to have significant benefit for chronic pain but even less scientific data exists to inform patients regarding their efficacy and safety. It is clearly time to embark on serious study of ancient and alternative medical approaches using the tools of modern science. It is promising and exciting that recent data on mind-body interactions support the fundamental basis of most CAM approaches, namely that the mind, brain, and body are best treated as an integrated whole.

At UCLA, we recently inaugurated the Comprehensive Mind Body Center, an interdepartmental affiliation of scientists, clinicians, and programs working in complementary and mind body medicine. The goals of the center are to promote the development of new models of medical care and provide a scientific basis for integrative medicine. Other similar centers around the country are also working on similar goals.

At present, decisions on whether to try CAM techniques for pain control or which techniques might be most appropriate must be made by each patient without the benefit of clear scientific data. If you are considering a CAM approach, it will be important to gather as much information as you can about the methods and especially the provider. As with any provider, look for his or her credentials, number of years experience, and ask

direct questions on what to expect and possible side effects from the treatment.

Putting together a pain management program

If you have chronic pain it is important to develop a pain management plan that works for you. Some recommended elements include:

1. Understand your pain problem. Try to separate hurt from harm. The pain you experience is real, but the cause may be a heightened sensitivity of the nervous system and not increasing damage to some part of your body (even though it feels that way).

2. Maintain a cooperative but not dependent relationship with your doctors. Doctors have a difficult time treating chronic pain and may feel frustrated as well. Be honest and assertive with your doctors, but also let them know you understand they cannot perform miracles and that chronic pain management is a team effort.

3. Use medications wisely, as directed by your physician.

4. Don't be afraid to acknowledge your emotional response to pain, be it fear, anger, or depression. Seek out psychological help if needed. Remember that the best chronic pain treatment should include both mental and physical elements.

5. Use active and positive coping strategies as much as possible. Passive strategies lead to increasing helplessness and dependence.

6. Seek support when needed but stay in control. Family, friends, and health care professionals are all important resources for you, but often they are not sure how best to help. Let all the important people in your life know that you appreciate their support and that you will ask them directly when you need their help or just someone to talk to.

7. Remember that new knowledge and treatments are coming so stay in touch. Pain is a rapidly expanding area of research. New technologies in functional brain imaging and molecular biology are generating, for the first time, detailed portraits of our brains in action and the biochemistry of pain transmission. There is no doubt that improved pain treatments will not be far behind.

8. If your pain problem continues to be unmanageable, you can contact a pain specialty clinic. Be aware that many practitioners (medical and chiropractic) may call their own practice a "pain clinic." However, a true pain management clinic provides comprehensive care by including multiple medical specialties such as anesthesiology, neurology, psychology and rehabilitation. Many of the best pain programs are located in university medical centers. Your primary care doctor should be able to refer you to a good one.

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