Pain is a normal response by the body to prevent further damage and promote healing. While an uncomfortable sensation, it is generally a temporary phenomenon. Not all pain is bad. In fact, pain is part of the body’s protective system. When trauma or injury occurs, neurons send signals to the brain to stop the activity causing the pain. Pain perception involves a very complex system of multiple receptors, neurotransmitters and nerve pathways that process and transmit signals to the brain.

With such complexity comes many opportunities for transmission errors to occur. Often chronic pain results after trauma or injury cause miscommunication and alterations in the transmission and perception of pain. Studies prove that certain interventions can reset nerve pathways and lessen or eliminate some chronic pain.

A TYPICAL WORKERS’ COMPENSATION INJURY

Consider a hypothetical case involving an office worker who lifts a heavy box and strains her neck and shoulder. The patient’s pain would normally subside in about two weeks. Evidence-based treatment guidelines call for acetaminophen or a nonsteroidal anti-inflammatory (NSAID) as first-line medications. However, a small group of patients may continue to experience prolonged or greater-than-anticipated pain relative to the severity of this injury. In those rare cases, treatment may progress to include other medications such as opioids. Prolonged acute pain and/or exposure to opioid therapy could begin to change the brain’s perception of pain.

THE BRAIN ADAPTS

The brain’s ability to adapt to changing circumstances is a factor. This innate ability — called neuroplasticity — occurs throughout a person’s lifetime. It can result in the brain and pain transmission pathways becoming rewired — or neuroremodeled. When this occurs, nerves along the pain pathway may be altered, causing a maladaptive change in the patient’s perception of pain. This maladaptation by the brain can complicate the rehabilitation of this patient and hinder her ability to return to work.

To understand the concept of neuroremodeling, think of the brain as a computer hard drive. The hard drive runs dozens of programs in the background in order to process and interpret constant inputs. A complex system of microchips and wiring transmits millions of pieces of information in the blink of an eye. If we boot up our computer and a critical file is corrupted or a key program misfires, the hard drive may not operate properly or may stop operating altogether. We may need to repair it or completely reboot it to get working again.

The same holds true of the brain, which continually processes and interprets inputs and generates outputs through the central nervous system. When neuroremodeling changes the nerves on the pain pathways, a breakdown in transmission of pain can occur and lead to unexpected outcomes. The brain can begin to perceive pain when no harmful stimuli are present or may heighten or mute the sensation of pain in response to stimuli. Repairing or rebooting the brain’s processor may be in order.

UNDERSTANDING PAIN: NEUROREMODELING

DOES CHRONIC PAIN HAVE TO BE CHRONIC?

FAST FOCUS

When acute trauma or injury changes nerves along pain pathways in the central nervous system, the brain’s perception of pain can be altered, and the stage can be set for chronic pain. A number of therapies have proven useful in resetting the brain’s perception of pain and curbing chronic pain.

Pain is a normal response by the body to prevent further damage and promote healing. While an uncomfortable sensation, it is generally a temporary phenomenon. Not all pain is bad. In fact, pain is part of the body’s protective system. When trauma or injury occurs, neurons send signals to the brain to stop the activity causing the pain.

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OPIOID-INDUCED HYPERALGESIA

One example of a maladaptive neuroremodeling occurs when opioid receptors undergo an alteration of function. In certain patients, this may increase instead of decrease the sensation of pain when opioid therapy is administered. This effect is called opioid-induced hyperalgesia (OIH). In the case of a patient suffering from OIH, removing opioids from the system through a tapering and discontinuation process may cause a rebound, and reset the patient’s perception of pain. A medically supervised gradual reduction is recommended and the assistance of a comprehensive pain management center may be indicated. Pharmacologic treatment — particularly opioid treatment — may be ineffective in treating pain for these patients so alternatives may need to be considered. [See related article, page 28 Preventing chronic opioid use]

REVERSING NEUROREMODELING

A number of treatment options can lessen chronic pain by reversing the misalignment of pathways that affect the way the brain processes pain. Options for reversal of this neuroremodeling include opioid tapering and discontinuation, mirror therapy, biofeedback and cognitive behavior therapy.

MIRROR THERAPY

A well recognized example of a mind-over-matter approach to changing the brain’s perception of pain is mirror therapy. Mirror therapy has been used successfully to treat phantom limb pain often experienced by amputees. It involves showing the amputee a reflected image of an intact limb repeatedly over a defined period of time. The brain begins to “see” an intact limb instead of perceiving a missing limb. The sensation and pain associated with the missing limb is reduced or eliminated. One study looked at the effects seen in the brain pre- and post- mirror therapy and documented the successful reversal of neuroremodeling and decrease in phantom pain.57

PSYCHOTHERAPEUTIC INTERVENTIONS

Interventions such as biofeedback and cognitive behavior therapy (CBT) also work on the brain’s perception of pain and may be useful in reversing the remodeling process. Biofeedback achieves this by creating greater awareness of the patient’s physiologic expressions of pain in their own body so they can manipulate and control them to alter their perception of pain or keep pain from escalating. Patients can be taught to change their thoughts and control emotions, which can result in improved breathing patterns, slowed heartbeats, lowered blood pressure and a reduced perception of pain. Cognitive behavior therapy (CBT) addresses the relationship of cognitive factors to pain behaviors. Through CBT, a patient can learn to identify their own negative, habitual thoughts related to pain and recognize the connection between their pain and those thoughts and resulting feelings. The perception of pain may be minimized by teaching the patient to substitute more adaptive thoughts and use coping strategies such as relaxation, distraction, imagery and self-hypnosis. 58

ALTERNATIVE THERAPIES GAINING GROUND IN COMP

While not widely utilized in the work comp environment, these therapies are gaining ground and are increasingly included in treatment guidelines. The 2013 updates to Delaware Department of Labor Healthcare Practice Guidelines support the use of these modalities in the plan to improve care to injured workers. Biofeedback and cognitive behavior therapy (CBT) also work on the brain’s perception of pain and may be useful in reversing the remodeling process. Biofeedback achieves this by creating greater awareness of the patient’s physiologic expressions of pain in their own body so they can manipulate and control them to alter their perception of pain or keep pain from escalating. Patients can be taught to change their thoughts and control emotions, which can result in improved breathing patterns, slowed heartbeats, lowered blood pressure and a reduced perception of pain. Cognitive behavior therapy (CBT) addresses the relationship of cognitive factors to pain behaviors. Through CBT, a patient can learn to identify their own negative, habitual thoughts related to pain and recognize the connection between their pain and those thoughts and resulting feelings. The perception of pain may be minimized by teaching the patient to substitute more adaptive thoughts and use coping strategies such as relaxation, distraction, imagery and self-hypnosis. 58

FINANCIAL CONSIDERATIONS

As more states revise opioid guidelines, alternative therapies will need to be given serious consideration. The costs of these therapies may initially appear excessive when compared to the cost of medications; however, the potential long-term benefits of reducing opioids and other medications and preventing chronic pain must be weighed.

MORE INFO

Healthesystems covered the topics of opioid and alternative therapies extensively in previous issues of RxInformer. Select articles and issues are referenced and can be accessed at www.healthesystems.com/rxinformer.

Beyond Opioids: Alternative Pain Management Therapies, Fall 2013

Behavioral Health, Fall 2012

Health and Wellness: A Comprehensive Guide to the Treatment of Chronic Pain, Fall 2012

Behavioral Health: A Comprehensive Guide to the Treatment of Opioid Addiction, Fall 2012

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Physician Consultations: The Role of M.D.s in Case Management and Long-Term Care, Fall 2012

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