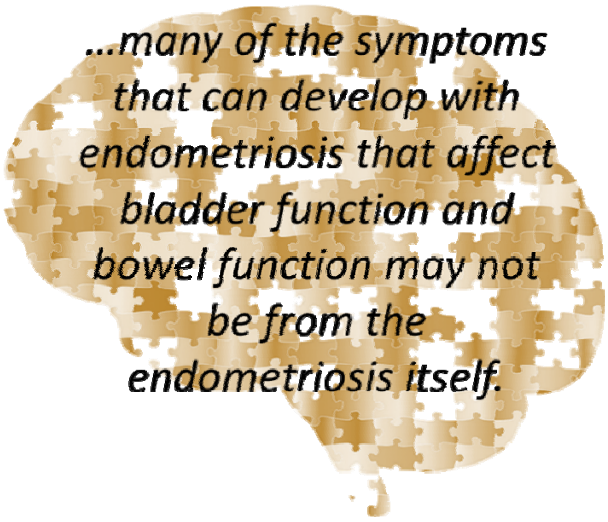
Chronic Pelvic Pain: The Role of Central Sensitization

Kenneth I. Barron, MD

Chronic pelvic pain, defined as pain for six months or more, affects 10-20% of women at some point in their lives. Endometriosis is recognized as one of the most common causes and is seen in up to 70% of women with chronic pelvic pain. However, many symptoms which affect bladder function and bowel function may not be from the endometriosis itself. This may explain why those symptoms don't always go away even after complete excision surgery.

We know from clinical studies there is often little relation between how severe endometriosis disease looks during surgery and the degree of pain a person feels. Some women with severe endometriosis have no symptoms and are only diagnosed when they have trouble getting pregnant. Other patients have severe pain with minimal findings during surgery. We also know that surgery is not effective for everyone: even after removing the uterus and the ovaries, 10% of patients continue to have pain. How do we explain this?

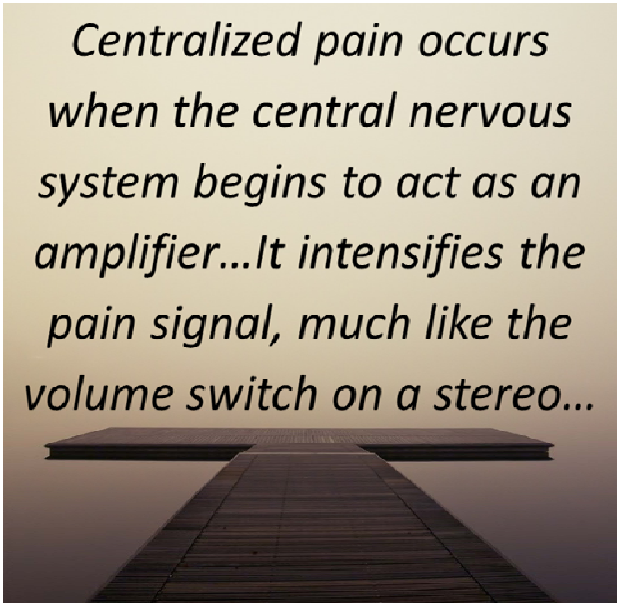


One answer lies in the least understood type of pain: **centralized pain** or **central sensitization.** If you were unaware there were different types of pain, you are not alone. The most familiar pain type is **nociceptive pain**. When you touch a hot stove with your finger, or get a papercut, nerves in your finger send signals to a relay nerve in your spinal cord which then sends the signal to your brain. The result is that you feel pain. This signal also lets you know where the pain is located. Nociceptive pain responds well to common pain medications such as acetaminophen (Tylenol), ibuprofen (Advil), or stronger opioid pain medications.

A second type of pain is **neuropathic pain**. Neuropathic pain occurs when there is damage, compression, or malfunction of a specific nerve in your body. This type of pain is felt in the area the nerve gives sensation to. For example, in carpel tunnel syndrome, when the nerve in the carpel tunnel of the wrist is constricted, a person feels tingling and eventually pain in the palm of the hand, rather than the spot where the nerve is compressed in the wrist. As opposed to the sharp, throbbing, stabbing or aching nature of nociceptive pain; neuropathic pain is often described as burning, tingling, shooting, or electric-like. Neuropathic pain does not usually respond to non-steroidal anti-inflammatory drugs (NSAIDS) such as ibuprofen and naproxen, but responds to medications such as gabapentin (Neurontin) and pregabalin (Lyrica), injections of anesthetics around the nerve, physical therapy to loosen compression around a nerve, and sometimes surgery to relieve nerve compression.

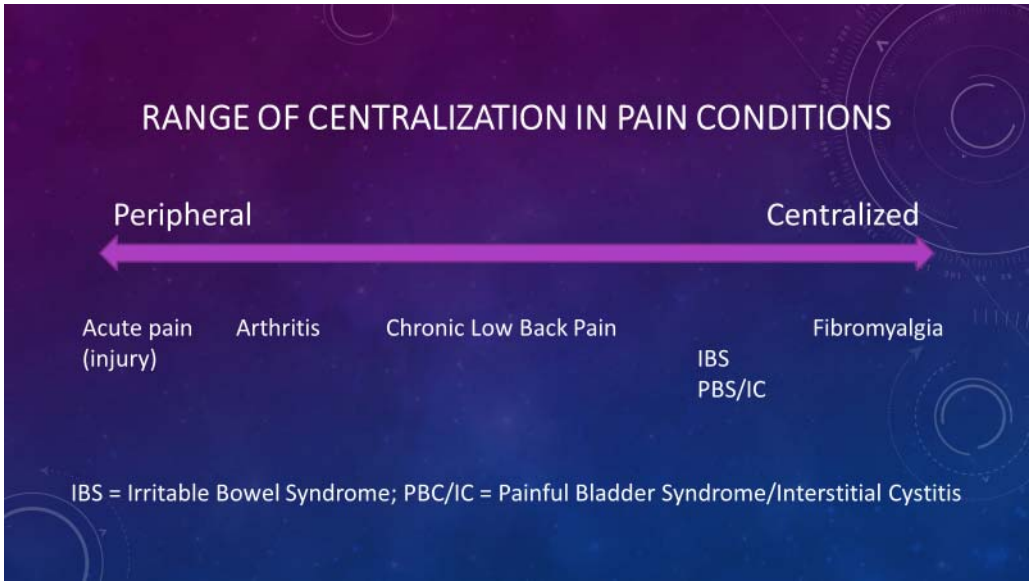
Nociceptive and neuropathic pain are both considered *peripheral pain* because they relate to pain from nerves outside of the relay station (spinal cord) and the pain processing center (brain). Together, the brain and spinal cord are called the central nervous system. *Centralized pain* occurs when the central nervous system begins to act as an amplifier when relaying pain signals. It intensifies the pain signal, much like the volume switch on a stereo, so that the brain translates a little pain signal into a big pain signal. Suddenly the sensation of a full bladder can feel like a bladder about to explode or a stabbing knife.

The best studied condition caused by centralized pain is fibromyalgia. Some patients experience fibromyalgia as constant low-grade pain all over the body and others as having a lower pain threshold. Functional Magnetic Resonance Imaging (fMRI) is an imaging test that measures brain activity in real-time. Functional MRI studies have shown that when people with fibromyalgia are exposed to non-painful touch such as a pressure on their arm, they have more activity in the brain areas that process pain compared to patients without fibromyalgia. Other studies have shown that the pain processing regions in these patients have changed size compared to patients without fibromyalgia.



Like fibromyalgia, many other chronic pain conditions are believed to have components of central sensitization. These include painful bladder syndrome/interstitial cystitis, irritable bowel syndrome, chronic fatigue syndrome and vulvodynia. MRI studies of patients with chronic pelvic pain, Irritable Bowel Syndrome (IBS), and vulvodynia have shown the same changes in brain structure seen in patients with fibromyalgia. Not surprisingly, patients diagnosed with one of these conditions is more likely to be diagnosed with another. People with endometriosis have IBS 32-52% of the time, painful bladder syndrome 33-89% of the time, and fibromyalgia 6% of the time—all more common than in the general population.

Why do only some people experience central sensitization and not others? Initial research shows there are many factors at play: genetics, chronic exposure to pain, stressors, traumatic experiences, and gender. Women are 1.5 to 2 times more likely than men to have this condition.



Recognizing the presence of different types of pain is the first step in figuring out a treatment plan. Failure of bladder symptoms or bowel symptoms to resolve after surgery for endometriosis can sometimes be explained by the presence of residual centralized pain. The treatment of centralized pain is unfortunately not as simple as surgery or a single pill.

TREATMENTS

Medication

Several different medications have been shown to be effective in conditions with central sensitization. **Gabapentin (Neurontin)** and **Pregabalin (Lyrica)** both work by blocking pain signals at receptors in the brain and spinal cord and are non-opioid medications. These medications are started at low doses and increased gradually. They can take 6 weeks to have an effect. When stopped, they need to be decreased gradually to prevent side effects.

Certain medications used to treat depression also have been shown to decrease levels of pain in chronic pain conditions. One class of medication is known as serotonin–norepinephrine reuptake inhibitors and include **Duloxetine (Cymbalta), Desvenlafaxine (Pristiq),** and **Milnacipran (Savella)**. Another class of medication know as tricyclic antidepressants has been shown in multiple studies to decrease pain levels also. These include **amitriptyline** (**Elavil)** and **nortriptyline (Pamelor).**

Exercise

Daily exercise can be a powerful treatment as well. It can be difficult to start an exercise program when you feel pain all the time and experience a worsening of symptoms if an exercise program is begun too quickly. Research has shown, however, that exercise has anti-inflammatory effects, improves sleep and depression, and decreases overall levels of pain in chronic pain conditions such as fibromyalgia, vulvodynia, and chronic low back pain. The mechanism is believed to involve the

release of natural brain chemicals called endorphins which bind to the same receptors that prescription opioids do. Studies of graded exercise programs in patients with fibromyalgia have shown improvement in overall quality of life, physical functioning, and pain intensity.

Mind-Body Therapy

Some of the most interesting and useful studies in treating chronic pain have shown the power of the mind over the body. As an example, Zen mediators have been shown to perceive painful sensations as less unpleasant than non-meditators. Similarly, meditation in the presence of painful sensations decrease the perception of pain intensity and unpleasantness. These meditative concepts have been successfully applied to patients with chronic pain using the more approachable concept of **Mindfulness**. Mindfulness is defined as a mental state achieved by focusing one's awareness on the present moment, while calmly acknowledging and accepting one's feelings, thoughts, and bodily sensations. The act of seeing yourself in an objective or non-judgmental way can give insight into how you respond to pain, stress, and anxiety. This thought process can help to change that response if it is unhelpful. For example, Mindfulness training has been shown to decrease emotional reactivity such as anxiety, which is a known risk factor for higher pain levels. Many hospitals and centers offer classes in Mindfulness.

Specific kinds of counseling/therapy have also been shown to be useful in developing coping strategies for pain flairs and improving quality of life. **Acceptance and Commitment Therapy** is a form of **Cognitive Behavioral Therapy** that focuses on Mindfulness and acceptance ideas. The aim is not complete elimination of pain, but instead to be present with what life brings you and to continue to function even in the face of pain. High quality studies have shown that Acceptance and Commitment Therapy improves pain-related functioning, mental health-related quality of life, depression, and anxiety in patients with fibromyalgia.

Given the overlap between fibromyalgia and conditions such as irritable bowel syndrome, painful bladder syndrome/interstitial cystitis, endometriosis, and chronic pelvic pain; most experts believe effective treatments for one diagnosis may be effective for other conditions. An option for those who do not have access to a trained therapist is a free online program called Fibroguide.com from the University of Michigan Chronic Pain and Fatigue Research Center. This 10-step program has been shown to decrease pain and improve function in patients with fibromyalgia.

Sleep

The restorative role of sleep in chronic pain is often underappreciated. Research analyzing the brain waves of patients with chronic pain have shown decreased sleep quality. Conversely, sleep deprivation in patients without chronic pain can cause symptoms of muscle pain, tenderness and fatigue. Researcher's believe sleep deprivation impairs the ability of the central nervous system to tone down pain signals, and therefore decreases a person's ability to control and cope with pain. Studies of medication and non-medication therapy to improve sleep quality have proven that better sleep can reduce fatigue and pain. Non-medical therapy begins with ensuring a good sleep environment. A dark cool room, maximizing quiet, no TV in the bedroom, and a relaxation routine before bed such as a

shower or bath can be helpful. Eliminating or reducing medications that can alter or prevent restorative sleep is a subject worth discussing with your primary care provider. More information on healthy sleep habits can be found at https://www.cdc.gov/sleep/about_sleep/sleep_hygiene.html.

In summary, some of the painful symptoms that come with endometriosis may not be directly caused by endometriosis, but by the impact of chronic pain on the central nervous system and the development of centralized pain. Centralized pain/central sensitization can lead to pain in other parts of the body such as the bladder, bowel, and pelvic floor muscles with or without endometriosis. Successful treatments focus on the central nervous system with medication, exercise, mindfulness, and cognitive behavioral therapy. There is hope for better pain relief and improved quality of life even if surgery hasn't been curative.

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