PAIN BC™

THE SCIENCE OF PAIN

The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage." Pain is a personal experience that is influenced by biological, psychological, social, and spiritual factors.

While acute pain typically resolves within three months, chronic pain lasts for more than three months and can persist even after tissues have healed. Chronic pain can be complex and invisible because the causes can be unknown and may involve increased sensitivity within the nervous system.

THE PAIN PATHWAY

Pain begins when specialized receptors called nociceptors detect potential threats or harm (i.e. touching a hot stove). These signals travel through peripheral nerves to the spinal cord and then to the brain to evaluate whether pain is necessary as a protective response.

Your nervous system is like a fire

Some messages the brain can tell you might sound like:

- "YES - there is danger," in which case it will send a signal of pain
- "DANGER! Please protect yourself from harm and remove your hand from the stove!"
- "You are safe now."

However, we're not always touching a hot stove. When you live with chronic pain, it might sound like this:

- The sensors that send signals that a stimulus has happened have become too sensitive and are sending too many signals to the brain.
- The brain is also making an incorrect assessment of danger, so it is sending pain signals when they are not necessary.
- The brain also begins creating more sensors, which send even more incorrect signals to the brain.

This is the feedback loop, or cycle, of pain that happens in an over-sensitive nervous system. The whole system is like a fire alarm that keeps going off. With chronic pain, pain is no longer an accurate indicator of harm or danger. But the cycle can be broken. We can teach the fire alarm to be less sensitive, so less pain signals will be sent.

Learn more about the science of pain. Pain Science TEDTalk: youtube.com/watch?v=eakyDiXX6Uc

NEUROPLASTICITY AND PAIN

Neuroplasticity is the brain's ability to change, adapt, and grow. This happens when neurons, or brain cells, form new connections or strengthen or weaken existing ones in response to learning, experience, injury, or environmental changes.

When you repeat an activity or thought pattern:

- Neurons activate together
- Connections between them strengthen
- Signals travel more efficiently over time

When you experience persistent or chronic pain, the brain can change over time and become more sensitive. Since repeated practice of thoughts or actions creates stronger neural pathways, your body learns to experience more pain over time.

- Chronic pain can change brain structure and rewire it so that how you think and what you pay attention to becomes biased towards pain and things that feel threatening.
- A negative pain mindset, such as ruminating how awful pain is and expecting it to worsen all the time, amplifies pain processing in the brain.

Chronic pain brains function differently over time. When someone lives with persistent pain, the brain gets practice sending pain signals to the body. Neuroplasticity comes in play as the natural process where the brain takes in new information and experiences and changes the brain. Like a muscle, the brain can get stronger at whatever it is used for most.

PAIN BC™

WAYS TO RETRAIN YOUR BRAIN

- Pain neuroscience education through the resources below.
- Connecting with a counsellor who practices Cognitive Behavioural Therapy (CBT), Acceptance And Commitment Therapy (ACT), or Pain Reprocessing Therapy (PRT).
- Gradual movements to teach your brain that you can move safely.
- Engaging in mindfulness and meditative exercises to help your body move into a more relaxed state.

RESOURCES

- Pain Support Line: 1-833-261-7246
- Empowered Relief®: paincanada.ca/resources/empowered-relief
- Coaching for Health: painbc.ca/coaching
- Pain Support and Wellness Groups: painbc.ca/supportgroups
- Making Sense of Pain: Online: painbc.ca/msop
- Managing Pain Before and After Surgery: paincanada.ca/course/managing
- Pain BC, Find Help Directory: painbc.ca/find-help/resources/directory
- LivePlanBe+: liveplanbeplus.ca
- Power Over Pain Portal: portal.poweroverpain.ca
- Self-Management BC: selfmanagementbc.ca

REFERENCES

Published May 2026