Science of Pain

Increasing your understanding of why you feel pain helps you manage your pain better. This handout provides information about why the body feels pain.

Why do we have pain?

Pain protects us. Pain acts as a warning to a threat or a potential danger.

Pain is complex. Think of it as an alarm system. 

The alarm system is known as our nervous system. The nervous system includes the brain, spinal cord and neurons.

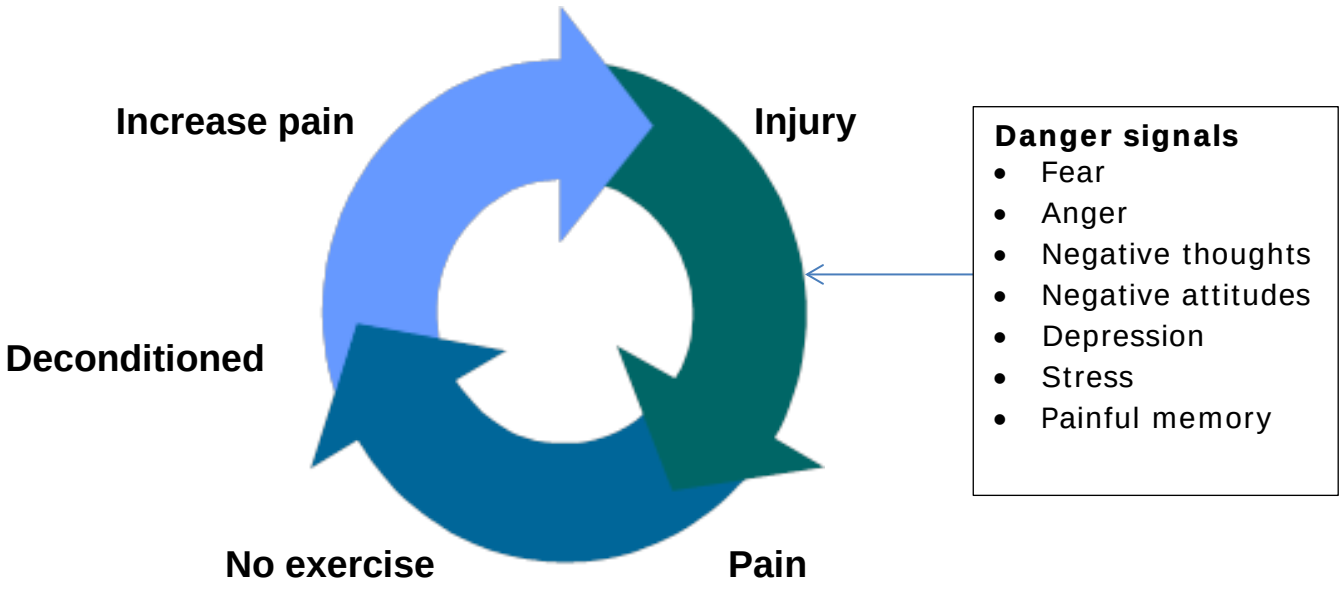
If our brain thinks our body is “in danger” the alarm goes off and then 3 things happen:

1. We feel pain. 
2. We do something to protect ourselves such as pull hand away from heat; rest painful foot, if severe – get help.
3. Body releases special chemicals throughout our nervous system to regulate our body.

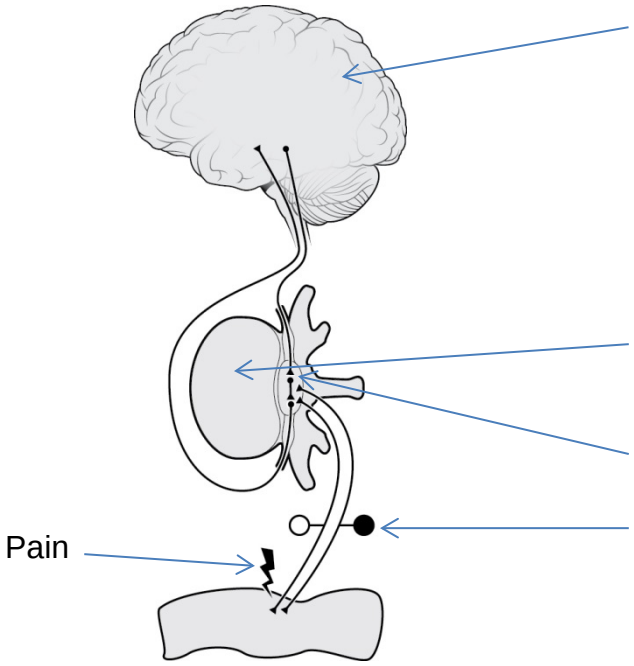
Can we experience pain without any tissue damage?

- Yes. There is both a physical and emotional part to pain. When we feel pain, many parts of our brain are active – especially the parts that control our thoughts and emotions.
- Our thoughts and emotions both positive and negative will affect our nervous system.
- Special chemicals known as danger / excitatory signals and calming signals are released from both physical and emotional pain
- Danger signals that increase our pain can come from fear, anger, negative thoughts and attitudes, depression, stress and painful memories.
- Pain is not always at the proper level of severity or in the right location.
- Pain does not always mean tissue damage.
- Danger signals=Excitatory signals such as substance P
- Calming signals=Inhibitory signals such as endorphins

The Pain Cycle



Our Nervous System



Brain: works on what is most important. The brain makes sense of information coming in and decides if there is pain. The brain is plastic so it can change.

Spinal cord: carries millions of messages through millions of neurons to the brain.

Dorsal horn name of an area in the spinal cord where signals can be changed.

Neuron: carries messages to spinal cord to brain

The body can either:

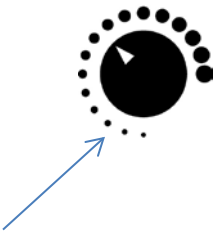
- amplify (turn up) the excitatory signals, or
- block (turn down) the excitatory chemicals with calming signals

Turn up the dial.

Turn down the dial.

This turning up or down of signals occurs in the Dorsal horn of the spinal cord and can change the number of signals the brain receives.

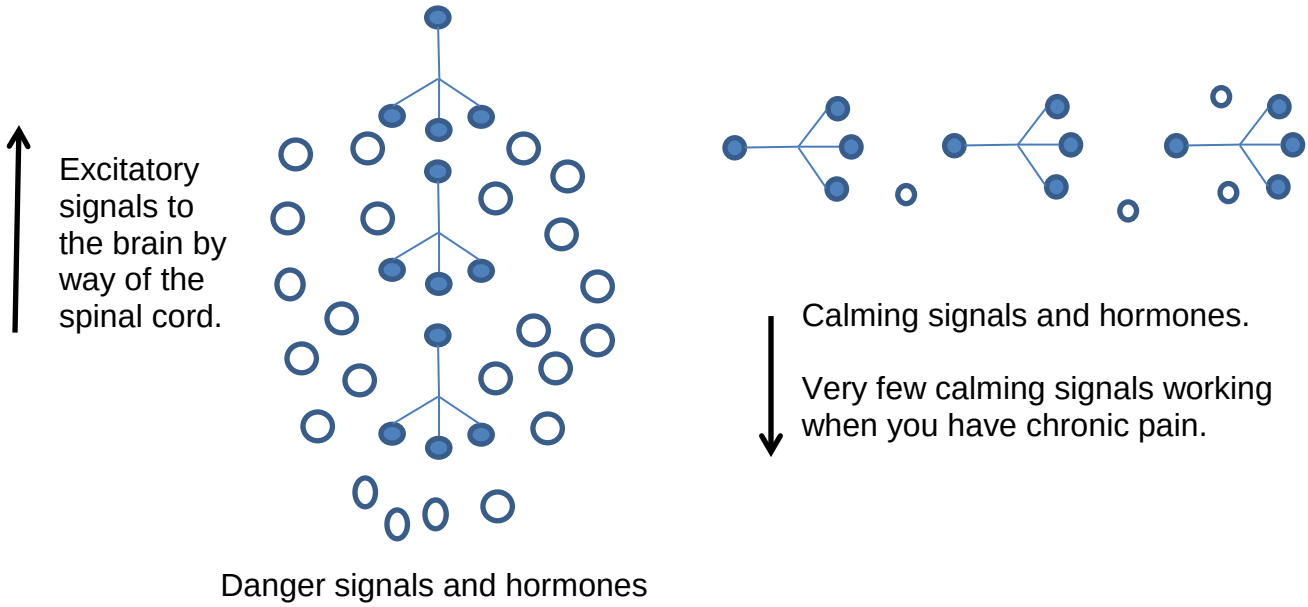
Research shows that chronic pain is less about damaged tissue.



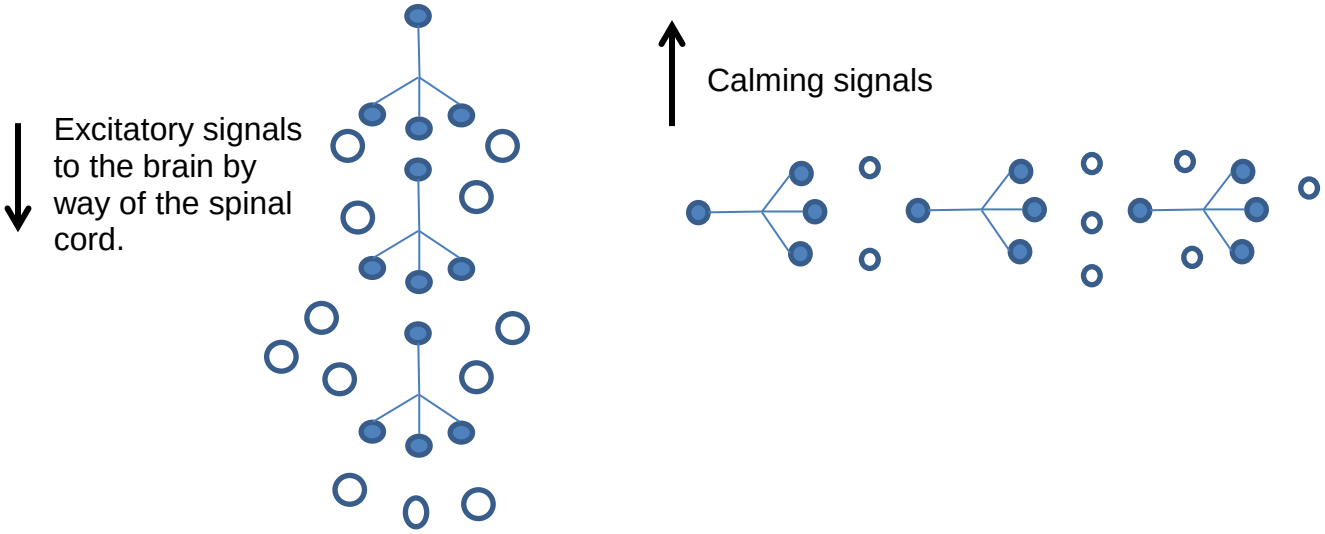
Chronic pain is more about the sensitivity of our nervous system and how the brain is interpreting the information. A helpful way to live with chronic pain is to **learn how to turn down your nervous system.**

When chronic pain has developed our nervous system is not working as before.

- Calming system is doing less to block the Excitatory signals.
- Excitatory system is over-sending Excitatory signals.
- Brain interprets increased Excitatory signals as pain.
- Nervous system becomes over-sensitive.



- Calming system is doing less to block Excitatory signals, and Excitatory system is sending too many signals to brain.
- Therefore, we feel pain as the nervous system becomes over sensitive.



- There is more of a balance between Excitatory signals and Calming signals. Less excitatory signals being sent to brain. We feel less pain.

Things to know about chronic pain

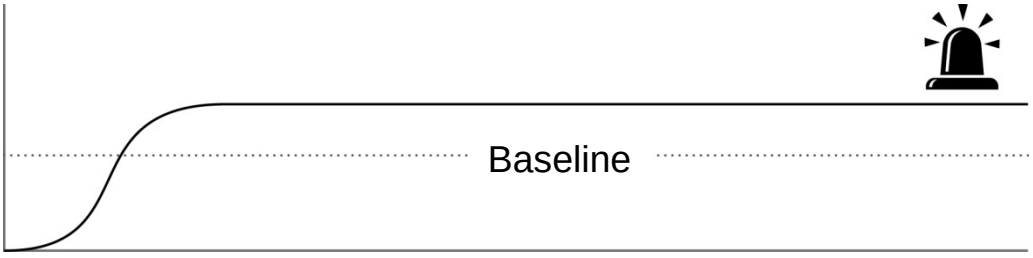
1. All chronic pain comes from the brain (thoughts, feelings and actions affect our pain).
2. Chronic pain causes our nervous system to become **over-sensitive** (even to things that do not normally cause pain).
3. Chronic pain is produced by an **over-sensitive** nervous system that makes our brain protect our body and this in not always helpful. Our brain is interpreting the increased excitatory signals as dangerous-even if there is no new danger or no tissue damage.
4. There different ways to settle your nervous system and make it less sensitive. We can help you learn these techniques and help you toward your goals of living with chronic pain.

5. Alarm system

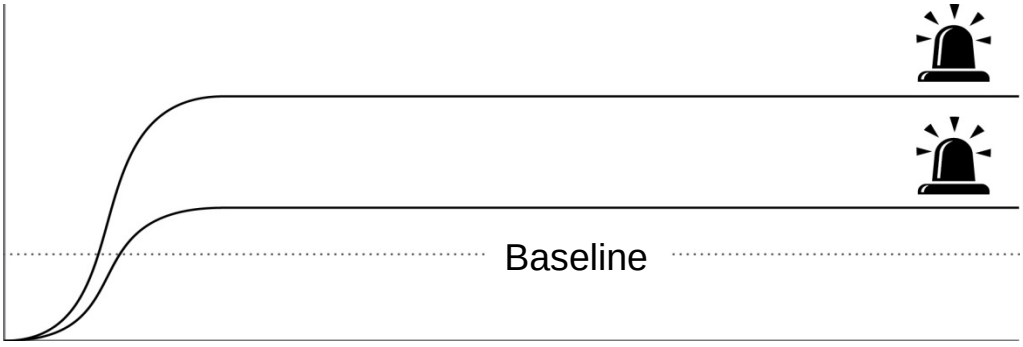
It is easier to trigger your body's alarm system when you have chronic pain. This is because your nervous system is wound up. The volume tuner is turned up.

You need to start to move and exercise at your own baseline before your alarm goes off. You do not have to push through the painful zone, but you will have some discomfort. This is due to a lack of use and a sensitive nervous system.

Acute pain



Chronic pain



- Alarm system fires more easily
- Need to exercise at a level before the alarm system fires
- Eventually with gradual exercises – the alarm system will rise

Challenge your alarm, challenge your body

Regaining movement needs a different approach to exercise. You need to challenge your alarm by making it less sensitive. You need to do this before you can strengthen your body.

Past regrets	Present things I can do NOW	Future worries
I used to… • take care of children • work full- time • hunt/fish	I am … • taking little steps “PACE”, start at baseline • using positive self-talk: feel good about yourself (I am sore but I am safe, “I hurt and I am ok”, Lotion is motion. • setting expectations; able to do; modify • making short term goals take control • aware of my body (mirror visualization) • understanding how thoughts, attitudes and emotions affect pain • laughing-laughter as well as exercise releases ENDORPHINS —calming signal • enjoying-something I like and have social support • learning to make choices to enjoy life again. This is my life!	What if I… • aggravate injury • can’t do it • fall • have increased pain

Notes

Your goals and techniques

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