

PHYSIO TIPS

IN MARCH

WHY DO WE HURT AND HOW?



Physio Tips is a monthly newsletter aimed at educating the public regarding the latest's evidence in injury management, without all the medical jargon. We will keep it simple and concise, but full of knowledge gems in order to empower and equip you.

REACH OUT TO US

What is Pain?

Pain is complex phenomenon that we are only beginning to unravel. Advances in research regarding pain are radically changing the way we view pain. At the core of treating something, there needs to be an understanding of the cause. Learning how pain works can help us understand what to do about it. In this month's newsletter we will explain how threat signals are communicated from sensory nerves to the brain and how the brain perceives the sensation of pain.



The purpose of pain

Pain is essentially a protective mechanism. Without it we would not pull our hand away from a hot stove. Pain helps us to minimize the risk of bodily harm - it serves as an alarm system that is key to self-preservation

The threat detectors

All our body parts have special sensory neurons, known as nociceptors. They are designed to detect harmful stimuli. When they detect a threat (like excessive heat or a cut) they send electrical signals to the spinal cord.

Metaphor - these nociceptors are like...

Employees of a big company that detect a drop in sales or any other threat to the company, and decide it's severe enough to bring it to the attention of the boss.



The alarm modifier

The spinal cord is where messages get filtered. It can determine whether signals coming from the nociceptors get relayed at all, and can also increase the alarm signals that reach the brain.

Metaphor - the spinal cord it like...

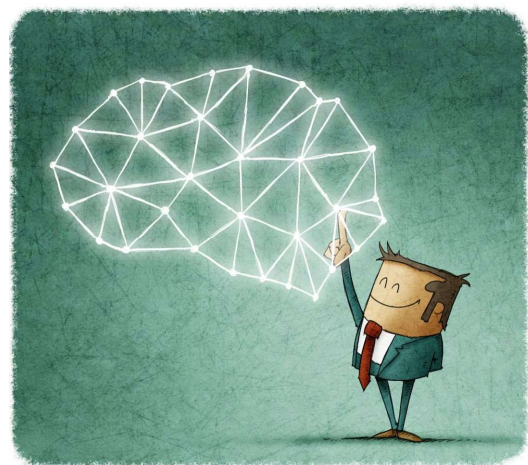
The boss's secretary who will listen to the employees' concerns and, knowing what the boss counts as priority and also knowing when he needs to be interrupted, she will decide whether to alert him with haste, or just make him aware, or not tell him at all as the concerns are silly.

The big boss with the final say

After the alarm has been turned up/down in the spinal cord, the message finally reaches the brain, where all threatening incoming messages are analysed. Many brain areas are involved and feelings, thoughts and behavioral responses are activated - the end result being your personal pain experience. **This whole process, from external stimuli to feeling pain, happens in milliseconds!**

Metaphor - the brain is like...

The big boss/ CEO, who will decide whether it is necessary to respond to the communicated threats and what the best response will be to protect the company



How the alarm gets modified

Various contextual, physical and psychological factors can reduce or increase the amount of signals that reach the brain. The signals are modified by the brain's pain dampening opioid mechanisms. When more opioids are released, the signals in the spinal cord are blocked, and when less opioids are released, the signals are amplified.



Things that silence the signals

- 1. Priority:** if you are in a life threatening situation, feeling pain is not as important as getting out of the situation, therefore the brain will almost 'ignore' the signals until the bigger threat is over
- 2. Wellness:** minimal stress and a positive psychological state means that when your brain analyses your well-being, the positives outweigh the negatives, and the danger signals get less attention
- 3. Positive beliefs:** understanding pain or being reassured that nothing serious happened, will reduce the threat



Metaphor:

If the secretary knows the boss has more important things to deal with, she will not bother him with all the messages. If the boss has everything under control and she reports threatening messages, he will take it as less of a shock. If everything else in the company is going well, he would be less likely to freak out about an issue.

Things that amplify the signals

- 1. High levels of stress/ poor psychological state:** if your brain analyses your well-being and everything is already 'heavy', the added threat signals are perceived as a greater danger
- 2. Negative beliefs:** beliefs related to permanent damage, fear that something serious is wrong - these kind of beliefs will increase the threat and therefore amplify the signals
- 3. Importance of the body part:** the threat will naturally be higher if the area generating the signals is of vital importance, like a violinist's hand
- 4. Past experience and context** (see video)

Metaphor:

If the secretary knows from past experience that the boss is particularly fearful of something going wrong, she will alert him immediately and with high urgency. If the boss is already stressed and the company is already struggling, he will see the additional bad news as extremely threatening.



What happens when the alarm system stays on alert and becomes faulty?



Chronic pain

Usually, once the threat has been removed, the nociceptors will stop sending threat signals to the spinal cord and the experience of pain should subside. When however, someone has experienced pain for a long time the receptors become over sensitive, and can even generate signals without an input or threat. The spinal cord also becomes more 'tuned in' and the messages that reach the brain are often faulty and amplified. This then means that the pain experienced is not necessarily linked to a real threat or injured tissue, but rather due to a malfunctioning nervous system.

Metaphor for a hypersensitive nervous system

This can be likened to a scenario where a company has been under strain for a prolonged period, and all the employees are worried and stressed. If the company should recover again, the staff remain anxious of when the next blow will come. Everyone therefore is on high alert and will inform the boss of the smallest sign of concern. The boss is also stressed and worried that things might fall apart again soon, and therefore listens intently to any complaints and might over react in a panic upon receiving repeated alerts from his staff.



Pain is produced in the brain, 100% of the time. Without a conscious brain, the signals from the nociceptors and spinal cord can fire away, but it can only be translated in to the sensation of pain by a perceiving brain. This does not mean that pain is 'all in our heads' - but it does mean that pain is an experience and is not something that sits in our tissues

Pain is very complex and therefore difficult to understand. If you would like to learn more about pain you can visit any of the following links, or ask any of our 'pain trained' physiotherapists at Therapy in Action.

[GET IN TOUCH WITH OUR PHYSIOS](#)

[NATIONAL GEOGRAPHIC ARTICLE ON PAIN](#)

[VIDEO ON HOW PAIN WORKS](#)

PAIN IS ALWAYS REAL, BUT NOT ALWAYS USEFUL

WATCH THIS SPACE FOR PHYSIO TIPS IN APRIL

Myths and truths about neck pain

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