

What is pain?

“Pain is a more terrible lord of mankind than even death himself.” (Albert Schweitzer)

Pain is defined as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage.” (International Association for the Study of Pain, IASP, 2012)

What is pain?

- Pain is a complex, multidimensional, highly-personalised *experience* in situations of perceived tissue damage, which in-turn conditions and motivates us to take action to avoid further damage.
- However, pain **CAN** be experienced **without tissue damage** (a very important concept to remember which we discuss later).
- Pain is by definition *unpleasant and aversive* (how does this compare with itch, nausea or dyspnoea for example?).
- Pain is a multidimensional **experience**, not just a sensation or perception; it’s not even one of the five primary senses.
- Pain has both *sensory* (hurting) and *emotional* (suffering) dimensions.
- Pain has *social, cultural, spiritual & philosophical* dimensions.
- *‘Pain is what the person-in-pain says it is.’* (McCaffery)
- Each person learns the meaning of pain based on their own life experiences, from a young age (touching a hot plate, skinning a knee or even duress).
- Pain always occurs in a **context**: A sportsman who says, ‘no pain, no gain’ will experience pain differently to a person facing cancer.
- We can only *really* know if someone’s in pain **if they tell us** (by verbal reports).
- **Pain behaviours** (grimacing, rubbing, crying, swearing, pacing) are subjective and non-specific signs of **distress**. Pain-acting is called **malingering** (which is not that common really).

- ‘The bane of pain is mainly in the brain’ (Loesser).
- You need a **conscious brain** to experience pain (the basis of general anaesthesia).
- **There is no single ‘pain centre’ in the brain.**
- The pain experience and associated *responses* (running away, rubbing an arm, crying, shaking, swearing) is generated by a **pain matrix**, a network of at least 22 loci including the brain stem, limbic system, hypothalamus, pre-frontal and somatosensory cortex.
- The pain matrix and the fear/anxiety centres of the brain are shared, especially the limbic system, so pain and anxiety (fear) often go together

What’s in a name?

- The word ‘*pain*’ is a modern English derivative of the Latin root for ‘punishment’, *poenos* (as in *sub-poena*-‘under punishment’).
- The concept of *pain* as a ‘punishment’ is expressed in many languages, cultures and epochs, suggests that pain is more than just ‘hurting’.
- Some philosophers consider pain as an unexplainable and unique experience of the person (self), existing in a realm that is impossible for an outside ‘observer’ such as a doctor, spouse, philosopher or priest, to truly access and understand.
- Pain is as difficult to understand as consciousness, love or anxiety and yet is pervades the existence of many living things on this planet and in particular the human condition.

Nociception

John Connor: “Does it hurt when you get shot?”

The Terminator: *I sense injuries.*

The data could be called pain’.” Terminator 2: Judgment Day (1991)

- Pain and **nociception** are different concepts.
- **Nociception** is the process of encoding and transmitting a tissue-damaging stimulus in the nervous system. (IASP 2008)

- **Nociception** is the neuro-physiological process of **transducing** the energy released during tissue damage (chemical, mechanical, thermal) into electrical impulses for **transmission** in the nervous system.
- *I sense injuries...The **data** could be called 'pain'."*
- Nociception is an **input** to the brain (stimulus).
- Pain is an **output** of the brain.
- Nociception is the most common stimulus that causes pain, *but it's not the only one.*
- **Other pain stimuli** include:
 - Nerve damage (neuropathic pain)
 - Anxiety (fear)
 - Chronic stress and illness (known as the **sickness response**)
 - Altered cortical processing (e.g. phantom limb pain, sensory distortions by mirrors).
- So, it **IS** possible to experience 'real pain' **without tissue damage** (nociception).
- Examples: Low back pain with a 'normal' MRI; phantom limb pain (there aren't even any tissues present where the person feels the pain!).
- You can experience pain with only **potential tissue damage** (e.g. squeezing a fingernail, briefly touching a hot plate).
- *Nociception* is like 'hearing', the process of sound being converted into nerve impulses in the ear and transmitted to the auditory cortex.
- *Pain* is more like 'music', a *complex sensory and emotional experience* (the emotional swell of beautiful music) triggered by an auditory stimulus.

Table 1.1

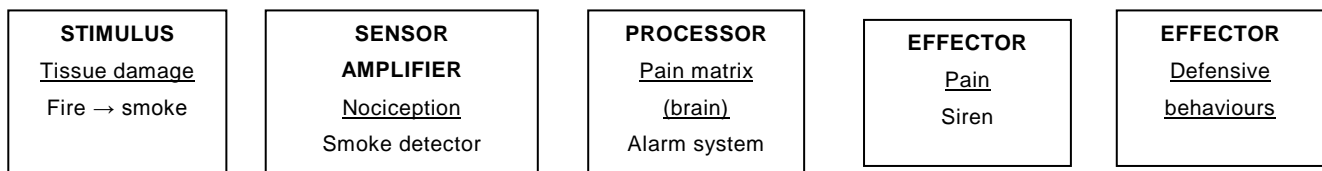
Summary of pain concepts, based on the IASP definition

- Pain is a sensory and emotional experience.
- Pain is an entirely subjective experience of the 'self'.
- Pain is not the same as nociception.
- Pain does not require the presence of tissue damage.
- Pain is expressed by the sufferer in the 'language' (terms) of tissue damage.
- The definition relies on verbal reports of pain.
- The definition refers to pain in humans but not in other species.
- Pain is not necessarily tied to tissue damage-this has ethical merit by promoting 'belief' of the sufferer's pain reports and alleviating the stigma of scepticism.
- The definition was designed as an explanatory clinical tool and not to define mechanisms, models or pathological concepts of pain.

Pain as an alarm

'Those precious little life-forms, where are you?' (DATA, Star Trek Generations)

- Pain has evolved over millions of years to protect Earth's life-forms from tissue damage.
- Nociception and pain are highly preserved in nature (down to crustaceans at least), and presumably confer a strong evolutionary survival benefit.
- Pain is the body's major tissue defence system (can you think of some others?).
- We need pain to survive.
- Like a man-made smoke detector, the pain alarm system is comprised of;



- The pain alarm like the smoke detector, amplifies 'pain signals' and is difficult to switch off, so tissue damage is not ignored.

- The pain alarm (effector) response includes pain behaviours (which help us escape from the tissue-damaging situation and attract help from others), such as grimacing, crying, swearing, limping, running away, labour pain, taking a pain killer or calling an ambulance.
- **Pain is a conditioning stimulus** that ‘teaches’ the organism to avoid situations associated with tissue damage (thorn bush, sabre-toothed tiger, fire).
- Pain is therefore linked to memory, reward, learning, placebo and nocebo responses. **Torture** is the worst example of this process.
- In patients with **chronic pain**, the alarm keeps on ringing even though the tissue damage emergency is over: Chronic pain is an **alarm malfunction** where the alarm keeps on ringing louder and louder without an emergency.
- The pain alarm is very robust after millions of years of evolution-it takes a lot to switch it off, which explains the trouble we have treating chronic pain.