

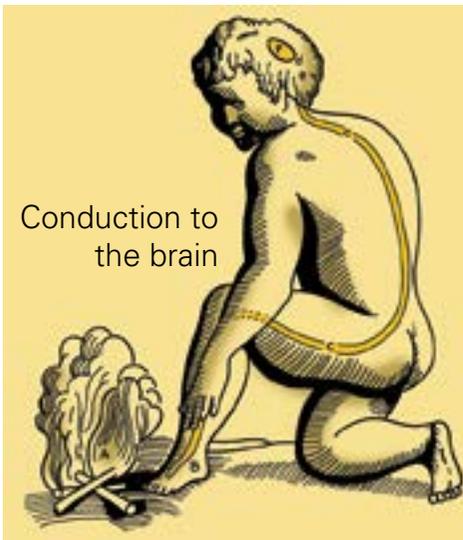
Nociceptive and neuropathic pain

Nociceptive pain

A

Nociceptive pain arises as a result of mechanical, thermal or chemical stimulation of the pain receptors (nociceptors). The pain-conducting nerves are generally not damaged.

Pain development in the brain



Conduction to the brain

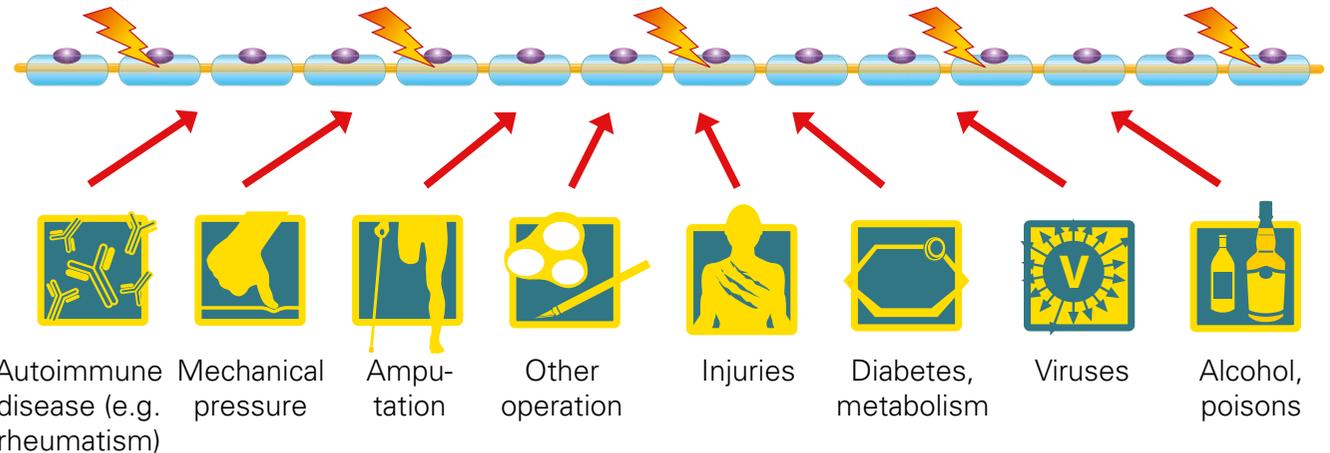
Harmful influence

Drawing modified from: Illustration of the pain pathway in René Descartes' *Traite de l'homme* (Treatise of Man) 1664

What is neuropathic pain? [1, 2]

B

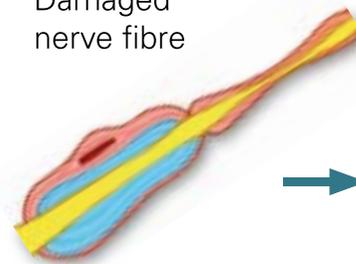
Pathological nerve pain resulting from impaired processing of pain due to nerve damage



How is neuropathic pain manifested? [3]

C

Damaged nerve fibre



Nerve damage is "over-repaired"

Overactivity of the nerve fibres
Intensified or spontaneous pain signals



Burning pain



Electric-shock pain



Stabbing pain

Nociceptive and neuropathic pain

A Nociceptive pain

Results from stimulation of the nociceptors (“pain sensors”) by mechanical, thermal or chemical stimuli or by lesions (as described in Sections 1-3).

It can be triggered in almost all tissues. Nociceptive pain arises following pain-producing stimuli by activation of the healthy peripheral nervous system. Examples are pain after surgery, bone fractures, skin injury or joint diseases.

B What is neuropathic pain? [1, 2]

Neuropathic pain is nerve pain that arises develops as a direct consequence of injury or damage to various nerve fibres.

As the C fibres are very fine and sensitive, they can be damaged very easily. Alcohol abuse, long-term metabolic dysfunctions (e.g. diabetes mellitus), viruses (e.g. herpes), persistent mechanical effects (defective intervertebral discs, tumours), inflammation or autoimmune diseases (Guillain-Barré syndrome, multiple sclerosis) can lead to neuropathy.

Neuropathic pain arises through damage to the central and peripheral nervous systems, leading to impaired pain processing.

C How is neuropathic pain manifested? [3]

The nerve cell counters neuropathy with “surplus” repair processes, including the formation of new molecules, which increase stimulus conduction (receptors and ion channels). Nerve fibres may become hyperactive as a result.

This leads to a lowering of the pain threshold (peripheral sensitisation) and consequently to hyperalgesia (excessive pain sensitivity), allodynia (pain perception caused by non-painful stimuli) and ectopic discharges (pain signalling in the absence of stimuli).

Neuropathic pain is commonly of a shooting, burning or stabbing nature and is generally not directly related to a noxious stimulus.

Neuropathic pain tends to become chronic, as pain stimuli are constantly generated in an uncontrolled manner as a result of the sensitisation (see also Sections 7-8). Central sensitisation may consequently also occur in addition to peripheral sensitisation.

[1] Treede RD et al. Neurology (2008) 70: 1630-1635.

[2] Haanpaa M, Treede RD. Pain Clinical Updates (2010) 18(7): 1-6.

[3] Campbell JN, Meyer RA. Neuron (2006) 52(1): 77-92.