Pain

The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience that is associated with acute or potential tissue damage or defines the form of such damage." Every 5th Austrian suffers from chronic pain for an average of 6 years. In 2002, 91,500 patients were treated for neurological pain syndrome.

Pain can be categorized according to its etiology and pathophysiology into three different qualities:

- **Nociception=somatic pain:** Originates as a warning signal caused through the exposure to mechanical (e.g. pressure), chemical (e.g. acid), or thermal pain that stimulates pain receptors in the skin, abdominal soft tissues, bones, or joints. This pain is experienced as burning, dull, or sharp and can be well located.
- **Naturopathic Pain:** Originates when nerve tissue is damaged through contusion, compression, severing, or infection. This is the case in amputations, paraplegia, nerve diseases, and shingles. The pain is experienced in the whole area that is supplied by the damaged nerve, in spite of the fact that the damage is located in only on one part of the nerve.
- **Visceral Pain:** Originates in the inner organs, for example through stretching of the gall bladder or the renal pelvis. The quality of the pain is dull, burning, or cramp-like and cannot be well localized. It can also radiate into other areas of the body.

These categories are less important for the clinical practice where the main differentiation is made between acute and chronic pain:

Acute Pain: Acute pain is a natural reaction of the human body that occurs with injury or infection and is a sign of disease or dysfunction. This type of pain is important as a warning, signals acute or potential tissue damage, and causes behavioral patterns that protect against further damage (e.g. pulling hand away from heat). The sensation is usually passing and ceases completely when the cause is treated or is self limiting. However, when acute pain is not adequately treated, there is a risk that it can become chronic, as is the case in about 10% of patients.

Chronic Pain: In contrast to acute pain, chronic pain no longer serves as a warning signal to the brain. It exists independently, even when the originally underlying cause of the pain has subsided. Chronic pain is usually diagnosed when the pain continues for more than a year in spite of medical treatment. Visual or verbal analogue scales can help patients to describe the intensity of their pain and are used to objectify a subjective sensation.

The most common forms of chronic pain include back pain (e.g. after a herniated vertebral disk), headache (e.g. migraines, tension headache), rheumatic pain (e.g. arthritis), neuralgia (e.g. Trigenimus nerve neuralgia, shingles), tumor pain (e.g. brain tumors, bone metastasis), degenerative pain (e.g. osteoporoses, arthrosis), and phantom pain (e.g. after amputation).

Different mechanisms that are based on the plasticity of neurons (=the conformation of cell connections to different impulses) play a role in the process by which pain becomes chronic. The repeated activation of pain receptors, for example through tissue damage, infection, or nerve damage, result in an increased excitability of central nerve cells and the formation of a pain memory.

The two most important mechanisms in this process are:

- **The Wind-Up Phenomenon:** The nerve cells react to repeated pain with an increase in the number of spontaneous electrical discharges. Eventually, the nerve cells demonstrate an increased electrical discharge rate without an increase in stimulus.
- **Pain Memory:** Through repeated pain stimuli, molecular changes take place in the nerve cells in which the disposition toward reaction remains intact. The result is that the cell can no longer "forget" the sensation of pain.

The treatment of pain, excluding the diagnosis and treatment of the underlying illness, is based on multiple building blocks. Medication therapy is central to this treatment and is organized into a three-step plan by the WHO Guidelines.

- **Step 1:** Non-Steroidal anti-rheumatics (NSAR) are used for light pain. This group includes acetylsalicylic acid (Aspirin), paracetamol (Mexalen, Tylenol), diclofenac (Voltaren), and ibuprofen. NSAR work through inhibition of an enzyme called cyclooxygenase, which builds the transmitter substance prostaglandin. Prostaglandin in tern is crucial for the development of pain in the periphery. In spite of having the same mechanism of action, there are differences among the NSAR regarding the length of their action, strength, and the areas in the body that they affect. The most important side effects of the group are ulcers in the stomach and small intestine, especially after heavy use. Paracetamol is the exception: it does not cause ulcers but is dangerous when overdoses occur since it then has toxic effects on the liver.
- **Step 2:** Opioids with low potency are used for the treatment of moderate to intense pain. Codein and tramadol are included in this group.
- **Step 3:** Opioids with high potency are used for intense to very intense pain and include medications such as morphine, methadone, buprenorphine, and levomethadone.

Opioids bind to receptors, called opioid receptors, in the central nervous system and inhibit the formation and transmission of pain. Common side effects include nausea, vomiting, sweating, constipation, sedation, and dizziness. Optimal pain therapy is often achieved through a combination of NSAR and opioids (e.g. codine and acetylsalicylic acid or codine and Paracetamol) because these medications have different mechanisms of action and can work in a mutually strengthening manner. Another positive effect of combination is that both medications can be prescribed in lower doses leading to a decrease in the side effects of both!

Many doctors and patients use opioids grudgingly because of their addictive potential. However, this bias is unjust in light of today's state of knowledge, which has proven that when opioids are used properly the risk of addiction is minimal. In addition to traditional pain medications, a group called coanalgesic or adjuvant drugs are used to treat pain when the etiology and type of pain permit. These medications do not have an analgesic (pain reducing) action of their own but they can increase or complement the pain therapy. This group includes antidepressants, muscle relaxants, and decongestants.