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| **The role played by the nervous system to ensure survival** |

The nervous system is one of the main organ systems in the body. The nervous system is a network of specialized cells, which transport information about the environment and itself, and also controls the other organ systems in the body.

The nervous system has three main functions:

1. collects input from the body and the environment
2. understands and processes the sensory input
3. makes a proper response to the input

Surviving

Every animal has to recognize the danger immediately and have to make a decision: attack the threatening one or run away. In danger, the nervous and the hormonal system produce adrenalin and cortisol and affect all organs to be able to attack or run away.

To survive it’s also really important to be able to respond to the environment in every minute - e.g. if we touch fire, be able to pull away our hand from the fire immediately to not burn it. In this the nociceptors help us, what are the pain receptors in the body. The experience of the pain indicates the damage of the tissue, so these receptors have a high threshold. There are three main environmental effects, that can cause damage to the tissue:

1. high pressure (mechanical)
2. strong chemical effects
3. extreme high temperature

There are five kinds of nociceptors in the body. These are the following:

* **mechanical nociceptors**: these nociceptors react to high pressure, tightness and the deformations of the tissue and also indicate the tear of the tissue. Their sensitivities are raised by the transient receptor potential (TRP) ion channels in their axon’s membrane. These channels are opening by the effect of the membrane deformations and allows ions to move through the channels.
* **thermal nociceptors**: these receptors are sensitive for high temperature (43 °C or above), which can cause the damage of the tissue. It also contains TRP channels.
* **chemical nociceptors**: this kind of nociceptors sense chemical substances, which cause pain. It also contains TRP channels, mostly TRPVs.
* **sleeping/silent nociceptors**: these are the most unsensible nociceptors. These receptors don’t contain TRP channels, only reacts when the axon end is damaged or there is an intensive inflammation reaction.
* **polymodal nociceptors**: the nociceptors listed above are sensible for only one effect, but polymodal nociceptors are sensible more than one effect.

Pain sensible neurons

There are pain sensible neurons in both the spinal cord and in the brain.

In the spinal cord, these neurons are in the ganglion spinale where the other sensory neurons are. The pains sensible neurons are pseudounopolars like the other sensory neurons, so they not affect the stimulus, it’s only a “nutrition central”.

The pain sensible neurons in the brain contain somatosensory fibers. These neuron’s central axons reach the brain stem in the cranial nerve, but after this, the protopathic fibers create the spinal trigeminal nucleus.

Sources:

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