

Where is your pain? Classically conditioned spatial dimension of pain in humans

Pain is a subjective, unpleasant sensation that may or may not be associated with bodily harm. The lack of such a relationship is very often visible in chronic pain syndromes, which affect nearly 1/5 of the population. The nature of the pain experienced is most often evidenced by its expression with the so-called sensory dimension. This dimension indicates the strength of pain, which can be determined with the use of scales, e.g. a numerical scale in which the pain has different intensity from 0 to 10. The so-called affective dimension, which in turn refers to the level of unpleasantness of a given pain sensation, can also be used to diagnose pain. In more recent studies, there are attempts to quantify a new dimension, the spatial dimension. This in turn relates to the subjective description of the location of pain, or more strictly to the body area in which this pain occurs. The measurement of the spatial dimension may help not only in diagnosing pain, but also in understanding the mechanisms of some chronic forms of pain, e.g. chronic widespread pain, in which pain occupies significant areas of the body.

Scientific research of the last decade indicates the possibility of involving learning processes such as classical conditioning in the formation of pain in humans. In other words, a number of experiments have shown that people can "learn" to feel pain in a similar way as Pavlov conditioned his dogs. But it is not clear whether this process of learning includes only the intensity of pain, or also its location. Imagine a clinical example: Body damage is related to the fact that information about the damage flows to the nervous system from several different places at the same time, which may affect the occurrence of classical conditioning. If, as a result of the injury, information about the damage arrives in the brain from different areas (tissues) at the same time, then information from one area (A) can be a stimulus for the conditioned information from another area (B). Then, as a result of combining these two events several times, information from area A itself may cause the patient to feel pain not only in area A but also in area B.

The planned project aims to learn about the mechanism of chronic widespread pain and to test the hypothesis that feeling pain in a certain body area is dependent on previous experience. This hypothesis has not been addressed so far, although it seems to be an important link in learning about the processes underlying pain sensation in humans. The project is interdisciplinary - it integrates experimental psychology with pain physiology and neuroscience. Behavioral, psychological and neurophysiological research methods will allow for 3 experiments on healthy volunteers who will experience pain in different body areas using the most modern research methods. In the first experiment, an additional location of pain will be used as a conditional stimulus, in the second experiment different locations of pain will be paired with color stimuli. In the third study, carried out in cooperation with the University of Lübeck, the second experiment will be repeated and adapted to measure brain activity using functional magnetic resonance imaging techniques.