

## **Popular science description**

It is highly intuitive that emotions of others are important in almost every aspect of our daily life,. They motivate us to do act prosocially – e.g. plan and acquire Christmas gifts for our loved ones, or on the contrary they may result with a lack of willingness to act. According to the traditional division, people have six basic emotions (Ekman, 1962). While we are well aware that emotions, such as fear, very easily “pass on”, transfer of positive emotions seems not as obvious. There is, however, truth to common sayings such as “laughter is contagious”.

Emotion recognition is an important social skill. We are often able to quite accurately determine the mood of the people we meet without even talking to them. The ability to understand and read the emotions of another person is often defined as empathy. Scientists compare empathy to a three-layered Russian doll, which at the simplest, most basic level consists of emotional contagion. An example of such contagion is the immediately spreading panic in the crowd. Until recently, this phenomenon was considered to be exclusively human, although more and more scientific works, including those carried out in our laboratory, suggest that it is a widespread ability in the animal kingdom. Emotional contagion, especially that of fear, has been observed, among others, in non-human primates, marine mammals, birds as well as rodents. From a biological, evolutionary point of view, it is highly adaptive. It allows an individual to obtain knowledge about a potential threat through social channels rather than through direct exposure to e.g. a predator. Despite the widespread occurrence, there is still little data on the neuronal correlates of this phenomenon.

In the proposed project, the main goal is to investigate the neuronal circuitry involved in social transmission of fear. The existence of social fear learning in animals is a fairly well documented. The use of animal models provides us with the ability to conduct research at a level of detail not available in human studies, as well as to test the role of individual groups of neurons through manipulation of their activity.

The project will employ three behavioural tests assessing: direct transmission of fear (observational fear learning), remote transmission of fear (in the safe environment of a homecage) as well as recognition of emotions. At the initial stage, we plan to identify brain structures involved in these processes. Then an attempt will be made to manipulate specific groups of neurons to learn more about their functions.

Understanding the neuronal mechanisms responsible for social transmission of fear will allow us an insight into the basis of empathy. There are many human disorders associated with abnormally functioning emotion recognition, and these have tremendous economic and sociological consequences. Empathy deficits are commonly reported in anxiety, depression and autism spectrum disorders, the number of diagnoses of which increases yearly. Understanding the biological basis of emotion recognition and its transmission between individuals is crucial for development of therapeutic strategies for people struggling with social functioning.