Learning from experiences – both good and bad ones is paramount for our survival. In highly complex brains, such a process requires the involvement and cooperation of numerous structures and circuits. Here we will focus on one brain structure that is particularly involved in recognizing positive and negative experiences, shapes the appropriate reaction, and helps memorize it for better future choices – the amygdala. This structure is immensely complex. It receives sensory and emotion-rich information, integrates it within multiple distinct neuronal populations across numerous substructures, and sends out appropriate readouts to drive the behavior – to approach or avoid.

Until recently, the amygdala was famous for its involvement in aversive learning – memorizing unpleasant, fearful events. Now, new data has come to light, showing its crucial role in forming positive memories as well. It is now believed that the amygdala is a hub; a decision center, where the good and bad experiences are evaluated. In order to do that, it sends out multiple projections, both within its complex substructure network and outside to other centers – those that inform about previous, memorized experiences and those that select and execute the appropriate action.

In this research, we will decipher how the amygdala processes the choice between two different rewards – sugar and an addictive drug. We will take a close look at the activity of the amygdala's neurons while the laboratory mouse chooses sugar or a drug. We will analyze which synaptic connections participate in this process, and investigate how the signals originating from the amygdala adapt in response to rewards. This research will expand our knowledge of the fundamental aspects of brain plasticity. It will elucidate how various rewarding stimuli and learning paradigms rewire the neuronal output from the amygdala.