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Neuronal circuits and molecular mechanisms underlying alcohol seeking

One of the main challenges in neurobiology is to understand the cellular and molecular basis of addiction. How is it formed, why some people cannot stop drinking despite so many adverse consequences? It is well known that alcohol is one of the most harmful drug of abuse but, at the same time, the molecular processes and brain circuits affected during development of addiction are still poorly understood.

During this project we plan to investigate the role of calcium/calmodulin-dependent protein kinase II (CaMKII), which is one of the most abundant regulatory protein it the brain, in alcohol seeking during withdrawal. In particular we will focus on the role of CaMKII in the central nucleus of the amygdala in alcohol seeking during abstinence period. This brain region is a part of brain reward system responsible for emotional responses and involved in mediating behaviors related to drug abuse. Our previous experiments showed that alcohol sensitization leads to dysregulation of CaMKII activity in the central amygdala and increased alcohol seeking in withdrawal. We plan to analyze the changes of the neuronal morphology and connections in mice amygdala during formation of alcohol addiction. We will also investigate the role of CaMKII in the regulation of these changes. This studies will lead us to better understanding of the molecular basis of addiction-related behaviors, such as alcohol craving, anxiety and seeking of addictive substance, what may provide opportunity to discover the new and possibly more successful pathways of addiction therapy.