

Alcohol addiction is one of the more serious, unresolved problems of the contemporary society, with the impact both on physical and mental health and economy of the afflicted individuals and their families. Due to contribution of many researchers we know that drug addiction involves dysregulation of the brain circuits. The aberrant activity is observed in the regions which in healthy individuals control perception of natural reward, such as food and sex, and learning. At the same time the molecular processes underlying development of drug craving and increasing sensitivity to drug-associated cues remain poorly understood. Thus the successful therapy of addiction is still missing.

In the current project we shall shine a light on the role of the dentate gyrus- the brain region involved in memory coding- in the regulation of alcohol-driven behaviour. The function of this brain region in alcohol addiction is poorly understood, however, experiments conducted in our Laboratory showed that it is highly possible. Furthermore, we will investigate the role of silent synapses in the regulation of alcohol addiction-related behaviour. Silent synapses are specific contacts between neuronal cells with not well understood function. However, their role in addiction has been proposed by several research groups. Finally we will investigate the role of Arc protein in the generation of silent synapses and regulation of addiction-related behaviour. The role of Arc protein in the regulation of addiction-related behaviour is poorly understood. The experiments performed in our Laboratory showed, however, that mutant mice missing Arc protein very intensively search for alcohol. This observation suggests that Arc protein regulates behaviour which underlies alcohol addiction.

The project will extend our understanding of the molecular and cellular basis of addiction-related behaviours.