ELECTROPHYSIOLOGICAL STUDIES OF PRIMARY CULTURES OF CEREBELLAR GRANULE NEURONS FROM THE RAT USING THE PATCH-CLAMP METHOD

Kristina Majauskaite[1], Silvija Jankeviciute[2]

[1]Institute of Biochemistry, Life Sciences Center, Vilnius University, Lithuania
[2]Neuroscience Institute, Lithuanian University of Health Sciences, Lithuania
kristina.majauskaite@bchi.vu.lt

Electrical signal transmission mechanisms in cholinergic synapses are widely studied, but many important questions remain unanswered. There is the enzyme acetylcholinesterase in cholinergic synapse, that catalyses the hydrolysis of acetylcholine into the metabolites choline and acetic acid, the latter dissociates into the acetate and proton. Are there any proton channels in cholinergic synapse and whether the protons affect the postsynaptic potential?
Trying to find the answers to these scientific questions, we combined two excellent techniques – primary cultures of cerebellar granule neurons (CGN) from the rat cerebellum and the Patch-clamp. CGN cultured *in vitro* maintain the same features displayed *in vivo* by mature cerebellar granule cells.

Combining primary cultures of cerebellum granule neurons from the rat and patch-clamp technique we succeeded in recording the action potentials in cerebellum granule neurons. This means that neurons are alive and responsive to stimuli. This provides a means to administer and study how analytes (for example, ion channels blocking or opening compounds) can affect neurons or ion channels in real time. Combining this both techniques we can investigate not only proton channels in cholinergic neurons and synapses, but also apply for other scientific purposes. These techniques enable researchers to understand how neurons (or ion channels in neurons) behave and how different drugs, toxins, ions, or other analytes can modify normal conditions.