Synapses are highly specialized adhesion sites communicating two neurons. Postsynaptic and presynaptic compartments are connected by protein complexes. Among crucial proteins required for this interaction are postsynaptic proteins neuroligins and their presynaptic partners neurexins. The recent research show that neuroligins and neurexins not only form the physical bridge that ensures the synapse stabilization, but are also necessary for its structure organization and proper synaptic transmission.

The main objective of the proposed project is to understand the expression regulation of postsynaptic adhesion molecule - neuroligin 3 (NLGN3) at the molecular level. Our preliminary results indicate that synaptic neuroligin 3 expression is controlled by fragile X mental retardation protein (FMRP), however the exact binding site for FMRP within *Nlgn3* sequence is unknown. Therefore, we plan to determine the exact interaction sites of these molecules.

Moreover, by using the recently-developed imaging methods, we propose to visualize *Nlgn3* and FMRP in neuronal cultures. Additionally, we will perform functional analysis of these molecules interaction in response to neuronal activity. For this reason, we will stimulate the neurons and investigate the colocalization of *Nlgn3* and FMRP to determine whether *Nlgn3* dissociates from FMRP in the activity-dependent manner.

The results of the proposed project will give us an insight and broaden the knowledge about neuroligin 3 functioning at the synapse. Our research will also contribute to better understanding of the molecular basis of fragile X syndrome, autism as well as other neurodevelopmental diseases with synaptopathy phenotype. Finally, our research might lead to development of new therapeutic strategies.