The subject of the project is the biology of the specialized type of glial cells, called oligodendrocytes. These cells reside within the central nervous system, where they produce myelin sheaths around long projections of nerve cells, creating the bulk of neural tissue called the white matter. Myelin sheaths gives neuron a strong assistance to its proper and efficient functioning, because they provide an electric insulation facilitating fast transmission of nerve impulses and mechanical and trophic support. In many neurodegenerative disorders impaired myelin production or maintenance is the reason of severe symptoms of the condition. The disorder which affects white matter in its developing state, is neonatal hypoxia-ischemia caused by temporal decreased blood supply to the brain during preterm or complicated labor. Nervous tissue is therefore influenced by diminished level of oxygen (hypoxia) and nutrients (due to ischemia). They contribute to neural cells death or changes in their maturation program which results in white matter alterations called hypoxic-ischemic encephalopathy (HIE).

The objective of the research is to examine the involvement of hypoxia-signaling molecules in the maturation of oligodendrocytes. Past studies performed on animal and *in vitro* models of neonatal hypoxic-ischemic injury revealed the inhibited or altered oligodendrocyte maturation, but still little is known about the mechanisms underlying this process. We hypothesize, that temporal oxygen decrease within nervous tissue may activate the HIF-1 (hypoxia-induced factor-1) pathway, which adapt cell's metabolism to hypoxic conditions. This pathway, activated in oligodendrocyte progenitors, may also directly or indirectly affect their maturation. We want to verify this hypothesis by performing studies on the *in vitro* model of hypoxic-ischemic injury to oligodendrocyte progenitor cells. We will expose the cells to anaerobic atmosphere and glucose-free medium for short period to mimic the injury. Additionally, we will induce chemical inhibition or activation of HIF-1 pathway after the insult. We will then analyze changes in the process of oligodendrocyte progenitor maturation through consecutive stages, including immature oligodendrocytes and oligodendrocytes capable to produce myelin and describe these changes with the use of different techniques of molecular biology.

We aim to verify, if HIF-1 signaling is involved in altered oligodendrocyte maturation after hypoxic-ischemic injury. Keeping in mind, that the only one available treatment of asphyxiated newborns is therapeutic hypothermia, which reduces the mortality, but has a minor effect on white matter loss, we hope that obtained results and conclusions will also be the opening to further studies on novel targets for enhancing oligodendrocyte maturation and decreasing myelin injury in neonatal HIE.