The ability of axonal regeneration after injury of the peripheral nervous system are significantly higher in adults than in the neonates. During the critical period of development, in the first 5 days of life, many motorneurons die after an injury to their axons. Developing motoneurons are very sensitive to breaking the connection with the muscles they innervate, which are the source of trophic factors necessary for their proper functioning. This particular sensitivity of neurons to sciatic nerve injury declines during the first week of life. In the case of newborn rats, damage to the axons within the first three days after birth causes the majority of neurons to die, while the entire neuron pool survives and reinnervates the muscles if the injury occurs on the day fifth after birth.

Mechanisms responsible for the impairment of peripheral nerve regeneration in the early period of postnatal development remain unknown. In the proposed project, we will verify the hypothesis that transplantation of an appropriate modified sciatic nerve will improve the regeneration of damaged axons, reduce mortality of motor neurons and allow reconstruction of motor functions lost as a result of peripheral nerve injury. We intend to examine the role of the experimentally selected signaling pathway, Wnt/b-catenin that is activated in more mature nerves. By enhancing Wnt activation we will determine whether such a strategy may allow younger animals to achieve a functional improvement comparable to that observed after transplantation of a more mature nerve. In addition, we will verify the hypothesis that these mechanisms are more universal by *in vitro* studies using human Schwann cells and neurons.

Proposing such an attempt of modifying the complex aspects of the microenvironment of an injured sciatic nerve in rat newborns to improve axonal regeneration, we challenge the dogma that the nerves of newborn animals are unable to provide support for regenerating axons.

Moreover, the second aim of this project will be to identify the specific profile of changes in gene expression in motoneurons at the early stage of their reaction to nerve injury in the presence or absence of pro-regenerative signals from the modified graft.

The presented project will use both traditional neuroanatomical and neurophysiological methods as well as very modern large-scale techniques of molecular biology.

The explanation of whether there are real possibilities of modulating selected features of the microenvironment of the injured nerve in order to achieve axonal regeneration and restoration of neuromuscular junctions and ultimately reconstructing motor functions will be important for conducting an effective and safe repair strategy in patients with peripheral nerve injuries.