Prevention and treatment of neurodegenerative diseases and stroke-related brain damage are major and unresolved problems of contemporary medicine. Despite the progress in understanding of molecular mechanisms of neuronal injury and preventing them, only few neuroprotective substances are used in the clinic and their efficiency in the treatment of stroke and neurodegenerations is not satisfactory. One of the major limitations to current neurodegenerative disease treatment is an inefficient delivery of neuroprotective drugs to the affected part of the brain and difficulties in the diagnosis if the drug is well addressed, i.e., if it reaches the targeted organ. Theranostics is a new branch of medicine based on joining of therapeutic and diagnostic function in one entity. Application of nanotechnology in theranostics will allow engineering of drug carriers simultaneously delivering therapeutic components and possessing a diagnostic function.

The main objective of the project *Theranostic nanocarriers for drug delivery in central nervous system disorders* – TheraforNerv is to develop a new strategy to deliver neuroprotectants by applying theranostic nanocarriers for neuroprotective drugs, which are able to cross the blood-brain barrier without imposing side effects on its normal function, and can be detected in a given part of a brain by Nuclear Resonance Imaging (MRI). In the project we aim to apply various methodologies of encapsulation of neuroprotective drugs together with fluorescent or MRI contrasting agents. The size of nanocarrier should not exceed 150 nm, they should be non-toxic, invisible to the immune system, able to cross the blood-brain-barrier and can be precisely localized in the organism. Fluorescently labelled nanocarriers will be used in the in vitro cell tests of neuroprotective activity of encapsulated drugs and ex vivo test of their localization in the brain, whereas nanocarriers with MRI contrasts will be used in the in vivo tests on animal models. The ultimate aim of the project is the development new drug carriers that can be used in future in therapies for stroke and neurodegenerative diseases, like Parkinson, Alzheimer or schizophrenia.