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Thesis title: **The study of neural stem cell proteome in the course of targeted differentiation**

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Abstract

Neurological diseases affect millions of people worldwide with growing incidence every year. In this work, I focused on neurodegeneration and neural stem cells which represent an important experimental model for neurobiology, and also a promising tool for the treatment of nervous system disorders. To ensure a safe regenerative therapy, the neural stem cells need to be precisely characterized before transplantation, and their differential potential and cell population purity must be verified. Here, I describe in detail the development of a targeted mass spectrometry method based on Selected Reaction Monitoring (SRM) demonstrating that this method is capable of characterizing neural stem cells upon differentiation. Via measuring well-defined cell markers, the method quantifies selected proteins and allows to determination of the differentiation stages of neural stem cells in a fast and reliable manner. Then, we aimed to perform a detailed proteome analysis of differentiating neural stem cells focused on cell surface proteins. I describe the results obtained from mass spectrometry-based analysis of proteins isolated by the technology called Cell Surface Capturing (CSC). The CSC method enriched cell surface proteins by chemical tagging of living cells. Using this approach, we were able to analyze in detail neural stem cells upon differentiation which has brought neural stem cells a step closer to more effective sorting strategies. Last but not least, I provided a list of candidate markers that could be either used to effectively monitor the differentiation potential of neural stem cells, or to enrich a preferable subpopulation of the cells for transplantation experiments. I also provided the list of candidate biomarkers for monitoring the development of Huntington's disease neuropathology.