

Abstract

This bachelor thesis is focused on ischemic injury of the central nervous system (CNS), one of the most frequent causes of death and disability in the world, and its possible treatment via the induction of neurogenesis. It consists of three different parts. In the first part, main neurogenic regions of the CNS, the subventricular zone and *gyrus dentatus* (GD) of the hippocampus, are described at the cellular, as well as molecular level. The second part is mainly dedicated to ischemic injury, to the global and focal brain ischemia. A particular chapter of this part describes changes in neurogenesis and gliogenesis after ischemic injury of the brain, changes in the induction of radial glial cells, proliferation and migration of neural progenitor cells and neuroblasts. In this chapter, we also describe the activation of astrocytes, microglia and NG2 glia (also known as polydendrocytes) after ischemic injury of the CNS. The last, third part of the bachelor thesis, is focused on signaling pathways, which significantly influence neurogenesis: Shh (Sonic hedgehog homolog), Notch and Wnt (Wingless/Integrated) signaling pathways. Special attention is devoted to the Wnt signaling pathway, which is an essential part of molecular mechanisms in nerve cells.

Keywords: neurogenesis, gliogenesis, hippocampus, *gyrus dentatus*, subventricular zone, ischemic injury, Wnt/ β -catenin signaling pathway