Abstract:

Polydendrocytes, or NG2 glia, are fourth type of glial cells in mammal central nervous system. In the adult brain, NG2 glia represent important cell type with respect to their role in gliogenesis and nervous tissue regeneration following injury. Ligands from the Wingless/Int (Wnt) family play key role in proliferation and differentiation of NG2 glia and they can also influence regeneration of nervous tissue after ischemia. The aim of this thesis was to elucidate the role of NG2 glia in neurogenesis and gliogenesis following ischemic brain injury and investigate the impact of Wnt signalling on the reaction of NG2 glia to this type of injury. To fulfil these aims, transgenic mouse strains with tamoxifen-inducible recombination, that enabled simultaneous expression of red fluorescent dye and either activation or inhibition of the Wnt signalling pathway in NG2 glia, were employed. To induce ischemic injury, middle cerebral artery occlusion model was used. Changes in differentiation and electrophysiological properties of NG2 glia were analysed using patch-clamp technique. Activation of the Wnt signalling pathway under physiological conditions and 7 days after ischemic injury led to increased differentiation of NG2 glia toward astrocytes, while 3 days after ischemic injury activation of this signalling pathway supported neurogenesis. Differentiation of NG2 glia was not affected by Wnt signalling inhibition.

Key words: Polydendrocytes; NG2 glia; CNS; Differentiation; Brain ischemia; Wnt signalling pathway