Abstract

Microtubules (MTs) are essential components of the cytoskeleton in all eukaryotic cells. Their function is particularly important in neurons where MTs stabilize their long processes and are responsible for the precisely regulated anterograde and retrograde, intra-axonal and intra-dendritic transport over long distances. MTs are essential also during development of the vertebrate brain and all its major steps: neurogenesis, neuronal migration and neuronal differentiation. MTs are regulated at multiple levels, but two seem to be particularly important: 1. posttranslational modifications of tubulin (PTMs) have been shown to control several MT properties as stability or MT-based transport. 2. microtubule-associated proteins (MAPs) that bind soluble MT subunits, MT lattice as well as MT ends and control MT-based transport and MT dynamics by either stabilizing, destabilizing or severing MTs. Consequently, deregulation of either tubulin PTMs or MAPs may induce severe changes in neuronal cytoskeleton. Bachelor´s thesis summarizes current knowledge on how PTMs (especially polyglutamylation) and MAPs (especially microtubule cleaving proteins such as spastin) regulate MT and neuronal development and degeneration.

Keywords: Microtubules, tubulin post-translational modifications, polyglutamylation, microtubule-associated proteins, spastin, neurodevelopment