Investigating the role of ShcD signaling downstream of Trk neurotrophic receptors

Neurons are the fundamental building blocks of the mammalian nervous system serving to transmit information from one to another. These specialized cells are generated from neural stem cells in a process referred to as neurogenesis. Complex intracellular signaling is required for neuronal development and is largely regulated through the Trk family of neurotrophic receptors. The Trk receptors elicit diverse and distinct biological responses primarily involved in modulating neuronal migration, differentiation, survival and plasticity. ShcD, a unique molecular phosphotyrosine adaptor protein, has been shown to signal non-canonically downstream of these neurotrophic receptors to modulate the activity of effector proteins. ShcD expression is greatest in the brain but its role in cell processes including cell migration, differentiation and survival has only been investigated in non-neuronal settings thus far. ShcD has been shown to serve a crucial function in the acquisition of migratory and invasive abilities by melanoma cells, highlighting its potential role in the regulation of migration. Additionally, ShcD expression is downregulated during oligodendrocyte differentiation and may be required to commit embryonic stem cells for differentiation. Together these findings suggest that ShcD may be involved in neuronal development through Trk-mediated signaling in the nervous system. The proposed research aims to explore the phenotypic and molecular consequences of altered ShcD expression on neuronal migration, differentiation and survival.