Genetics and Neural Stem and Precursor Cells

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The establishment of the three-dimensional cytoarchitecture in the adult brain requires a tight control of neural stem and precursor proliferation, migration and differentiation during development. In particular, a precise guidance of the neuroblasts from their site of origin towards their definitive site of residency is finely regulated. In humans, brain malformations can result from neuronal migration defects of stem and precursor cells. The spectrum of migration disorder severity extends from periventricular heterotopia and subcortical band heterotopia to a complete cortical disorganization, as observed in lissencephaly. Recently, these migration disorders have been linked to mutations in the filaminA, doublecortin and LIS1 genes. Here, we summarize our findings concerning the genetic characteristics of these migration disorders, the functional MRI findings of heterotopic neuroblasts and in vivo/in vitro analysis of the migration-associated gene products. (Supported by the VW- and Fritz Thyssen-Foundation).