Engineering neurogenesis in the postnatal cerebral cortex

Sophie Péron[1,2] , Nicolás Marichal[1], Chiara Galante[2], Laia Torres-Masjoan[1], Ana Beltrán-Arranz[1], Marisa Karow[3], Benedikt Berninger[1,2]

[1] Institute of Psychiatry, Psychology & Neuroscience, Centre for Developmental Neurobiology and MRC Centre for Neurodevelopmental Disorders, King's College London, UK

[2] Institute of Physiological Chemistry, Johannes Gutenberg University Medical Center, Mainz, Germany

[3] Biomedical Center of the Ludwig Maximilians University Munich, Germany

Reprogramming of cell identity emerges as a novel concept for tissue repair (Heinrich et al., Nat Cell Biol 2015). Here I discuss the possibility of reprogramming glial progenitor cells in the postnatal mouse cerebral cortex in vivo. We found that, in sharp contrast to our earlier findings *in vitro*, single transcription factor such as Ascl1 and Neurog2 are highly inefficient in driving glia-to-neuron conversion *in vivo*. However, combining these factors with additional factors (Sox2, Bcl2) results in the generation of originally DCX-positive induced neurons which eventually mature into NeuN-positive neurons. Yet, induced neurons remain conspicuously immature in terms of their electrophysiological properties. Here I discuss our progress in promoting the maturation of induced neurons by modulating the activity of the reprogramming factors and the electrical activity of induced neurons. I will also discuss how our understanding the molecular trajectory of the conversion process may guide further improvements of our reprogramming strategies.