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Abstract

Systems genetics of adult hippocampal neurogenesis

Complex traits such as neuronal development are controlled by complex molecular processes. Trying to manipulate complex processes for therapeutic purposes might become futile, if too many variables remain unknown. One strategy is to identify the key regulators, which like hubs in a network of airline connections, occupy central positions in the interdependencies of regulatory gene networks.

The presentation summarizes past, ongoing and future work that aims at making use of systems genetic approaches to unravel the regulatory principles underlying adult hippocampal neurogenesis, i.e. the generation of new neurons in the adult and aging hippocampus. Due to the central role of the hippocampus in learning and memory processes and its particular sensitivity to age-related impairment, including dementia, adult neurogenesis is gaining increasing interest as a key principle in understanding plasticity in the adult and aging brain.

Combining conventional QTL analysis in recombinant inbred strains of mice with expression genetics we identified a set of candidate genes and were able to draft the first gene networks. Current work is extending this work to situations, in which adult neurogenesis is regulated by activity. Future work will focus on the precursor cells themselves and ask, how genes control genes and genetic networks associated with neuronal development and its activity-dependent regulation.

Biography

- 1993 PhD University of Freiburg
- 1993-1995 Assistant in Clinical Neuropathology (Benedikt Volk).
- 1995-1998 Postdoctoral fellow Salk Institute La Jolla (Fred H. Gage).
- 1998-2000 Clinical Neurologist at Regensburg University.
- 1999 Heinz Maier-Leibniz Award Deutsche Forschungsgemeinschaft
- 2000 Research group leader MDC Berlin-Buch
- 2001 in addition: Volkswagenstiftung Research Group at Dept. of Experimental Neurology, Charité
- 2002 Habilitation in Experimental Neurology
- 2004 Senior Fellow Maxnet Aging. 2005 Nathan Shock Award (National Institute on Aging, USA)
- since 2007 Professor for Genomics of Regeneration, CRTD.