Abstract

Title: Characterization of mice models with different forms of BDNF knockouts

Topic(s): Neuroanatomy/Neurobiology

Objective: Neurotrophins, such as brain-derived neurotrophic factor (BDNF), play a role in central functions of the brain like learning and memory (Leal et al. 2017, Monteggia et al. 2004), eating behaviour (Rios et al. 2013, Lebrun et al. 2006) and anxiety-related behaviour (Hashimoto 2007). Loss of BDNF or impairments in the BDNF-signalling are therefore linked with brain dysfunction. However, its role in the postnatal brain has remained difficult to assess, since the BDNF-null mutation is lethal (Rauskolb et al. 2010).

Methods: We therefore used different knockout mice with a C57Bl6/N background displaying a lack of BDNF, i.e. a conditional knockout of BDNF in NFL expressing neurons (pyramidal neurons, projection neurons, purkinje cells, motor neurons), a heterozygous knockout, a heterozygous knockout with the conditional knockout on the other allel and their control littermates. We performed several behavioural tests (van Gaalen and Steckler 2000) with female and male mice at the age of three, six and nine months to cover possible gender and age effects, respectively. At the age of 12 months Novelty induced hypophagia was performed to detect anxiety- related behaviour more specifically. Furthermore, we measured food intake and weight of the mice weekly.

Results: Only in some of our analysis narrow differences of the conditional knockout mice to their control littermates could be measured. Significant differences were shown by the types of heterozygous knockout in more of our tests.

Conclusions: Interestingly, changes in behaviour of BDNF knock out mice increased with age. This may be due to the fact, that BDNF expression is highest immediately after birth and decreases with age. We suggest that young mice may cope better with a loss of central BDNF than old mice (i.e. through a higher expression of BDNF by glial cells).

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