IJAE
Vol. 120, n. 1 (Supplement): 183, 2015
ITALIAN JOURNAL OF ANATOMY AND EMBRYOLOGY

Immunochemical detection of BDNF in the brain of a rat model of depression

Laura Poddighe[1], Maria Pina Serra[1], Marianna Boi[1], Maria Antonietta Piludu[2], Osvaldo Giorgi[2], Maria Giuseppa Corda[2], Marina Quartu[1]

[1] Dipartimento di Scienze Biomediche, Sezione di Citomorfologia, Università degli studi di Cagliari, Monserrato, Italy - [2] Dipartimento di Scienze della Vita e dell'Ambiente, Sezione di Neuroscienze, Università degli studi di Cagliari, Cagliari, Italy

Several lines of evidence show a relationship between alterations in the mechanisms that control the expression of neurotrophic factors and mood disorders (1). In particular, support for the role of brain-derived neurotrophic factor (BDNF) in the pathogenesis of depression and related deficits in neuronal plasticity comes from evidence that a reduction of BDNF expression has been found in postmortem brains and serum of depressed subjects and that the BDNF gene is required for the response to antidepressant drugs. With the aim to contribute to the characterization of the molecular and neuronal systems involved in the pathogenesis of depression and in the mechanism of action of the antidepressant treatments, here we use the outbread Roman High- (RHA) and Roman Low-Avoidance (RLA) rat lines, psychogenetically selected for rapid versus poor acquisition of active avoidance, respectively, and bearing several behavioral characteristics closely resembling the cardinal symptoms of depression (2), to investigate on the immunochemical occurrence of BDNF in selected areas of the RHA and RLA rat brain by means of western blot (WB) and immunohistochemistry. WB analysis indicates that the relative levels of BDNF patently and markedly differed in the hippocampus, where they were significantly lower by 58% in RLA vs RHA rats ($p = 0.0014$). In the remaining examined areas, namely the prefrontal cortex, the caudate-putamen complex proper, the core and shell regions of the nucleus accumbens and the ventral tegmental area, the relative BDNF levels did not show statistically significant differences. In tissue sections, BDNF-like immunoreactive (LI) material labelled neuronal cell bodies, proximal processes and varicose nerve fibers, with an uneven distribution in telencephalic cerebral cortex, hippocampus, amygdala, nucleus accumbens, caudate-putamen complex proper, thalamus and ventral tegmentum of the midbrain. Densitometric analysis of immunostained brain sections were used to quantify differences among the two rat lines. The results obtained provide a morphological evidence for a differential expression of BDNF in specific areas of RLA vs RHA rat brains and may form the morphological basis to understand the regulation of the trophic machinery in depression.

This work was supported by grants from L.R. 07/2007, RAS project 2012.

References

[1] Duman RS, Monteggia LM. (2006) A neurotrophic model for stress-related mood disorders. Biol Psychiatry 59:1116–1127; doi: 10.1016/j.biopsych.2006.02.013.

[2] Piras G et al., (2014) Effects of chronic antidepressant treatments in a putative genetic model of vulnerability (Roman low-avoidance rats) and resistance (Roman high-avoidance rats) to stress-induced depression. Psychopharmacology 231:43-53; doi: 10.1007/s00213-013-3205-7.

Keywords

Depression; BDNF; trkB; hippocampus; nucleus accumbens; VTA; western blot; immunohistochemistry.