

## Effect of acute stress on the expression of BDNF in the hippocampus of the Roman rats, a genetic model of stress-induced depression-like behaviour

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The outbred Roman High- (RHA) and Roman Low-Avoidance (RLA) rats were psychogenetically selected for rapid vs. poor acquisition of active avoidance, respectively, and differ in many behavioural traits. Thus, RHA rats are impulsive, novelty seekers, and proactive copers, whereas RLA rats display behavioural traits that resemble some of the cardinal symptoms of depression (1). Beyond the monoamine hypothesis, compelling evidence suggests that mood disorders are characterized by reduced neuronal plasticity. Thus, it has been shown that exposure to stress and antidepressant treatments modulate the expression of neurotrophic factors, and that these changes show an anatomical specificity (2). To characterize the molecular and neuronal systems involved in the pathogenesis of stress-induced depression and in the mechanism of action of antidepressant treatments, we performed western blot (WB) and immunohistochemistry studies to assess the localization of the brain-derived neurotrophic factor (BDNF) in the hippocampus of RHA and RLA rats, both under basal conditions and after exposure to an acute stressor, i.e., the Forced Swim Test (FST). WB analyses showed that, under basal conditions, the relative levels of BDNF were lower in RLA vs. RHA rats, whereas, after FST, the relative levels of BDNF were markedly higher in the hippocampus of RLA vs. RHA rats. In brain tissue sections, BDNF-like immunoreactive material labeled neuronal cell bodies, proximal processes and varicose nerve fibers. Densitometric analysis used to compare immunostained brain sections from the two rat lines showed that, under basal conditions and upon FST, major differences were limited to the hippocampus proper, mostly to the CA3 and CA2 sectors, whereas the dentate gyrus (DG) showed no line-related differences. These results are at variance with previous studies showing that the expression of BDNF in the hippocampus is reduced in depressed patients and in rats exposed to stressors. In conclusion, the present study provides morphological evidence for an unexpected differential regional expression of BDNF in the hippocampus of RLA vs. RHA rats and supports the view that acute stress stimulates neuronal plasticity in genetic animal models of depression.

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

### References

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### Keywords

Depression; BDNF; hippocampus; western blot; immunohistochemistry.