ACUTE AND CHRONIC STRESS INDUCE CHANGES IN GENE TRANSCRIPTIONS RELATED TO ALZHEIMER’S DISEASE IN RATS

P. Sántha¹, M. Pákás³, Ö. Fazekas¹, S. Kálmán¹, J. Kálmán Jr.¹, E. Fodor¹, S. Szűcs¹, Á. Zvara², G. Szabó³, Z. Janka⁴, J. Kálmán¹

¹Department of Psychiatry, Alzheimer's Disease Research Centre, University of Szeged, ²Laboratory of Functional Genomics, Biological Research Centre of the Hungarian Academy of Sciences, ³Department of Pathophysiology, ⁴Department of Psychiatry, University of Szeged, Szeged, Hungary

Preclinical and clinical studies demonstrate that stress may be implicated in the risk of neurodegenerative diseases such as Alzheimer’s disease (AD). Our study aimed to investigate the effects of acute and chronic restraint stress (RS) on the gene transcription of β-actin, amyloid precursor protein (APP) and mitogen activated protein kinase-1 (MAPK-1), proteins related to synaptic plasticity and neuronal degeneration. Male wistar rats were exposed to RS for five hours daily through 3, 7, 14 or 21 days. At the end of exposure periods, total RNA was purified from the cortex and hippocampus. The amounts of β-actin, APP and MAPK-1 mRNA were determined with real time PCR method. Protein levels of β-actin and APP were investigated via Western blot. Our results indicate that the mRNA expression of β-actin and APP followed a U-shaped response curve. The RS caused a significant increase in hippocampal β-actin mRNA expression by the 3rd and 21st day. Significant APP mRNA elevation was observed only by the 3rd week after RS. MAPK-1 mRNA levels increased on the 3rd, 14th and 21st days compared to the control animals. According to the western blot results, there was no change in the amount of β-actin protein. Our findings demonstrate that both acute and chronic RS leads to region specific gene transcriptional changes in the rat brain. These results provide new information about the pathomechanism of stress in the changes of synaptic plasticity in AD. This study was supported by OTKA (grant No 60589), ETT (grant No 052-07/2/2009).