The study of molecular and electrophysiological mechanisms underlying behavioral disorders induced by post-traumatic stress disorder

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Post-traumatic stress disorder (PTSD) is characterized with a mixture of symptoms of anxiety, mood and cognition alterations and memory disturbances. Involvement of limbic system in the PTSD pathogenesis is crucial and many studies have highlighted the role of the hippocampus and amygdala in its development. In our research, we focused to study behavioral, molecular and electrophysiological parameters of post-traumatic stress disorder (PTSD) in mice models.

Fear conditioning models of PTSD was created with the combination of the contextual fear conditioning (CFC) and single intraperitoneal injection of corticosterone in mice group1- corticosterone$^{(+)}$CFC$^{(+)}$ (5mg/kg) and group3 corticosterone$^{(+)}$CFC$^{(+)}$ (10mg/kg). Only CFC animals without corticosterone injection were considered as models of normal fear memory (group2- corticosterone$^{(-)}$CFC$^{(+)}$). Additionally, 2 control groups were created: corticosterone$^{(+)}$CFC$^{(-)}$ (group4) and corticosterone$^{(-)}$CFC$^{(-)}$ (group5). Within 24 hours of CFC anesthetized animals were sacrificed by transfusion with phosphate-buffered saline and brains were harvested. 200 micron axial slices were prepared using a vibratome. NR3C1 (encodes the glucocorticoid receptor) and NR3C2 (encodes the mineralocorticoid receptor) were selected for real time quantitative polymerase chain reaction (RT-qPCR). Obtained data from qPCR experiments were analyzed by statistical program GraphPad. Preliminary results revealed that there is The trend of increased expression of NR3C1 and NR3C2 genes compared to the control group particularly in the hippocampal region, of fear memory associated with PTSD During (increased dose - CFC^{+}CORT^{+} 10mg/kg) in group3 animal model.

During model formation, animals were placed in CFC-cabine for 5 minutes and presented with painful footshocks (duration - 2 sec, intensity - 0.8mA) with the corticosterone (5mg/kg)/solvent injection at the end. Additionally, 2 control groups were created: CFC-corticosterone+ and CFC-corticosterone-. Behavioral patterns of fear memories were analyzed in an open field with the program Videotrack (Viewpoint, France) 3 days after CFC in the same CFC- box or in new box. Fear and exploratory/relaxed reactions of both groups of experimental animals were assessed. Obtained results show that mice from normal and PTSD-associated fear memory groups both have increased fear and decreased exploratory/relaxed reactions to context and auditory stimulus after CFC.

In ketamine-anesthetized wild tape laboratory rats metal (constatntan) tripolar electrodes were stereotaxically implanted in to the both side of the hippocampus for the unipolar registration of the neuronal activity and bipolar stimulation of the CA1 field. Single and paired-pulse electrical stimulation protocol were administrated. Preliminary results revealed that there is The trend of increased neuronal activity in the hippocampal region, of fear memory associated with PTSD animal models.