The Effect of Intra-nucleus Accumbens Administration of Allopregnanolone on $\delta$ and $\gamma_2$ GABA$_A$ Receptor Subunit mRNA Expression in the Hippocampus and on Depressive-like and Grooming Behaviors in Rats

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Alterations in GABA$_A$ receptor expression have been associated with the allopregnanolone (ALLO) antidepressant effect in rats. The present study aimed to verify the effect of bilateral intra-nucleus accumbens core (intra-AcbC) administration of the neurosteroid ALLO in the $\delta$ and $\gamma_2$ GABA$_A$ receptor subunit mRNA expression in both hippocampal hemispheres and to correlate with results in the grooming microstructure and forced swim tests (FST). Wistar male rats were bilaterally treated with control solution, ALLO 1.25, ALLO 2.5 or ALLO 5 $\mu$g/rat, 24, 5 and 1 h before the behavioral tests. At the end of the experiments the brains were removed and frozen for histological analysis and qPCR protocol. One Way ANOVA, followed by Tukey test was used when $P < 0.05$. Both $\delta$ ($P < 0.001$), and $\gamma_2$ ($P < 0.001$) had increased levels of mRNA in the ALLO 5 $\mu$g/rat group compared to control. Also, the right hemisphere expression was higher than the left one in this ($\delta$: $P < 0.001$; $\gamma_2$: $P = 0.029$). This increased $\delta$ subunit expression was correlated with head-shake behavior ($r = 0.547$; $P = 0.019$). Intra-AcbC ALLO administration (5 $\mu$g/rat) presented an anti-immobility activity in the FST ($P = 0.019$), concomitant with climbing increase ($P = 0.007$). ALLO at doses of 1.25 ($P = 0.044$) and 5 $\mu$g/rat ($P = 0.039$) also decreased the percentage of correct transitions in the grooming microstructure test. This study points to an asymmetrical brain change in GABA$_A$ receptors that may be related to the antidepressant effect of intra-AcbC infusion of allopregnanolone.

Word Keys: forced swim test, real time RT-PCR, neurosteroids

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