

Phosphodiesterase 3 inhibition enhances the spatial memory consolidation in rat by increasing the PKA in the hippocampus

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Background and Aims: In the present study the effect of rolipram as a well known phosphodiesterase 3 (PDE3) inhibitor was evaluated on the spatial memory consolidation in the water maze. For more declaration of its mechanism of action, the H89- a protein kinase A inhibitor- was administered concomitantly.

Methods: This study was done on the male wistar rats. Animals were trained in the water maze for finding the hidden platform during four consecutive days. Different doses of rolipram (0.01, 0.03, 0.1 and 0.3 mg/kg) was daily injected intraperitoneally (i.p) after the completion of the training. For evaluation of the spatial memory consolidation the probe test was carried out 24h after the end of the training process and the time spent in target quadrant and target proximity was reported. In the next step of the study, the H89 was administered intrahippocampally (i.h) with the most effective doses of rolipram (i.p) in a separate experiment.

Results: Our data showed the 0.03 mg/kg (i.p) rolipram significantly increase the time spent in target quadrant and target proximity during the probe test. Other doses of rolipram did not show statistically difference in these times compare to the control level. Moreover the H89 (5 μ mol/l, 1 μ l/side, i.h.) reversed the enhancing effect of the rolipram (0.03 mg/kg i.p) on the mentioned time to the basal level of control animals.

Conclusions: These findings illustrated that rolipram improves spatial memory consolidation in an optimal dose. This effect to some extent was mediated by the activation of PKA in the hippocampus as a downstream of cAMP. It can be conclude the cascade of PDE3 inhibition/cAMP/PKA play a key role in the improving effect of rolipram on the consolidation.

Keywords: Rolipram; Spatial memory consolidation; PKA; Hippocampus