ROLE OF RGS14$_{414}$ IN OBJECT RECOGNITION MEMORY AND REGULATION OF SYNAPTIC PLASTICITY IN PERIRHINAL CORTEX

M. Masmudi-Martin [1], S. J. Posadas [1], I. Navarro-Lobato [1], G. Delgado [1], Z. I. Bashir [2], Z. U. Khan [1].
[1]Medicine, University of Malaga Faculty of Medicine, Malaga, Spain
[2]School of Physiology and Pharmacology, University of Bristol, Bristol, United Kindom.

Participation of perirhinal and frontal cortices in processing of object recognition memory has long been recognized, however, recently our laboratory extended this to area V2 of visual cortex. We observed that RGS14$_{414}$-mediated activation of area V2 neurons leads to an enormous increase in object recognition memory. This memory enhancement was of such extent that it converted short term memory of 45 minutes into long lasting long-term memory that could be traced even after many months. Here, we have tested the memory enhancer effect of RGS14$_{414}$ in perirhinal cortex, an area intimately involved in processing of object memory. A relationship of behavioral performance of RGS14$_{414}$-treated rats with electrophysiological synaptic plasticity was investigated. Stimulation of perirhinal cortex with RGS14$_{414}$ produced an equally robust increase in object recognition memory as was observed in area V2. Further, we found that RGS14$_{414}$-mediated activation of perirhinal cortex, (i) blocked the depotentiation induced by 1Hz stimulation during 10min; (ii) blocked the LTP induced by 20Hz stimulation while showed no effect at 100Hz stimulation; and (iii) reduced the LTD induced by the application of 20µM carbachol, a cholinergic receptor agonist, during 10min, however no effect was observed at a higher concentration (50µM). Furthermore, we also observed that phosphorylated isoforms of AMPA receptor 1 and 2 (iGluR1 & iGluR2) were significantly reduced. Thus, our results indicate that iGluRs reflects the level of synaptic plasticity (LTP and LTD) observed in RGS-animals but lack this correlation with enhanced memory behavior.

This work was supported by projects from MINECO, Junta de Andalucía y NIH.