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Assessing the role of N-methyl-D-aspartate (NMDA) receptors and voltage dependent calcium channels in synaptic plasticity induced by the combined application of tetanic stimulation and pentylenetetrazol in hippocampus area CA1 of sodium salicylate treated rats

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Statement of the Problem: Pentylenetetrazol (PTZ), a GABAA receptor antagonist, is one of the most extensively used epileptogenic agents. PTZ-induced seizures cause a number of seemingly permanent biological alterations in the hippocampus and other brain regions. These alterations may play an important role in synaptic plasticity. *In vitro*, a brief PTZ application (3 mM, 10 min) did not potentiate the slope of field excitatory postsynaptic potentials (fEPSPs) but induced along lasting enhancement of the amplitude of population spikes (PSs). Given the widespread use of salicylates (main metabolite and active component of aspirin) in clinical practice and to explore the relationship between tolerance to salicylate, long-term potentiation (LTP), and hippocampal activity, we studied whether tolerance to sodium salicylate would augment the plastic effect of a brief exposure to PTZ, and whether quantized priming via a natural stimulus pattern prior to PTZ exposure would change the lasting effects of PTZ.

Methodology & Theoretical Orientation: To assess whether priming would alter PTZ-induced plastic changes in the CA1 region, primed burst stimulation (PBs) sequences were applied on hippocampal slices taken from chronic sodium salicylate (NaSal) treated rats prior to the PTZ protocol (3 mM, 10 min). The underlying molecular mechanisms (NMDARs vs. VDCCs) of the long-term potentiation (LTP) induced by the 4PBs plus PTZ combined treatment in the NaSal group were also studied.

Findings: We noted priming with a natural pattern of stimulus trains prior to PTZ (4PBs-PTZ) can uncover the effects of chronic salicylate at the synaptic level that NMDA receptors activity and the VDCCs may involve in the phenomenon.

Conclusion & Significance: The elucidation of changes in synaptic plasticity following chronic salicylate could be useful in the clinical practice when aspirin is chronically prescribed in the medication program of some diseases such as cardiovascular diseases.

Biography

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