Effect of Calcium Oscillations on Neuronal Gene Expression

Abstract
Long term potentiation (LTP) of synaptic strength is thought to form the basis of learning and memory. LTP is initiated by the elevation of intracellular calcium, which ultimately leads to the expression of new genes. Gene array technology was used to test the hypothesis that cytoplasmic calcium oscillations in rat cortical neurons modulates the expression of genes associated with synaptic functions. Specifically, gene expression was compared between neurons undergoing rapid calcium oscillations and neurons not undergoing calcium oscillations. Our results suggest that calcium oscillations increase the expression of dual specificity protein phosphatase 7, ras-related protein RAP-lA, ubiquitin, and adenosine Al receptor (ADORAI), and decrease the expression of calmodulin.