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Poster Presentation

The Role of Protein Kinases in Memory

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Abstract

When an experience is encrypted into a long-lasting memory, it is believed that specific sets of neurons in the brain of the animal undergo changes including the strengthening of preexisting synapses and the growth and maintenance of new synaptic connections. These activity-dependent synaptic changes appear to require the coordination of a variety of cellular processes in spatially separated cellular locations. Gene expression within the nucleus leads to structural changes at synapses and alterations. Whereas the establishment of short-term memory has been found to depend on the modification of preexisting cellular proteins, long-term memory requires new gene expression and the synthesis of new proteins. In the adult mammalian brain, more than 250 protein kinases are expressed, but only a few of these kinases are currently known to enable learning and memory. Based on this information it appears that learning and memory-related kinases either impact on synaptic transmission by altering ion channel properties or ion channel density, or regulate gene expression and protein synthesis causing structural changes at existing synapses as well as synaptogenesis. Activation of both protein tyrosine kinases and mitogen-activated protein kinases is required for much longer and may thus have a particular function during transformation from short-term into long-term memory. Quite different time courses appear for protein kinase C (PKC) and protein kinase A (PKA), which may function at two different time points, shortly after training and again much later. This suggests that PKC and PKA might play a role at early and late stages of memory formation. Keywords: NKCC1, Bumetanide, Temporal Lobe Epilepsy.

Keywords: Protein Kinases, Memory, Learning.

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