Abstract View

NGF FASCILITATES HIPPOCAMPAL LTP AND IMPROVES MEMORY IN THE INTACT ADULT RAT BRAIN.

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The basal forebrain cholinergic system is postulated to play a major role in modulating hippocampal and cortical neuron excitability, thereby controlling mechanisms critical for mediating neuronal plasticity in learning and memory. The projection of cholinergic neurons from the septal nucleus to the hippocampus is one of only two brain systems that constitutively expresses both high and low affinity neurotrophin receptors throughout life, raising the possibility that nerve growth factor (NGF) may play a role in modulating hippocampal plasticity and function. To test this hypothesis, adult Fischer 344 rats received intraseptal infusions of low doses of NGF and were evaluated using electrophysiological in vivo recordings of hippocampal long-term potentiation (LTP) and spatial learning paradigms that rely on hippocampal function. Results from these studies indicate that NGF: 1) significantly increased cholinergic neuronal size within the septal nucleus, 2) increased ChAT activity in the septal nucleus and hippocampus, 3) facilitated the induction of LTP within the entorhinal-dentate pathway, and 4) improved acquisition of spatial memory in the Morris water maze. These findings indicate an important and novel role for NGF in regulating biological mechanisms related to memory, and putative substrates of memory, in the adult brain.
Supported by: Alzheimer's Association, NIA AG10435

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