

**TITLE:** Assessing changes in BDNF as a correlate to learning and memory following chronic methamphetamine administration.

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**ABSTRACT:**

**Background:** The neurotrophin brain derived neurotrophic factor (BDNF) has emerged as a key participant in cognitive processes, such as learning and memory. It is recognized as an effector immediate early gene (IEG) capable of influencing synaptic activity pre- and post synaptically. Methamphetamine (METH) is a psychostimulant that disrupts activity at the synapse. This interruption causes alterations in monoamines and IEGs related to learning and memory in the hippocampus. METH users are known to perform subpar than controls on tasks of verbal/nonverbal memory and recognition, but the mechanisms that underlie these disturbances are unclear.

**Methods:** In this study, 29 guinea pigs (200-250 g) underwent novel object recognition (NOR) task, a test of recognition memory, using customized home cages and video-tracking software. METH (10 mg/kg/day) or saline (24 µl/day) were infused using osmotic pumps for 7 days at the rate of 1.0 µl/hr.

**Results:** Following familiarization to 2 similar objects, subsequent discrimination for novel objects when tested after 3-hours was impaired in METH-treated guinea pigs (n=10). This impairment was still evident even after 7 days post-drug infusion (n=12). In contrast, saline controls showed discrimination for novel objects indicating good recognition memory (n=7). Molecular assays showed down-regulation of the plasticity factor BDNF and in METH-treated animals. Furthermore, long-term potentiation (a cellular correlate of learning and memory) was reduced in METH guinea pigs relative to saline controls.

**Conclusion:** These results suggest that METH affects some of the same processes undergirding memory functions and their drug-induced