9-METHYL-B-CARBOLINE IMPROVES LEARNING AND MEMORY IN RATS

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Introduction: Recently we discovered stimulatory and regenerative effects of 9-methyl-β-carboline (9-me-BC) for dopaminergic neurons. Neurotrophic factors and an anti-inflammatory environment were also induced.

Aims: To study the effect of 9-me-BC on learning and memory behaviour in rats as well as its pharmacological impact on the expression of neurotransmitters, synaptic proteins, growth factors and markers for neurogenesis.

Methods: Female Wistar rats treated once daily with 9-me-BC intraperitoneally (2µmol/100g body weight up to ten days) were tested for learning behaviour in the eight-arm radial maze (RAM). The effect of 9-me-BC (single administration) on working memory (scopolamine model) of trained rats in the RAM was tested before, 20 and 60 minutes after scopolamine administration. Number of errors and exploration time were registered. For pharmacological investigations naïve rats were treated with 9-me-BC and brain areas dissected after 10 days.

Results: 9-Me-BC significantly improved learning (number of errors and total exploration time) in the RAM after 10 days of treatment. In the scopolamine model 9-me-BC treated rats performed significantly less errors. In the hippocampus, 9-me-BC significantly increased the growth factor brain derived neurotrophic factor, while the expression of several synaptic markers was not influenced. Tissue levels of norepinephrine, dopamine and serotonin were significantly enhanced, while aspartate, glutamate, glutamine, taurine and GABA were unaffected. The expression of the neurogenesis marker neuroD1 was increased and of the immediate early gene c-fos was reduced by 9-me-BC.

Conclusions: 9-Me-BC stimulates monoaminergic neurotransmitters, neurogenesis markers, neurotrophic factors and cognition. It may have a potential for treating PD and AD alike.