Pharmacological Reports
2011, 63, 1372–1382
ISSN 1734-1140

Memory-related effects of cholinergic receptor ligands in mice as measured by the elevated plus maze test

Marta Kruk, Kinga Tendera, Grażyna Biała

Department of Pharmacology and Pharmacodynamics, Medical University of Lublin, Chodźki 4A, PL 20-093 Lublin, Poland

Correspondence: Marta Kruk, e-mail: marta.kruk@umlub.pl

Abstract:
The purpose of our experiments was to examine the influence of cholinergic receptor ligands on memory-related behavior in mice using the elevated plus maze (EPM) test. The EPM test allows the exploration of different memory processes (acquisition and consolidation), depending on the time of drug treatment. The time necessary for mice to move from the opened arm to the enclosed arm (i.e., transfer latency, TL) was used as an index of memory. Our findings reveal that for both the processes of acquisition and consolidation, treatment with nicotine (0.035 or 0.175 mg/kg, free base, *sc*) shortened TL on the second day of the experiments (TL2), thus improving memory processes. Treatment with scopolamine (0.3 or 1.0 mg/kg, *ip*) significantly increased TL2 values, thus impairing cognitive processes. Moreover, we found that treatment with nicotine, at the non-effective doses used during testing, prevented scopolamine-induced memory impairment by inducing a decrease in TL2 values. Next, we evaluated the influence of bupropion (10 or 20 mg/kg, *ip*), a drug currently used for smoking cessation in humans, on memory-related behavior induced by treatment with nicotine and scopolamine. An acute injection of bupropion (10 or 20 mg/kg) prior to injection with either nicotine (0.035 mg/kg) or scopolamine (1.0 mg/kg) significantly prevented nicotine-induced memory improvement or scopolamine-induced memory impairment. Bupropion treatment can diminish the rewarding (dependence-producing) effects of nicotine and also the cognitive effects that are related to addiction. Our studies further indicate the great involvement of the cholinergic system in memory processes and the potential for the development of more effective pharmacotherapies for memory impairment-like human disorders in which the cholinergic pathways have been implicated.

Key words:
nicotine, scopolamine, bupropion, memory and learning, elevated plus maze, mice