Pharmacological Reports
2008, 60, 655–663
ISSN 1734-1140

NMDA/glutamate mechanism of magnesium-induced anxiolytic-like behavior in mice

Ewa Poleszak[1], Piotr Wlaź[2], Andrzej Wróbel[3], Sylwia Fidecka[1], Gabriel Nowak[4,5]

[1]Department of Pharmacology and Pharmacodynamics, Medical University of Lublin, Staszica 4, PL 20-081 Lublin, Poland

[2]Department of Animal Physiology, Insitute of Biology, Maria Curie-Skłodowska University, Akademicka 19, PL 20-033 Lublin, Poland

[3]Second Department of Gynecology, Medical University of Lublin, Jaczewskiego 8, PL 20-090 Lublin, Poland

[4]Department of Neurobiology, Institute of Pharmacology, Polish Academy of Sciences, Smętna 12, PL 31-343 Kraków, Poland

[5]Department of Cytobiology and Histochemistry, Collegium Medicum, Jagiellonian University, Medyczna 9, PL 30-688 Kraków, Poland

Correspondence: Ewa Poleszak, e-mail: ewa.poleszak@am.lublin.pl

Abstract:
The anxiolytic-like activity of magnesium in mice during the elevated plus maze (EPM) has been demonstrated previously. In the present study, we examined the involvement of NMDA/glutamate receptor ligands on the magnesium effect on the EPM.
We demonstrated that low, ineffective doses of NMDA antagonists (the competitive NMDA antagonist CGP 37849, 0.3 mg/kg; an antagonist of the glycine$_B$ sites, L-701,324, 1 mg/kg; a partial agonist of the glycine$_B$ sites, D-cycloserine, 2.5 mg/kg; and the non-competitive NMDA antagonist MK-801, 0.05 mg/kg) administered together with an ineffective dose of magnesium (10 mg/kg) evoked a significant increase in the percentage of time spent in the open arm of the maze (an index of anxiety). Moreover, magnesium-induced anxiolytic-like activity (20 mg/kg) was antagonized by D-serine (100 nmol/mouse), an agonist of glycine$_B$ site of the NMDA receptor complex.
The present study demonstrates the involvement of the NMDA/glutamate pathway in the magnesium anxiolytic-like activity in the EPM in mice, and that this activity particularly involves the glycine$_B$ sites.

Key words:
magnesium, NMDA receptor ligands, anxiety, elevated plus maze, mice