Pharmacological Reports
2008, 60, 844–855
ISSN 1734-1140

Olfactory bulbectomy and amitriptyline treatment influences mGlu receptors expression in the mouse brain hippocampus

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Abstract:
Olfactory bulbectomy (OB) is an established animal model of depression that has been investigated mostly in rats. As in human major depression, OB induces behavioral alterations that can be ameliorated by chronic antidepressant treatment. Furthermore, it was shown that OB induces changes of various protein receptor levels in brain areas that are important in antidepressant therapy. In the present study, we investigated the effects of OB and amitriptyline (AMI) treatment on the expression of metabotropic glutamate receptors (mGluR) in the mouse hippocampus using the western blot method. AMI was given for 14 days, in a dose of 10 mg/kg, intraperitoneally. The levels of most subtypes of mGlu receptors, e.g., mGlu1a (mGluR group I), mGlu2/3 (mGluR group II), mGlu4, and mGlu7 (mGluR group III) receptors, were measured. Additionally, immunohistochemical stainings were made in slices of the mouse hippocampus.
It was found that OB induced an increase in mGluR1a-immunoreactivity (IR), which was abolished by AMI treatment in the hippocampus. The removal of the olfactory bulbs caused a decrease in the level of mGlu2/3 receptors in the hippocampus, which was reversed after AMI administration. MGluR4-IR was decreased in the hippocampus in all the groups studied. A decrease of mGluR7-IR was observed in the OB group, and the effect was abolished by the administration of AMI. However, decreases in the level of mGlu2/3 and mGlu7 receptors were observed after AMI administration.
The results obtained indicate an influence of OB on mGlu receptors levels in the hippocampus, and the OB-induced effect can be reversed by chronic AMI treatment in the case of mGlu1a, mGlu2/3 and mGlu7 receptors.

Key words:
olfactory bulbectomy, depression, amitriptyline, mGluR, immunoblotting