Pharmacological Reports
2007, 59, suppl. 1, 217–225
ISSN 1734-1140

Evaluation of glutathione-related enzyme activities in the liver and kidney of rats exposed to lead and ethanol

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Abstract:
Recently, we have put forward the hypothesis that a decreased concentration of reduced glutathione (GSH) may be implicated in the mechanisms of peroxidative damage to the liver and kidney caused by lead (Pb) and/or ethanol (EtOH). Thus, the aim of the present study was to assess the activities of GSH-related enzymes, such as glutathione peroxidase (GPx), glutathione reductase (GR), and glutathione S-transferase (GST) in these organs of rats exposed to Pb (500 mg/l in drinking water) and/or EtOH (5 g/kg/24 h intragastrically) for 12 weeks. The exposure to Pb led to a decrease in the hepatic activities of GPx, GR and GST and an increase in the renal activities of GPx and GR. After the exposure to EtOH, a decrease in the hepatic activities of GPx and GR and an increase in the renal GPx activity were observed. The co-exposure to Pb and EtOH resulted in a decrease in the activity of the study enzymes in the liver. The decrease in the hepatic GPx activity was also significant compared to the animals exposed to Pb and EtOH separately. The renal GR activity increased due to the co-exposure to Pb and EtOH in comparison with the control group and the groups treated with Pb and EtOH separately, whereas the renal GPx activity increased only compared to the control group. Analysis of variance revealed that the changes in the activity of the study enzymes after co-exposure to Pb and EtOH resulted from an independent action of these xenobiotics as well as from their interactive action. The results suggest that changes in GPx, GR and GST activities may belong to the mechanisms leading to a decrease in GSH concentration in the liver and kidney due to exposure to Pb and/or EtOH.

Key words:
lead, ethanol, glutathione peroxidase, glutathione reductase, glutathione S-transferase