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Gadolinium chloride suppresses styrene-induced cytochrome P450s expression in rat liver

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ABSTRACT

To assess the effect of gadolinium (Gd) on the expression of several forms of cytochrome P450 (P450s) and antioxidant enzymes, we treated rats with gadolinium chloride (25 mg as Gd/kg body weight) 4 h after styrene (a multiple P450 inducer) treatment (600 mg/kg). Gd treatment significantly suppressed styrene-inducible cytochrome P4502B1 (CYP2B1), CYP2B2, CYP2E1, and CYP3A2 mRNA expressions to 48.6%, 69.8%, 61.1%, and 38.5%, accompanying with the reduction of proteins expression to 1.42%, 31.2%, 21.1% and 21.1%, respectively, compared with styrene alone treatment. Gd suppressed styrene-inducible CYP1A2 expression, but only at the protein level. On the other hand, styrene treatment caused a decrease in reduced form of glutathione (GSH), as well as increases in lipid peroxide and serum ALT and AST activities, suggesting the occurrence of hepatic damage probably due to styrene-induced oxidative stress in rat liver. Post-treatment of Gd attenuated this styrene-caused hepatic damage. Moreover, mRNA expressions of cellular antioxidant enzymes such as catalase, CuZn-superoxide dismutase (CuZnSOD) and glutathione peroxidase (GPX) were hardly changed by styrene and/or Gd treatment. In summary, Gd suppressed styrene-inducible expression of not only CYP2B1 but also several forms of P450 at both the mRNA and protein levels, along with attenuation of styrene-caused liver damage. These findings suggested that Gd is a chemo-preventive agent against hepatic damage caused by xenobiotics requiring biotransformation.

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