Dietary Selenium Has a Protective Potency against Fetoletal Toxicity of Methylmercury

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The effect of dietary selenium on the fetoletal toxicity of methylmercury was examined in mice of the ICR strain. From 4 weeks of age, female mice were fed diets containing various amounts (<0.01 , 0.1, 0.2, 0.4 ppm) of selenium. When pregnant mice were injected sc with 25 $\mu\text{mol/kg/d}$ of methylmercuric chloride (MMC) on days 13, 14, and 15 of gestation, fetal death was observed only in the group of mice fed selenium-deficient (<0.01 ppm) diet. One-tenth ppm of selenium in the diet was found to be enough to protect fetuses against the fetoletal toxicity of MMC at this dose level.

Mercury accumulations in maternal and fetal tissues were independent of the dietary selenium level. A striking increase in selenium concentration after maternal injection of MMC was observed in fetal liver of mice fed selenium-supplemented diets. However, glutathione peroxidase (GSH-Px) activity was markedly decreased in fetal liver by maternal injection of MMC. Since neither selenium level nor GSH-Px activity was affected in the maternal tissues, the systems involving selenium-dependent GSH-Px in the fetuses seem to be more sensitive to MMC

than those in the mother. In fetal liver, therefore, the ratio of the GSH-Px activity to the amount of selenium was markedly smaller in MMC-treated animals. To elucidate the mechanism of this phenomenon, we tried to characterize the chemical form of increased selenium in fetal liver following maternal MMC administration.

On Sephadex G-200 column chromatography, most of the selenium in the soluble fraction of fetal liver obtained without MMC treatment was eluted in the GSH-Px fraction (Peak I). However, maternal MMC injection yielded an additional major peak of selenium, named Peak II, besides the GSH-Px fraction. On dialysis of aliquots of the GSH-Px and Peak II fractions against 0.5M 2-mercaptoethanol (2-ME), most selenium was released from the Peak II fraction, whereas a large amount of selenium remained in the GSH-Px fraction. Since selenium in the form of selenocysteine, as in the GSH-Px molecule, is not released during dialysis against 2-ME, the chemical form of the selenium in Peak II seems to be unlike selenocysteine. Though the amount of selenium in the GSH-Px fraction on gel filtration was not decreased by maternal MMC injection, the enzyme activity in the same fraction was decreased by MMC treatment in a dose-dependent manner. To elucidate the mechanism of the protection by dietary selenium against fetoletal toxicity of MMC as well as the mechanism of fetotoxic manifestation of MMC, further investigation of the characteristics of the chemical form of the selenium in Peak II fraction is necessary.