Effect of Fetal Sex and Maternal Smoking on Cord Blood Glutathione Peroxidase Activities

H. L. Halliday, M. Bannon, and D. McMaster

Department of Child Health and Medicine, The Queen's University of Belfast, and Royal Maternity Hospital, Belfast, Northern Ireland

Glutathione peroxidase is a selenium-based enzyme, the main function of which is the catalysis of chemical reactions that detoxify peroxides and prevent damage to cell membranes. Whole-blood glutathione peroxidase activity is directly proportional to blood selenium levels and may be used as an indicator of selenium status.

Glutathione peroxidase activity was estimated in the cord blood of 47 newborn infants (mean gestational age, 38.9 ± 2.1 weeks; mean birthweight, 3,307 ± 578 g). In 23 cases corresponding maternal glutathione peroxidase activities were measured at the time of delivery and compared with values for 23 nonpregnant women of the same age. Maternal glutathione peroxidase levels were the same as those of nonpregnant controls (33 ± 4 IU/g hemoglobin); however, the mean cord blood activity was lower (23.6 ± 4.8 IU/g hemoglobin at 37°C), with a median maternal cord blood ratio 1.5:1.

The mean cord blood activity in male infants (22.1 ± 4.9) was significantly lower than that in female infants (25.4 ± 4.1) (p < 0.01). Maternal smoking had a similar effect, so that cord blood levels were 22.1 ± 4.9 if the mother smoked and 24.3 ± 4.6 if the mother was a nonsmoker (p < 0.05). Maternal smoking and fetal sex had no influence on maternal glutathione peroxidase activities.

Multivariate analysis showed that both maternal smoking and fetal sex had significant independent effects in lowering cord blood glutathione peroxidase activity. It would appear that sex differences in glutathione peroxidase activity begin during fetal life and may be the result of hormonal or chromosomal influences. Cigarette smoking may alter plasma selenium levels to reduce glutathione peroxidase activity. It is possible that high con-
centrations of cadmium in the tissues of cigarette smokers may form cadmium-selenium complexes, which would render selenium unavailable for the formation of glutathione peroxidase.

It is speculated that low glutathione peroxidase activity may be one explanation for the increased prevalence of bronchopulmonary dysplasia among boys.