

INTERACTIONS BETWEEN ZINC, IRON AND FOLIC ACID IN THE PREGNANT RAT

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Over the last few years there have been expressions of concern in the scientific literature that iron supplementation during pregnancy could adversely affect the maternal zinc status, thus compromising embryonic or fetal development (Solomons 1986). In addition, the suggestion has been made that folic acid administration during pregnancy might also reduce the uptake or availability of zinc (Ghishan et al. 1986).

We have studied the metabolic interaction between these three nutrients (zinc, iron and folate) in the pregnant rat to ascertain whether a marginal (but non-teratogenic) zinc deficiency would be exacerbated by high dietary levels of iron or folic acid and lead to any adverse effect on pre-natal development. The dietary regimes and the numbers of animals used are shown in the table.

ZINC (mg/kg)	IRON (mg/kg)			
	200	Folic Acid (mg/kg)		1000
	0.3	1.5	0.3	1.5
7.5	8	8	8	9
20	8	7	8	8
100	8	8	7	7

Diets which contain 100mg Zn/kg, 200 mg Fe/kg and 0.3 mg Folate/kg are considered adequate for rats.

Fetal development was assessed at the end of pregnancy and trace element levels were determined in maternal liver and serum as well as placenta, fetal liver and carcass. Malondialdehyde levels were also estimated in maternal and fetal liver.

The incidence of fetal malformation (external, internal and skeletal) was not affected by any dietary treatment, despite the low maternal zinc levels in some groups at the end of pregnancy. Malondialdehyde levels were elevated as a result of zinc deprivation and further elevated in the presence of high dietary iron. Significant changes in iron and zinc concentrations were found in several tissues, notably serum, placenta and maternal and fetal liver, mainly as a result of varying the dietary zinc and iron levels.

These data show that even at exceedingly high ratios of dietary iron to zinc (133 to 1) there was little effect on pre-natal development in the rat. Although further studies are needed, extrapolation to the human situation would imply that, providing no other dietary problems exist, moderate iron and folate supplements should not be detrimental during pregnancy.

GHISHAN, F.K., SAID, H.M., WILSON, P.C., MURRELL, J.E. and GREENE, H.L. (1986). *Am.J.Clin.Nutr.* 43 : 258.

SOLOMONS, N.W. (1986). *J.Nutr.* 116 : 927.

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