Abstract

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Chronic ethanol perturbs testicular folate metabolism and dietary folate deficiency reduces sex hormone levels in the Yucatan micropig.

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BACKGROUND: Although alcoholism causes changes in hepatic folate metabolism that are aggravated by folate deficiency, male reproductive effects have never been studied.

OBJECTIVE AND METHODS: We evaluated changes in folate metabolism in the male reproductive system following chronic ethanol consumption and folate deficiency. Twenty-four juvenile micropigs received folate-sufficient (FS) or folate-depleted (FD) diets or the same diets containing 40% of energy as ethanol (FSE or FDE) for 14 wk, and the differences between the groups were determined by ANOVA.

RESULTS: Chronic ethanol consumption (FSE and FDE compared with FS and FD groups) reduced testis and epididymis weights, testis sperm concentrations, and total sperm counts and circulating FSH levels. Folate deficiency (FD and FDE compared with FS and FSE groups) reduced circulating testosterone, estradiol and LH levels, and also testicular 17,20-lyase and aromatase activities. There was histological evidence of testicular lesions and incomplete progression of spermatogenesis in all treated groups relative to the FS control, with the FDE group being the most affected. Chronic ethanol consumption increased testis folate concentrations and decreased testis methionine synthase activity, whereas folate deficiency reduced total testis folate levels and increased methionine synthase activity. In all pigs combined, testicular methionine synthase activity was negatively associated with circulating estradiol, LH and FSH, and 17,20-lyase activity after controlling for ethanol, folate deficiency, and their interaction.

CONCLUSION: Thus, while chronic ethanol consumption primarily impairs spermatogenesis, folate deficiency reduces sex hormones, and the two treatments have opposite effects on testicular folate metabolism. Furthermore, methionine synthase may influence the hormonal regulation of spermatogenesis.

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