Abstract

Early-in-life dietary zinc deficiency and supplementation and mammary tumor development in adulthood female rats.

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OBJECTIVE: Zinc deficiency during pregnancy and postnatal life can adversely increase risk of developing human diseases at adulthood. The present study was designed to evaluate whether dietary zinc deficiency or supplementation during the pregnancy, lactation and juvenile stages interferes in the development of mammary tumors induced by 7,12-dimethylbenzanthracene (DMBA) in female Sprague-Dawley (SD) rats.

METHODS: Pregnant female SD rats were allocated into three groups: zinc-adequate diet (ZnA - 35-mg/kg chow), zinc-deficient diet (ZnD - 3-mg/kg chow) or zinc-supplemented diet (ZnS - 180-mg/kg chow) during gestational day 10 (GD 10) until the litters' weaning. Female offspring received the same diets as their dams until postnatal day (PND) 51. At PND 51, the animals received a single dose of DMBA (50 mg/kg, ig) and zinc-adequate diets. At PND 180, female were euthanized, and tumor samples were processed for histological evaluation and gene expression microarray analysis.

RESULTS: The ZnD induced a significant reduction in female offspring body weight evolution and in mammary gland development. At late in life, the ZnD or ZnS did not alter the latency, incidence, multiplicity, volume or histological types of mammary tumors in relation to the ZnA group. However, the total tumor number in ZnS group was higher than in ZnA group, accompanied by distinct expression of 4 genes up- and 15 genes down-regulated.

CONCLUSION: The present findings indicate that early-in-life dietary zinc supplementation, differently to zinc deficiency, has a potential to modify the susceptibility to the development of mammary tumors induced by DMBA.

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