Paternal selenium deficiency but not supplementation during preconception alters mammary gland development and 7,12-dimethylbenz[a]anthracene-induced mammary carcinogenesis in female rat offspring.

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BACKGROUND: Breast cancer is a global public health problem and accumulating evidence indicates early-life exposures as relevant factors in the disease risk determination. Recent studies have shown that paternal nutrition can influence offspring health including breast cancer risk. Selenium is a micronutrient with essential role in central aspects of embryogenesis, male fertility and cancer and that has been extensively studied as a chemopreventive agent in several breast cancer experimental models.

OBJECTIVE: Thus, we designed an animal study to evaluate whether paternal selenium deficiency or supplementation during preconception could affect the female offspring mammary gland development and breast cancer susceptibility.

METHODS: Male Sprague-Dawley rats were fed AIN93-G diet containing 0.15 ppm (control diet), 0.05 ppm (deficient diet) or 1 ppm (supplemented diet) of selenium for 9 weeks and mated with control female rats. Mammary carcinogenesis was induced with 7,12-dimethylbenz[a]anthracene (DMBA) in their female offspring.

RESULTS: Paternal selenium deficiency increased the number of terminal end buds, epithelial elongation and cell proliferation in the mammary gland of the female rat offspring and these effects were associated with higher susceptibility to DMBA-induced mammary tumors (increased incidence and higher grade tumors). On the other hand, paternal selenium supplementation did not influence any of these parameters.

CONCLUSION: These results highlight the importance of father’s nutrition including selenium status as a relevant factor affecting daughter’s breast cancer risk and paternal preconception as a potential developmental stage to start disease preventive strategies.

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