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Bisphenol A: Breast cancer risk stems from mammary stem cells

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Bisphenol A (BPA) is a most pervasive chemical in modern life as a component of polycarbonate plastics and epoxy resins. Perinatal exposure to low, environmentally relevant doses of BPA in rodents resulted in the induction of pre-neoplastic ductal hyperplasia, carcinoma in situ, and increased susceptibility to tumorigenesis. However, the underlying mechanism for these observations is unclear. The murine mammary stem cells (MaSCs) are present in fetal mammary rudiments and could be the putative targets for BPA-induced tumorigenesis. More recently, MaSCs of different lineages have been matched with different subtypes of breast cancer by their specific gene-expression signatures. We thus hypothesize that BPA induced susceptibility of mammary gland to tumorigenesis may be mediated through MaSCs. To test this hypothesis, we exposed 21-day old Balb/C mice to BPA by gavage at 25 μg/kg/day during puberty for 3 weeks, and then isolated primary mammary cells at different time points (6-week, 2 and 4-month) for MaSC quantification using an in vitro mammosphere formation and differentiation assay as well as the in vivo cleared mammary fat pad regeneration assay. Our findings indicate that low dose BPA exposure at puberty can accelerate puberty onset, increase lateral branches and luminal cells, and hyperplasia in adult mammary glands. More significantly, puberty BPA exposure altered MaSCs in such a way that regenerated glands from these MaSCs yielded higher preneoplastic lesion than control MaSCs, indicating puberty BPA exposure render MaSCs more susceptible to transformation. Our findings suggest that BPA-induced susceptibility of mammary glands to tumorigenesis have a stem cell origin

Biography

Qiaoxiang Dong received her Ph.D. from Louisiana State University in May 2005. She has published more than 60 peer-reviewed papers, and has presented 18 oral presentations, 11 posters, and had a total of 30 conference abstracts published. She also serves as reviewers for more than two dozens of international journals and many grant agents

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