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Long-lasting Effects of Perinatal Exposure to Brominated Flame Retardant on Male Reproductive Outcomes in Rat Model

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Meta-analysis of 101 studies published between 1934 and 1996 indicates that mean sperm concentration decreased around 50% during this period. More recent studies have found alarmingly poor semen quality in the general population of Northern Europe. Additional adverse trends include increased incidence of testicular cancer, and congenital malformations such as cryptorchidism and hypospadias. Testicular germ cell cancers increased by about 400% over the period of 50 years in industrialized countries. Decreased quality of male reproductive health has been linked to environmental endocrine disruptors exposure. However, the ability of xenobiotics to produce long-lasting effects and mechanisms of perturbation of the male reproductive system following developmental exposures are not well understood. Both animal experiments and human studies show male reproductive toxicity to polybrominated diphenyl ethers (PBDE), a group of ubiquitous, persistent, and bioaccumulative environmental xenobiotics. Here we report the result of experiment in which pregnant Wistar rats were fed 0.2 mg/kg body weight BDE-47 (the most ubiquitous PBDE congener) daily starting from the eighth day of pregnancy until weaning. Multiple endpoints of male reproductive health were assessed in offspring on postnatal week 20: testis size, sperm production, morphology, motility, circulating testosterone, select gene expression in prostate (qRT-PCR) and all-genome gene expression in testis (RNA-seq). Seventeen weeks after exposure was abolished testis size was significantly smaller in adult rats and genes of inflammatory response were significantly upregulated in testis tissue among other results. Our findings confirm male-reproductive toxicity of PBDE and identify inflammatory response as a long lasting mechanism of repro-toxicity triggered by perinatal exposure.

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