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Effects of Bisphenol-A and Octylphenol on the Expression of Steroidogenic Enzymes and Inhibin in the Cultured Mouse Testicular Cells

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Endocrine disrupting chemicals (EDCs) have been known to mimic or inhibit the function of the endogenous hormone in human or wildlife population, thereby may disturb a reproductive system. The normal development of male reproductive tract is depend upon endogenous hormone, testosterone. The biosynthesis of that requires the expression of several enzymes, including cytochrome P450 cholesterol side-chain cleavage enzyme (CYPscc), 3-hydroxysteroid dehydrogenase (3β-HSD) and cytochrome P450 17α-hydorxylase/C17-20-lyase ($CYP_{17\alpha}$). Inhibin and activin produced mainly by Sertoli cell involves in negative feedback mechanisms which controls the production of LH and FSH by acting on anterior pituitary gland. This study was designed to evaluate the effects of bisphenol-A and octylphenol on steroidogenesis and feedback system in testicular cells of pre-pubertal mice. Mouse testicular cells were prepared from 15-day-old mouse testis by enzyme digestion (collagenase, trypsin). These cells were cultured in DMEM supplemented with human FSH (0.1 IU/ml), testosterone (10^{-7} M), and fetal bovine serum (10%) or medium with estrogen (E_2), bisphenol-A (BPA) and octylphenol (OP; 10^{-9}M, 10^{-7}M, and 10^{-5}M, respectively) for 48 hours. After culture, total cell number and viability were assessed by heamocytometer and trypan blue stain. The expressions of cytochrome CYPscc, 3β-HSD, $CYP_{17\alpha}$ and SF-1 mRNA were detected by RT-PCR. The expressions of α and β subunits of inhibin were also detected. As a result, testicular cells treated with OP (10^{-5} M, respectively) significantly decreased the viability but not all of the groups. After incubation of testicular cells for 48 hours in the presence of BPA or OP, the expression of CYPscc, 3β-HSD and $CYP_{17\alpha}$ mRNA were significantly decreased but the expression of SF-1 were not changed except in positive control treated with E_2. The expression of α subunit of inhibin was increased at the highest concentration of OP. There are no differences in the expression of β_A and β_B subunits of inhibin. Further studies are required to elucidate whether BPA and OP has an effect on feedback loop in male reproductive system. In conclusion, BPA and OP might inhibit steroidogenesis by decreasing the CYPscc, 3β-HSD and $CYP_{17\alpha}$ mRNA expression in the mouse testis. These results suggest that BPA and OP would disturb testicular function and subsequently impair spermatogenesis. (This study was supported by grant R02-2001-00399 from KOSEF)