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Toxic effects of polychlorinated biphenyls on cultured rat Sertoli cells

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Polychlorinated biphenyls (PCBs) are ubiquitous and persistent environmental contaminants. In mammals, PCBs affect spermatogenesis and may be associated with Sertoli cell changes. Therefore, our aim was to evaluate in vitro toxic effects of hydroxylated PCB (PCB-22; 2',3',4',5'-tetrachloro-4-biphenylol) and PCB congener (PCB-77; 3,3',4,4'-tetrachlorobiphenyl) on Sertoli cells isolated from 19- to 21-day-old male rats. Sertoli cells incubated for 24 hours in 10(-7) M PCB-22 and 10(-8) M PCB-77, but not in 0.05% ETOH or 10(-7) M 17beta-estradiol (E2) showed morphological changes. Sertoli cells demonstrated progressive damage with higher concentrations of PCB-77 (10(-7) M). After 24 hours, 10 (-7) M PCB-22 killed 20% of the Sertoli cells and equimolar PCB-77 killed 45% of the Sertoli cells in culture. At 10(-8) M, PCB-22 did not kill any significant number of Sertoli cells, whereas PCB-77 killed 40% of cells in culture. This result showed differential effects of PCB compounds, with PCB-77 being more cytotoxic than PCB-22 as tested on Sertoli cells. Because PCB-77 produced greater toxic effects, we further tested this congener on Sertoli cell lactate production. After 24 hours, lactate production by Sertoli cells treated with 10(-7) or 10(-8) M PCB-77 was significantly increased. Finally, Sertoli cells exposed to 10(-7) M PCB-77 showed disorganized and less intense F-actin staining. The results demonstrate that PCBs, but not E2, is directly toxic to Sertoli cells in vitro, and suggest this toxic effect is independent of estrogenic action.