Involvement of the AhR in Reproductive Function with Exposure to PCB 126

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This research investigated the effects of polychlorinated biphenyls (PCB) on rat ovaries and determined the extent to which the aryl hydrocarbon receptor (AhR) mediated the adverse effects of PCB 126 at each stage of follicular development. The goal was to translate this research to understand the effects of PCB 126 on human reproductive systems. PCBs are toxic organic compounds found within dated industrially manufactured products and although their effects on the reproductive system— and more specifically ovarian follicle counts— are largely unknown, PBCs are known to cause forms of liver and skin disease. This study uses ovarian tissue samples from wild-type (WT) and AhR knockout (AhR KO) Sprague Dawley/Holtzman rats. These rats were injected intraperitoneally with either PCB 126 or a corn oil placebo to study the effects on follicle counts at the five main stages of follicle maturation: primordial, primary secondary, antral, and corpus luteum. The results illustrated WT Oil counts were significantly higher than WT PCB counts in secondary follicles (Mean: 114.4 vs. 40.4, $p = 0.026$), antral follicles (Mean: 64.6 vs. 18.4, $p < 0.001$), and corpus luteum (Mean: 335.4 vs. 48.8, $p < 0.001$). There were no significant differences noted between the AhR KO PCB counts and the AhR KO Oil counts. The WT Oil counts were significantly higher than the AhR KO Oil counts within antral follicles (Mean: 64.6 vs. 38.9, $p = 0.006$) and corpus luteum (Mean: 335.4 vs. 267.0, $p = 0.014$). The results of the study indicate PCB 126 had adverse effects on reproductive function and the AhR likely mediates the toxicity of PCB 126. Additionally, AhR possibly plays an important role in ovarian function and its removal may reduce follicle counts and instigate other functional issues.

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