PERFORMANCE OF OVARIAN FUNCTION BY BENZO(a)PYRENE

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Abstract: This study was conducted to evaluate the effect of benzo(a)pyrene (BaP) on ovarian function. Adult female Fisher-344 rats were randomly assigned to a treatment and a control group (unexposed). Treatment consisted of subacute exposure of rats via inhalation to 0.1 mg/m³ of BaP: carbon black aerosol, four hours a day for 10 days. From the fourth day of exposure, half of the animals in the control (unexposed) and treatment groups were synchronized with subcutaneous progesterone (P₄) injections (1 mg P₄/animal/day for 4 days). Folliculogenesis was induced in these animals with intra-peritoneal (IP) injection of 15 IU of equine gonadotropin (EG) about 24 hours after the last P₄ injection (day 7 of BaP treatment). Ovulatory response was subsequently induced at 48 hours post EG (proestrus, confirmed by vaginal cytology) by an IP injection of 15 IU of human chorionic gonadotropin (hCG; day 9 of BaP treatment). The remaining unsynchronized rats were monitored for cyclicity from day 4 till the cessation of BaP exposures by vaginal cytology and ovulatory response was induced with similar concentration of hCG administered to their synchronized counterparts. Blood samples were collected at proestrus and at 24 hrs post hCG for ovarian steroids for sera that were used for determining ovarian steroid concentrations by appropriate radioimmunoassay methods. Following exsanguination (at 24 hrs post hCG), all animals in the study were sacrificed, ovaries excised and weighed and number of ovulation points per animal determined by counting the total number of corpora lutea on both ovaries. In the synchronized group, all rats responded identically to the synchronization and folliculogenesis/ovulation induction protocol. However, estrous cycle was attenuated in unsynchronized BaP-exposed rats (6.9 days) versus controls (3.9 days; P < 0.05). Both synchronized and unsynchronized BaP-exposed rats had lower ovulation rates (synchronized BaP, 18.7 ± 1.5 vs synchronized control, 29.0 ± 1.3; unsynchronized BaP, 11.0 ± 2.4 vs unsynchronized control 24.4 ± 1.6; P < 0.05 ). However, ovarian weights were unaffected. These data suggest that BaP perturbs the ability of ovaries to respond to gonadotropins for adequate initialization of folliculogenesis and induction of ovulation and (b) BaP probably acts to reduce ovulatory response to gonadotropins via a reduction in estrogen biosynthesis by follicles.

Keywords: Benzo(a)pyrene, gonadotropins, synchronization, ovarian steroids, estrous cycle, proestrus

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