number, and protein content were significantly decreased in these cell models. Counted cell number, cell viability and protein content are significantly higher in AST than in MGC, which were exposed to MeHg (5 or 10 μM) for 6 days. Western blot and immunocytochemistry also showed qualitative increases of GS protein in these cells. Apparent morphological alteration of the glial cells was observed at 5 and 10 μM MeHg-exposed groups. To investigate the effect of glutamate on MeHg toxicity, MeHg (10 μM) and glutamate (0.5 μM) were co-treated to the MGC or AST for 6 days. Exposure of glutamate (0.5 μM) to AST or MGC has no effect on GS activity. However, MeHg (10 μM) exposed cells or cells co-treated with MeHg and glutamate showed significant increases of the GS activity and GS protein. Counted cell number, cell viability and protein content were dose-dependently decreased in MeHg exposed- or co-treatment groups, and were significantly higher in AST than MGC. AST was more resistant to decrease of cell number, cell viability and protein content and % increase of GS activity in AST was significantly higher than in MGC. This data provide evidence that increase of GS activity may have a protective role in MeHg toxicity in glial cells.

[PA4-18] [04/18/2002 (Thr) 14:00 - 17:00 / Hall E]

Effect of TCDD on the expression of rat hepatic cytochrome P450 2A1: Assessment of the effect in vivo and in a hepatocyte culture system

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This study aimed to determine the effects of 2,3,7,8-tetrachlorodibenzo-p-dioxin(TCDD, dioxin) in P450 (CYP) 2A1 expression, using in vivo and in cultured hepatocyte system, in comparison with traditional TCDD-mediated induction of CYP 1A1. Hepatic microsomal testosterone 7a-hydroxylase activity as a marker of CYP2A1 was increase in both male and female rats. As judged by the change in testosterone metabolic activity catalyzed by liver microsome, oral administration of TCDD into rats increased the CYP 2A1 time- and dose-dependently. In cultured hepatocytes, CYP2A1 protein induction by TCDD was matched with changing in CYP2A1 activity. Northern blot analysis confirmed extensive increase of CYP2A1 mRNA induced by TCDD. In addition, resveratrol, specific inhibitor of CYP1A1, had the greatest inhibitory effect (approximately 60%) in CYP2A1 mRNA, caused by the AhR ligand TCDD in a concentration-dependent manner.
These results suggest that the potentiation of CYP2A1 induction by TCDD is regulated at the level of transcription of the CYP2A1 gene, presumably via binding to XRE core sequence and the expression of CYP2A1 is induced by addition of TCDD, which was in agreement with CYP1A1 expression by AhR-TCDD complexes. Despite the fact that CYP1A1 induction is used widely as a measure of environmental TCDD exposure, the data presented in this study suggest that induction of CYP2A1 enzymes is another indicator of exposure to TCDD.

[PA4-19] [04/18/2002 (Thr) 14:00 - 17:00 / Hall E]

In utero exposure of permethrin alters sexual maturation of male and female rat

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Permethrin is one of the pyrethroid insecticides, which are synthetic derivatives of natural pyrethrins contained in the flowers of phyrethrum. Permethrin is a widely used agent for indoor and outdoor pest control due to its high insecticidal potency and low mammalian toxicity. However, any chemical with hormonal activity like estrogen could affect reproductive function including sexual maturation. Our previous study indicated that permthrin showed estrogenic activity. Therefore, we examined whether permethrin changes the sexual maturation of male and female rat. Subcutaneous treatment with permethrin(10 ㎎/㎏) 6 to 18 of gestational day(GD) led to significant delay in vaginal opening of female offspring, and also delay in vaginal opening was observed with intraperitoneal injection (200 ㎎/㎏) 6 to 18 of GD. Male rats exposed to permethrin had significant decreases in anogenital distances (AGDs) on postnatal day (PND) 3, 15 and

21 by intraperitoneal injection as well as subcutaneous treatment, whereas had no effect on preputial separation (PPS). In addition, 10 mg/kg of permethrin elevated serum level of testosterone and increased in testis weight of male rats on PND 49. In the female offspring of PND 22, serum level of E2 was reduced and significant reductions of ovarian ERα mRNA and protein level were showed. In contrast, reproductive organ weights (uterus, vagina and ovary) were increased. Our results demonstrated that in utero exposure of permethrin might alter normal sexual maturation of male and female in rats.

[PA4-20] [04/18/2002 (Thr) 14:00 - 17:00 / Hall E]

Effects of Neonatal Exposure to Di(n-butyl)phthalate on Reproductive Organ Development in Sprague-Dawley Male Rats

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Effects of a xenoestrogen, di(n-butyl)phthalate (DBP), on development of male reproductive organ were investigated using neonate male rats. The aim of present study is for a better understanding of how DBP influences the growth of reproductive organ when neonatally exposed to male rats. Sprague-Dawley neonate male rats were injected by s.c. with corn oil (control), flutamide (0.05, 0.1, and 0.5 mg/animal) and DBP (5, 10, and 20 mg/animal) on days 5-14 after birth. All animals were killed at 31 (immature) and 42 (pubertal) days of age, respectively. Blood was collected for serum testosterone analysis, and then testes and accessory sex organs (epididymis, seminal vesicles, ventral prostate, levator ani plus bulbocavernosus muscle (LABC), cowper's glands) were dissected carefully and weighed. In addition, steroid hormone receptors (AR and ER) expression was examined in the testes and ventral prostate. At 31 days of age, flutamide (0.5 mg/animal) and DBP (20 mg/animal) significantly decreased the weights of ventral prostate, seminal vesicles, LABC, and cowper's glands as compared with those in the control group, but serum testosterone levels were unaffected. Flutamide slightly delayed the testes descent at the high dose (0.5 mg/animal), but DBP did not show any significant effect on the testes descent at all doses. In addition, DBP and flutamide also significantly decreased the expression of AR in the testes, but expression of ER-β is increased in prostate. At the pubertal stage, seminal vesicles, and cowper's glands weights were significantly decreased only at the high dose of flutamide (0.5mg/animal) and DBP (20 mg/animal), whereas the weights of the testes and epididymis were unaffected. Moreover, DBP also markedly decreased serum testosterone levels. In contrast, flutamide also significantly decreased the expression of AR in the testes, but expression of ER-β were similar to control. Based on these results, flutamide and DBP have shown a number of similarities in patterns of reproductive organ development, but some marked differences.

[PA4-21] [04/18/2002 (Thr) 14:00 - 17:00 / Hall E]

Gender-related Difference in Alteration of Acetylcholinesterase Activity of Rats Exposed to Organophosphate Pesticide Terbufos

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An organophosphate pesticide terbufos (S-t-butyl thiomethyl O,O-diethyl phosphorodithioate, TBF) has been extensively used as an insecticide. A sexual dimorphism in the cholinergic innervation between both sexes was reported in certain species. However, a sexual dimorphism in TBF toxicity was not reported and remains unclear. TBF (0.5 mg/kg x 2) was orally administered to both male and female rats (postnatal day 48). The rats were sacrificed at 6, 12, 24 and 72 hr after oral administration. Acetylcholinesterase (AchE) and neuropathy target esterase were determined in the brain and liver tissues and the blood. AchE activity in the frontal cortex was significantly inhibited by 38% in female and 30% in male at only 6 hr after administration. In the entorhinal cortex AchE activity was significantly inhibited by 24-38% in female rats at