【P-37】

Comparative Effects of Dibutyl Phthalate (DBP) on Oxidative Damages and Antioxidant Status in the Testis of Hypo- and Hyperthyroid Rats

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The hypometabolic state is associated with the production of free radicals in the target organs. However, it is unclear if thyroid hormone status is associated with oxidative DNA damage in the testis. This study examined the effects of di(n-butyl) phthalate (DBP) on the oxidative DNA damage and antioxidant enzymes activity in the testes of hyper- or hypothyroid rats. Hypothyroidism was induced in Sprague-Dawley pubertal male rats (4 weeks of age) by adding 0.1% propylthiouracil (PTU) to their drinking water for 30 days and hyperthyroidism was induced by treatment with T3 (10 ug/kg/day, i.p.). DBP (750 mg/kg/day) was administered to the normal, hypo- and hyperthyroid rats via oral gavages over a 30-day period. The body weight changes in the hyper- and hypothyroid rats were significantly lower than that of control group. No significant changes in the testes and epididymides weight were observed in the hyper- and hypothyroid rats. However, DBP (750 mg/kg/day) significantly reduced the weights of the testes in both the hyper- and hypothyroid rats. Serum T3 and T4 levels were significantly decreased in the hypothyroid rats, and in hyperthyroid rats a significantly higher level of T3 was detected. In contrast, the serum thyroid hormone levels (T3, T4, and TSH) did not change after the DBP (750 mg/kg/day) treatment. Histomorphological examinations revealed severe diffused Leydig cell hyperplasia in the DBP (750 mg/kg)-treated groups, but these effects were mild in the DBP-treated hypothyroid rats. The 8-OHdG levels were significantly increased in the testes of DBP-treated hyperthyroid rats, but there was no significant differences were observed in DBP-treated hypothyroid and normal rats. Catalase activity was reduced in hypothyroid status, whereas DBP significantly increased catalase activity in all treatment groups. Glutathione peroxidase (GPx) activity was decreased in the testes of hypothyroid rats, whereas superoxide dismutase (SOD) activity was significantly increased in hypothyroid

rat. These results suggest that hypothyroidism may cause changes in the metabolism of DBP in the testis, thus may protect against oxidative damages induced by metabolic activation of DBP.

Keyword: Hyperthyroid, hypothyroid, oxidative damage, DBP antioxidant enzyme