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Alterations of Androgenicity in Rats Exposed to PCBs (Aroclor 1254)

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It has been demonstrated in several mammalian species that polychlorinated biphenyls and a wide variety of organochlorine insecticides induce hepatic microsomal enzymes which have the ability to hydroxylate natural steroid hormones (CONNEY et al. 1967, KUNTZMAN et al. 1967). The hydroxylation of both estradiol-17 β and testosterone results in the increased excretion of these polar metabolites resulting in decreased plasma concentrations (NOWICKI and NORMAN 1972, CONNEY and KLUTCH 1963, FAHIM et al. 1968). Thus the accelerated rate of testosterone metabolism has significant effects regarding the maintenance of male sexual characteristics. The ability of phenobarbital to also alter endogenous androgenicity via induction of hepatic microsomes has been demonstrated by significantly reducing weights and RNA content of male accessory organs of rats (FAHIM et al. 1970).

A secondary sexual characteristic of testicular androgenicity which has received little attention as affected by microsomal induction compounds is erythrocyte production. This investigation was designed to detect a quantitative alteration in androgenicity in male rats treated with Aroclor^R 1254 as exemplified by a change in the production of erythrocytes.

METHODS AND MATERIALS

Twenty male Sprague-Dawley rats (Spartan Research Animals, Haslett, Michigan) weighing 261.2 ± 3.9 g were equally divided into four groups. One group was designated the control and animals in the remaining three groups received an intraperitoneal injection of Aroclor 1254 (Monsanto Chemical Co.) of 10, 20, and 50 mg/kg respectively in a 0.1 ml volume of sesame oil. The control animals also received an intraperitoneal 0.1 ml volume of sesame oil. The animals were given food and water ad libitum for 14 days. On the fifteenth day the animals were sacrificed and three 1.0 ml blood samples were obtained from each animal in a heparinized tube. Total RBC determinations were manually made utilizing

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hemocytometers and blood diluting reservoirs (Unopette, Becton-Dickinson Co.) with 10 ul pipets. Three determinations were made on each blood sample collected.

RESULTS AND DISCUSSIONS

Male rats exposed to Aroclor 1254 demonstrated a dose-response relationship reflected by a decrease in the production of erythrocytes with increasing concentrations of Aroclor 1254 (Table 1). This study supports the findings of an earlier study in which androgen specific tissues (testes, assessory glands) were reduced in weight under the influence of phenobarbital via hydroxylation of testosterone (FAHIM et al. 1970). Thus the ability of Aroclor 1254 to decrease the productions of erythrocytes via metabolic transformation by mixed function oxidases to polar compounds, could be considered a viable explanation as the mechanism of action. Thus the maintenance androgen specific tissues is somewhat altered as a result of exposure to compounds capable of inducing microsomal enzymes.

TABLE 1

Mean erythrocyte values of adult male rats exposed to various concentrations of Aroclor 1254

	[1]Number erythrocytes X 10^6/cc
Control	9.21a[2]
Treatments (mg/kg)	
10	8.63b
20	8.52b
40	7.31c

[1]Each value represents the mean of five observations with nine values going into each observation.

[2]Means followed by unlike letters are significantly different from each other according to Tukey's W procedure.

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