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Effects of Triphenyltin Acetate on Pregnancy in the Rat

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Triphenyltin acetate (TPTA),a fungicide/algicide, is used for the control of the potato blight,leaf spot of sugar beet and for algal control on paddy rice. The acute dermal LD50 for rats is 500 mg/kg;10 ppm in the diet for 2 years do not produce symptoms in dog and guinea pig (MARTIN 1971). The acute oral LD50 values are discordant: 125, 238 or 300 mg/kg according to MARTIN (1971), BEN DYKE et al.(1970) or METCALF (1971).

The present study was undertaken to test the teratogenic potential of TPTA in the rat.

MATERIALS AND METHODS

Female Sprague Dawley rats (Charles River,Italy) weighing 200±20 g were paired overnight with males of the same strain. The morning that a sperm positive smear was observed was designated as the first day of pregnancy. Mated females were assigned at random to 4 test groups (12/group). Animals were maintained in air conditioned room (22±2°C,60% relative humidity),illuminated 12/24 h and supplied with food and water ad libitum. TPTA was administered as aqueous suspension to mated females by gavage at doses of 0, 5, 10,and 15 mg/kg on day 6 through 15 of gestation. Maternal weight on day 6 of pregnancy was used for calculation of doses. Females were killed on day 21 of gestation. The uterus was exposed by laparotomy and the position and number of live and dead fetuses and resorptions recorded. The uterus was stained in accordance with the method of SALEWSKI (1964) to determine the total number of implantations. Live fetuses were weighed,examined for external abnormalities and divided into two groups for soft-tissue (WILSON 1965) and skeletal examination (STAPLES & SCHNELL 1964). The fetal ossification was evaluated according to ALIVERTI et al. (1979). Data for postimplantation loss and anomalies were analyzed by chi square test. All other data were analyzed by Student's *t*-test.

RESULTS

Data are summarized in Tables 1 and 2. The oral ad-

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TABLE 1 - Prenatal Effects of TPTA in the Rat

Observations	Dose/Group (mg/kg/day)			
	Control	5	10	15
No.inseminated	12	12	12	12
No.died	0	0	0	2
No.pregnant	9	10	12	10
No.with total resorptions	0	0	0	4
Av.maternal weight gain (g)°	86±15	59±45	52±47*	19±54**
Av.implants°	12±3.5	11.4±3.2	10.9±2.7	10.1±3.1
Postimplantation loss (%)	2.7	8.7	6.1	44.4***
No.live fetuses per pregnancy°	11.6±3.5	10.4±2.9	10.2±2.5	5.6±5.5*
Fetal weight (g)°	3.8±0.3	3.6±0.5	3.4±0.5	3.7±0.3

°Mean ± Standard Deviation
*P<0.05 **P<0.01 ***P<0.001

TABLE 2 - Incidence of Anomalies in Fetuses from Rats Treated with TPTA

Observations	Dose/Group (mg/kg/day)			
	Control	5	10	15
Av.no.sternal ossification centers°	5.6±0.4	5.3±1	5.2±1.1	5.7±0.4
Av.no.metacarpal ossif.centers°	3.9±0.2	3.3±0.5*	3.4±0.4*	3.4±0.4*
Av.no.caudal ossification centers°	3.0±0.3	2.2±0.8*	2.4±0.6*	2.5±0.5*
Anomalies (no.fetuses affected/no.examinated)				
Agenesis of anterior phalanges	0/105	0/104	1/123	0/56
Hydronephrosis	0/52	0/52	1/65	0/29
Hydroureter	0/52	0/52	0/65	4/29**
Sternebrae asymm.or bipartite	0/53	6/52*	6/58	0/27
Vertebrae missing or bipartite	0/53	2/52	2/58	2/27*
Uni- or bi-lateral 14^{th} rib	4/53	4/52	1/58	0/27
Reduced ossif. of pelvic girdles	0/53	6/52*	2/58	0/27

°Mean ± Standard Deviation

*P<0.05 **P<0.01

ministration of TPTA to pregnant rats induces a dose-related reduction in the weight gain of the treated females, evident already at the dose of 5 mg/kg. A statistically significant increase of postimplantation loss has been found only at 15 mg/kg dose and it was caused by total resorptions observed in 4/10 females of this group. The mean fetal weights do not differ significantly in control and treated groups; however,we have found significant reduction of some ossification centers,mainly at the level of the metacarpus and caudal vertebrae,in all groups treated with TPTA. The minor anomalies (asymmetrical or bipartite sternebrae,reduced ossification of pelvic girdles) also increased in these groups. Visceral examination revealed no marked differences between the control and the treated groups.

DISCUSSION

Administration of TPTA does not induce teratogenic effects in the offspring of the treated rats even at the dose levels resulting in clear maternal toxicity. Reduction of skeletal ossification and increase of some minor anomalies were the only effects observed in the treated fetuses. A high incidence of total resorptions at the highest dose level may be interpreted as a manifestation of the maternal toxicity. It thus appears that the administration of TPTA has no effects on the organogenesis of the rat.

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