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Studies on Toxic Effects of Gamma-Pentachlorocyclo-hexene (PCCH)

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Gamma-PCCH is known to be a main gamma-Hexachlorocyclo-hexane metabolite (Engst et al. 1979). Only few studies have been published regarding demonstrations of toxic effect of the gamma-PCCH. The oral LD_{50} of gamma-PCCH was determined to be 3500 mg/kg b. w. in rats and 4270 mg/kg b. w. in mice (Engst et al. 1976). Münster (1974) examined the distribution and effects of beta-PCCH (the dehydrochlorination product of alpha-HCH) and has found a rapid metabolization and liver enlargement.

MATERIALS AND METHODS

Groups of 15 male outbred rats (Shoe:WIST, VEB Versuchstierproduktion Schönwalde, DDR; weighing 125 g at the beginning) were fed pelleted standard diet (formula R13) containing 7000, 3500 or 350 ppm gamma-PCCH (synthetized as shown by Nakajima et al. 1949; for g. l. c. see Macholz et al. 1984) for 30 days. The calculated daily intake was 782, 394 or 38 mg gamma-PCCH/kg b. w.

Two control groups (15 animals each) received basic diet. One group (KO) was isolated from the other control group (O) to prevent exposure via air to gamma-PCCH released from the diet of the test groups. The animals were housed three/cage. Pellets and water were provided ad libitum. After decapitation of the animals on the 31st day, blood serum total protein, albumin, globulin, activities of glutamate oxalacetate transaminase, glutamat pyruvate transaminase and leucine aminopeptidase were measured by standard techniques (Lewerenz 1983). Statistical evaluation was performed by Student's t-test. The level of probability to denote significance was $p \leq 0.01$.

Table 1. B. w. gain of the rats (g) during oral intake of gamma-PCCH

Week	group 0	KO	7000 ppm	3500 ppm	350 ppm
0	126	124	125	124	122
1	166	164	137[1)]	152[1)]	158
2	198	198	154[1)]	179[1)]	187
3	232	232	183[1)]	210[1)]	222
4	250	259	193[1)]	229[1)]	248
5	272	284	212[1)]	249	273

1) $p < 0,01$

RESULTS AND DISCUSSION

There were no significant differences between groups 0 and KO. The food consumption was significantly decreased during the 1st week in rats fed the 7000 or 3500 ppm diet. In the following weeks the animals of these groups showed a normal food intake. The b. w. gain was significantly decreased after administration of 7000 or 3500 ppm gamma-PCCH (Table 1). Relative organ weight of brain, heart, kidneys and adrenal glands were not affected by the 3500 and 350 ppm diet (Table 2). The liver weight was significantly increased. All investigated serum parameters were not significantly affected.

Table 2. Relative organ weight (g/100 g b. w.) after oral intake of gamma-PCCH

	group 0	KO	7000 ppm	3500 ppm	350 ppm
brain	0.628	0.548[1)]	n.d.[2)]	0.611	0.573
heart	0.283	0.260	n.d.	0.268	0.259
liver	4.108	3.769	n.d.	5.169[1)]	3.901
kidneys	0.705	0.646	n.d.	0.727	0.723
adrenal glands	0.016	0,017	n.d.	0.018	0.016

1) $p < 0.01$ 2) n.d. not determined

Neurotoxic effects have been shown in all dosage groups (Müller et al. 1981). The no toxic dose seems to be considerable below 38 mg/kg b.w.

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