SHORT COMMUNICATION

TOXIC EFFECT OF MERCURY ON TESTES IN DIFFERENT ANIMAL SPECIES

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Summary : Testicular changes following the administration of mercuric chloride, ($HgCl_2$, ip in various dosages) over one month were studied in rats, mice, guinea pigs and hamsters. $HgCl_2$ (5 *mg/kg)* caused a testicular degeneration and cellular deformation was observed in both the seminiferous tubules and the Leydig cells in all species; a significant decrease of testicular weight also resulted. There was no cellular deformation at the dose of 2 *mg/kg;* only spermatogenic inhibition and Leydig cell atrophy were observed in the animals. At the dose of 1 *mg/kg,* testicular degeneration was observed only in the hamster, only partial degeneration was recorded in the rat and the mouse and no change was noted in the guinea pig.

Key words : testes degeneration spermatogenesis mercuric chloride

INTRODUCTION

There are many reports on the toxicity of mercury and its compounds (1,7,10). However, the reports are few on the effects of mercury on testes (2,3). The present communication deals with our observation on the effect of mercuric chloride ($HgCl_2$) on testes of different animal species.

MATERIALS AND METHODS

Adult mature animals of 4 different species viz. rats (150±10 g, n=20), mice (30±5 g, n=16), guinea pigs (500±10 g, n=12) and hamsters (144±5 g, n=16) were used. All animals were kept in air-conditioned quarter (temp., 75±2°F) under uniform husbandry throughout the experimental period and water was supplied *ad libitum*. Animals of each species were divided equally in 4 groups. Group I served as control. Other groups were given $HgCl_2$ (ip) at dose of 1 *mg/kg* (Group II), 2 *mg/kg* (Group III)

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and 5 *mg/kg* (Group IV) every day for 30 days. The dosages of $HgCl_2$ was selected since the LD_{50} range of $HgCl_2$ (ip) is 14-25 *mg/kg* in different mammalian species. The $HgCl_2$ was prepared in normal saline and the volume of injection was 0.5 *ml* per animal. Group I in each species received equivalent volume of saline. On the 31st day, the animals were sacrificed by cervical dislocation. Testes were weighed and fixed in Bouin's fluid, paraffin sections (5 *μm)* were stained with ironhematoxyline and eosine.

RESULTS AND DISCUSSION

Highly significant reduction in testicular weight was noted in Group IV of all the species under treatment with 5 *mg/kg* of $HgCl_2$ (Table I). Degenerative changes were observed in group IV in all species, where the germinal elements and the Leydig cell nuclear number were significantly diminished. Moreover, the cellular deformations and distortion of the seminiferous tubules was particularly observed in the hamster and the rat (Fig. 1 and 2). Mercury inhibits DNA and protein synthesis (5,6); possibly, the arrest of testicular function might be due to inhibition of the testicular protein synthesis

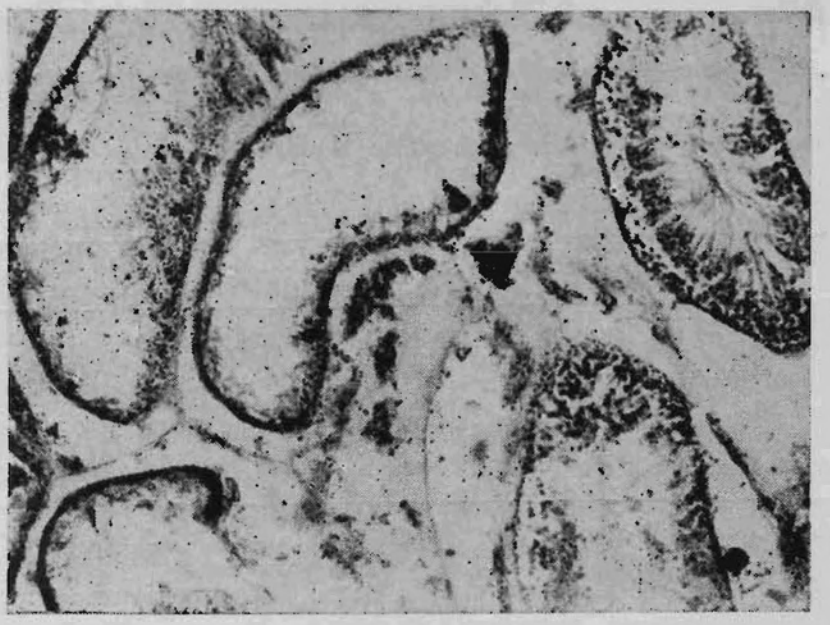

Fig. 1 : Complete testicular degeneration in rat after treatment with 5 *mg/kg* $HgCl_2$ (ip) every day for 30 days (x 640).

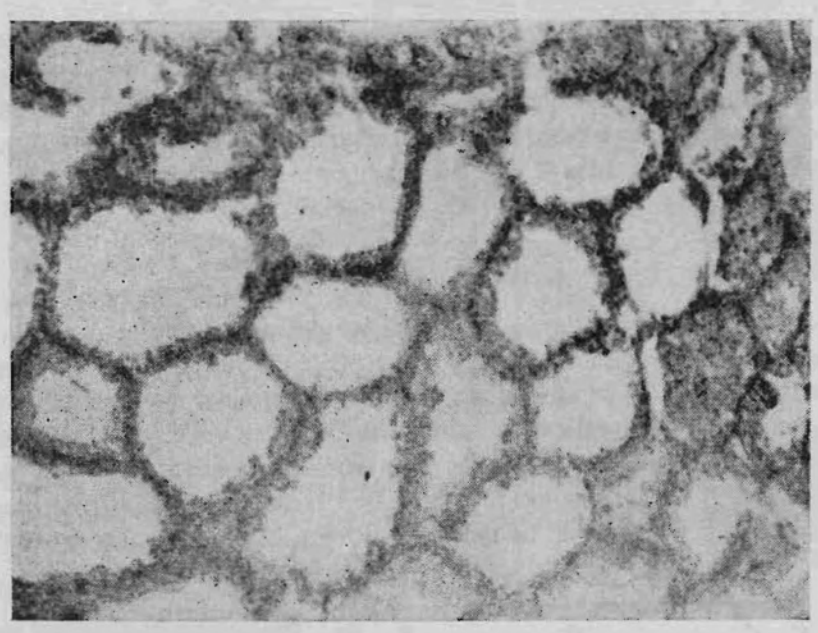

Fig. 2 : Complete degeneration in the seminiferous tubules and atrophy of the Leydig cells of hamsters after treatment with 5 *mg/kg* (ip) every day for 30 days (x 640).

TABLE I : The effect of mercuric chloride (given ip daily for 30 days) on the testicular weight (g). (The number of animals are in parenthesis).

(Mean±S. E.)

Species	*Control*	*1 mg/kg*	*2 mg/kg*	*5 mg/kg*
Rat	1.070±0.06 (5)	0.970±0.02NS(5)	0.880±0.04[a] (5)	0.670±0.03[a](5)
Mouse	0.080±0.003 (4)	0.071±0.001[b] (4)	0.063±0.002[a](4)	0.043±0.002[a](4)
Guinea pig	1.080±0.03 (3)	1.140±0.03NS(3)	0.960±0.01[b] (3)	0.780±0.03[a](3)
Hamster	1.340±0.05 (4)	0.670±0.20[a] (4)	0.680±0.03[a] (4)	0.410±0.01[a](4)

NS : Not significant. (a) : $P<0.001$; (b) : $P<0.05$ (t-test)

and the degeneration of the testicular tissues. Synthesis of testosterone from Leydig cell is closely associated with the process of male gametogenesis (8); however, sharp fall of testicular weight and gametogenic inhibition might be due to atrophy of the Leydig cells which could cause the inhibition of testosterone synthesis in group IV. Muscle

and peripheral nervous system are the main sites of injury in mercury toxicity (4, 6). Mercury is not taken up by the testes when a tracer dose of 203 Hg is given to the mouse (3). Contradictory findings of mercury accumulation in the Leydig cells after single injection (ip) to the rats have also been reported (9). In this study, $HgCl_2$ (2 *mg/kg*) produced a partial inhibition of spermatogenic cells, but no change was observed in the Leydig cells. Furthermore, the hamster was the most affected species at all the dose levels. The testicular tissue of guinea pig was not affected in the doses of 1 *mg* and 2 *mg/kg* of $HgCl_2$. These findings suggest a species variation in mercury toxicity.

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