ABSTRACT

This study was initiated to investigate the possible effects on the sexual competence of male rats following short term exposure to hexavalent chromium (sodium chromate) and the antigestational effects of hexavalent chromium and trivalent chromium (chromium chloride) on the pregnancy outcome of rats. Concentrations tested in the males were 1mg/kg/day and 4mg/kg/day, given intraperitoneally (IP) for five consecutive days. The pregnant female rats were treated IP using the same dose levels in addition to a higher dose level of 8mg/kg/day during days 1-7 and 7-14 of pregnancy. In an another set, hexavalent chromium was administered subcutaneously during days 14-21 of pregnancy at a dose level of 4mg/kg/day.

The higher dose of hexavalent chromium caused severe impairment of libido in male rats. However, at successful matings the fertility remained unaltered. The number of animals attempting mounting, intromission and achieving ejaculation were significantly reduced respectively by 43%, 43% and 72% and so was the mount frequency (treatment vs controls: 6.0 $\pm$ 2.8 vs 18.5$\pm$ 1.9) and intromittent frequency (5.8 $\pm$ 2.8 vs 16.1 $\pm$ 2.0). Intercopulatory interval was enhanced (423.6 $\pm$ 169.0 vs 37.8 $\pm$ 3.0 sec.). In contrast, time up to ejaculation and copulatory efficiency remained unaltered.

The investigations on the pregnancy outcome of rats showed that there was a significant interruption in pregnancy with pre-natal exposure of hexavalent chromium, in contrast to trivalent chromium. The intermediate dose (4mg/kg/day) of hexavalent chromium administered during day 7-14 of pregnancy caused a significant reduction in the number of uterine implants (by 50%) and a significant increase in post-implantation losses by 33%. Irrespective of the time of treatment (day 1-7 or day 7-14 of pregnancy) this dose caused a significant reduction of foetal size. Furthermore, significant impairment of the number of pups born was observed with this dose, when administered from day 14-21 of pregnancy.

The only significant effect observed with trivalent chromium administration was a marked dimunition of foetal size during day 7-14 of pregnancy.

Approximate LD_{50} values for sodium chromate were greater than 20mg/kg and lower than 200mg/kg while those for chromium chloride were greater than 200mg/kg and lower than 2000mg/kg.

These results demonstrate that hexavalent chromium is hazardous to both male and female reproduction in rats. The antireproductive effects of trivalent chromium were minimal compared to hexavalent form.