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JOURNAL ARTICLE

Atrazine effects on testosterone levels and androgen-dependent reproductive organs in peripubertal male rats

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Previous studies have reported that atrazine, a widely used herbicide that selectively inhibits photosynthesis in broadleaf and grassy weeds, has adverse effects on reproductive function in the male, suggesting a direct effect of atrazine on the hypothalamicpituitary-testicular axis. As yet, however, no studies have critically examined the doses of atrazine that elicit such effects, and few have focused on the mechanism by which atrazine acts. Herein we report a dose-response study of the effects of atrazine ingestion on reproductive function in male Sprague-Dawley rats during a critical developmental period, the peripubertal period. Atrazine was administered by gavage to rats from day 22 to day 47 of age, at doses of 1-200 mg/kg body weight per day. Atrazine administration of up to 50 mg/kg per day had no effect on any of the measured variables. Serum testosterone concentration was reduced by atrazine at doses of 100 and 200 mg/kg per day, as were seminal vesicle and ventral prostate weights. Intratesticular testosterone concentration was reduced in parallel with serum testosterone, suggesting that the reductions in serum testosterone resulted from reduced testosterone production by Leydig cells or from changes in testosterone metabolism within the testis, or both. Serum luteinizing hormone (LH) concentration was reduced despite the reduced serum testosterone, suggesting an effect on the hypothalamus, the pituitary gland, or both. At the termination of the study, the average body weight of rats receiving atrazine at 100 mg/kg per day was found to be reduced by approximately 9%. This suggested the possibility that the effects of atrazine on the reproductive tract may not be direct, but rather, the noted deficits of the male reproductive tract resulted from reduced food intake by the treated rats. We tested this by feeding control (vehicle-gavaged) rats amounts of food equivalent to that consumed by the atrazine-fed rats, and then assessing reproductive tract endpoints. Even mild food restriction resulted in reductions in serum testosterone concentration, in the weights of androgen-dependent organs, and in serum LH concentration; the same deficits that were seen in atrazine-gavaged rats. Indeed, the effects of atrazine on the male reproductive tract seen in rats receiving atrazine at greater than 50 mg/kg per day could not be distinguished from the effects of reduced food consumption. These results suggest that caution must be exercised before concluding that atrazine (or any potentially toxic chemical) has direct, detrimental effects.

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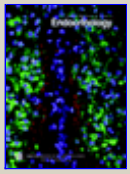

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