

Developmental effects on sulfentrazone exposed rats

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ABSTRACT

This work studied the effects of herbicide sulfentrazone maternal exposure on physical and neurobehavioral endpoints of rat pups development, since the results of some studies about sulfentrazone embryo/fetal toxicity elicited some concern.

For that, the effects of the herbicide (25 and 50 mg/kg) were examined during the first 6 days of gestation or organogenesis period. After parturition, pups were tested in a developmental test battery.

Herbicide maternal exposure resulted on significant alterations of the postnatal age at which the developmental milestones opening of the ears and eyes and testes descent were observed. There was a reduced rate of weight gain and a neurodevelopmental delays in the functional state of the rat pup nervous systems showed in righting reflex, negative geotaxis, grip response and motor coordination - locomotion and rearing (21 to 90 days of life) in the treated groups. However, the herbicide did not show genotoxicity investigated by the comet test.

These findings emphasize that sulfentrazone maternal exposure may lead to some neuromuscular and behavioral deficits in nursing pups.

INTRODUCTION

Although some studies pointed to embryo/fetal toxicity at treatment levels that were not maternally toxic, knowledge about the potential toxic effects of the herbicide sulfentrazone is still limited.

The current analysis aims to assess whether in utero sulfentrazone exposure has a detrimental impact on early physical and neurobehavioral outcomes.

MATERIAL AND METHODS

Treatment - Wistar rats exposed to 25 and 50 mg/kg of the herbicide sulfentrazone or its vehicle at the first 6 days of gestation or organogenesis period (6-15 days).

Physical developmental parameters - pinna detachment, fur development, incisor eruption, opening of ears and eyes, vaginal opening and testes descent, were expressed as the number of days required for the appearance of these milestones in all pups of a litter. The frequency of animals showing each of the parameters was recorded daily. Dams and pups were weight during all the observational period.

Reflex development - Surface righting reflex (PNDs 2-5); Grip strength response (PNDs 3-7); Negative geotaxis (PNDs 7-11) and Locomotion and frequency of rearing (PNDs 21, 30, 60, 90) in an open-field arena.

Genotoxic effect - evaluation was obtained as a visual perception of DNA damage (Comet test), using five recognizable comet classes, from class 0 (undamaged, no discernible tail) to class 4 (almost all DNA in tail, insignificant head).

RESULTS

Pregnant rats exposed to sulfentrazone did not show any overt sign of maternal toxicity. The herbicide did not affect a) pup viability at birth or during lactation; b) litter size; c) mean gestation length; d) maternal behavior.

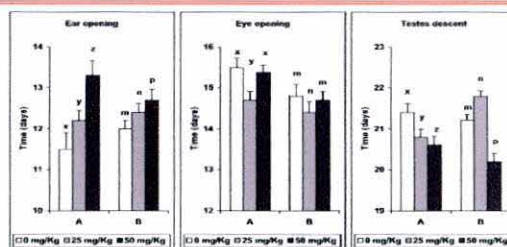
Offspring presented a diminished of weight gain rate in pups of exposed mothers when treated during the beginning of gestation period at the highest dose tested. The pups treated during organogenesis period presented an inconstant alteration in weight gain during few days.

Pup physical milestones - delayed opening of ears and eyes and testes descent by sulfentrazone.

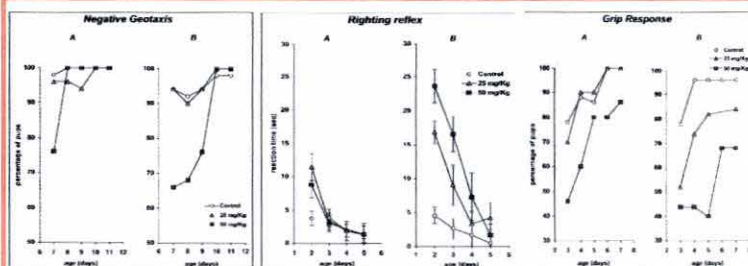
Reflexes - delayed righting reflex, negative geotaxis, grip response and motor coordination.

Genotoxic effects - no observed effects in mothers and pups.

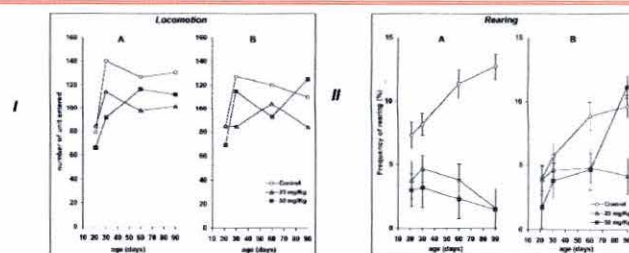
Delay in motor coordination - locomotion and rearing (21 to 90 days of life) in the sulfentrazone exposed groups.



Pups physical milestones



Pups reflexes



Pups motor performance

CONCLUSION

Sulfentrazone can influence the development of motor coordination skills rather than general motor activity or muscular strength. The herbicide is potentially neurotoxic and is capable of damaging the physiological systems controlling spontaneous motor activity and motor coordination and consequently may cause some behavioral deficits in nursing pups.

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