Neurobehavioral Effects of Sodium Tungstate Exposure on Rats and Their Progeny

Authors: S. M. McInturf; M. Y. Bekkedal; A. Olabisi; D. Arfsten; E. Wilfong; R. Casavant; W. Jederberg; P. G. Gunasekar; G. CHAPMAN
NAVAL HEALTH RESEARCH CENTER (DET) WRIGHT-PATTERSON AFB OH ENVIRONMENTAL HEALTH EFFECTS LAB

Abstract: In the mid 1990's, the use of tungsten as a replacement for lead and depleted uranium began for the manufacture of small arms munitions and armor penetrator munitions, respectively. Recent reports have demonstrated that tungsten can solubilize in soil and is present in some US drinking water supplies, however, little research has been conducted to determine the human health consequences of exposure. The purpose of this study was to use a battery of tests as an initial screen for potential neurobehavioral effects that may be associated with 70 days of daily tungsten exposure via drinking water. Sprague-Dawley rats were orally dosed with diH2O vehicle, 5 or 125 mg/kg/day of sodium tungstate for 70 consecutive days. The rats were mated after 14 days and dosing continued through pregnancy up to post-natal day 21. Following sodium tungstate treatment, neurobehavioral tests were conducted on the adult females and their pups. Early neurobehavioral evaluations on the-pups were done through tests of the righting reflex and maternal separation distress as measured by ultrasonic vocalizations. The adult females were tested for maternal retrieval, acoustic startle/pre-pulse inhibition (AS/PPI), spontaneous locomotor activity, and navigation in a watermaze. In the pups, a 78% increase in distress vocalizations was observed in the highest dose group as compared to controls and an interaction of sex and dose was found for righting reflex latencies. While there were no treatment related effects for maternal retrieval, AS/PPI or watermaze navigation, dose related effects were observed for measures of locomotor activity. Adult females treated with the low dose showed increased distance traveled, more time in ambulatory movements, and less time in stereotypic behavior than controls or high dose animals. Those receiving the highest dose had more time in stereotypical movements than controls, and less time resting than controls and the lowest exposure group.

Limitations:

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