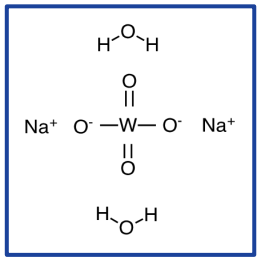
SUMMARY

Background: Sodium tungstate dihydrate (ST) is used in applications such as fire- and waterproofing fabrics and in medicines to treat diabetes. ST also occurs naturally in the environment and can enter bodies of water through the weathering of rocks and soils, creating potential human exposure via drinking water. NTP studied the effects of lifetime exposure to ST in drinking water in male and female rats (with exposure starting in utero) and male and female mice (with exposure starting in adolescence) to identify potential toxicity or cancer-related outcomes.



Methods: Pregnant rats were exposed to ST in drinking water at concentrations of 250, 500, or 1,000 milligrams per liter (mg/L) throughout pregnancy and while nursing their offspring, and then groups of 50 male and 50 female offspring continued the same exposures as their mothers for 2 years. Groups of 50 male and 50 female mice were exposed to ST in drinking water at 500, 1,000, or 2,000 mg/L for 2 years. For both rats and mice, additional animals were evaluated for organ weights and tungsten concentrations periodically throughout the 2 years. Control animals received tap water with no chemical added (0 mg/L ST). At the end of the studies, tissues from more than 40 sites from every animal were examined for signs of disease. Additional studies were conducted to set appropriate doses and identity target organs for the studies described above. The potential for ST to damage DNA was evaluated in both rats and mice following exposure to ST in drinking water for 3 months.

Results: In rats, neoplasms (which can include benign or malignant growths) were observed in the thyroid gland of female offspring. Noncancerous tissue abnormalities were observed in the kidney in both males and females and in the uterus in females. In mice, neoplasms were observed in the kidney of males, with noncancerous tissue abnormalities in the kidney and large intestine in both males and females and in the testes in males. Damage to DNA was observed in liver cells of male and female rats and male mice. Cells of the ileum, a region of the small intestine, also had damaged DNA in male mice.

Conclusions: *NTP uses a four-point scale to rate the level of evidence that a substance has the ability to cause cancer in laboratory animals. Under the conditions of these 2-year drinking water studies, there was no evidence that ST has the ability to cause cancer in male rats, equivocal (uncertain) evidence that it has the ability to cause thyroid cancer in female rats, equivocal (uncertain) evidence that it has the ability to cause kidney cancer in male mice, and no evidence that it has the ability to cause cancer in female mice. Exposure to ST increased noncancerous tissue abnormalities in the kidney of male and female rats and mice, in the uterus of female rats, in the large intestine of male and female mice, and in the testes of male mice.*