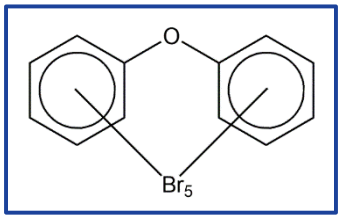
SUMMARY

Background: DE-71, a polybrominated diphenyl ether (PBDE), has been used as an additive flame retardant, often in furniture materials. Additive flame retardants can leach into the environment. Production of PBDEs was voluntarily phased out in the United States around 2004; however, they remain in the environment because of prior production and discarded products. PBDEs have been found in water, wildlife, humans, and various food products including meat, poultry, and fish. The California Office of Environmental Health Hazard Assessment nominated individual PBDEs for study because they are considered a health risk and are found in human and animal tissues in the United States. The effects of oral administration of DE-71 in rats and mice were studied to identify potential toxicity or cancer-related outcomes.



Methods: Groups of 52 pregnant rats were administered 3 or 15 milligrams (mg) DE-71 per kilogram (kg) body weight per day, and groups of 62 pregnant rats were administered 50 mg/kg DE-71 in corn oil via oral gavage, during pregnancy and the nursing of their offspring until 20 days after birth. Groups of 60 (0 or 50 mg/kg) or 50 (3 or 15 mg/kg) male and female offspring were administered the same doses as their mothers by gavage, starting at 12 days after birth for 2 years. Groups of 50 male and 50 female mice were administered DE-71 in corn oil by gavage for 2 years at doses of 3, 30, or 100 mg/kg. Control animals were administered 0 mg/kg (corn oil alone) by gavage. Additional 3-month studies were conducted to set appropriate doses and identify target organs for subsequent studies. Tests were conducted to evaluate the potential for DE71 to damage DNA. At the end of the study, tissues from more than 40 sites from every animal were examined for signs of disease.

Results: Exposure of pregnant rats to DE-17 had no discernable effect on their health or on littering parameters (e.g., percentage of females producing litters, litter size). However, in the offspring dosed for 2 years, survival was reduced in male rats in the highest dose group (50 mg/kg). Body weights were reduced in male and female rats in this dose group. Survival and body weights were also reduced in male and female mice in the highest dose group (100 mg/kg). Neoplasms (which can include benign or malignant growths) were observed in the pituitary gland of male rats, uterus of female rats, thyroid gland of male and female rats, and liver of male and female rats and mice. Increased incidences of noncancerous tissue abnormalities occurred in the liver and thyroid gland of male and female rats and mice; the kidney of male and female rats; the parotid salivary gland, prostate gland, preputial gland (a gland in front of the genitals), thymus (a gland that produces and trains immune cells), and forestomach of male rats; the uterus, vagina, cervix, and adrenal cortex of female rats; the forestomach and adrenal cortex of male and female mice; and the testes of male mice. Tests to evaluate the potential for DE-17 to damage DNA were negative.

Conclusions: *The NTP four-point scale rates the level of evidence that a substance has the ability to cause cancer in laboratory animals. Under the conditions of these 2-year oral gavage studies, there was clear evidence that DE-17 administration has the ability to cause liver cancer in male and female rats and mice, some evidence that it has the ability to cause thyroid gland and pituitary gland neoplasms in male rats, and equivocal (uncertain) evidence that it has the ability to cause uterine neoplasms in female rats. In addition, DE-17 exposure caused increased incidences of noncancerous tissue abnormalities in the liver and thyroid gland in male and female rats and mice; the kidney in male and female rats; the parotid salivary gland, prostate gland, preputial gland, thymus, and forestomach in male rats; the uterus, cervix, and adrenal cortex in female rats; the forestomach and adrenal cortex in male and female mice, and the testes in male mice.*