Phosmet

Phosmet (Imidian) is a broad-spectrum organophosphate insecticide used on nut and fruit trees, grapes, and on cattle and swine for tick and flea control. Exposure may occur to pesticide applicators and agricultural and horticultural workers, and to the general public through ingestion of residues present in food.

Phosmet passed the animal data screen, underwent a preliminary toxicological evaluation, and is being brought to the Carcinogen Identification Committee for consultation. This is a compilation of the relevant studies identified during the preliminary toxicological evaluation.

Epidemiological data

No cancer epidemiology studies were identified.

Animal carcinogenicity data

- Two-year feeding studies in mice
  - Male and female B6C3F1 mice: as reviewed in U.S. EPA (1994)
    - Increase in hepatocellular adenoma and carcinoma (combined) in males (by pairwise comparison and trend) with apparent early onset
    - Increases in hepatocellular carcinoma, hepatocellular adenoma and carcinoma (combined), and mammary gland adenocarcinoma (uncommon tumor) in females (by trend)

- Two-year feeding studies in rats
  - Male and female Sprague-Dawley rats: as reviewed in U.S. EPA (1994)
    - No treatment-related tumor findings

Other relevant data

- Genotoxicity
  - A potent direct-acting mutagen, expected to be a methylating agent: (U.S. EPA, 1994)
  - Mutations in Salmonella typhimurium and Saccharomyces cerevisiae assays (positive): Vlčková et al. (1993)
  - HGPRT mutations in Chinese hamster V 79 cells (positive): Slameňová et al. (1992)
  - DNA single-strand breaks in human fibroblastoid cells (positive): Slameňová et al. (1992)
  - Guanine N⁷-alkylation in vivo in male AB Jena/Halle mouse liver and kidneys (negative): Dedek et al. (1984)
o Chromatid-type aberrations in exposed workers in Hungary (statistically significant increase): Kiraly et al. (1979)
o Morphological transformation in Syrian hamster embryo cells (positive): Slameňová et al. (1992)
o Other genotoxic tests as reviewed in U.S. EPA (1994)
  ▪ E. coli reverse mutation assay (negative)
  ▪ B. subtilis assay (negative)
  ▪ Dominant lethal test in rabbit (inconclusive)
  ▪ Mouse lymphoma forward mutation (positive)
  ▪ Mouse lymphoma structural chromosomal aberrations (positive)
  ▪ Mouse lymphoma sister chromatid exchange (positive)
  ▪ DNA damage assay in human fibroblastoid cells (negative)
  ▪ Morphological transformation of BALB/3T3 cells (positive)
  ▪ Micronucleus test in mouse bone marrow (negative)

• Liver alterations
  o Single intraperitoneal (i.p.) injection of diethylnitrosamine (on day 1), four i.p. injections of N-methyl-N-nitrosourea (on days 2, 5, 8 and 11), N-bis-(2-hydroxypropyl)-nitrosamine in drinking water for two weeks, followed by phosmet in diet for 16 weeks in male F344 rats (increase in glutathione-positive liver foci): Hasegawa et al. (1993)

  o Structurally similar to dimethoate, a U.S. EPA Group C carcinogen (based on increases in hemolymphoreticular tumors in male B6C3F1 mice and hemangioma/hemangiosarcoma of the spleen and skin and angioma/angiosarcoma of the lymph in male Wistar rats
  o The carcinogen formaldehyde is a probable metabolite of phosmet

Reviews

• U.S. EPA (1994, 2001)

References


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1 Excerpts or the complete publication have been provided to members of the Carcinogen Identification Committee, in the order in which they are discussed in this document.


