EVALUATION OF THE ENVIRONMENTAL TOXICANTS VINYL CHLORIDE (VC) AND VINYLIDENE CHLORIDE (VDC)

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ABSTRACT

This report summarizes the results of 9 months exposure to various levels of vinyl chloride (VC) and one level of vinylidene chloride (VDC) in rats and mice.

At the end of 9 months exposure of rats to 50, 250, or 1,000 ppm VC, or 55 ppm VDC for 6 hours/day, 5 days/week, a number of adverse effects were found. Between the 33rd and 39th week, one male and three female rats exposed to VC died or were terminated. A number of tumors were found in these rats as well as in some of the rats terminated at the end of 9 months exposure to VC. Hemangiosarcomas were observed in liver, lung and adrenal gland of rats exposed to 250 or 1,000 ppm VC. The tumor incidence was higher in the rats exposed to 1,000 ppm VC than in rats exposed to 250 ppm VC. The body weight gain of female rats exposed to 1,000 ppm VC was slightly depressed. Exposure to 55 ppm VDC caused one subcutaneous hemangiosarcoma of the skin. Exposure to 55 ppm VDC slightly depressed the body weights of both male and female rats. At the end of 9 months exposure to VC or VDC, no adverse changes in clinical laboratory data occurred.

Exposure of mice to 50, 250, or 1,000 ppm VC resulted in a large number of deaths or early terminations during the 7- to 9-month period. The clinical signs in these mice included rough hair coat, lethargy, sudden weight loss and the appearance of external tumor masses and/or abdominal distention. The majority of mice terminated during the 7- to 9-month period had tumors in more than one tissue. The major tumors found were bronchiolar adenoma and/or metastatic mammary gland squamous cell carcinoma or anaplastic carcinoma in the lung; hemangiosarcoma in the liver; and ductular adenocarcinoma, squamous cell carcinoma and/or anaplastic carcinoma in the mammary gland. Other tumors found included malignant lymphoma, hemangioma or hemangiosarcoma of various tissues. The incidence and severity of the bronchiolar adenomas were dose related. A threshold level of exposure greater than 50 ppm VC for the induction of hepatic angiosarcoma appeared to exist. The exposure to VC caused no apparent changes in clinical laboratory data with the exception of increased pulmonary macrophage counts in the 1,000 ppm VC exposed male mice.

Exposure to 55 ppm VDC resulted tumors in three mice. These tumors included bronchiolar adenoma in lung and hemangiosarcoma or hepatoma in the liver. Other lesions which appeared to be related to the VDC exposure were intranuclear inclusions and an increase in the number of large, basophilic nuclei. No adverse changes in clinical laboratory data were noted.