VINYL CHLORIDE (Group 1)

A. Evidence for carcinogenicity to humans (*sufficient*)

Vinyl chloride has been associated with tumours of the liver, brain, lung and haematolymphopoietic system[1]. A large number of epidemiological studies[2-12] and case reports[13-25] have substantiated the causal association between vinyl chloride and angiosarcoma of the liver. Several studies also confirm that exposure to vinyl chloride causes other forms of cancer, i.e., hepatocellular carcinoma[13,19,23,26], brain tumours[11,27], lung tumours[12,28-30] and malignancies of the lymphatic and haematopoietic system[11,29,31]. Exposure to polyvinyl chloride dust was associated with an increased incidence of lung tumours in one study; the authors suggested that trapped vinyl chloride monomer was responsible[30]. Melanoma occurred in excess in one study[12] but has not been mentioned in others. Slightly elevated risks for gastric[29] and gastrointestinal cancer (other than liver cancer)[32] were indicated in some studies, but these were not confirmed in others.

B. Evidence for carcinogenicity to animals (*sufficient*)

Vinyl chloride administered orally or by inhalation to mice, rats and hamsters produced tumours in the mammary gland, lung, Zymbal gland and skin and angiosarcomas of the liver[1]. Similar findings were made in more recent studies[33-39]. In one, a combination of oral administration of ethanol and inhalation of vinyl chloride resulted in more liver tumours (including angiosarcomas) than after treatment with vinyl chloride alone[40].

C. Other relevant data

Chromosomal aberrations were induced in peripheral blood lymphocytes of workers exposed to vinyl chloride at levels of 5-500 ppm (13-1300 mg/m^3). Two studies reported negative results for sister chromatid exchanges in exposed workers, while in another study a weakly positive response was found[41].

Vinyl chloride induced chromosomal aberrations, sister chromatid exchanges and micronuclei in rodents exposed *in vivo* but did not induce mutation in the mouse spot test or dominant lethal mutations in rats or mice. It alkylated DNA in several tissues of mice and rats exposed *in vivo*. Vinyl chloride induced sister chromatid exchanges in human lymphocytes *in vitro*. It induced mutation in Chinese hamster cells and unscheduled DNA synthesis in rat hepatocytes *in vitro* and induced transformation of BALB/c 3T3 cells and virus-infected Syrian hamster cells. It induced sex-linked recessive lethal mutations, but not aneuploidy, heritable translocations or dominant lethal mutations in *Drosophila*. It was mutagenic to plants and to *Schizosaccharomyces pombe* but not to other fungi; it induced gene conversion in yeast. It caused DNA damage and mutation in bacteria. Vinyl chloride bound covalently to isolated DNA in the presence of a metabolic system[41].

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