TETRACHLOROETHYLENE (Group 2B)

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

Tetrachloroethylene has been studied by observing laundry and dry-cleaning workers, who may also have been exposed to other solvents, especially trichloroethylene (see p. 364), but also petroleum solvents. In several cohort and proportionate mortality studies, excesses have been reported of lymphosarcomas[1], leukaemias[2] and cancers of the skin[1,2], colon[3], lung[2,4] and urogenital tract[1-5], although in one study no excess of urogenital cancer was seen among persons exposed mainly to tetrachloroethylene[5]. Some excess of lymphomas and of cancers of the larynx and bladder was seen in a large cohort of dry cleaners[6]. A familial cluster of chronic lymphocytic leukaemia has also been related to dry-cleaning[7]. A large case-control study of bladder cancer did not show any clear association with dry-cleaning[8]. In other case-control studies, dry-cleaning appeared to be a risk factor for pancreatic cancer[9] and for liver cancer[10]. Some excess of liver cancer was also seen in one of the proportionate mortality studies[2]. In two case-control studies of liver cancer[11,12], an increased risk with occupational exposure to organic solvents (in one of the studies in women only[12]) was observed; in the first study, one case and no control had had exposure to tetrachloroethylene; in the second, one of six female cases was in dry-cleaning workers. Even if there is some consistency in several studies with regard to an association between lymphatic malignancies and urogenital cancers, taken together, and exposure to tetrachloroethylene, this broad grouping and the small numbers involved do not permit any definite conclusion to be drawn about any causal connection.

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

Tetrachloroethylene was tested for carcinogenicity in mice and rats by oral administration and by inhalation. In mice, it produced hepatocellular carcinomas in animals of each sex by each route of administration[13,14]. One experiment in rats by oral administration was considered to be inadequate[13]. Exposure of rats by inhalation produced an increased incidence of leukaemias[14]; the other experiment by inhalation was inadequate[13]. Tetrachloroethylene was also tested inadequately by intraperitoneal injection in mice[13].

C. Other relevant data

In one study, tetrachloroethylene did not induce chromosomal aberrations or sister chromatid exchanges in lymphocytes from persons occupationally exposed to low concentrations[15].

Tetrachloroethylene induced DNA strand breaks in liver and kidney cells of mice treated *in vivo*. It induced transformation of rat embryo cells but not of BALB/c 3T3 cells; it did not induce unscheduled DNA synthesis in rat hepatocytes. It induced sex-linked recessive lethal mutations in *Drosophila*. Tetrachloroethylene induced gene conversion and mitotic recombination in yeast in one study under conditions in which endogenous levels of cytochrome P450 were enhanced. It was mutagenic to plants but not to yeast *in vitro* or in a host-mediated assay or to bacteria[15].

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