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# Ethylene Dibromide Toxicity to Human KB Cells

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Ethylene dibromide (EDB, 1,2-dibromoethane), a synthetic organic chemical, acts as a lead scavenger in gasoline. Increasing amounts of EDB are also found in fumigants for fruits and vegetables (Brown 1984).

Effects of EDB on humans have been reported (Marmetschke 1910; Olmstead 1960; Pflesser 1938). The adverse effects included acute toxicity resulting from inhalation, skin absorption and ingestion. The most commonly occurring tissue lesions were changes in the liver and kidneys.

Acute toxicity observed in laboratory animals following single or repeated exposure to EDB appeared to be similar to the lesions seen in humans (Kochmann 1928; Rowe *et al.* 1952). Wong *et al.* (1982) reported chronic toxicity effects in rats exposed to EDB. EDB is both a carcinogen (Olson *et al.* 1973; Wong *et al.* 1982) and a mutagen (Kale and Baum 1981). All these data suggest that exposure to EDB may be hazardous to humans.

As the toxicity of EDB apparently has not been determined in cultured human cells, we report have our findings on the toxicity of EDB, using human KB cells.

## MATERIALS AND METHODS

The cells used throughout this work were human KB cells (Mochida *et al.* 1983).

Toxicity test methods used were as described (Mochida and Yamasaki 1984). The cells were suspended in Eagle's minimum essential medium (MEM) at a concentration of $1 \times 10^5$ cells/mL and 1-mL volume was placed in Leighton tubes. After 24-h of incubation at 37°C, the MEM was replaced with MEM-containing EDB. To minimize the loss of EDB, all test cultures were placed in Leighton tubes with silicone rubber stoppers. The ID50 value (50%

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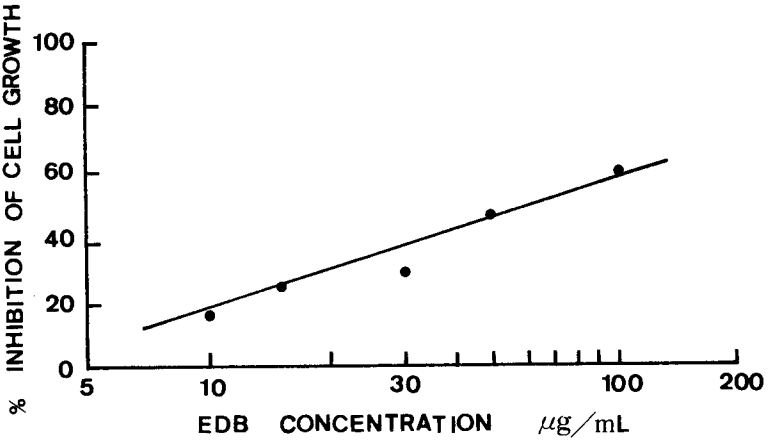


Figure 1. Dose-response curve obtained after 72-h exposure of KB cells in culture to various concentrations of EDB.

inhibitory dose to growth of KB cells after 72-h of incubation) was used as an index of the toxicity of EDB.

EDB obtained from Wako Pure Chemical Industries, Ltd., Osaka, Japan was dissolved in acetone and diluted in MEM immediately before use (final concentration of acetone was less than 0.5%).

## RESULTS AND DISCUSSION

Figure 1 shows the dose-response curve obtained with EDB. Inhibition of the growth of KB cells after 72-h of incubation proved to dose-dependent. The 72-h ID50 value was 61 μg/mL.

The ID50 values of diphenyl (DP), o-phenylphenol (OPP) and 2-(4´-thiazolyl)benzimidazole (TBZ) used as pesticides for citrus fruits, obtained using the same KB cell culture systems, were 20.5 μg/mL, 30.0 μg/mL and 64.0 μg/mL, respectively (Mochida *et al.* 1983). Our present results show that EDB is less toxic than DP and OPP to KB cells, however, EDB has a toxicity close to that of TBZ.

The ID50 value of 1,2-dichloroethane obtained using the same KB cell culture system is 1500 μg/mL (Mochida *et al.* 1986). We found that 1,2-dibromoethane (EDB) had about 24 times the toxicity of 1,2-dichloroethane to KB cells.

EDB has been found in ground water (Sun 1984). Landau and Tucker (1984) and Herring *et al.* (1988) reported the effects of EDB on aquatic organisms (fishs and

Hydra) and Landau and Tucker (1984) showed that the acute toxicity responses on *Juveinle* fish (48-h LC50) were 6.2 mg/L (*Snook*) and 4.8 mg/L (*Minnow*), respectively. These values are higher than our ID50 value (61 $\mu$g/mL), obtained using cell culture systems. Herring *et al.* (1988) showed that the 72-h LC50 value for *Hydro oligactis* was 50 $\mu$g/mL. This value is similar to the ID50 value we obtained using cell culture systems.

These findings will aid in evaluating the toxicity of EDB to humans.

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