



Project Summary

Interaction Between Water Pollutants: Quantitative Electron Microscopy of Hepatic Morphological Changes Induced by 1,2-Dichloroethane (DCE) and 1,1-Dichloroethylene (VDC)

Robert H. Gray

The full report summarizes electron micrographic changes in liver and kidney parenchymal cell organelles caused by the ingestion of two halogenated hydrocarbon pollutants. The conclusions drawn herein apply to quantitative and qualitative risk factors derived for drinking water contaminants, therefore, have direct programmatic relevance to the HERL program mission.

This Project Summary was developed by EPA's Health Effects Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Results and Discussion

Numerous chemicals that are found as contaminants in public water supplies constitute potential public health hazards. The studies here were designed to determine the early histopathological effects of two known water contaminants, 1,2-dichloroethane (DCE) and 1,1-dichloroethylene (VDC), administered alone or in mixtures to laboratory rats.

Both agents have been shown to cause cytotoxic responses in kidney and liver. Male rats, weighing 170-190g, were used in all studies. Animals were dosed IP with DCE (300 and 600 mg/kg body wt) or VDC (100 and 200 mg/kg body wt) alone or a mixture (150/50 and 300/100 mg/kg body wt, DCE/VDC, respectively) of the two compounds and sacrificed after four hours. Hepatic tissues were removed and prepared for quantitative electron microscopic studies. The following cellular and subcellular parameters were evaluated: cell and cytoplasm and nuclear volumes, the number of organelles (mitochondria, peroxisomes and lysosomes) per cell, the mean volume of the individual organelles and their absolute and relative fractional volume/cell. The absolute and fractional volume/cell of lipid droplets were also determined. Significant changes were seen in cell, cytoplasmic and nuclear volumes, except in the high dose DCE group (600 mg/kg). Significant increases in cellular lipid droplets were observed in all treatment groups except the high dose mixture group. All treatment groups exhibited a decreased number of mitochondria per cell and an increase in the mean volume of individual mitochondria. All groups, except the high

dose DCE group, had increased numbers of peroxisomes/cell and a concomitant decrease in mean volume of individual peroxisomes. lysosomes did not change significantly in their numbers or their mean volume.

Comparison of measured parameters of the single dosed animals with the mixed dosed exhibited the most sig-

nificant differences in the lipid droplet compartment. The increases in lipid droplets in the mixed dosed animals (300 and 100 mg/kg of DCE and VDC, respectively) were slightly greater than additive compared to the corresponding single dosed groups. Similar trends, but lower in magnitude, were noted for lipid droplets in the lower mixed dosed

animals (150 and 50 mg/kg of DCE and VDC, respectively). In the 300 mg/kg DCE-150 mg/kg VDC mixed dose group, an additive trend was noted for the increase in the number of lysosomes per cell and the peroxisome volume per cell compared to the single dosed animals. However, these observed increased trends were not statistically significant.

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B. Alex Merrick is the EPA Project Officer (see below).

The complete report, entitled "Interaction Between Water Pollutants: Quantitative Electron Microscopy of Hepatic Morphological Changes Induced by 1,2-Dichloroethane (DCE) and 1,1-Dichloroethylene (VDC)," (Order No. PB 89-214 126/AS; Cost: \$21.95, subject to change) will be available only from:

National Technical Information Service

5285 Port Royal Road

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The EPA Project Officer can be contacted at:

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