

ATTENTION: Mr. Milton Freifeld

A Mortality Study of Workers Exposed to Vinyl Chloride
April 22, 1976

This is a report of a study of mortality rates in a population of 10,173 workers who at some time in the past were engaged in the manufacture of vinyl chloride or its polymers. An earlier report on a portion of this population showed that these workers experienced an increased risk of death from cancer of the liver (already found by other investigators) and cancers of the lung, brain and lymphatic system. The larger group represented in this study has permitted a more detailed analysis of the relation between the risk of death from these causes and duration and level of exposures.

The study population was identified by an examination of past and present personnel records in 37 plants which produced either vinyl chloride or polyvinyl chloride. Every man who had been in an exposed job for more than one year was identified and his work history obtained. Men who had worked in the past and had quit or been laid off were traced to determine whether they were still alive as of December 31, 1972, the date chosen as the "closing date" of the study.

Of the 10,173 men selected for study, 95 percent were successfully traced, and 707 deaths were found. The study population included men hired as far back as the late 1930's and included 2,006 men who had worked 15 years or more.

The number of deaths which occurred was compared with the number which would have been expected in a comparable population of United States males for each cause.

The total number of deaths was about 16 percent less than expected, and the total number of cancer deaths was about equal to what would be expected.

Some cancers occurred at a lower rate than expected, and these did not appear to be related to the length or level of exposure. Cancer of the urinary organs and the lymphatic system showed some excess deaths (22 percent and 12 percent) but were not related in any systematic way to exposure. There was a 44 percent excess in leukemia deaths, also not related to the circumstances of exposure.

Lung cancer showed an 8 percent excess in the total study group, but in men who had worked for 16 years or more and had begun work at least 20 years before the closing date of the study, there was a 62 percent excess.

Cancers classed as "Other and Unspecified" showed a 44 percent excess in the study population as a whole, but a 230 percent excess in the older group mentioned above. This excess was largely due to an excess of brain cancer, since 38 percent of these cancers were brain, compared with 20 percent for the general population.

There was a slight excess of digestive cancer in men with high exposure, and in men with other than low exposure who had worked at least 16 years beginning at least 20 years before the study date. In these older men 50 percent of the digestive cancers were liver cancer compared with about 9 percent for the general population.

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In another analysis, the study population was scored according to the estimated total amount of vinyl chloride to which they were exposed; men were given a score of 1 for each month of low level exposure, 2 for each month at medium exposure, and 3 for each month at high exposure. There was a somewhat irregular increase in mortality from digestive cancer, respiratory cancer and cancer of other and unspecified sites with increasing score. For men with scores of 400 or more (equivalent to 11 years of high exposure or 33 years of low exposure, for example) the excess mortality was 88 percent for digestive cancer, 54 percent for respiratory cancer, and 183 percent for cancers of other and unspecified sites.

The study generally confirms the findings of earlier investigators, but provides additional data for men with long service whose employment began many years ago.

by Dr. W. R. Gaffey