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Title: The mortality experience of workers exposed to
tetrachlorodibenzodioxin in a trichlorophenol process accident

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Descriptors: accident; acute; cancer; cardiovascular; delay; dioxins;
epidemiology; humans; mortality; populations-at-risk; skin; TCDD

Summary:

There was no increase in SMR or standardized mortality ratios (the ratio of mortality rates in the exposed and the unexposed control, consisting of the U.S. white male standard population of the same age range during the same 30 year period of follow-up) for all causes of death, and for the categories of all malignant neoplasms and circulatory diseases in 121 white, male workers at the Monsanto Company trichlorophenol process plant in Nitro, West Virginia who developed chloracne from TCDD exposure in March, 1949, following an accident.

This study represents 100% follow-up of all workers accidentally exposed to high levels of TCDD who manifested an objective, known, specific health effect of that exposure, chloracne. The authors reviewed plant safety records, workman's compensation, and plant medical records to identify the highly

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exposed workers and assumed that all of the skin disorders recorded on the plant records represented true cases of chloracne. The data were analyzed by the modified life-table method using the updated Monson program, a standard technique.

Evaluation:

The data and analysis presented support the authors' conclusions. The actual denominator of all workers exposed to high levels of TCDD during the accident is not given, only those who developed chloracne. Since it is not known whether persons exposed to high levels of TCDD who also develop chloracne are more, equally, or less likely to experience increased mortality from one or more diseases compared to similarly-exposed workers who don't develop chloracne, it is not apparent as to why the investigators only included those who did have chloracne. In any case, as they point out, 121 is a small number, especially when one is studying relatively rare outcomes, such as various neoplasms. On the plus side, the 30-year follow-up is probably long enough to take latency (the period between exposure and onset of certain diseases including malignancies) into account.

Although the exposed group, in fact showed a low SMR of 0.69 (that is 69% of expected), this is typical when one is comparing a healthy worker group with the general U.S. age, race, and sex similar population since the U.S. population contains disabled, unemployed, diseased, etc. persons (who experience a very different pattern of mortality than a healthy worker group.) A better control group would have been an age-, race-, sex-matched group of workers from the same plant or a similar plant, who were not

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accidentally exposed to TCDD. Of concern is the SMR of 1.00 for malignant neoplasms (that is the mortality rate for this category in the exposed was the same as expected in the general population, in spite of the 0.69 SMR for all causes and 0.68 SMR for cardiovascular diseases). In fact, an SMR of 1.00 ought to be interpreted as worrisome since we would expect an SMR of closer to 0.69 for malignancies (if this cause[s] of death followed the pattern for all causes). Looking a bit deeper at the types of malignancies occurring there are excesses of lung cancer (1.66-fold), neoplasms of lymphatic and hematopoietic tissue (3.4-fold) and one death from a fibrous histiocytoma (a very rare tumor). Excesses of lung cancer were also noted in two other industrial accidents with TCDD exposure described by the authors. As they point out, there was a possible increase in mortality from leukemia (a hematopoietic neoplasm) in the population residing near Seveso and from lymphoma (a lymphatic neoplasm) in a Swedish study examining mortality associated with dioxin exposure. Fibrous histiocytoma is related to soft tissue sarcomas, reported to be associated with dioxin exposure in the Swedish studies.

Levels of exposure are not given.

The results support the defendant, but the SMR for malignancies and specific types of neoplasms are suspicious.

Reviewer: Linet, M.

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