

## Dioxin and Soft Tissue Sarcomas

There are two kinds of data involved in the current debate about the link between soft tissue sarcomas and exposure to 2,3,7,8 TCDD ("dioxin"). The first kind might be called "after the fact" data. They consist of several soft tissue sarcomas that turned up in three studies, two at Monsanto and one at Dow, and were noticed after the fact by investigators at NIOSH. These investigators then looked for other soft tissue sarcomas and found some at two Monsanto plants. Whether there are four or five or seven such cancers depends on how one defines exposure, but in any case these are reported to be in excess on the basis of conventional statistical calculations.

These calculations are suspect because they were made after the fact. To see this, notice that there have been some 7000 workers with potential exposure to dioxin nationwide in some eight plants (NIOSH data). NIOSH observed cases coming from two plants, and calculated "excesses" based on the populations of those plants. What they should have done, and are now in the process of doing, is to follow up the whole 7000 workers and to relate whatever number of soft tissue sarcomas are found to this population of 7000. It may be that this process will turn up a true excess, but until it is done the significance of the currently known soft tissue sarcomas cannot be evaluated.

The second kind of evidence consists of a series of epidemiologic studies directed specifically toward soft tissue sarcomas. These began when a Swedish group did two studies comparing cases of soft tissue sarcomas to matched controls who did not have cancer [1,2]. Both groups, or their next of kin where necessary, were interviewed by telephone about past chemical exposures. There was more exposure to phenoxy herbicides, which could have dioxin as a contaminant, in the cases than in the controls. Exposure was estimated to be associated with a six-fold increase in risk.

The studies were criticized by other investigators [3,4]. In brief, the method of obtaining exposure information was prone to bias, and the duration of exposure of the cases was suspiciously short. Other technical problems also surfaced, and other investigators attempted to confirm or refute the findings through independent studies with different designs.

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Two general mortality studies of Swedish forestry workers and railway pesticide sprayers showed no soft tissue sarcomas [5,6]. A similar study of Finnish herbicide sprayers also showed no soft

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tissue sarcomas [7]. Finally, a New Zealand study, similar in design to the Swedish studies but with more attention paid to controlling possible bias, did not confirm the Swedish findings [4,8].

In summary, we have a small number of soft tissue sarcomas among two groups of workers involved in the production of 2,4,5 T. Their significance cannot be evaluated. We also have six epidemiologic studies, two of which show a relationship between soft tissue sarcomas and dioxin and four of which do not. The only thing that seems clear is that the NIOSH nationwide study of dioxin exposed workers should certainly go forward, and that the National Cancer Institute should be encouraged to conduct a study based on the Swedish design in order to further clarify the situation.

#### References

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