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Dr. Pierre Decoufle
ACOSH
1435 North Freemont
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Dear Pierre:

We have reviewed the draft copy of "Mortality Among Chemical Workers Exposed to Benzene." Our comments and suggestions follow. These comments are a result of review by all Conoco personnel concerned, as well as comments from a consulting epidemiologist.

1. Based on correspondence dealing with the scope of the proposed study, the title of the paper is perhaps misleading and inconsistent with what was mutually agreed on.

To be specific, in a letter dated 5/10/77 from you to Dr. Whetstone you said: "... since most of the deaths identified as of now appear to be persons who previously worked in the Refinery, we probably cannot consider it a benzene study but rather a more general study of petrochemical workers."

In a letter of 7/7/77 from Dr. Whetstone to you, he fully agreed with that concept and went further to state "... The potential for employee exposure to many other chemicals besides benzene has, as you know, always led me to believe that a simple cause and effect linkage between benzene in any abnormal health effect was scientifically unsound, unless great care to quantify the levels of benzene exposure and isolate them from other exposures could be carefully accomplished. If we were to develop a simplistic benzene/health effect conclusion, it might divert our focus from real cases."

✓ We strongly urge the title be changed to reflect the original intent of the study as expressed in the referenced correspondence. Also, the reference to the potential for multiple chemical exposures should be emphasized.

2. ✓ The presentation of the data and analytical results appears misleading in some cases. In each table where SMR's are reported, a clearer representation of the data could be made. For example, including the 95% confidence limits for the SMR's would aid the reader in ascertaining their significance. We strongly recommend this be done.

1 The major findings of the study are among the subgroup of workers (197) who were employed more than one year. Tables 1, 3, 4, and 5 present the results for all participants. These tables should be presented by length of employment as well.

Without being familiar with Monson's program, the chronological period of the control population used is not clear. Also, the comment on page 9 that the age at onset of multiple myeloma in cases A and B was relatively young when "compared to the incidence in the general population" needs clarification. Are you referring to the "onset" in the general population?

3. The calculation of SMR's is an appropriate technique for analyzing mortality data in this study. However, due to the lack of controls (particularly race), we feel this analysis must be viewed as a hypothesis generating approach rather than a more definite hypothesis testing one.

The statistical power argument mentioned on page 7 applies to a single test of significance and not the application of multiple tests to various causes of deaths and subgroups of the population. Unless leukemia were the hypothesized cause which is likely to be affected and that the subgroup employed beyond one year is the group to be examined in this study, the statement made on the bottom of page 7 "... a statistically significant result might be strictly fortuitous" is incorrect and may lead the reader to place undue significance on subsequent positive findings.

4. In your description of the study group we recommend several points be clarified. It would be of interest to know the size of the total pool of workers from which the 262 were selected. Was there elimination of some clerical, professionals, etc.?

The race of worker was unknown for 40% of the study population. Several questions arise as a result of this fact. Why was race undeterminable for such a large portion of the study group? What effect might this have on SMR's and if significant should this be stated in the text?

These comments are offered per your letter of May 7th regarding the draft report. Once again they are a combination of comments from all concerned in Conoco and those made by a consulting epidemiologist. As we have discussed, please call if you have questions concerning the above.



Thomas G. Grumbles

TGG:dem

cc: Dr. Whetstone
R. E. Lehmkuhl
R. D. Gamblin
Tom Huffman
Michele Malloy