

genesis. In general, however, man is more resistant than mouse to chemical carcinogens, and the latency time is much longer.

In the larger work that is soon to be published I conclude that some mineral oils and derived fluids represent only a small hazard for man even under conditions of relatively heavy exposure at the workplace.¹ With modern hygiene and protective measures against skin contact and especially against inhalation, however, the risk of cancer in people from exposure to such fluids and oils is probably small.

1 Iversen OH. Tumorigenesis and carcinogenesis studies of a number of insulation oils and fluids on hairless and SENCAR mice with special reference to skin tumours and malignant lymphomas. *APMIS* Suppl (in press).

Kidney cancer in utility workers exposed to polychlorinated biphenyls (PCBs)

Sir,—On reading this paper (1989; 46:823-4) I found that the three case reports involved workers commonly exposed to several substances (of which PCBs were one group) and that there was absolutely no evidence offered (or found) which indicated that PCBs were any more responsible aetiologically for the cancers than any of the other common exposures.

The title of the paper suggests to me that the authors have capitalised on the current PCB hysteria fostered by the popular press in North America – and perhaps in Europe? I am surprised that you let that title pass: it is misleading. Nowhere, other than in the title, do the authors infer a causal relation between the cancer and any of the substances to which the men were exposed. No evidence is presented even to suggest there might be a statistical association between the cancers and exposure to PCBs.

R E M LEES
Occupational Health Centre,
Queen's University, Kingston,
Canada K7L 3N6

Author's reply:

We can appreciate Lees's concern with respect to raising undue anxiety by singling out PCBs in the title of our article. We believe, however, that our action is appropriate for several reasons. The only chemicals singularly identified as occupational exposures by all three cases of kidney cancer were PCBs. Significant animal

toxicological data exist to implicate PCBs as carcinogenic promoters.¹ We consider this to be critical in that the time from exposure to appearance of disease for at least two of our cases would suggest a relatively short latency period. Given the persistence of PCBs in the environment, the potential for these chemicals to offer a continuing health hazard to general populations, even though many countries have banned the production and use of these chemicals, must be considered. Statistical analysis of our three cases would have shown a large excess (about 20 cases per 10 000 person-years versus a population figure of one case per 10 000 person-years²); however, this is not unusual for disease clusters and any formal statistical test would have confirmed this as a highly unusual event.

Finally, whereas it is true that PCBs have received significant play in the popular press as carcinogens the issue is far from resolved in scientific circles. We believe that it is thus desirable to bring to the attention of serious researchers the possibility that PCBs in concert with other agents may be an area requiring specific hypothesis testing research.

26 1 Safe S. Polychlorinated biphenyls (PCBs): mutagenicity and carcinogenicity. *Mutat Res* 1989;220:31-47.

2 Cusano MM, Young JL, jr, eds. *Forty-five years of cancer incidence in Connecticut: 1935-1979*. Washington: US Department of Health and Human Services, 1986. (Monograph 70.) (NIH pub No 86-2652.)

Pulmonary function in histology technicians compared with women from Michigan: effects of chronic low dose formaldehyde exposure on a national sample of women

Sir,—Kilburn and colleagues (1989; 46:468-72) have compared the lung function of a group of histopathology technicians with the lung function from a population sample from Michigan studied by Miller *et al*.¹ The studies were carried out by the same groups and Kilburn's co-authors were also authors of the Miller *et al* paper. Kilburn *et al* concluded that there was a steeper relation of lung function to age among the technicians compared with the Michigan sample. They attributed this to an adverse response to low dose formaldehyde (by title of paper) and to solvents (in the summary).

This conclusion is not justified for methodological reasons and because of limitations of both studies.

The Michigan sample is described as "a probability sample of a large 9 000 000 population industrial state." But the sample was small and it cannot be concluded that it is representative. Firstly, the sampling was biased towards rural dwellers by taking different sampling rates for six geographical regions "to ensure that an adequate number of people would be selected in each area to justify establishing a clinic there." No information is provided on the numbers of people selected. There were 4077 initial volunteers, of whom 2542 agreed to be examined. Of these, 1738 actually completed the examinations. So it is most unlikely that the participation rate was higher than 20%.

These numbers were whittled down further: others excluded were 507 children, 249 non-white adults, 159 obese people, 339 clinically abnormal, and 88 ex-smokers. This left just 190 men and 216 women. The prediction equations for lung function for Michigan women used in the Kilburn paper were based on just the 216 men and current smokers aged 18 to 82. But even then a further 23 women were excluded from the calculations because the data "were identified as influential values." Thus these 23 women must have had data which changed either the slope or position of the regression relations, so that their inclusion would have yielded a different regression line. It is impossible to conclude that these 193 white, non-obese, clinically non-abnormal, non-extreme women are representative of all Michigan women, let alone of all American women. It needs to be noted that the 23 additional exclusions were from all lung function analyses (FVC, FEV₁, FEV₁/FVC %, FEF_{25-75%}, FEF_{75-85%}, FEF_{50%}, and FEF_{75%}), but it is not stated whether their extreme influence affected all relations or only one.

The Kilburn paper, however, reports that "The entire Michigan sample of 486 white women which provided a representative sample of women in the United States was compared with white women in this paper. It appeared reasonable to compare them with a representative population for evidence of an occupational exposure rather than with a hand picked normal group selected for modelling." Thus he is saying that he added back to the 193