Abstracts of papers submitted for publication on the Mortality Study of Workers exposed to Vinyl Chloride Monomer.

(A) THE MORTALITY EXPERIENCE OF WORKERS EXPOSED TO VINYL CHLORIDE MONOMER IN THE MANUFACTURE OF POLYVINYL CHLORIDE IN GREAT BRITAIN

By A.J.FOX and P.F.COLLIER

Identification particulars were obtained for over 7,000 men who were at some time between 1940 and 1974 exposed to vinyl chloride monomer in the manufacture of polyvinyl chloride. Approximately 99% of these have been traced and their mortality experience studied. The overall standardised mortality ratio, 75.4, shows a significant reduction compared with the national rates. Four cases of liver cancer are found. Two of these have been confirmed by a panel of liver pathologists as angiosarcoma and two as not angiosarcoma. There is no evidence supporting the hypothesis that cancers other than those of the liver are associated with exposure to vinyl chloride monomer. The two cases of angiosarcoma were found in men who has been exposed to high concentrations although the second man died only eight years after exposure. The industry in Great Britain has expanded considerably since the Second World War with over 50 per cent of men having entered within the last decade. Conclusions drawn about the influence of vinyl chloride monomer on the mortality experience of men in this industry must consequently be tempered by the reservation that the full impact may not yet be in evidence.

(Submitted to the British Journal of Industrial Medicine)

(B) LOW MORTALITY RATES IN INDUSTRIAL COHORT STUDIES DUE TO SELECTION FOR WORK AND SURVIVAL IN THE INDUSTRY

By A.J.FOX and P.F.COLLIER

Occupational groups are often described as relatively healthy because their mortality rates are lower than the national average. Although correct this confuses the issue for those interested in assessing the effects of exposure to a particular chemical. By a further analysis of data collected in a study of all men ever exposed to vinyl chloride monomer in the manufacture of polyvinyl chloride in Great Britain, three factors have been shown to contribute to the low mortality rates that were observed. The three factors, the selection of a healthy population for employment; the survival in the industry of the healthier men; and the length of time that this population has been pursued, have all been quantified. The mortality experience within five years of entering this industry was shown to be as low as 37 per cent of that expected; for circulatory disease and respiratory disease as low as 21 per cent. There was a progressive increase in standardised mortality ratio with the length of time since entry such that the effect had almost disappeared 15 years after entry. To avoid confounding the selection effect with the survival effect the latter was measured by separating men who survived 15 years after entering the industry according to whether or not they were still in the industry after this period. Those who had left experienced an overall standardised mortality ratio some 50 per cent higher than those still in the industry. This effect although consistent in the age groups between 25 and 74 and all cause groups studied was greatest in those aged between 25 and 44 and for lung cancer and respiratory disease.

(Submitted to the British Journal of Preventive and Social Medicine)

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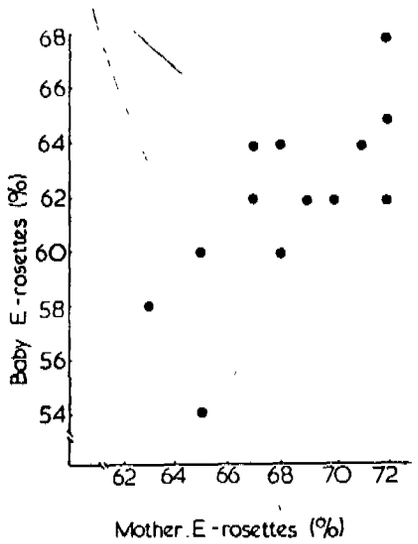

Fig. 2—E-rosetting cells in 13 mother-baby pairs.

$P<0.001$, paired t test). For the E-rosetting cells the mean for the mothers was 68·3% (S.D. 2·9%) and for the babies 61·9 (S.D. 3·7%). This difference too is significant ($P<0.001$) and the correlation coefficient is also significant ($r=0.74$, $P<0.005$) (fig. 2).

The E rosettes in the mothers ranged from 63% to 72%. We had no counts of less than 50% and cannot calculate in the same way as Halbrecht and Komlos, but our counts for the babies ranged from 58% to 65% which is higher than their figures and nearer the mean of 53% reported by Campbell et al.[1] and Steel et al.[2]

There is considerable variation in E-rosette counts due to technique. We used the method described by Stjernswärd et al.[3] In testing each mother and baby's cells together, however, variation due to technique should not greatly affect the ratios.

The normal range of T cells in newborns is probably wide. However, our findings suggest that there is a direct relationship between the number of E-rosetting cells in some mothers and their babies. Since these cells are the major subpopulation of peripheral-blood lymphocytes, it is likely that the correlation between the total blood-lymphocyte counts is largely due to the correlation between the E-rosetting cells (T cells). This raises the possibility that these cell populations in the fetus are regulated by maternal factors.

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GENETIC RISKS OF VINYL CHLORIDE

Sir,—The assertion in the paper by Dr Infante and his colleagues (April 3, p. 734) that "a significant excess of fetal loss was observed among wives following exposure to V.C.M." is such as to have justified much more complete presentation. Any assertion of such importance should at least be supported by a specification of the methods of data collection, and a tabulation of the raw data before analysis.

The subject being spontaneous abortion, the use of a questionnaire, and the ensuing low response-rates, can be viewed sympathetically, but must detract from the accuracy of the study. The data are presented only after an age-adjustment procedure which behaves very misleadingly. A crude percentage of 10·1 for a sample whose average age is 26·4 is adjusted violently downwards to 6·1, while a figure of 16·5 for a sample of average age 30·2 is only reduced marginally to 15·8. Presumably the adjustment is being done within the study and the small sample size is the cause of this anomaly. It would have been better to have adjusted all the figures in accordance with national figures, but perhaps, in such a delicate area, such statistics are not available or are unreliable.

It is to be hoped that the complete study will be published without delay, with the above omissions rectified, so that it will be possible to put this, at present isolated, question in context.

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SOCIAL STIGMA AND TUBERCULOSIS

Sir,—You have stated[1] that "Within the U.K. tuberculosis is no longer feared. It is widely known to be curable with little inconvenience to the patient and it carries little, if any, social stigma". Personal experience in Belfast showed that fear still existed in some patients before their disease was explained to them. Because of this we have tried to find out if social stigma still exists.

We asked 32 patients with pulmonary tuberculosis and 31 controls with other chest diseases of similar age, sex, and social background, about their attitudes towards their disease. In the tuberculosis group only 2 of the 13 with a family history of tuberculosis and 7 of the 19 without such a history knew that it was still possible to develop the disease in Belfast. In fact, there are at present about 100 new cases notified each year in a population of 600 000.

Only 17 of the 32 patients with tuberculosis knew that their disease was infectious. 2 university students were among the group who did not know. A similar proportion thought the disease was in some way related to an inherited weakness of the chest.

Both the tuberculosis group and the control group were asked if they had any sense of shame or similar emotional feelings because of their illness. 5 of the 31 control patients expressed feelings of inferiority, shame, embarrassment, and a sense of social isolation. These were all related to specific physical disabilities such as cough, sputum, or dyspnœa. 12 of the 32 tuberculosis patients described feelings of shame, inferiority, and a fear of social ostracism. None of these attitudes were related to specific physical complaints. The interview with another patient was cancelled due to obvious embarrassment and shame about discussing the disease. An additional 4 from the group of tuberculosis patients although not suffering from a direct social stigma about the disease expressed a sense of guilt and shame at the reflection of their life style. These patients were males who had been heavy drinkers with families, although none were alcoholics.

Improved social conditions here in the past helped to reduce the incidence of pulmonary tuberculosis. However, in many large cities there is increasing alcoholism, overcrowding, squatting, and drug taking, as well as an increase in the numbers of old people. Such features may arrest the downward trend in notifications of the disease. If the lack of knowledge about tuberculosis and the continued social stigma (not just in elderly patients) exist in other areas of the U.K. then perhaps now is the time to increase public education about a preventable and curable disease.

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1. Campbell, A. C., Walker, C., Wood, L., Aynsley-Green, A., Yu, V. *Clin. exp. Immun.* 1974, 18, 469.
2. Steel, C. M., Evans, J., Smith, M. A. *Lancet*, 1975, i, 914.
3. Stjernswärd, J., Jondal, M., Vanky, F., Wigzell, H., Sealy, R. *ibid.* 1972, i, 1352.

1. *Lancet*, 1975, ii, 593.