CORRESPONDENCE

Relation between asbestosis and bronchial cancer in amphibole asbestos miners

Sir—Sluis-Cremer and Bezuidenhout (1989;46:537–40) present data on the relation between asbestosis and bronchial cancer in amphibole miners but analyse the effect of dose of asbestos only after allowing for the effect of asbestosis grade. Since the risk and severity of asbestosis are themselves dose related much of the effect of dose on the risk of cancer had already been allowed for by the analysis of the effect of asbestosis grade. Nevertheless, years of exposure, probably the most reliable measure of dose because it is known more accurately than intensity, still had a significant effect. This is consistent with the dose of asbestos rather than asbestosis being the major determinant of the risk of cancer.

It would be interesting to see the results of a further analysis of the data in which the various measures of dose were entered into the logistic regression before the asbestosis grade to determine the effect of asbestosis after the effect of dose of asbestos has been allowed for. To shed further light on the relation between asbestosis and bronchial cancer the ideal analysis would compare the incidence of cancer in subjects with and without asbestosis matched for dose of asbestos received. I wonder whether their data include sufficient subjects to attempt such an analysis?

Their analysis concerned subjects who had undergone necropsy, which occurred in a minority of deaths in the study population. The criteria for selection for necropsy were not mentioned. If necropsy had been more ; 103-ATC-13.1.90likely to be carried out in men with cancer if there had also been evidence of asbestosis during life, as has been the case in the United Kingdom until recently, this would have tended to augment the apparent effect of asbestosis on the risk of cancer. It is not indicated whether the presence of asbestosis was assessed without knowledge of whether or not cancer was present. Pathologists commonly look harder for asbestosis when they know bronchial cancer is present.

Table 2 of the paper shows that there were large standard deviations in the various measures of dose and suggests that subjects with only brief exposure were included. The observation that there appeared to be no excess risk of cancer in the group without asbestosis may indicate no more than that many of them had relatively slight exposure.

R M RUDD
London Chest Hospital, Bonner Road, London E2 9JX

Dr Sluis-Cremer and Mr Bezuidenhout reply:

We have carried out the two analyses suggested by Rudd. It must be mentioned, however, that what he first suggests is the assessment of the risk of developing bronchial cancer in the presence of asbestosis after controlling for the effect of the various measures of dose. In our paper we state our objective "... to determine if any parameter of exposure to asbestos dust exert any additional risk of developing bronchial cancer after allowing for the presence of asbestosis." After adjusting for the effects of smoking and age then entering the various measures of dose in separate analyses followed by asbestosis grade the latter still emerged as a significant risk factor for bronchial cancer. Admittedly, years of exposure accounted for most of the variation in model 1 (table 1) but notwithstanding this, the grade of asbestosis still emerged as a highly significant risk factor for bronchial cancer.

Following Rudd's next suggestion we were able to match to each of the 35 cases two to four referents with year of exposure within 20% of that of the respective case. A conditional logistic regression analysis was performed on the matched case-referent set of 157 subjects to assess the effect of asbestosis absent/present on risk of bronchial cancer after adjusting for the effects of age and smoking (table 2). The improvement in the fit of the model to the data with the introduction of asbestosis was significant (LR χ^2 = 5·55; 1 df, p = 0·02) with the estimate of the relative risk by the odds ratio (OR) significant at 3·4 (p = 0·03; 95% CI:1·1–10·46). As in the

Table 1 Goodness of fit χ^2 values for the stepwise unconditional logistic regression analysis

Model	*Step*	*Term entered*	*Improvement in LR χ^2*	*Degrees of freedom*	*p Value*
1	1	Smoking	10·13	4	0·04
	2	Age	14·83	1	0·0001
	3	Exposure (y)	25·44	1	<0·001
	4	Asbestosis	11·01	2	0·004
2	3	Residence time	12·23	1	0·0005
	4	Asbestosis	20·64	2	<0·0001
3	3	Fibre years	3·95	1	0·05
	4	Asbestosis	26·6	2	<0·0001
4	3	Residence time weighted dosage	1·65	1	0·20
	4	Asbestosis	28·44	2	<0·0001

Table 2 Goodness of fit χ^2 values for the stepwise conditional logistic regression analysis matching cases and referents by years exposure

Step	*Term entered*	*Improvement in LR χ^2*	*Degrees of freedom*	*p Value*
1	Smoking	9·29	4	0·054
2	Age	0·39	1	0·53
3	Asbestosis	5·55	1	0·018

unconditional logistic analysis in the published paper, heavy smoking emerged as a significant contributor to the risk of bronchial cancer (OR = 7·9; p = 0·02; 1·4–43·2).

The necropsy rate in the study population was low (37%) by South African standards; 85% in gold miners. The necropsy cases were not selected by any authorities but by the doctors and family of the dead men in the hope of obtaining compensation. Men with advanced disease would probably have already obtained maximum compensation and there was thus no need for necropsy. The families of workers with short or forgotten service or ignorant of the regulations may not have insisted on necropsy. Lung cancers if diagnosed in life would have obtained maximum compensation. We agree that there are probably selection factors for necropsy of which we are ignorant.

The mean net duration of exposure of cases of cancer without asbestosis was six years and their referents without cancer or asbestosis was eight years—this is hardly "slight" exposure. Among those with asbestosis, patients with cancer had 13 years of exposure and their referents without cancer 14 years.