Risk factors for radiogenic cancer: a comparison of factors derived from the Hanford survey with those recommended by the ICRP

Sir,—In their latest paper on radium luminisers (1985;42:341–5) Baverstock and Papworth have some very misleading things to say about the MSK model for predicting cancer risks of radiation workers. This model is a source of risk estimates whose standard errors are large because they were of necessity based on a relatively small number of Hanford deaths.¹ Therefore, in the recent paper all the figures in table 1—which are supposed to show how MSK predictions for three exposure ages compare with “flat rate” predictions of ICRP—and in the second column of table 2—which show “predicted deaths by MSK analysis”—are far too precise. It is true that—as a point estimate—an MSK prediction could be 15 times as high as the ICRP equivalent but confidence limits are so wide that it would be more accurate to say “between two and 150 times as high.”

According to an earlier report on the luminiser study,² the observed number of non-cancer deaths (46) was much smaller than the expected number (72.2). Therefore, it is unlikely that more than two thirds of the deaths were actually traced. On this assumption the observed number of deaths from cancer in table 2 of the recent paper ($O = 27$) would be much closer to “predicted deaths by MSK analysis” ($p = 30.2$) than to “expected deaths due to natural incidence” ($E = 15.8$).

Finally, we are told that MSK have given no mechanistic reason why “sensitivity to radiation induced carcinogenesis increases with age *more rapidly than the natural mortality from the given disease*”. The emphasis is ours since the MSK allowance for exposure age is exactly what one would expect from known effects of age on all causes of death (see official statistics of mortality) and other studies of the effects of advancing age on sensitivity to a wide range of noxious agents. The fact that A-bomb survivors seem to be an exception to this rule is puzzling, but only if one assumes that there were no late effects of the radiation other than cancer. Recent work has cast serious doubt on this hypothesis and has shown that the combined effects of survival of the fittest and radiation induced marrow damage probably left children and old people with much greater risk of dying from infections during the latent phase of cancer than young adults.^{3,4}

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References

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Book review

Nickel in the human environment. Edited by FW Sunderman. (£30.) Oxford; Oxford University Press for the International Agency for Research on Cancer, 1985.

This book contains the proceedings of a symposium held in Lyon in 1984. There are four sections, epidemiology, carcinogenicity, metabolism and toxicology, and human exposure. The greatest part of the first section relates to occupational exposure and so does about half the fourth section. These chapters provide a good summary of present knowledge about occupational risks, both past and present, although there is not a great deal of new information. The chapters dealing with carcinogenicity report on several experimental studies and contain a good deal of new data. It seems clear that nickel is able to cross the cell membrane and is deposited in the nucleus and nucleolus. The properties of a protein which may form complexes with nickel ion and DNA is also described for the first time here. The relevance of this observation to the carcinogenicity of nickel, however, has not been established.

One of the more interesting chapters in the section on metabolism and toxicology is on the essentiality of the metal. Animal studies leave no doubt at all that nickel is an essential trace element. Animals reared on a diet deficient in nickel do not grow at a normal rate, and they also develop an anaemia resistant to treatment with iron. Interactions between nickel and calcium and between nickel and zinc are also described, emphasising how complex is the normal metabolism of the essential trace elements.

Most dietary items contain relatively low concentrations of nickel, but some vegetable products, including oatmeal, nuts, and cocoa, may contain amounts that are sufficiently high to suggest that they may exacerbate nickel dermatitis, and it is recommended that patients with severe nickel sensitivity should be treated with a low nickel diet.