only for multiple myeloma. Moreover, as the authors acknowledge, analyses of various cohorts of radiation workers (which overlap in part with the cohort studied by Kneale and Stewart) in the United States and elsewhere find no evidence of statistical incompatibility between the cancer risks associated with such occupational exposure and those found in the survivors of the Japanese atomic bombings. Consequently, we think that little weight should be attached to the results of the paper by Kneale and Stewart.

MARK LITTLE
CHRISSHARP
Medical Department,
National Radiological Protection Board,
Chilton, Didcot OX11 9RQ


Author's reply—Most of the difficulties which Little and Sharp have with our paper would seem to stem from a failure to understand that our statistical methods were simply practical applications of the general theory of nested likelihood ratio tests. This theory is a very general method of identifying statistical tests that have a wide range of optimum properties provided one has a sufficiently general statistical model of a parametric kind that describes how the data might have been generated, and provided this model satisfies certain easily checkable mathematical restrictions. Why this is so can be discovered in any general textbook of mathematical statistics, either the one referenced in our paper—namely, Kendall and Stuart—or the one preferred by Little and Sharp—namely, Cox and Hinkley.

For studying the relation between radiation and carcinogenesis relevant parametric models can be found in Breslow and Day.1 For example, how intuitively obvious about a carcinogenic study to be justified by making use of a parametric model is shown in Vol I page 248, and two formulae for parametric models for cohort studies are given in Vol II page 49: the choice of which formula to use depends upon whether the cohort study is proceeding in continuous time (first formula) or in discrete units of time (second formula). We naturally used the second formula as it is for randomized doses were only available as annual totals.

The mathematical techniques and limited computer facilities available in 1980 did not allow direct (case-control) methods to be used in cohort studies. Therefore, Vol II of Breslow and Day deals mainly with studies where various approximations (such as Poisson regression when person-years at risk can be calculated) were used. The United States and elsewhere found no evidence of statistical incompatibility between the cancer risks associated with such occupational exposure and those found in the survivors of the Japanese atomic bombings. Consequently, we think that little weight should be attached to the results of the paper by Kneale and Stewart.

The statistical and medical papers-namely, Why in any country? For example, preferred by the practitioners (table 2) with the standard analysis of variance ratio of y2 values, and that was how X2 came to be relevant. All this can be investigated either in Kendall and Stuart or in Cox and Hinkley.

GEORGE W KNEALE
ALICE M STEWART
Department of Public Health and Epidemiology, University of Birmingham, Edgbaston, Birmingham B15 2TT


Parental exposure to radiation and childhood cancer

This study1 was referred to by Roman et al (p 78) as a "study linking dosimetry information contained within the National Registry of Radiation Workers (NRRW) with records of childhood cancer held in the National Registry of Childhood Tumours (NRCT)". This statement needs amplification. From our outset the Old Bailey Survey of Childhood Cancers (OSCC) has been a partner in this project. Identifying particular cases for some 40 000 parents have been abstracted from the interview records of the OBC; these data are now held within the files of the National Registry of Childhood Tumours.

TOM SORAHAN
University of Birmingham
Institute of Occupational Health,
Edgbaston, Birmingham B13 2TT


Offspring sex ratio as an indicator of reproductive hazards

Editor—In a recent letter the sex ratio was discussed as an indicator of occupational exposures.1,2

The sex ratio at birth is a prevalence measure reflecting the sex programming at the time of conception and the survival until birth. The sex ratio has been suggested to reflect the hormone concentration at the time of conception.3,4 According to this hypothesis high level of androgens changes the ratio towards more girls. External exposures may have this effect as