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Because we receive many more letters than we have room to publish we may shorten those that we do publish to allow readers as wide a selection as possible. In particular, when we receive several letters on the same topic we reserve the right to abridge individual letters. Our usual policy is to reserve our correspondence columns for letters commenting on issues discussed recently (within six weeks) in the *BMJ*.

Letters critical of a paper may be sent to the authors of the paper so that their reply may appear in the same issue. We may also forward letters that we decide not to publish to the authors of the paper on which they comment.

Letters should not exceed 400 words and should be typed double spaced and signed by all authors, who should include their main degree.

Childhood leukaemia and radioactive discharges at Seascale

SIR,—Dr D Jakeman's letter (20 September, p 760) about the uncertainty of any link between leukaemia in early childhood (say before the age of 5) and the discharges at Seascale in the early 1950s restates a commonly held belief that very young children are at highest risk. There is no supporting evidence, however, for supposing that such children are indeed much more radiosensitive to the induction of leukaemia, dose for dose, than adults.

After radiotherapy of the "chest" in infancy (age 0-2 months) for supposed thymic enlargement thyroid cancer was increased about 100-fold (24 cases observed, 0.29 expected), but in the same population after a 20 year follow up there were seven cases of leukaemia in some 2800 subjects, with 2.27 expected.¹ The combined results of three other, similar surveys showed two cases of leukaemia in some 2600 subjects, with about two expected.^{2,4} Only two of the total of nine cases were in children under 5 years old. Thus irradiation of a substantial fraction of the body, including bone marrow and lymphoid tissue, in over 5000 infants to a tissue dose of 1000 mSv and more did not cause a statistically established increase in leukaemia in early childhood. A cohort study (after the exclusion of deaths within the first year of life) of nearly 5000 children after cardiac catheterisation under x ray guidance showed three cases of leukaemia (all at more than five years after the procedure), with 1.88 expected.⁵ An average thoracic dose of 74 mSv for cardiac catheterisation in infants and children was cited.

Even the fetus in utero is little more radiosensitive than the adult to the induction of fatal malignant disease (2-2½%/Gy v 1-2%/Gy uniform whole body irradiation), with leukaemia forming about one third of the cases induced in each group.^{6,7}

This evidence seems to show that if the Sellafield discharges caused an increase in leukaemia the radiation dose to the tissues of origin of childhood leukaemia must have been much more effective than the 50 mSv or the 10× natural background dose cited by Dr Jakeman. Most attention has been centred on

the possibility that longlived bone seeking α emitters in the Sellafield discharges (for example, plutonium isotopes) are absorbed into the tissues to a much higher degree in very young children than in older people, so leading to bone marrow doses much larger than expected from conventional considerations. Whether radiation induced acute lymphatic leukaemia in childhood originates in bone marrow rather than in some other irradiated tissue, however, is not known.

It seems likely, when the next Seascale child dies of leukaemia, that the coroner would order tissue analyses for longlived radionuclides. However, this could not provide evidence relating to children averaging 4 years old at the time of the releases of radioactivity in the early 1950s, who, according to Dr Jakeman, would have been most at risk of contracting leukaemia. Direct evidence would be provided by similar tissue analyses of exhumed bodies of children dying from any cause in the same locality during those relevant years. If non-leukaemic children were found not to contain unexpected concentrations of α emitters there would be no direct support for the hypothesis that young children in general absorb these radionuclides from food, water, or inhaled air to a greater extent than adults. It might be argued that the young children at risk of leukaemia in the 1950s were specifically those who did absorb α emitters to a greater extent than other children (because they either were exposed to more or were intrinsically better absorbers). The smaller the minority of children with exceptionally high tissue levels, however, the fewer will be the children at the higher risk and therefore the larger must be the frequency of induced leukaemia per unit dose to cause a given number of cases of induced leukaemia. If "the population of children under 5 living in Seascale in 1955 was about 250" it seems unlikely that any of them would have died from any cause and, if so, there seems no possibility of finding direct evidence in support of Dr Jakeman's suggestion that there was a relatively transient period of increased risk from enhanced radiation exposure of tissues during the early 1950s.

Dr Jakeman's conclusion that uncertainty re-

mains applies inescapably to any single statistical correlation, however good (or bad) it may appear, but the evidential weight of that uncertainty in the Seascale case, taken on its own, must be greatly reduced by the evidence cited above from much larger numbers of children exposed to much larger tissue doses than he has estimated for the children at Seascale.

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Orchidectomy versus oestrogen for prostatic cancer: cardiovascular effects

SIR,—The trial of Dr P Henriksson and Professor O Edhag (16 August, p 413) showing that oestrogen given for prostatic cancer apparently