

Preliminary Communication

MALIGNANT DISEASE IN CHILDHOOD AND DIAGNOSTIC IRRADIATION IN UTERO

PUBLIC-HEALTH departments all over the country are engaged in an environmental survey which will eventually cover some 1500 children who died of leukaemia or malignant disease before the age of 10 in the years 1953-55. As yet only approximately a third of the case-material has been gathered, but preliminary analysis has yielded a result which should, we feel, be reported without further delay.

The survey covers the whole of England and takes the following form.

The addresses of all children certified as dying from leukaemia or malignant disease during the three years 1953-55 have been collected and the attendant doctors asked for permission to approach the parents. Where the request has been approved, the mother is invited to cooperate by allowing a doctor from the local-authority health department to call and interview her. An interview by the same doctor is also arranged with the mother of a control child of the same age and sex, chosen at random from a list of births in the town or rural district in which the affected child's parents were living when the death occurred.

Of necessity a large number of doctors are conducting these interviews, but they are all following the same conventions and using standard schedules. Provided the parents of the dead child have not moved out of the area, only one doctor interviews each case-control pair. The questionnaires for the children who have died are designed to elicit information about the child's health before the onset of the fatal illness, and the mother's health before and during the relevant pregnancy. All investigations and treatments are recorded, and wherever possible X-ray data are checked with hospital notes. A note is also made of any cases of leukaemia and malignant disease in the family, any degree of consanguinity between parents and grandparents, and certain features of the child's diet and home background. The schedules for the controls ensure that the same facts are obtained up to the age when the corresponding case first showed signs of the fatal illness.

PAST HISTORIES* OF X-RAY EXAMINATIONS AND ANTIBIOTICS IN 547 CHILDREN WITH MALIGNANT DISEASE AND 547 CONTROLS MATCHED FOR AGE, SEX, AND LOCALITY

No. of mothers and children X-rayed		Leukaemia		Other malignant diseases		All malignant diseases	
Period	Type of exposure	269 cases	269 controls	278 cases	278 controls	547 cases	547 controls
Antenatal	Diagnostic—						
	Abdomen	42	24	43	21	85	45
	Other ..	25	23	33	32	58	55
Before conception of survey child	Therapeutic	1	..	1
	Diagnostic—						
	Abdomen	17	24	28	30	45	54
	Other ..	103	88	108	119	211	207
Postnatal (children only)	Therapeutic	1	..	1	..	2	..
	Diagnostic	45	49	46	50	91	99
	Shoe-fittings	55	52	40	46	95	98
†Total no. of mothers	..	140	130	160	154	300	284
Total no. of children	..	89	91	75	84	164	175
Either mother or child X-rayed	..	179	172	194	198	373	370
Postnatal medication (children)							
	Sulphonamides	51	45	42	42	93	87
	Antibiotics	68	52	50	58	118	110

* i.e., before the onset of the fatal illness in the affected child or equivalent period in the control child.

† Since a mother or child may appear in more than one X-ray category, the totals in this category are less than the sum of totals in the three preceding ones.

One reason for attempting a nation-wide survey was the possibility that the peak of leukaemia mortality in early life noted by Hewitt¹ might be explained if weak irradiation could initiate malignant changes in a foetus or very young child. Hence this preliminary analysis of the completed schedules is focused mainly on the X-ray histories. The accompanying table shows the numbers of cases and controls with a history of irradiation of the mother or child. It also gives the numbers of children who received antibiotics or sulphonamides before the onset of the fatal illness or the equivalent date.

It will be seen that although they are alike in other respects, there is one important difference between the children who died and their controls: the number of mothers who had an X ray of their abdomen during the relevant pregnancy was 85 for the cases and only 45 for the controls. In the group labelled Other Malignant Diseases the corresponding figures for growths in different parts of the body were:

	Cases	Controls
Brain and appendages	11	9
Kidneys	10	2
Suprarenals	9	4
Lymph-nodes	4	2
All other sites	9	4

So large a total difference between the cases and controls can hardly be fortuitous. Nor, in view of the other resemblances, is it likely to be due to faulty choice of controls or to bias in recording. It could, however, be explained if children who are X-rayed before they are born are more prone to develop leukaemia and other malignant diseases than children who have not been X-rayed in utero.

DISCUSSION

The following facts have been known for some time. First, excessive exposure to radioactive materials may cause not only immediate radiation sickness and death but also the subsequent development of leukaemia and cancer. Secondly, the immediate ill-effects of radiation are disproportionately great when the whole body is exposed. Thirdly, therapeutic irradiation of pregnant women is liable to cause microcephaly and other congenital defects in the foetus.²

In the last twelve months two other disturbing facts about X rays have come to light. In the first place it is now known that radiotherapy can cause leukaemia in adults³ and cancer in children.⁴ Secondly, the dose of irradiation received by the foetal gonads during diagnostic pelvimetry frequently exceeds 2.5r.⁵ The present investigation suggests that, besides causing genetic damage, this apparently harmless examination may occasionally cause leukaemia or cancer in the unborn child.

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