

Fallout from Chernobyl

Thyroid cancer in children increased dramatically in Belarus

EDITOR,—Neither the editorial¹ nor the three articles²⁻⁴ relating to the Chernobyl reactor accident make more than a passing mention to the one major increase in malignancy that has so far been identified—namely, the greatly increased incidence of childhood thyroid cancer in the exposed population of southern Belarus, which was first reported in 1992.^{5,6} The pathology was documented in 1993,⁷ the relation to the disaster has been reviewed,⁸ and the paradox that isotopes of iodine may be carcinogenic to the thyroid in normal children despite their safety in adults with Graves' disease has been discussed.⁹ As was reported at a recent World Health Organisation meeting in Rome, the increase has now also been recorded in the northern Ukraine and is continuing in Belarus.

Thurstan B Brewin gives the impression that the Chernobyl accident was fairly trivial and that we know all about the dangers of radiation.¹⁰ He is concerned that the dangers of radiation are being exaggerated, but he goes too far in the direction of complacency. We most certainly do not know all about the dangers of radiation—for example, we need to know more about the tissue specific effects of different radioactive isotopes. Complacency, and a belief that we knew all about the dangers, led to huge releases of various isotopes from the Hanford nuclear facility in the United States, partly as a deliberate but covert experiment.¹⁰

Despite the accident at Chernobyl there is clearly a case to be made for nuclear power, but it must be made against a background of openness and a realistic assessment of risk. The accident at Chernobyl was unprecedented, with about 10¹⁸ Bq of radioactive isotopes released. While studies of low level exposure are valuable, studies of the effects of the fallout in the exposed population in the vicinity of Chernobyl are more likely to be helpful. Currently several international organisations are cooperating with local scientists in studies of the population exposed to much higher levels of fallout around Chernobyl than were seen in Western countries. The proper response to future incidents must be informed by information gained from studies of the consequences of Chernobyl.

E D WILLIAMS
Professor of histopathology

Department of Histopathology,
Addenbrooke's Hospital,
Cambridge CB2 2QQ

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Belarus increase was probably caused by Chernobyl

EDITOR,—We are surprised that John Boice and Martha Linet, commenting on childhood cancer since the accident at Chernobyl ("probably nothing to worry about")¹ failed to mention the increase in the number of cases of childhood thyroid cancer observed in the Republic of Belarus. Altogether 160 cases were reported to the Belarus tumour registry from 1986 to 1992, compared with nine from 1976 to 1985.² The incidence averaged 0.041/100 000 (95% confidence interval 0.019 to 0.078) during the decade preceding the accident but had increased to 2.55 (1.94 to 3.28) by 1992—that is, to a rate 62 times higher. This increase has been attributed to radioiodines released from the reactor³; alternative explanations, however, include false positive histological diagnoses, improved reporting, and screening.⁴ Screening may lead to the detection of dormant and thus clinically irrelevant occult tumours.⁴

Together with Belorussian colleagues, we have examined histopathological, epidemiological, and clinical features of cases diagnosed from 1986 to 1992.⁵ The histological slides from 120 of the 160 children were reviewed by senior Swiss and Belorussian pathologists, and thyroid carcinoma was confirmed in 113 cases.⁵ This was of the papillary type in 112 cases and medullary carcinoma in one. All patients in whom the diagnosis was confirmed underwent thyroidectomy or hemithyroidectomy.

Leading cancer registries in Europe and the United States report considerably lower incidences for childhood thyroid cancer than that in Belarus, indicating that only a small part of the increase could be due to improved reporting of cases since the accident at Chernobyl. If a large proportion of the cases were cases of occult carcinoma detected by screening then many small tumours (<5 mm in diameter) without signs of tissue invasion would be expected.² The tumour characteristics observed in Belarus, however, do not match this expectation. The table compares the characteristics of cases diagnosed from 1986 to 1989 with those diagnosed in 1990 and 1991. The number of children screened by different research groups is unknown, but screening activities generally started after 1989. No trend towards less advanced tumours in the later years is evident. Overall, 87% of the tumours measured ≥ 10 mm in diameter; 62% had spread beyond the capsule, 65% had invaded cervical lymph nodes, and 13% had spread to the lungs.

The reports to the registry thus seem to reflect a real increase in the incidence of childhood thyroid cancer in Belarus, but is there a causal link with the accident at Chernobyl? The regional distribution of contamination with iodine-131 roughly corresponds to the areas of high incidence in southern

Belarus.² The age distribution of the patients also suggests an association with the accident. In the decade preceding the accident only one of the 10 children was aged under 10 at diagnosis, but the proportion of children under 10 increased to over 50% among the cases reported in 1990 and 1991. None of the children in the cases reported in 1990 and 1991 was born after 1986. This is compatible with a higher susceptibility to radiation among younger children.

Comparison of histologically confirmed cases of thyroid cancer diagnosed 1986-9 (no or little screening) with those diagnosed 1990 and 1991 (some screening). Figures are numbers (percentages)

TNM classification	Period		P value*
	1986-9 (n=10)	1990-1 (n=76)	
T (tumour):			0.19
<1 cm (T1)	0 (0)	11 (14)	
1-4 cm (T2)	4 (40)	15 (20)	
>4 cm (T3)	1 (10)	2 (3)	
Beyond capsule (T4)	5 (50)	48 (63)	
N (lymph node metastasis):			0.8
None (N0)	4 (40)	26 (34)	
Ipsilateral (N1a)	4 (40)	27 (36)	
Other (N1b)	2 (20)	23 (30)	
M (distant metastasis):†			0.9
None (M0)	9 (90)	66 (85)	
Yes (M1)	1 (10)	10 (15)	

*By continuity adjusted χ^2 test or Fisher's exact test.
†All metastasis of the lung.

These data make a real increase in the incidence of childhood thyroid cancer in Belarus likely and a causal relation with the accident at Chernobyl possible. As Boice and Linet point out,¹ however, the data cannot be considered to be conclusive in either instance because of potential biases. Little is known about occult thyroid cancer in children, which seems to be rare in this age group.² Papillary carcinoma is related to exposure to radiation but the same histological appearances are also common among occult tumours.² The fact, however, that in Belarus over 200 children have now undergone thyroid surgery after a diagnosis of thyroid cancer is worrying. We believe that continued and concerted support from the international community is needed both to clarify the nature of this epidemic and to ensure appropriate medical care.

THEODOR ABELIN
Professor

MATTHIAS EGGER
Senior research fellow

Department of Social and Preventive Medicine,
University of Berne,
CH-3012 Berne,
Switzerland

CHARLES RUCHTI
Professor

Department of Pathology,
University of Berne

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