Thyroid cancer in the Ukraine

SIR — When a serious accident occurs in a nuclear power station, fallout from radioactive iodine (mainly ^{131}I) is often one of the main sources of human exposure to ionizing radiation. Radioactive iodine may be taken into the body by inhalation or in food, a major source being milk, and is concentrated in the thyroid gland. In May–June 1986, several weeks after the Chernobyl accident on 26 April 1986, measurements of thyroid content of ^{131}I were made for 150,000 people in the Ukraine, including 110,000 children aged 0–18 years at that time[1]. Because the thyroid gland is small in children and they drink more milk than adults, children were estimated to have received doses that were on average three times higher than in adults. The collective dose to children aged 0–18 in the entire Ukraine was estimated to be 400,000 person-Gy. On the basis of these estimates it was predicted that the accident might result in a discernible increase in thyroid cancer[1,2].

After the accident, the Ukrainian Research Institute of Endocrinology and Metabolism set up a register of thyroid cancer, receiving notification of all patients treated for thyroid cancer at hospitals throughout the Ukraine. Up to the end of 1993, 418 thyroid cancers have been reported in children and young adults who were aged 0–18 at the time of the accident: among them, 170 were aged 0–14 at the time their thyroid cancer was diagnosed and 248 were aged 15 or older. For 111 patients treated in the clinic of the Ukrainian Research Institute of Endocrinology and Metabolism, diagnoses were verified by four independent experienced histopathologists: 107 (96%) were papillary carcinomas, 2 (2%) were anaplastic, one (1%) was follicular and one (1%) was medullary.

The table shows the number of children aged 0–14 diagnosed with thyroid cancer in the Ukraine each year from 1986 to 1993 and the annual incidence rate per million. Incidence rates were fairly steady for the first 3 years, at around 0.7 per million per year, but have increased since 1989, the rate in 1993 being about five times higher than in 1986. (We are preparing a paper giving the clinical and other details of these cases.) Only two of the children with thyroid cancer were born after 1986, equivalent to an incidence rate of less than 1 per million per year in children born after the accident.

The increase in incidence of thyroid cancer in children in the whole of the Ukraine masks larger increases in the most heavily contaminated areas. The figure shows seven zones within the Ukraine divided according to estimated average thyroid dose in children. The legend gives the median dose to the thyroid and the annual incidence rate in children aged 0–18 at the time of the accident who were diagnosed with thyroid cancer in 1990–92. Among the 14,580 children aged 0–18 at the time of the accident who were living in Pripyat, a town 3.5 km from the Chernobyl plant, six have been diagnosed with thyroid cancer in 1990–92, corresponding to an annual incidence rate of 137 per million. Thus, the estimated average thyroid dose in children varied by several orders of magnitude within the Ukraine and there is a more than 30-fold gradient in thyroid cancer incidence rates in the country, corresponding to the gradient in thyroid doses from ^{131}I.

A similar increase in the incidence of thyroid cancer has been reported from Belarus[3]; the possibility was then raised that concern about the possible effects of the Chernobyl accident on thyroid cancer might have resulted in increased frequency and intensity of examinations of the thyroid in children and that cancers were being diagnosed that would otherwise never have become evident clinically[4–6]. No statistics are available on the frequency or timing of clinical examinations of the thyroid in children, nor on the percentage of tumours that were picked up by screening. But the magnitude of the increase is probably too great to be due to increased screening of the population. Screening may cause at the very most a transient 10-fold increase in the frequency of thyroid cancer[6]; but the increase in thyroid cancer in the Ukraine was considerably greater than that in some areas.

In conclusion, the pattern of thyroid cancer in relation to thyroid dose from ^{131}I suggests that the increase in thyroid cancer in childhood reported in the Ukraine is likely to be a direct consequence of the accident at Chernobyl.

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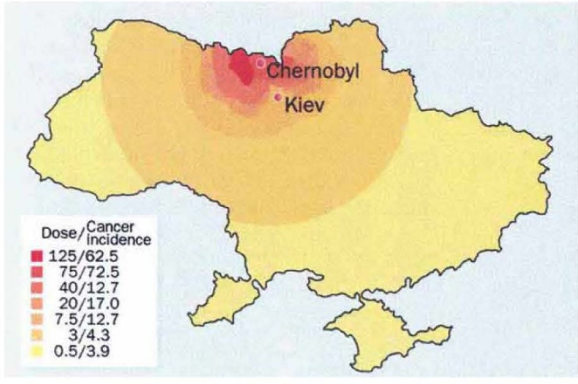

Map of the Ukraine showing the distribution of doses to the thyroid and the corresponding annual incidence of thyroid cancer per million (1990–92) for children who were 0–18 years old at the time of the Chernobyl accident. The key shows the median doses (in cGy) to the thyroid from ^{131}I corresponding to the annual incidence rates (per million). Respective numbers of thyroid cancers were 6, 5, 4, 15, 53, 46 and 98. The basis for the dose estimates is given in ref. 1.

INCIDENCE RATE OF THYROID CANCER (PER MILLION) IN CHILDREN AGED 0–14, 1986–93

	1986	1987	1988	1989	1990	1991	1992	1993
Incidence rate (no.)	0.72(8)	0.63(7)	0.72(8)	0.99(11)	2.35(26)	2.00(22)	4.24(48)*	3.70(42)*

*Includes one child born after 1986.

Nailing the lophophorates

SIR — Henry Gee[1] is right to remind us that it may be premature to rely on a single molecule when the apple-cart of metazoan phylogeny is threatened with an upset. Via a series of deliciously coded nuances he defends the long-cherished opinion that the lophophorates (the bivalved brachiopods, colonial ectoprocts or bryozoans, and phoronid worms) belong within the deuterostomes (which undoubtedly include the pterobranchs), rather than the protostomes, as an analysis of 18S ribosomal DNA now indicates[2].

Nevertheless, this latter view is based on more than a single molecule. Consider the setae of brachiopods, chitinous