Leukemia Studies Continue to Draw a Blank

When large numbers of childhood thyroid cancer cases began showing up in the three most heavily contaminated republics around Chernobyl 5 years after the accident, many people braced for a jump in the incidence of leukemia. After all, studies of the Japanese atomic-bomb survivors and of other radiation accidents have pinpointed leukemia as the key early indicator of the effects of radiation. But so far, thyroid cancer remains an anomaly (see p. 357): Three major international studies have so far failed to detect any measurable increase in leukemia—or any other cancers—in the general population.

Researchers are now cautiously optimistic that the accident will not leave a grim legacy of escalating cancer rates. "The risk to the population appears to be quite small," says epidemiologist Sarah Darby of the Imperial Cancer Research Fund in Oxford, U.K. But Darby and others point out that a small increase in cancer rates may be lost in the poor records of the affected republics. And they note that careful monitoring—and painstaking efforts to reconstruct population dose rates—will be needed for many years to determine the full effects of the accident. "It could take us another 10 years to find out," says Max Parkin of the International Agency for Research on Cancer (IARC) in Lyons, France, who is coordinating a major study of childhood leukemia and lymphoma incidence throughout Europe. Adds Herwig Paretzke of the GSF Institute for Radiation Protection in Munich, Germany, "I'd be surprised to see an increase in the solid cancers other than thyroid, but you can never be sure."

Why, after 10 years, is an accident that released hundreds of times as much radiation as the bombings of Hiroshima and Nagasaki causing an increase in thyroid cancer but little leukemia? One reason is the different ways radioactive iodine and cesium—the two biggest threats to the general population from the accident—produce their insidious health effects. Iodine has a half-life measured in days and is taken up by the body into the thyroid, giving a short intense dose of radiation to that organ. Longer lived radioactive cesium irradiates the entire body through the environment and food chain over an extended period, providing low whole-body radiation doses.

Parkin says that the excess dose of whole-body radiation to inhabitants of Belarus—calculated to be just 2 millisieverts per person during the first year following the accident—would be expected to raise childhood leukemia incidence by around 6%. Such an increase would amount to around 25 extra cases of leukemia in the whole of Belarus over a 5-year follow-up period, he says. It would require sensitive and reliable monitoring to pick up such small numbers, he points out, but that has not always been the case in the three most affected republics.

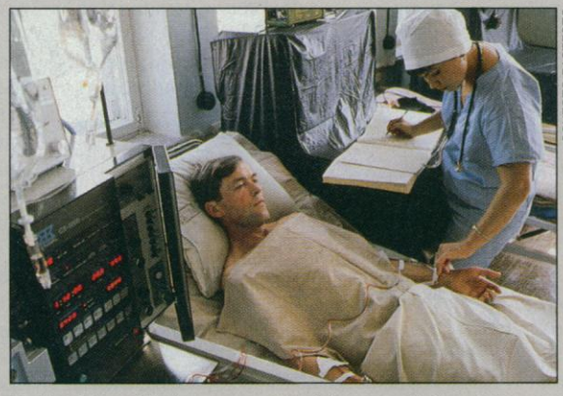
Although the Soviet Union began collecting cancer data in 1951 and leukemia data in 1965, the quality of the data has been difficult to assess because the record-keeping did not conform to international guidelines, says Elisabeth Cardis of the IARC. Indeed, in most parts of Russia the data are still compiled manually, she says. Belarus set up its own childhood cancer registry in 1982, and it is considered good by outsiders. Both this and the Ukrainian registry are now computerized.

Several local and international teams have been trying to tease reliable numbers out of these registries. One of the first groups to look for leukemia and other cancers, led by Anatoly Prisyazhniuk at Kiev's Center for Radiation Medicine, looked at cancer rates in Ukraine before and after the accident up to 1993 and compared rates between regions with differing degrees of contamination. They found no evidence of increases that could be linked to the accident.

Another study, by Eugene Ivanov of the Institute for Hematology in Minsk and Albrecht Kellerer from the Radiobiological Institute at the University of Munich, looked specifically at rates of leukemia in children who were under age 15 in Belarus between 1982 and 1994. It found no increased incidence after the accident in the two most contaminated regions compared to the four less contaminated regions of the country. The current incidence rates are similar to rates in other European countries, says Kellerer.

The IARC study coordinated by Parkin—the biggest international study of leukemia incidence since the accident—has drawn a similar blank. The study, whose first phase has just been completed, found a small increase in incidence across the whole of Europe between 1980 and 1991 of about 0.5% per year. But the rise shows no link with countries most contaminated by the accident, says Parkin. The study will analyze at least another 5 years' data.

In addition to monitoring cancer rates, researchers are taking a hard look at the dose estimates made by Soviet scientists. Munich's Paretzke, working with researchers from Kiev's Institute for Radiation Medicine, has been recalculating the doses to people evacuated from the most contaminated areas. His results, based on new questionnaires and re-examination of the original Soviet records, suggest that initial dose estimates may have been two to five times too high.



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Early victim. Worker exposed to intense radiation during the accident being given a bone-marrow transplant.

Reconstructing individual dose rates at such low radiation levels is, however, a difficult business. Internal doses can be calculated from measurements of ingested cesium, which accumulates in tissues, particularly muscle. But trying to assess the total radiation dose from both internal and external sources involves major monitoring programs. In one $8 million effort funded by Germany, about 300,000 people were measured over 2 years using mobile body counters together with measurements of ground contamination. The study found that only 2% of the people received doses above levels at which annual health checks are advised. "Part of the purpose of the project was to reassure people, and mostly they had low levels of contamination," says Ralf Hille of the German National Research Center at Jülich.

The failure to detect a surge in cancer rates so far is, however, small comfort for the people of the affected areas of Belarus, Ukraine, and Russia, who have already undergone the stress and anxiety of the accident and the subsequent evacuations and relocations. Says Martin Griffiths, director of the United Nations' Department of Human Affairs: "People on the ground are not convinced they will not suffer disease as a result." Until the monitoring has run its full course, that uncertainty will persist.

–Nigel Williams