



The photos on the first three pages are of Belarussian children suffering from thyroid cancer who traveled to Germany for radioiodine treatments.

Investigating Chernobyl - Induced Thyroid Cancer: *Politics vs. Science*

A worried patient from Czechoslovakia entered nuclear physician Stuart Jones', MD, office at Lehigh Valley Hospital in Pennsylvania several months ago after being told she needed a bone scan for a possible stress fracture. She was an engineer, in this country temporarily, and was reluctant to have the scan. She had

international research effort in which investigators from various organizations and countries have been attempting to conduct independent studies on the same populations. The problem? Each research team has a different approach and the results sometimes contradict each other. The major players include the World Health Organization (WHO), which has been

Nearly ten years after the nuclear power plant disaster, scientists from around the world are trying to track the incidence of childhood thyroid cancer and treat the young victims. Their efforts seem promising, but a lack of coordination may stymie the research.

been in Czechoslovakia during the time of the Chernobyl accident and feared being exposed to any additional radiation. Adding to her concerns, her country had laws—that came about after Chernobyl—requiring all citizens to keep records of how much exposure they received from radioactive materials, including nuclear scans. After a health physicist at the hospital showed the patient the dosimetry information regarding the scan, she was reassured that the radiation dose from the procedure fell within her country's limits and agreed to have the test.

In recent years, nuclear physicians across the U.S. have encountered similar concerns among patients from Eastern Europe. The cancer fears surrounding the 1986 nuclear power plant explosion at Chernobyl—in which reactor number 4 burned uncontrolled for 10 days—have been growing stronger as research turns up a more definitive link between the resulting fallout radiation and thyroid cancer. Two recent studies have firmly documented an increased incidence of thyroid cancer among children living in the nearby areas of Ukraine, Belarus and Russia and have brought Chernobyl back into the news.

Underlying the grim statistics and photos of young cancer victims, however, is a somewhat disjointed

gathering epidemiological data, and the National Cancer Institute (NCI), which has been trying to set up a cohort study, as well as the European Economic Community, the International Atomic Energy Agency, and Ukrainian, German, Japanese and Swedish research groups. To add to the confusion, several groups of researchers want access to the same group of children who were exposed to the highest levels of fallout radiation. In this somewhat competitive atmosphere, the Chernobyl researchers are finding that the politics of research often get in the way of the science.



The highest incidence of thyroid cancer from Chernobyl has been seen in children living in the Ukraine, Belarus and Russia.

The Latest Findings

Ever since the Chernobyl accident, researchers have been screening residents of regions with the most fall-out radiation. This radiation was passed



onto people mainly through the milk of cows who ate foliage contaminated with radioactive iodine. Two recent reports have found that the rate of thyroid malignancies has increased among individuals who were children at the time of the Chernobyl accident. A team of researchers from the Ukrainian Research Institute of Endocrinology and Metabolism in Kiev reported in the June 1, 1995 issue of *Nature* that the rates of thyroid cancer have climbed from

about 0.7 per million children in 1986 through 1988 to 3.7 per million in 1993. Rates increased most in regions closest to Chernobyl. For example, the thyroid cancer rate is 137 cases per million in Pripjat, a town 3.5 kilometers from Chernobyl. The second report, written by WHO collaborators as a letter to the editor in the *British Medical Journal* reported similar increases from the disease registries kept by the Ministries of Health in Belarus, Ukraine and Russia. Belarus had the highest overall rate of childhood thyroid cancer on the order of 30.6 per

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— A. Bertrand Brill, MD, PhD, at the University of Massachusetts Medical Center

million and as high as 96.4 per million in the town of Gomel.

“It’s clear the accuracy of diagnosing the tumors is high,” said A. Bertrand Brill, MD, PhD, professor of nuclear medicine at the University of Massachusetts Medical Center in Worcester who is chairman of SNM’s Radiobiological Effects of Ionizing Radiation committee. “Also, the areas that have received the highest radiation doses have the highest rates of cancer, so the numbers seem to be following a dose-response curve.” Most of the researchers involved with the NCI project as well as other studies seem to agree that the increase in thyroid cancer is real.

This is a sharp turn around from three years ago when WHO researchers surprised the scientific world by reporting a “great increase” of thyroid cancer among children who lived in the most contaminated zones in Belarus. A second study published around the same time found no such increase, which touched off a debate among scientists over whether the numbers indicated a true rise in thyroid cancer or were instead due to “ascertainment bias,” the harder researchers look for an effect, the more likely they are to find it (*Newsline*, November, 1991, page 23N). “At the time, no one believed the WHO numbers were inflated,” said Fred A. Mettler, Jr., MD, MPH,

at the University of New Mexico School of Medicine who led the study which found no evidence of an increase. “But if we suddenly start screening a population, we’re apt to find a surge in cancers that are not radiation-induced.”

Since these first numbers were reported, at least a dozen studies, now ongoing or in the planning stages, are attempting to go beyond tracking the incidence of disease. The goal is to develop hard-and-fast data on dosimetry. One eagerly awaited study slated to be published in a few months is a case-control study from the NCI and the Belarus Ministry of Health which has generated some quantitative, although preliminary, dose-specific risk estimates for exposure to radioactive iodine. In addition, NCI is beginning a much larger cohort study that will enroll 15,000 Belarussians and 70,000 Ukrainians who were children at the time of the reactor disaster and will track them for 20 years.

German researchers are also trying to get a closer look at the thyroid cancer by examining tissue samples from the tumors of children from Belarus. “We

want to see if there are specific oncogenes that will indicate whether a cancer is caused by radiation,” said Christoph Reiners, MD, director of the clinic for nuclear medicine

at the University of Wurzburg in Germany. “For instance, 398 children from Belarus have been diagnosed with thyroid cancer since Chernobyl. Of these, about 250 to 300 cases probably resulted from radiation fallout, but we can’t yet distinguish these from the ones due to natural causes.”

As part of this project, the German government has provided funding for thyroid cancer patients to be flown from Belarus to Germany for ¹³¹I treatments. In a recent study reported at this year’s SNM Annual Meeting in Minneapolis, Reiners and his team postoperatively treated 88 children with advanced Stage III and IV thyroid cancers with about 3 courses of ¹³¹I. The tumors in the lymph nodes, neck tissue and distant organs completely disappeared in 35% of the children, and the tumor marker thyroglobulin decreased in all the patients, a sign that the tumor was responding to treatment, said Reiners. He is now administering additional treatments of ¹³¹I to those who still have tumors in an effort to increase the remission rate to the expected 60% to 80%. “The cancers we are seeing in these children are a lot more aggressive than thyroid cancers we see in German children,” said Reiners. “We don’t know yet if this is related to radiation exposure from Chernobyl.”

One interesting footnote to the study: Reiners ini-



tially did whole-body measurements before treating the children and found high amounts of ⁷⁵Se in one-third of them. It turns out these children, while in Belarus, had been treated with contaminated ¹³¹I from a Russian reactor in Tashkent.

Few Grants for Treatments

Short of flying patients to foreign countries, most of the Chernobyl researchers have not made thyroid cancer treatment a major priority. "No one wants the responsibility of going into a foreign country, dealing with a wary government and administering a radioactive drug to a radiation-phobic society," said Brill. Reiners did

cians then traveled to Washington University in St. Louis to observe U.S. procedures for radioiodine treatments and surgery in children.

Although this effort may have led to better trained physicians, Baverstock said the scarcity of thyroid replacement hormone supplies has made some surgeons reluctant to do total thyroidectomies to treat the cancer. Instead, they remove only part of the thyroid which may miss some of the cancer cells. Making matters worse, there is an extremely high incidence of iodine deficiency in Belarus, he said. This condition not only causes goiters but can also cause further increased risk of thyroid cancer by causing an elevation in thyroid stimulating hormone in the gland which can make cancer cells more

aggressive. Most thyroid cancer patients still are not getting state-of-the-art treatment, regardless of the fact that they are sought after for studies conducted by top researchers throughout the world.

Lack of Communication

Although the various research teams stay abreast of each other's studies, they rarely collaborate and operate in an almost competitive atmosphere. "I'd say there was a fair amount of overlap in the data collecting efforts among the groups," said David

establish a treatment program in Belarus about 10 months ago to provide radioiodine treatments (with drug shipments from Great Britain and scintillation cameras from Germany) to children with less serious cases of thyroid cancer, but that is the only program of its kind.

"The number of thyroid cancer cases in Belarus and the Ukraine has exceeded the total number of cases for all of Europe. Treating this cancer is a major problem for physicians in these countries," said Keith Baverstock, PhD, a radiation scientist with WHO's European Centre for Environmental Health in Rome. In an effort to decrease the knowledge gap about thyroid cancer in the former Soviet Union, the National Institutes of Health in Bethesda, MD sponsored a symposium in 1992 to update about a dozen key surgeons, radiologists and endocrinologists from Kiev and Minsk on the latest research. The physi-

Becker, MD, a nuclear physician at the New York Hospital-Cornell Medical Center in New York, who is organizing the NCI studies. Aggravating matters, he said, are the Ministries of Health in Belarus and the Ukraine who supply all the research teams with epidemiological data from their disease registries. The ministries recently replaced key people who had readily supplied data to the teams in the past. Some studies have slowed to a standstill as the researchers work to gain the new staff's trust, according to Becker.

Although the scientists may meet with each other and discuss results at medical conferences held every few years by WHO, NCI and others, for the most part they keep a guarded distance—even though they may be only a few miles apart in such tiny towns as Gomel or Pripjat. Case in point: In a recent interview, Baverstock wanted to know if Becker and

Cases of Thyroid Cancer Diagnosed in Children Under Age 15 in Belarus, Russia and Ukraine (Rates are Annual Averages per Million Children)

| | 1981-85 | | 1986-90 | | 1991-94 | | Measured Cs contamination (10 ¹⁰ Bq/km ²) | Estimated thyroid doses(Gy) |
|-----------------------------|---------|------|---------|------|---------|------|--|-----------------------------|
| | # Cases | Rate | # Cases | Rate | # Cases | Rate | | |
| Belarus | 3 | 0.3 | 47 | 4.0 | 286 | 30.6 | na | na |
| Gomel | 1 | 0.5 | 21 | 10.5 | 143 | 96.4 | 4-1700 | 0.15-5.7 |
| Ukraine | 25 | 0.5 | 60 | 1.1 | 149 | 3.4 | na | na |
| Five most northerly regions | 1 | 0.1 | 21 | 2.0 | 97 | 11.5 | 19-56 | 0.05-2.0 |
| Russia | na | na | na | na | na | na | na | na |
| Byransk and Kaluga regions | 0 | 0 | 3 | 1.2 | 20 | 10.0 | 4-370 | 0.06-1.8 |

SOURCE: WORLD HEALTH ORGANIZATION

other NCI researchers still had doubts about the increased incidence in pediatric thyroid cancer. He was somewhat surprised when told that all of the researchers who spoke with *Newsline* thought there was enough evidence to document an increase in thyroid cancer (even if some of them are still questioning the exact numbers of cancers reported).

The reason for the aloofness may stem from each team's perception of the other. The heated response of U.S. researchers to the original WHO data published three years ago is still on Baverstock's mind. "At the time, they didn't try to disprove our data by embarking on more studies but instead made critical comments and stood on the sidelines," he said.

"There is clearly still a lot of skepticism about our findings on the other side of the Atlantic [in America]. In the meantime, we've been publishing our data, while NCI has been working on studies for years that have yet to be published. When are they even going to begin their cohort study?"

On the other side of the debate sits Mettler who takes issue with the WHO studies' methodologies and the ways in which the findings are published. "WHO has been trying to compile epidemiological data, but they're completely unfamiliar with literature and peer review in our journals," Mettler said. "They often don't know how to put together a paper and don't describe their methodology well." Becker concurs and says that papers submitted by the WHO to scientific journals often do not meet the epidemiological and statistical criteria for peer review and thus are sent back for revisions. Instead

of reworking the data and resubmitting it, the WHO researchers usually choose to publish their data in scientific journals as "letters to the editor" rather than articles. (Baverstock counters that this is the quickest way to disseminate important information.)

Each group of researchers also perceives biases

in each other's data, which has added to the tensions. For instance, WHO relies on data from the Belarussian Ministry of Health, yet Reiners points out that 70% of financing for the Belarus health system comes from abroad. "The Minister of Health has a strong incentive to prove that there is an increase in cancer as a way to get more aid," he said. Overall, though, the lack of communication may stem more from turf battles and toes being stepped on than a serious problem with anyone's data. "The American researchers are resentful about WHO trying to coordinate things," said Brill. The same could be said by WHO researchers about the U.S. Perhaps the political

An Increase in Leukemia and Birth Defects?

In recent months, newspaper headlines have blamed the Chernobyl disaster for a host of medical conditions from birth defects to leukemia to heart disease. The researchers studying Chernobyl's effects, however, all agree that studies have shown no statistically significant rise in any of these conditions. (The only surge documented has been in the number of thyroid cancer cases in children.) Why

is there a perceived increase? "Every health problem is attributed to Chernobyl," said A. Bertrand Brill, MD, PhD, professor of nuclear medicine at the University of Massachusetts Medical Center in Worcester who is chairman of SNM's Radiobiological Effects of Ionizing Radiation committee. "People forget that these problems were around before the power plant explosion. For instance, about 6% of babies born worldwide are expected

to have some sort of defect, yet every birth defect is now blamed on radiation."

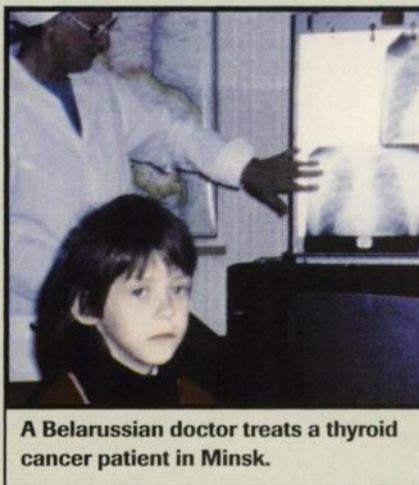
The Ministries of Health in Belarus and the Ukraine may also be behind the reports of an increase. After Chernobyl, these two countries changed their classification systems for birth defects. Suddenly, minor abnormalities such as webbed toes were categorized as birth defects, although they never were before, according to Fred A.

Mettler, Jr., MD, MPH, at the University of New Mexico School of Medicine. What's more, a true rise in birth defects would have shown up within months after the explosion in women who were pregnant at the time. Within a year of the accident, researchers examined the fetuses aborted by women who had unplanned pregnancies and found

no increase in abnormalities.

A rise in leukemia rates should have also shown up by now. Usually, the latency period for leukemia is 2 to 3 years—much shorter than that of thyroid cancer. "I haven't seen any evidence documenting an increase in leukemia, and I doubt that a pattern will emerge at this point," said Mettler. Newspaper reporters may be playing up the anecdotal stories of children with birth defects and leukemia in an effort to make big news. They are probably also getting their information from Ministry

of Health officials who want more aid from other countries. Whatever the reason for the scary news reports, the result has been an increase in Americans' fear of radiation. "No matter what the data say, we just can't seem to convince people that birth defects and other cancers besides thyroid are not attributable to Chernobyl," said David Becker, MD, a nuclear physician at the New York Hospital-Cornell Medical Center in New York.



A Belarussian doctor treats a thyroid cancer patient in Minsk.

wrangles are unavoidable, but they may be lessened by the fact that the scientists all have a common goal: to get a full accounting of the consequences of the Chernobyl disaster.

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