

## HEALTH EFFECTS

seen in the thyroid. This makes it highly likely that exposure to radioactive isotopes of iodine is responsible for the thyroid cancer increase. Radioisotopes of iodine are known to have been present in high levels in the fallout; they are very greatly concentrated in the thyroid gland, so that the radiation exposure in the gland is many times that of other tissues. Absolute proof of the causal relationship between exposure to radioiodine and the development of thyroid cancer is not available, but the circumstantial evidence is very strong, and no other plausible explanation for the increase is available.

It is not possible to predict with certainty whether the relative high risk for the development of thyroid cancer will remain at its present figure; more than five years of observation are needed. It is possible that follicular carcinomas have a longer latent period than papillary carcinomas, and that they may increase in incidence in later years. Evidence from external radiation suggests that the relative risk increases up to 20 years after exposure, then declines. But an increased risk is still present at 40 years after exposure and it would be prudent to make this assumption when considering the likely future rates of occurrence of thyroid carcinomas in the exposed population.

If the future risk is estimated on the basis of present trends in the exposed areas using a relative risk model, then the incidence of those exposed as children in Gomel will be about 200 times that of the United Kingdom. There are many uncertainties, and an exact prediction of the expected numbers of thyroid carcinomas in the future is not possible. However, it would be prudent for advance planning of screening and health care to consider that a large increase is a possible outcome.

Thyroid carcinoma in adults is in most cases a tumour of relatively low malignancy, causing death in only a minority of cases. It is rather more aggressive in very young children, and a long follow-up period is needed. The number seen in Belarus and Ukraine constitutes a major challenge, both for treatment and for our understanding of the relationship between exposure to fallout from a nuclear accident and the subsequent development of malignancy.

The increased susceptibility of very young children to the subsequent development of thyroid carcinoma needs further study, but it may be possible to target screening to the cohorts most at risk. □

*Report by Dr. Fred A. Mettler, University of New Mexico, United States, who served as Chairman of Topical Session 1: "Clinically observed effects". This report reviews the health hazards as investigated by the International Chernobyl Project, which was conducted in 1990.*

The International Chernobyl Project (ICP) was conducted during 1990 about four and a half years after the accident. The health effects portion of the project represented the combined effort of about 100 physicians and scientists from 12 countries. The project was difficult due to the very large area of heavy contamination that extended for hundreds of kilometres from the reactor site. Ultimately, the project was designed using an age-matched cohort comparison from nearby uncontaminated settlements.

The ICP was specifically designed to study issues related to persons still living on highly contaminated territories. These persons were continuing to receive radiation exposure and there were pressing issues related to intervention and potential dose reduction. It was well known that there were hundreds of thousands of emergency workers who had been exposed, but in 1990 there was no possibility for dose reduction in these groups. Both the International Red Cross and the World Health Organization had sent health assessment teams to the area in 1988-89. These were relatively small projects, but reached essentially the same conclusions as the ICP did.

There have been a number of publications relative to the ICP, including brief summaries and overviews. The Technical Report is more than 500 pages. Its extensive scientific explanation, limited availability, and price have undoubtedly deterred many people from actually reading it. Summaries are the most commonly available literature on this project and it is these that have been read by the public and media. Persons with a serious interest in this subject, however, should obtain and read the Technical Report that was approved by the project's International Advisory Committee.\*

It is important to examine the specific findings of the ICP health effects group and see how they have held up in light of an additional five

\*The International Chernobyl Project: Technical Report, STI/PUB/885, (ISBN 92-0-129191-4) published by the IAEA, Vienna (1991).

years of research which was presented at the International Chernobyl Conference in April 1996.

The health effects group collected extensive data on a number of concerns expressed by local physicians. A few examples of issues that we were able to address and bring to closure are given here. While there were children with anaemia, there was not a difference between clean and contaminated settlements. Lead poisoning was a concern of many parents as a result of potential emission of materials dumped on the destroyed reactor. Children in all villages had blood lead levels which were generally lower than those normally found in Western Europe and the United States. These and a number of other ICP findings have since been corroborated by other groups.

With regard to immune issues, it was clear in 1990 that overall lymphocyte levels were not affected. In the ICP Technical Report, it was stated that "the independent medical team remains unable to state absolutely that there are not some subtle immunological changes in the population; however, if there are such changes they appear to be of little clinical importance." While some papers about immunological abnormalities were proffered to the Chernobyl Conference in April 1996, these were at significant variance with each other, both in terms of their findings and the time course. While there have been claims in the media of "Chernobyl AIDS", there were no papers nor was there a general consensus at the Conference to support this concept.

The ICP concluded in 1990 that there were significant non-radiation related health disorders in both control and contaminated settlements. Between 10% to 15% of persons examined were in need of prompt medical treatment. Hypertension and dental care were pointed out to be major public health problems. This has been supported by subsequent work of other groups. In the last five years, the average lifespan in most of the former Soviet Union has decreased due to non-radiation related health problems such as stroke, heart disease, accidents, suicide, and alcoholism.

The ICP health effects teams spent the majority of their effort on children. Up to 1990, fetal malformation data did not show evidence of a significant radiation related increase. Comments and papers presented at the 1996 Chernobyl Conference about this emotional issue indicated that while most scientific groups feel that there has been no radiation-related

increase, there still are some persons who feel that there has been an effect.

Psychological investigations of the ICP showed that up to 90% of persons living in contaminated settlements thought they had, or might have, an illness due to radiation exposure. Interesting enough, in clean settlements the comparable percentage was 75%. The psychological issues were summarized in the Technical Report by stating that, "The psychological problems related to Chernobyl are major. Most of the people have genuine concerns and are not acting in an irrational fashion, given their circumstances." These findings have since been corroborated by many scientific groups and the many speakers at the 1996 Chernobyl Conference concluded that this remains the major health effect today.

Obviously there were (and still are) concerns about thyroid problems. This related primarily to thyroid enlargement, nodules, and cancer. In 1990, about 3% of children were found by palpation to have enlarged thyroids and 0.5% had nodules. But there was no statistical difference between clean and contaminated areas. Papers presented in the last five years and proffered to the 1996 Chernobyl Conference indicate little consensus about whether there is now an increase in thyroid nodules.

A major portion of the ICP was directed toward estimation of future health effects, particularly leukaemia and cancer. A 1990 review of health data showed that cancer had been increasing each year, both before and after the accident. The rate of increase appeared to be stable. The incidence of cancer has continued to increase at about the same rate in the last five years but the major cause of recent reduction in lifespan has not been due to cancer.

Thyroid cancer was a major concern in 1990. In the Technical Report (page 510), we stated that "available data reviewed did not provide an adequate basis for determining whether there had been an increase in leukaemia or thyroid cancers as a consequence of the accident. The data were not detailed enough to exclude the possibility of an increase in the incidence of some tumour types."

The health effects group also was asked to estimate future and lifetime health effects. Since we did not know the exact doses for each of the thousands of contaminated settlements nor the number of persons in each, the ICP gave an example of a representative settlement and what the expected consequences might be. We used a hypothetical settlement of 10,000 persons with



a dose from external radiation of 0.1 Sv over 70 years. In such a typical village, we predicted that thyroid cancers would almost double, that there would be about a 40% increase in leukaemia, and about a 3% increase in all cancer deaths over 70 years. The ICP Technical Report stated that "most of the thyroid cancers would be expected to occur in children because of their larger absorbed thyroid dose, longer lifespan, and increased sensitivity relative to adults" and that "with the large release of radioiodine during the accident, it is expected that there will be a radiogenic excess of thyroid cancer cases in the decades to come. This risk relates to thyroid doses received in the first months after the accident."

The ICP also indicated that "reported estimates of thyroid dose in children are such that there may be a statistically detectable increase in the incidence of thyroid tumours in the future" and that "certain high risk groups (such as children with high absorbed thyroid doses) will need specific medical programs based on their potential risks." We did point out that with limited resources, it would be too costly and impractical to follow all persons who were exposed and that the concept of WHO to concentrate on combined international studies for high-risk populations should be endorsed. This recommendation has not come to pass and there remain multiple competing scientific investigations that cover identical issues, particularly related to thyroid cancer and leukaemia.



Medical doctors on the ICP health team examined hundreds of children living in towns of Belarus, Russia, and Ukraine. More than 100 physicians and scientists from 12 countries took part in the 1990 project. (Credit: Mettler/USA)

In summary, the International Chernobyl Project represented an historic event. It was an unprecedented international effort with co-operation between scientists, physicians, and just plain people. The health effects group findings helped focus attention to areas of importance. The subtitle of the 1996 Chernobyl Conference was "Summing Up the Consequences of the Accident". There is the implication that the issue is finished. It is clear from the atomic bomb survivor data that any final summary of consequences from large radiation exposures of a population will take at least five decades and not just one decade to complete. Effects in children and psychological issues will remain at the forefront. □