International Agency for Research on Cancer

World Health Organization

26 April 2016

Chernobyl, 30 years on: Interview of Dr A. Kesminiene on the research and health impact of the Chernobyl disaster

Dr Ausrele Kesminiene, Deputy Head of the Section of Environment and Radiation at the International Agency for Research on Cancer (IARC), has been studying the health effects of the Chernobyl disaster since 1991.

What have been the main objectives and focus of the research on Chernobyl over the past 30 years?

Research on the health impact of the Chernobyl disaster has mainly focused on thyroid cancer, in particular in individuals exposed to radioactive iodine isotopes in childhood and adolescence. Efforts have been made to better understand the mechanisms of radiation-induced thyroid cancer and to identify factors that could modify the radiation risk, in order to determine a molecular "radiation fingerprint" (i.e. the changes that are specifically due to radiation only). In addition to studies of thyroid cancer after childhood exposure to radioiodine, a wide variety of other studies have also been conducted; for example, studies of the causal relationship between radioiodine and some non-cancer thyroid diseases, including follicular adenomas and functional and autoimmune thyroid disorders.

Studies have also been conducted to evaluate the risk of haematological malignancies in children and Chernobyl clean-up/recovery workers (known as liquidators) in order to assess cancer incidence trends in contaminated territories in the three most affected countries. Studies of cancer incidence and mortality, cardiovascular diseases, and all-cause mortality among liquidators have also been conducted. Although the quality of the research varies, the list of studies is long.

How many thyroid cancer cases have occurred among children and adolescents in the most affected areas?

According to national studies in Belarus, the Russian Federation, and Ukraine, more than 11 000 thyroid cancer cases have been diagnosed over the past 30 years in individuals who were children or adolescents at the time of the Chernobyl disaster. Some of these cases are most likely attributable to radioiodine intake in 1986, although long-term increases in incidence are difficult to quantify, because the risk of spontaneous thyroid cancer increases with age as the study population gets older.

What lessons have been learned from the Chernobyl disaster in terms of cancer?

Today, there is general agreement in the scientific community that the incidence of thyroid cancers increases after radiation exposure in childhood and adolescence. In addition, several studies have found an increased incidence in haematological malignancies and thyroid cancer among Chernobyl liquidators. Findings on radiation-associated risk for chronic lymphocytic leukaemia (CLL) and other

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types of leukaemia in Chernobyl clean-up workers were reported in 2013 by Zablotska et al. Previously, CLL had been considered a non-radiosensitive type of leukaemia. Further research is required to confirm these findings and to determine the possible underlying mechanisms.

Some studies have focused on non-cancer health consequences of exposure to radiation. Convincing evidence of increased cataract prevalence among Chernobyl clean-up workers led to a considerable reduction in the recommended equivalent dose limit for the lens of the eye: from 150 to 20 mSv per year, with no year's dose exceeding 50 mSv (Worgul et al., 2007).

Much has been learned about diagnosing and treating young patients with thyroid cancer. In particular, important discoveries have been made about the possibility of a very short latency period for thyroid cancer after internal exposure to I-131 in childhood.

Chernobyl also led to greater knowledge about optimizing the treatment and follow-up of survivors of acute radiation sickness.

These lessons about and experience with thyroid cancer radiation risks have served as a basis for improving preparedness for radiation-related accidents such as the Fukushima disaster, to minimize the potential adverse health consequences.

Despite these important findings, much is still unknown. What do you see as the key areas where more research is needed?

For example, we still have no convincing evidence of childhood leukaemia associated with Chernobyl, and it is unclear whether this is due to methodological limitations or for other reasons. Also, we do not know much about the temporal patterns of radiation-related risk of thyroid cancer after exposure to I-131 in childhood (i.e. the changes in radiation risk with time since exposure and with attained age), because longer follow-up is required. More information is also needed about the potential transgenerational radiation-associated effects in offspring born to exposed parents (i.e. liquidators and evacuees), and this requires further research. A well-designed study of thyroid cancer among Chernobyl liquidators would provide important information about the radiation risks for thyroid cancer attributed to adult external and internal (for early liquidators) exposures.

What role has IARC played in the research on the health effects of the Chernobyl disaster?

IARC has always been strongly committed to studying the long-term health effects of the Chernobyl disaster, because cancer is one of the established long-term health effects of exposure to ionizing radiation. Since the 1990s, IARC has been involved in several key areas of research, such as studies of the risks of thyroid cancer and haematological malignancies in clean-up workers and the

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development of a retrospective dose reconstruction method (the RADRUE method) for these studies. IARC has also coordinated international efforts to better integrate the various national and bilateral studies on the long-term health effects of the Chernobyl disaster.

Under IARC leadership, the Cooperation on Chernobyl Health Research (CO-CHER) project, funded by the European Union, was established following an assessment of the existing research infrastructures and the identification of a number of research priorities to form a basis for sustainable future research on Chernobyl. The CO-CHER project partners are principally institutions that are extensively involved in research on the health effects of the Chernobyl disaster. This international network also includes individual experts in epidemiology, clinical medicine, mental health, dosimetry, molecular biology, pathology, and risk communication.

What is most needed to support Chernobyl health research going forward?

The need for research is huge, yet the funding continues to shrink as the years go by. We need a sustainable approach to Chernobyl health research – similar to the approach taken after the Hiroshima and Nagasaki bombings in Japan. Without such an approach, it is unlikely that the true impact of the Chernobyl disaster will ever be fully understood.

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