

Review

Chernobyl: Consequences of the Disaster for the Population and the Environment

Yablokov AV, Nesterenko VB, and Nesterenko AV

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This volume of *Annals of the New York Academy of Sciences* is a translation of a book originally published in Russian by three scientists from Russia and Belarus, and is mainly based on publications in Russian-language journals and other sources on the consequences of the Chernobyl accident for human health and the environment. The original Russian publication was published in 2008.

In the opinion of this reviewer, the authors unfortunately did not appropriately analyze the content of the Russian-language publications, for example, to separate them into those that contain scientific evidence and those based on hasty impressions and ignorant conclusions. Therefore, the main conclusions of Yablokov, Nesterenko, and Nesterenko are the odd mixture of facts (e.g., increased thyroid cancer in children in Belarus, Russia and Ukraine) and uncorroborated statements of mass mortality in emergency and recovery workers caused by radiation, abnormalities in newborns, etc. An inexperienced reader will have difficulty in separating these conclusions, and the present review is intended to assist him/her in doing so.

The list of cited references in the translation (Yablokov et al. 2009) indicates that the authors avoided the most respectable papers of Russian-language authors, which received serious international peer review and were published in respected journals. These hundreds of journal articles by authors from Russia, Belarus, and Ukraine were analyzed in detail by teams of independent international experts and became the basis for generalizations of the UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR 1988, 2000, 2008) and the UN Chernobyl Forum (IAEA 2006, WHO 2006, UNDP 2002, Forum 2006). Careful analysis of already peer-reviewed publications with the final separation of “grain from the chaff” is the key to the objectivity of the findings of these international bodies. It is no wonder that the UNSCEAR reports are the most authoritative source of modern knowledge—in its own way, “the bible of radiation medicine.”

In the volume under review, Prof. Yablokov and his coauthors give extensive references to the media, commercial publications, websites of public organizations, or even unidentified ones, to justify their ideas. These are also the source for statistical data on demography, morbidity, etc., which is not considered seriously by the scientific community. Most of the references are conference proceedings, abstracts of theses, and brochures in Russian, all hitherto unknown to the world and hardly accessible even in the former Soviet Union, not to mention the rest of the world. Thus, independent verification or clarification of the data presented by the authors is virtually impossible.

The most impressive is Section 2 on the methodology of the book (written by A.V. Yablokov). It begins with the author's reasonable reproach to the Soviet authorities on classifying the data during the first years after the accident, as well as on the unreliability of official health statistics. The authors also mark the deficit in dosimetric measurements, particularly individual ones, thus complicating reconstruction of radiation doses received by subjects of epidemiological studies. Further, the author insists on changing the current radiation-epidemiological methodology and, in fact, on the rejection of analytical studies, because they require reconstruction of individual doses, which the author does not trust.

Instead, the author proposes so-called ecological or geographic technologies, in which health indicators in areas with similar environmental, social, and economic conditions, but with different levels of radioactivity, are compared. However, international experience in radiation epidemiology has repeatedly demonstrated that this approach leads to erroneous conclusions, and the volume under our review demonstrates this once again.

The second proposal by A.V. Yablokov—to observe the changes in health indicators over time and relate them to the account of radiation—is also very popular among profanes. However, in late 1980s and especially in the 1990s, enormous socio-economic changes took place in this country and led to a serious shortage of health care system, and to increased morbidity and mortality. To identify radiogenic effects over this background is a complex scientific task that cannot be solved by simple methods of comparison of past and current health indicators.

Radiation is a relatively weak carcinogen, and its health effects in the population are identified with great difficulties and only with internationally recognized analytical techniques with individual account not only for the dose but also for other influencing factors. The only exception was the post-Chernobyl radiogenic thyroid cancer in children, because the doses from radioiodine were so high (up to tens of Gray), and the spontaneous incidence rate in children is so low (a few cases per million children per year) that the effect of radiation was detected both within analytical and ecological studies (UNSCEAR 2008).

In fact, the "Yablokov's Manifesto" on denial of the analytical approach and unconditional trust in the ecological or geographical research methods with primitive statistical tests puts an end to the reliability of all conclusions of the medical Chapter II.

Biased selection of articles and the author's conclusions are predetermined by his belief in a totally negative effect of any dose of radiation, and he is not embarrassed with brutal contradiction of the selected works and his own conclusions to the century-long experience in radiobiology and radiation medicine. Each section ends with conclusions about the catastrophic impact of Chernobyl radiation on human health, including increasing death rates. The value of this review is not zero, but negative, as its bias is obvious only to specialists, while inexperienced readers may well be put into deep error.

Describing the "radiogenic" mortality, the author forgets that we are all mortal, including the Chernobyl workers and the population of the contaminated areas, and attributes mortality mainly to the impact of radiation. Meanwhile, quite accurate data of the Russian national registry suggest that mortality rates of the Chernobyl workers standardized by age and sex are no higher but lower than the one for the population of Russia (Ivanov et al. 2004). Yablokov's assessment for the mortality from Chernobyl fallout of about one million (!) before 2004 (Subsection 7.7) puts this book in a range of rather science fiction than science. It is obvious that if such a mass death of people occurred, it would not have remained unnoticed, even more because it is not so much about the population of the three countries, than about the rest of Europe and even countries outside Europe (!).

It is important to note the difference between the initial positions of epidemiology experts and of the author. Experts are seeking hardly identified indications of at least minimal provable radiation effects in the population and workers in order to clarify the radiation risk factors for radiation protection. And there are no real successes, except for the cases of thyroid cancer in children and leukaemia in the most exposed workers. There are no longer any discussions of broad-scale radiogenic morbidity and especially mortality in population and workers. Broad-scale medical and demographic research during 25 years since the accident has not revealed those, nor are they expected to be found in the future. However, A.V. Yablokov is still seeking to convince the public of mass lesions of the population with the Chernobyl radiation.

Chapter IV examines some issues of radiation protection of the population, mainly in Belarus, where two other authors, V.B. Nesterenko and A.V. Nesterenko, actively worked. In conditions of exposure to low doses, which are typical for the major part of the population of Belarus after the Chernobyl accident, the authors tested preparations of pectin and recommended them for widespread use in order to reduce radionuclide content in children (Hill et al. 2007). Here the optimization procedure for this radiation protection action is clearly lacking (ICRP 2006), with weighing the benefits of the drug (reducing radiation risk) and possible damage to health (whether this drug has been checked for chronic use?), the costs of the measure and its perception by population. At low doses of internal radiation, and even smaller doses prevented, the result of the optimization analysis is not obvious at all.

Doubtful are recommendations to eat food products rich in potassium and calcium, and drink plenty of fluids to reduce incorporation of cesium-137 and strontium-90. Inexperienced readers should be protected against these unwarranted recommendations.

The statement that internal exposure levels in the population increase since 1994 contradicts the general trend and monitoring data in Russia. On the contrary, the levels are gradually decreasing with the half-life between 10 and 20 years (IAEA 2006). In contrast to the opinions of the authors, international experts showed that the formation of americium-241 in the environment does not amount to a serious radiological problem (IAEA 2006, UNSCEAR 2008). From the standpoint of modern radiation protection, the need for countermeasures will hardly exist longer than few decades (the authors write about centuries), and the area where they will be justified will gradually decrease.

The Chernobyl accident was indeed the major man-made disaster, which led to numerous harmful effects in the environment, public health, and public life. Professional scientific community patiently and carefully examines these implications and draw lessons from what has happened. There are no reasonable grounds to suspect the modern community of experts in concealing the facts. Conversely, professional epidemiologists are hunters for scientific facts, and a proven radiation-induced effect is the most coveted scientific production. Intervention of incompetent people, although having academic titles, in this delicate process prevents adequate public information and decision making by authorities responsible for protecting the population.

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