

Chernobyl Accident: the Crisis of the International Radiation Community

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Introduction

11 years passed since the Chernobyl accident. Within this period a lot of data have been established by the Belorussian, Russian and the Ukrainian specialists. These data clearly show that the Chernobyl accident is the most severe accident in the history of peaceful use of nuclear energy in the world. It has caused a heavy impact on the environment in Belarus, Russia and the Ukraine, significant worsening of the economic situation in these countries, disruption of social life in the affected areas, growing anxiety and fears among the people living in the contaminated territories, as well as significant biomedical effects on these people and on other categories of people.

At present there are no controversies about the ecological, economic, social and psychological consequences of the nuclear explosion at the Chernobyl NPP. At the same time there exist significant differences in the assessment of radiological consequences of this accident. Specialists in the affected republics of the former USSR had established a significant rise in the incidence of many somatic diseases soon after the accident. However, the international radiation community either denies such effects at all or rejects any link between the increase in the morbidity in general somatic diseases and the Chernobyl accident, and attempts to explain this increase on the basis of purely psychological factors and stresses. Such position of the international radiation community results from some political reasons and from the fact that it recognises only leukaemia, solid cancers, teratogen and genetic effects as late effects of radiation. At the same time even in the case of medical effects recognised by the international radiation community, it failed to make a correct assessment of thyroid cancers and hereditary malformations resulting from the Chernobyl accident. As well, it could not realise timely the real reasons of the Chernobyl facts. These implications may be considered as a sign of a crisis of the international radiation community. It could not assess the seriousness of the Chernobyl accident and its radiological consequences. Instead of taking an objective position in order to help the affected populations of the former USSR the international radiation community practically played a role of an advocate of the USSR government that tried to play down the consequences of this accident from the very

beginning. These and other problems are discussed in the present report.

Official Assessment of Reasons and Consequences of the Chernobyl Accident

The Chernobyl accident is recognised by specialists as the worst nuclear accident in the history of peaceful use of nuclear energy. It had occurred on the 26th of April 1986 when the personnel of the fourth unit of the Chernobyl NPP attempted to test the capability of a turbogenerator to supply electrical energy for a short period of time in case of a station blackout. The accident completely destroyed the reactor and as a result large amounts of radioactive materials have been released to the environment. The Soviet authorities initially tried to conceal the fact of this accident. But as it was impossible they attempted to play down the radiological consequences of the accident.

Soon after the accident the IAEA and the USSR agreed to hold a Post-Accident Review Meeting in Vienna. This meeting took place on the 25th-29th of August 1986. At this meeting Soviet specialists presented false information on the accident and its radiological consequences [1].

According to the Soviet point of view, the main reason for the accident was a violation by the Chernobyl NPP personnel of the procedures of nuclear power reactor operation developed in the USSR. The Soviet specialists had also delivered their prognoses of the Chernobyl accident radiological consequences. They explained that deterministic effects were established only among the personnel and the firemen involved in the extermination of the accident. The Soviet specialists had excluded the possibility of deterministic effects among the population and forecasted only negligible stochastic effects. For example, their calculations based on the non-threshold hypothesis of the dose-effect relationship forecasted that the increase in the mortality rate had to be less than 0.05% of the spontaneous cancer mortality rate. This result covered the population in the European part of the USSR (about 75 mln. people).

The explanations presented by the Soviet part have been fully accepted by the participants of the meeting. This can be seen from the Summary Report of the Post-Accident Review Meeting in Vienna, published by the IAEA in September 1986 [2]. On page 28 of the above-mentioned report one can read the following:

"The foregoing account is based on the Working Documents submitted and information volunteered

by the Soviet experts. On the basis of this information we have a plausible explanation for the sequence of events at Chernobyl Unit 4, and no attempt has been made to find alternative."

On page 17 of the Summary report of the IAEA it is stated that:

"The errors and violations of procedures were the major factors contributing to the accident."

The participants of the IAEA meeting have also agreed with the prognosis of radiological consequences suggested by the Soviet specialists. Such conclusion can be drawn on the basis of the following statement made on page 7 of the Summary Report of the Post-Accident Review Meeting:

".... it appears that over the next 70 years, among the 135,000 evacuees, the spontaneous incidence of all cancers would not be likely to be increased by more than about 0.6%. The corresponding figure for the remaining population in most regions of the European part of the Soviet Union is not expected to exceed 0.15% but is likely to be lower, of the order of 0.03%. The relative increase in the mortality due to thyroid cancer could reach 1%" [2].

Such point of view was not changed by the international community until the present time.

The Post-Accident Review Meeting has delivered plausible explanations of the reasons of the Chernobyl accident and its radiological consequences accepted by the international radiation community. However, these explanations have either been erroneous, or incorrect. Today it is known that different drawbacks of the RBMK-type reactor project (four reactors of this type were in operation at the Chernobyl NPP) have been the real reasons of the accident [3] and not the mistakes of the personnel as it was stated in the Post-Accident Review Meeting in Vienna [2].

The most important of these shortages were [3]:

- large positive void coefficient;
- unstable operation at low reactor power;
- possibility of power excursion;
- imperfect construction of absorber rods (use of graphite water displacers linked with absorber rods).

One needs to notice that the IAEA had to correct its explanation of the direct reasons of the Chernobyl accident only 7 years after the Post-Accident Review Meeting in Vienna.

A question arises: why did the experts of western countries not even try look for other explanations of the reasons of the Chernobyl accident especially after the Soviet experts had told at the Vienna Meeting that remedial actions were planned to improve the safety of the RBMK reactors operation such as the increase of the full enrichment from 2.0% to 2.4% and installation of additional absorbers into the core (these two

measures were developed to mitigate the problem of the positive void coefficient of the RBMK-type reactors - one of the main reasons of the accident)? The usage of fast shutdown system and some other systems had also been foreseen.

Two different explanations can be suggested for the fact that the participants of the Post-Accident Review Meeting in Vienna could not understand the real reasons of the accident. First is that the experts at this meeting did not understand the specific features of the RBMK-type reactors. Second is that they were unwilling to doubt the official Soviet point of view in order to save the image of nuclear energy. The first explanation is quite unreasonable because all remedial actions to improve the nuclear safety of reactors of the RBMK-type that were suggested by Soviet specialists at the Post-Accident Review Meeting in Vienna indicated clearly the project shortages of such reactors. It seems to us that the second explanation is more adequate and unpleasant because it means that the specialists in the field of nuclear safety are ready to conceal the real dangers of the peaceful use of nuclear energy.

The publication of the document [3] has practically put an end to the inadequate explanations of the reasons of the Chernobyl accident. However, a different situation remains in case of the radiological consequences of the accident. In fact, up to now the international radiation community insists that the radiological consequences of the Chernobyl accident are almost negligible. Only in 1995 did the international radiation community recognise the relation between irradiation and the high increase in the thyroid cancer incidence among children in Belarus, the Russian Federation, and the Ukraine [4]. All other effects established by the Belorussian, Russian and the Ukrainian specialists are completely rejected [5].

For example, the international radiation community does not recognise the data of Prof. G.Lazjuk and his colleagues [6,7] on hereditary malformation in the affected areas of Belarus. As well, nobody recognises the valuable statistical data on the significant increase in the morbidity rate in different somatic diseases, established soon after the Chernobyl accident in Belarus, the Russian Federation, and the Ukraine. As far as the radiological consequences of the Chernobyl accident are considered, the international radiation community continues to advocate the idea suggested by the Soviet specialists and accepted at the Post-Accident Review Meeting in Vienna that the radiological consequences of the Chernobyl accident cannot even be observed.

Such position of the international radiation community was of great importance for the Soviet authorities that have been trying from the very beginning to play down the Chernobyl radiological consequences. At the time of the accident the Soviet Union was in a state of a deep economic crisis and could not provide necessary assistance to the affected populations of Belarus, Russia and the Ukraine. The Soviet Union could provide only limited help to the affected population. Due to this reason all information related to the Chernobyl accident and its radiological consequences in the former USSR was concealed not only from the general public, but in many cases from the specialists in the field of radiation protection. For example, the data presented by the Soviet experts at the Post-Accident Review Meeting in August 1986 were closed in the USSR for a long time. The same happened to different documents regulating protective measures in the contaminated areas of the USSR.

Medical Effects on People Affected by the Chernobyl Accident

The "350 mSv concept"

The complicated economic state of the USSR was possibly the main reason for elaboration of the so-called 350 mSv concept or the lifetime dose concept that established a limit of irradiation of the affected population. This concept was developed by the National Commission on Radiation Protection of the USSR (NCRP) in the late autumn 1988 [8].

The 350 mSv concept was based on the following assumptions:

- the sum of external and internal doses that can be delivered to a person as a result of the Chernobyl accident will not exceed 350 mSv within 70 years period beginning from the 26th of April 1986 in the majority of the contaminated areas of the USSR;
- an additional dose of radiation equal or less than 350 mSv accumulated within the whole lifetime on the contaminated territory will have no significant medical consequences for the people.

In accordance with these assumptions there was no necessity to carry out different protective measures including relocation practically in all areas of Belarus, Russia and the Ukraine affected as a result of the

Chernobyl accident. It was foreseen to implement the 350 mSv concept beginning from the 1st January 1990. Along with its implementation all restrictions introduced in the contaminated areas after the accident had to be lifted.

The 350 mSv concept was based on prognoses of medical consequences made by the Soviet specialists in the summer 1986 [1], as well as on the basis of a revised assessment carried out under supervision of Prof. L.Ilyin in late 1988 [9]. The new predictions agreed very good with the old ones. However, they were incorrect as the previous ones. This is especially well seen in the case of thyroid cancer. According to the assessment [9], only 39 additional thyroid cancers would have been induced in children of Belarus as a result of the Chernobyl accident. They had to appear within the 30-year period after the latent period of 5 years. This means, that the first additional thyroid cancers could be registered by children in Belarus only in 1991.

This prognosis of Prof. L.Ilyin and his colleagues [9] was completely wrong. It can be seen from Table 1, where the data on the thyroid cancer incidence in Belarus [10] are given. Only 7 cases of children's thyroid cancer have been registered in Belarus within the 9-year period before the Chernobyl accident (1977-1985). This gives 1 thyroid cancer per year as a spontaneous morbidity rate of children in Belarus. Taking this value into consideration, one had to expect only 5 children's thyroid cancers in Belarus within the first 5 years after the Chernobyl accident. On the contrary, 47 cases of this cancer have been established over 1986-1990 which is 9 times more as compared to the expectations based on the assumptions by Prof. L.Ilyin and his colleagues [9].

The total number of children's thyroid cancers established in Belarus in 1986-1995, which is the first 10 years after the Chernobyl accident, reached 424 cases [11]. It exceeded 10 times the total number of children's thyroid cancers predicted by authors [9] for the 35-year period after the accident. As can be seen from the comparison of predicted and real data, the prognoses of the Soviet specialists [1,9] had underestimated to a great extent the children's thyroid cancer resulting from the Chernobyl accident. The

Table 1 Number of thyroid cancer of children and adults in Belarus [10].

Pre-accident period			Post-accident period		
Years	Adults	Children	Years	Adults	Children
1977	121	2	1986	162	2
1978	97	2	1987	202	4
1979	101	0	1988	207	5
1980	127	0	1989	226	7
1981	132	1	1990	289	29
1982	131	1	1991	340	59
1983	136	0	1992	416	66
1984	139	0	1993	512	79
1985	148	1	1994	553	82
Total	1131	7	Total	2907	333

same may be concluded in regard of the hereditary malformations in the contaminated areas of the former USSR. Predictions [1,9] excluded practically even the possibility of such effects being established. The incorrectness of this conclusion was shown by Prof. G.Lazjuk and his colleagues [6,7].

The mentioned facts are without doubt an indication of the serious underestimation of the radiological consequences of the Chernobyl accident made by the authors of the assessment [1,9]. This fact was evident for many specialists in the contaminated areas of Belarus, Russia and the Ukraine who had established a significant worsening in the health state of the affected population soon after the accident.

However, the results of the assessments [1,9] as well as the 350 mSv concept were considered by Soviet authorities and the international radiation community as valid. One needs to notice that the international radiation community had known in details the new Soviet assessment of the Chernobyl radiological consequences [9] and the 350 mSv concept. Soon after the Session of the USSR Academy of Medical Sciences, the report of Prof. L.Ilyin et al. [9] has been submitted to the World Health Organisation. Later it was published as a scientific article in a famous international journal [12]. The same happened to the 350 mSv concept. The report on the 350 mSv concept was delivered by Prof. L.Ilyin at the Thirty-eighth Session of the UNSCEAR that was held in Vienna 8-12 May 1989 [13]. The 350 mSv concept was also presented on the 12th of May 1989 at an informal meeting on the Chernobyl consequences organised by the Secretariat of the IAEA [14].

The new Soviet prediction did not cause any criticism from the part of the international radiation community. Such conclusion can be made from the fact that the contents of the article by Prof. L.Ilyin and his colleagues [12] did not significantly differ from the report [9], and from the fact of extensive help of the international radiation community to the Soviet government in its attempts to implement the 350 mSv concept.

Experts from WHO

This help was demonstrated by a visit of a group of the WHO experts to the Soviet Union in June 1989. This visit found place due to a request of the Soviet Government. The group of the WHO experts included the following specialists: Dr. D.Beninson, Chairman of the International Commission on Radiological Protection (ICRP), Director of License Department of Argentina Atomic Energy Commission; Prof. P.Pellerin, Chief of Radiation Protection Services of the French Health Ministry, member of the ICRP; Dr. P.J.Waight, Radiation Scientist of the WHO Division of Environmental Health [15].

The WHO experts attended a meeting of the USSR National Commission on Radiation Protection in Moscow, where they had taken part in a discussion of

the principles and implementation of the 350 mSv concept. They had also taken part in meetings and discussions with other specialists of the affected Soviet republics and people from contaminated areas. In Minsk the WHO experts had visited a special meeting on Chernobyl problems held at the Academy of Sciences of Belarus. Such well-known specialists of the Ministry of Health Care of the USSR as Prof. L.Ilyin, Prof. L.Buldakov, Prof. A.Guskova and others had participated in that meeting.

At all of these meetings and discussions the WHO experts had completely approved of the official Soviet point of view that the Chernobyl accident could not cause significant health effects by the affected populations. They not only agreed upon the 350 mSv concept, but even volunteered the view that, had they been requested to set a level for the lifetime dose, they would have chosen a value of the order of two to three times higher than 350 mSv [15].

The WHO experts had also rejected any relation between radiation and the significant increase in the morbidity in many somatic diseases established in the affected areas of Belarus, Russia and the Ukraine soon after the accident. In regard to this problem they said in their report to the USSR government:

"... scientists who are not well versed in radiation effects have attributed various biological and health effects to radiation exposure. These changes can not be attributed to radiation... and are much more likely to be due to psychological factors and stress. Attributing these effects to radiation only increases the psychological pressure in the population and provoke additional stress-related health problems, it also undermines confidence in the competence of the radiation specialists. This has in turn, led to doubts over the proposed values. Urgent consideration should be given to the institution of an education programme to overcome this mistrust by ensuring that the public and scientists in allied fields can properly appreciate the proposals to protect the population" [15].

The quotations given above from the report [15] clearly show that the WHO experts played a role of advocates of the Soviet authorities which tried to play down by any means the scale of the Chernobyl accident and its radiological consequences.

In January 1990 the special Mission of the League of the Red Crescent Societies also visited the affected areas of Belarus, Russia and the Ukraine [16]. This Mission comprised 6 members - qualified specialists in different branches of medicine from the United Kingdom, Sweden, the Netherlands, the Federal Republic of Germany and Japan. The experts of the Mission of the League of Red Cross and Red Crescent Societies were more careful in their assessment of the radiological situation in the affected areas. However, they too could not understand the real reasons for the worsening of the health state of the population affected by the Chernobyl accident. In the summary of their

report compiled after returning from the affected areas, they had stated the following conclusions:

"Among the health problems reported it was felt that many of these, though perceived as radiation effects both by the public and by some doctors, were unrelated to radiation exposure. Little recognition appears to have been given to factors such as improved screening of the population and changed patterns of living and of dietary habits. In particular, psychological stress and anxiety, understandable in the current situation, cause physical symptoms and affect health in a variety of ways" [16].

Nevertheless, the Mission of the League of Red Cross and Red Crescent Societies was able to understand the seriousness of the situation in the affected areas of Belarus, Russia and the Ukraine. They had managed to come to the correct conclusion that in some cases relocation of people must have been accepted as one of the countermeasures. Taking this into account, they stated that the indications for relocation should be based not only on radiation doses, but on considerations of socio-economic conditions of inhabitants in the affected areas as well. This conclusion has been a very important one because the central authorities of the USSR were making all attempts to avoid the relocation as a measure of radiation protection.

International Chernobyl Project

In 1990 the International Chernobyl Project has been carried out under the aegis of the IAEA. It was initiated by the letter of the Soviet government sent on October 1989 [17]. The letter requested the IAEA to conduct an evaluation of the countermeasures taken in the USSR after the Chernobyl accident and of the future protective measures. Conclusions made on the basis of this evaluation were published in 1991 in a special report [17]. The report stated in regard of the biomedical consequences of the Chernobyl accident:

"There were significant non-radiation-related health disorders in the populations of both surveyed contaminated and surveyed control settlements studied under the Project, but no health disorders that could be attributed directly to radiation exposure. The accident had substantial negative psychological consequences in terms of anxiety and stress due to the continuing and high levels of uncertainty, the occurrence of which extended beyond the contaminated areas of concern. These were compounded by socio-economic and political changes occurring in the USSR.

The official data that were examined did not indicate a marked increase in the incidence of leukaemia or cancers. However, the data were not detailed enough to exclude the possibility of an increase in the incidence of some tumour types. Reported absorbed thyroid dose estimates in children are such that there may be a statistical increase in the incidence of thyroid tumours in the future.

On the basis of the doses estimated by the Project and currently accepted radiation risk estimates, future increases over the natural incidence of cancers or hereditary effects would be difficult to discern, even in large and well designed long term epidemiological studies" [17].

This abstract shows that the participants of the International Chernobyl Project practically repeated the conclusions of the official Soviet predictions presented at the Post-Accident Review Meeting in August 1986 in Vienna [1] as well as the conclusions of the documents [2] and [9].

The following conclusions were made in the Report of the participants of the International Chernobyl Project in relation to the increase in the morbidity in general somatic diseases that have been registered by medical specialists of Belarus, Russia and the Ukraine in the contaminated areas:

"Reported adverse health effects attributed to radiation have not been substantiated either by those local studies which were adequately performed or by the studies under the Project.

Many of the local clinical investigations of health effects had been done poorly, producing confusing often contradictory results. The reasons for these failures included: lack of well maintained equipment and supplies, poor information through lack of documentation and lack of access to scientific literature; and shortages of well trained specialists" [17].

In accord with these statements radiobiological consequences of the Chernobyl accident must have been relatively insignificant. However, such conclusion was wrong and that was proved just a couple of years after the International Chernobyl Project. Thus, one could wonder about the reasons for the experts participating in the International Chernobyl Project to be so optimistic in the evaluation of the radiological consequences of the Chernobyl accident. This question sounds especially justified in case one notices that practically all participants of this project had materials showing a picture contrary to their optimistic assessment.

It is known that the international experts who had taken part in the International Chernobyl Project were aware of the report by the Minister of the Ministry of Health Care of Belarus [18] delivered at an informal meeting arranged by the IAEA Secretariat on the 19th of December 1989 in Vienna. The Belorussian Minister reported about a significant increase in the morbidity of thyroid by children especially in heavily contaminated districts of the Gomel region. He also informed the participants of the meeting about an increase in the rate of hereditary malformations in new-born:

"The frequency of the birth of children with congenital developmental defects (with stricter recording) in the radionuclide-contaminated areas over recent years has increased somewhat more

significantly than in remaining areas of the Republic (except the Grodno region). This index is 5.65 (per 1,000 newly born) for Byelorussia but 6.89 for the contaminated areas" [18].

In regard of the worsening of the general health state of the affected population the Minister stated:

"Among adults in 1988 there was a two- to fourfold increase, in comparison with preceding years, in the number of persons suffering from diabetes mellitus, chronic bronchitis, ischemic heart diseases, nerve diseases, ulcers and chronic bronchopulmonary diseases. There was also a noticeable rise in the proportion of children with various functional disorders, neurasthenic and anaemic syndromes, chronic diseases of the tonsils and nasopharynx, etc. At the same time, doctors of all specialities have noted a more difficult and more prolonged course of many diseases, a higher frequency of complications and an increase in adequate drug response" [18].

Despite of the official character of the information presented by the Belorussian Minister it was completely ignored and was not considered during implementation of the International Chernobyl Project. This disregard is often explained by the international radiation community by the low competence of the specialists working in the contaminated areas of Belarus, Russia and the Ukraine and by lack of reliable data on the morbidity in these and clean areas.

Such explanation is not correct, at least in Belarus. For example, the monitoring of hereditary malformation of striker recording has been carried out in Belarus since 1982 [6]. One needs to know that submission of data on hereditary malformations of striker recording such as reduction of extremities, spina bifida, polydactyla, etc. to the national register is compulsory in Belarus. Such conditions allow to acquire reliable statistics related to the hereditary malformations.

Thyroid cancer in Belorussian children

The Belorussian specialists could also prove their high professional skills in the case of children's thyroid cancer. Different doubts were expressed by specialists of other countries after a group of Belorussian specialists had published their data on thyroid cancer of children in Belarus in the scientific journal "Nature" in September 1992 [19]. According to [20,21] a significant rise in the incidence of children's thyroid cancers in Belarus could be caused by the improved screening after the Chernobyl accident. Specialists of the World Health Organisation had suggested two rather exotic hypotheses [22]. According to the first, the growth in the thyroid cancer incidence in children of Belarus could have been caused by giving stable iodine preparates to children in the affected areas after the decay of radioactive iodine in order to prevent endemic goitre. The second hypothesis was based on the assumption that children's thyroid cancer in

Belarus has been induced by chemical species (nitrates, etc.) in fruit and vegetables brought to the Republic from the Soviet Middle Asia where mineral fertilisers and pesticides are heavily used.

It is evident that these hypotheses are not plausible. The preparates of stable iodine were used in Belarus over a number of years before the Chernobyl accident because the soil in Belarus, especially in the Gomel and Brest regions is short of stable iodine. However, no increase in the thyroid cancer incidence had been registered in Belarus prior to the Chernobyl accident. On the other hand, the amounts of fruit and vegetables from the Soviet Middle Asia have not been large enough to be accessible to a significant number of children in Belarus.

The specialists of the WHO believed that their hypotheses could be valid because at the time of publishing of the paper [19] only a minor increase in the thyroid cancer incidence has been registered in the Ukraine and no increase at all in Russia. In reality, this difference in the morbidity in thyroid cancer in Belarus, Russia and the Ukraine had another cause. It is known [23], that the highest thyroid doses have been delivered to the affected children in Belarus and the lowest to the children in Russia. This fact explains the difference in the latent periods of the thyroid cancers in the affected republics of the former USSR.

Some specialists denied that radiation could have been the reason for the increase in the children's thyroid cancers in Belarus because of a very short latent period. Such specialists simply could not understand that the duration of the latent period depends strongly on the number of irradiated persons. It can be lessened if the number of exposed persons increases. This very important idea was suggested by a famous specialists in the field of radiation medicine, Prof. J.Gofman a long time before the Chernobyl accident. The Belorussian specialists have managed to prove the validity of this idea by Prof. J.Gofman in the case of thyroid cancer, thus making a significant contribution to the study of radiation effects on the organism. In 1993-1995 it was confirmed that their data have been correct [4, 25, 26].

Health statistics in the affected areas

Another very important contribution from the part of the Belorussian specialists is the establishment of a significant increase in the incidence of the general somatic diseases among the affected populations. Many specialists doubt that an increase in the incidence of general somatic diseases exists. The fact that such doubts have no serious grounds becomes evident from the data given in Tables 2 and 3 of this report. These data are the results of epidemiological studies carried out by Dr. P.Shidlovsky for the residents of the contaminated and control districts of the Brest region [27, 28].

As can be seen from the Tables 2 and 3, there had been a significant difference in the morbidity in many classes of general somatic diseases in adults and children living in the contaminated and clean areas of the Brest region. In the case of adults such difference may be observed in infections and parasitogenic diseases, diseases of the endocrine system, maldigestion, disorders of metabolism and immunity, psychic disorders, diseases of the circulatory system, cerebrovascular diseases, diseases of the respiratory system, diseases of digestive organs, etc [see Table 2]. In the case of children a significant difference was established in infections and parasitogenic diseases, diseases of the endocrine system, psychic disorders,

disease of the nervous system, diseases of the sense organs, diseases of digestive organs, etc [see Table 3].

Dr. P.Shidlovsky surveyed a large number of persons in his studies of the contaminated and control districts. This provides a significant reliability of his results. For the cohort of residents of the contaminated districts he had used all residents of Luninets, Stolin and Pinsk districts of the Brest region.

The total number of people living in these districts constituted in 1990 approximately 182,900 persons. The average caesium-137 contamination is 37 to 185 kBq/m² (1-5 Ci/km²) [27,28]. As the control cohort Dr. P.Shidlovsky used residents of Kamenetsk, Brest, Malorita, Zablinka and Pruzany districts of the Brest region with total number of 179,800 persons [27, 28].

Table 2 Indices of general morbidity of adults and adolescents in 3 contaminated and 5 control districts (rayons) of the Brest region in 1990 [27].

Diseases	Indices of the general morbidity (per 100,000 adults and adolescents)		P
	3 contaminated districts	5 control districts	
Altogether	62,023±113.48	48,479±117.9	0.99
Infections and parasitogenic diseases	3,251±41.5	2,119.8±34.0	0.99
Diseases of the endocrine system, maldigestion, metabolism disorders, immunity disorders, including: thyrotoxicosis with and without goitre	2,340.6±35.4 74.4±6.4	1,506.7±28.7 29.5±4.0	0.99 0.99
Psychic disorders	2,936.0±39.5	2,604.0±37.6	0.99
Chronic otitis	249.9±11.7	166.3±9.6	0.99
Diseases of the circulatory system including: hypertension, : ischemic heart diseases	12,060.7±76.2 3,318.2±41.9 5,307.3±52.42	9,300.4±68.5 2,394±36.1 4,366.5±48.2	0.99 0.99 0.99
From the total number of patients suffering ischemic heart diseases: patients with acute myocardial infarction	53.6±5.4	41.7±4.8	0.99
patients with other acute and subacute forms of ischemic heart diseases	44.3	17.2	0.99
patients with stenocardia	1,328.6±26.8	594.5±18.1	0.99
Cerebrovascular diseases, including: cerebral atherosclerosis	1,981.4±32.6 1,764.4±30.8	1,363.2±27.3 986.7±23.3	0.99 0.99
Diseases of the respiratory system, including: chronic diseases of tonsils and adenoids : chronic bronchitis and unspecified bronchitis, emphysema :suppurative and other chronic non-specific lung diseases	597.0±18.0 1,891.2±31.8 182.1±9.7	278.1±12.4 1,359.3±27.3 152.9±9.2	0.99 0.99 0.99
Diseases of digestive organs, including: gastric ulcer, duodenal ulcer : chronic gastritis (atopic) : chololelitic disease, cholecystitis (without mentioning of gallstones)	7,074.4±59.9 1,895.0±31.8 1,468.6±28.1 1,147.1±24.9	5,108.5±51.9 1,225.7±25.9 765.3±20.5 658.5±19.1	0.99 0.99 0.99 0.99
Urogenital diseases, including: nephritis, nephritic syndrome, neprosis : kidneys infections	3,415.6±42.5 131.8±8.5 649.5±18.8	1,995.6±33.0 67.9±6.1 522.2±17.0	0.99 0.99 0.99
Female infertility	83.7±2.3	56.2±5.5	0.99
Skin diseases and diseases of the subcutaneous fat, including: contact dermatitis and other forms of eczema	3,376.7±42.2 735.4±20.0	2,060.0±35.5 350.4±13.9	0.99 0.99
Diseases of the osteomuscular system and of the connective tissue including: osteoarthritis and salt arthropathies	5,399.1±52.96 1,170.0±25.1	4,191.9±47.3 770.3±20.6	0.99 0.99
Poisoning with medicine preparates as well as with biological substances having mostly a non-medical character	135.6±3.8	28.9±4.1	0.99

These novel findings of the Belorussian scientist Dr. P.Shidlovsky were later confirmed by many other specialists of the CIS. In February 1993 the official magazine of the Ministry for Health Care of Belarus "Zdravookhranenie Belarusi" published results

obtained by the Ukrainian epidemiologists [29]. They analysed the morbidity among 61,066 persons evacuated from the 30-km zone in 1986. The Ukrainian have found data similar to that of Dr. P.Shidlovsky for this category of people. Nearly the

Table 3 Indices of general morbidity of children in 3 contaminated and 5 control districts (rayons) of the Brest region in 1990 [27].

Diseases	Indices of the general morbidity (per 100,000 adults and adolescents)		P
	3 contaminated districts	5 control districts	
Altogether	68,725±188.5	59,974±203.3	0.99
Infections and parasitogenic diseases	7,096.5±104.4	4,010.1±80.6	0.99
Diseases of the endocrine system, maldigestion, metabolism disorders,	1,752.1±53.3	1,389.5±48.1	0.99
Psychic disorders	2,219.8±59.9	1,109.6±43.0	0.99
Diseases of the nervous system and of the sense organs	4,783.5±86.8	3,173.7±72.0	0.99
Chronic rheumatism	125.6±14.4	87.7±12.2	0.95
Chronic pharyngitis, nasopharyngitis, sinusitis	117.4±13.9	82.6±11.8	0.95
Diseases of digestive organs, chronic gastritis (atopic)	3,350.4±73.2	2,355.8±62.3	0.99
chololelitic disease, cholecystitis (without mentioning of gallstones)	128.9±14.6	40.5±8.3	0.99
Atopic dermatitis	208.3±18.5	60.7±10.1	0.99
Diseases of the osteomuscular system and of the connective tissue	1,011.6±40.7	672.8±33.6	0.99
Congenital malformations including: congenital malformations of the heart and of the circulatory system	737.2±34.8	492.4±28.7	0.99
Poisoning with medicine preparates as well as with biological substances having mostly a non-medical character	679.3±33.4	482.3±28.4	0.99
	305.8±22.4	242.8±20.2	0.95
	4,383.7±83.7	52.3±9.4	0.99

Table 4 Primary morbidity of adults and adolescents in Belarus (per 100,000 persons) [32].

Diseases	Year	Belarus	1 st Group	2 nd Group	3 rd Group	4 th Group
Diseases of the endocrine system, maldigestion, metabolism disorders, immunity depression	1993	631	2559	2528	1472	762
	1994	668	2862	2169	1636	909
	1995	584	3427	2368	1272	723
Diseases of the blood and blood-forming tissue	1993	62	322	293	292	132
	1994	91	339	283	254	114
	1995	74	304	279	175	101
Psychic disorders	1993	1014	1460	861	1416	930
	1994	1099	2439	1253	1579	1194
	1995	1125	3252	2317	1326	1115
Diseases of the nervous system and of the sense organs including cataract	1993	3939	5927	4880	4369	5270
	1994	4185	7250	4719	4789	5363
	1995	4120	8604	5812	3864	4769
Diseases of the circulatory system	1993	136	301	355	226	190
	1994	146	420	425	366	196
	1995	147	463	443	321	194
Diseases of the digestive organs	1993	1626	4956	4969	3215	1732
	1994	1646	5975	5852	4827	1702
	1995	1630	7242	6293	4860	1524
Diseases of the osteomuscular system and of the connective tissue	1993	1938	5728	2653	3943	2170
	1994	1889	6411	3607	3942	2015
	1995	1817	7784	4216	3298	2283
Diseases of the osteomuscular system and of the connective tissue	1993	3148	4447	3611	4236	4432
	1994	3474	7095	4152	4404	4712
	1995	3720	8860	4419	5166	4196

Notices: Belarus — all adults and adolescents; 1st Group — liquidators; 2nd Group — evacuees from the 30-km zone; 3rd Group — residents of settlements in areas with caesium-137 contamination level higher than 555 kBq/m² (15 Ci/km²); 4th Group — residents of settlements in areas with caesium-137 contamination level from 37 to 185 kBq/m² (from 1 to 5 Ci/km²);

same results have been established for Belorussian and Russian liquidators [30, 31]. The studies [30, 31] established reliable data showing that the difference in the morbidity of liquidators and the general public increases with time. A similar increase is to be found in all other categories of the affected populations.

Table 4 compiled by the author of the present report on the basis of data of the National Medical Register published by authors [32] indicates this fact clearly. An analysis of Table 4 shows the existence of an evident correlation between doses of irradiation or levels of surface contamination and the morbidity of the affected populations. The highest incidence in somatic diseases in comparison to the total population of Belarus is to be found in liquidators and the people evacuated from the 30-km zone in 1986, the lowest — in the residents of the affected territories with caesium-137 contamination level less than 555 kBq/m² (15 Ci/km²).

Comparison with Japanese data

One needs to stress a very interesting fact. Very often specialists who doubt of the significant increase

in the number of non-specific somatic diseases in populations affected by the Chernobyl accident state that such an effect has not been observed in citizens of Hiroshima and Nagasaki which survived the atomic bombardment in August 1945. However, such statements are wrong. It was shown by specialists of the Hannan Chuo Hospital (Osaka, Japan) [33]. They examined 1,232 victims of the atomic bombardment within the period of 1985-1990. According to [33]:

"Lumbago was 3.6 times more frequent, hypertension 1.7 times, eye diseases 5 times, neuralgia and myalgia 4.7 times, same tendencies for gastralgia, gastritis, etc."

The data of Japanese specialists are presented in Fig. 1.

There are no data in Fig 1 for such diseases in Japanese general public as dental disease, headache arthritis, loss of physical strength, cervical spondylitis because the authors [33] could not find them in "The Basic National Life Survey of Japan". Accordance in data established in people affected by the Chernobyl accident and the victims who had survived Hiroshima and Nagasaki gives a strong argument in favour of the

assumption that the increase in the incidence in general somatic diseases established in Belarus, Russia and the Ukraine resulted from the accident, and not from pure psychological factors. This information indicates that at present there are no objective grounds for any scepticism often expressed by the international radiation community [5, 34] in relation to such phenomena as the increase in the incidence in general somatic diseases in all categories of people affected by the Chernobyl accident.

One decade after Chernobyl

About 20 scientific papers describing various somatic effects in liquidators, adults and children exposed to radiation as a result of the Chernobyl accident have been presented at the International Conference "One

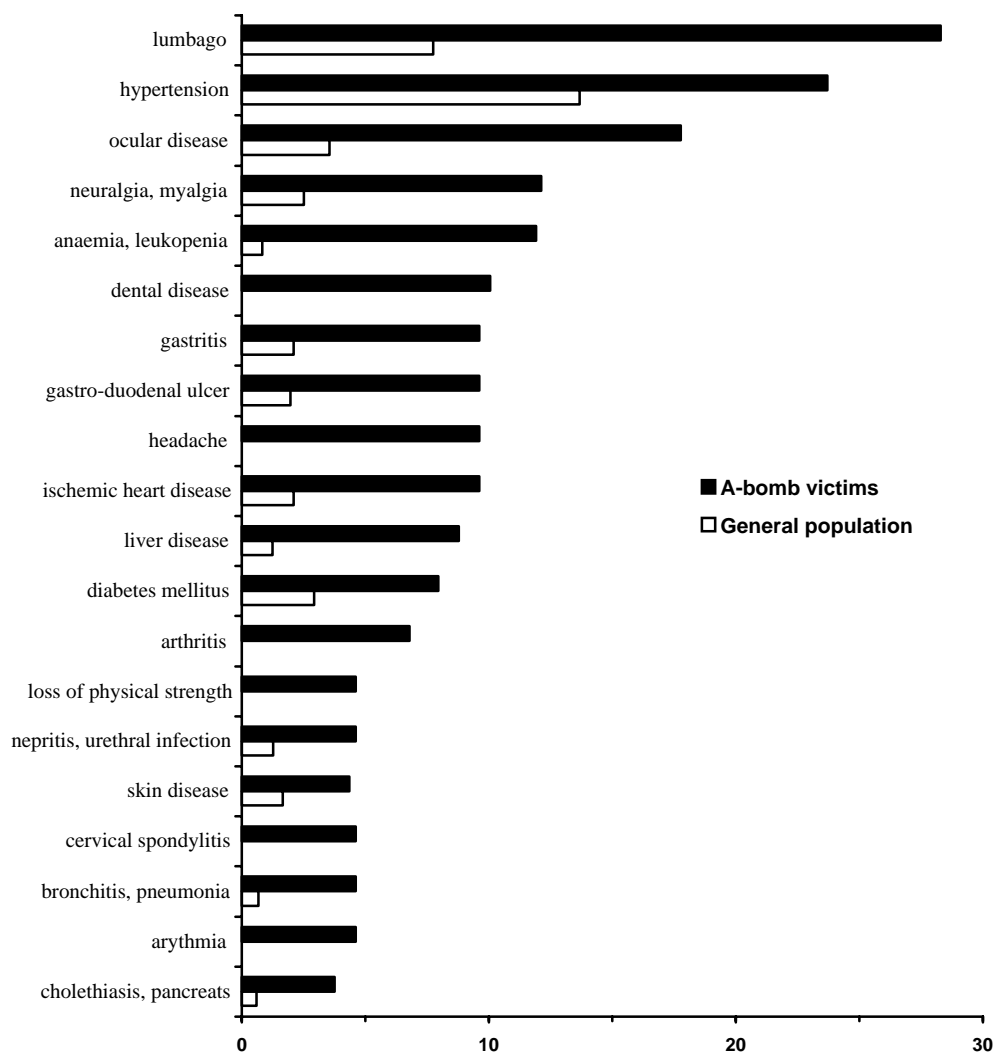


Fig. 1 Comparison of morbidity rates (%) of the A-bomb victims and of the general Japanese population [33].

Decade after Chernobyl. Summing up the Consequences of the Accident" held in Vienna, Austria, 8-12 April 1996 [35, 56]. This conference was sponsored by the European Commission, the International Atomic Energy Agency and the World Health Organisation in co-operation with the United Nations Scientific Committee on the Effects of Atomic Radiation and other United Nations divisions, as well as with the Organisation for Economic Co-operation and Development (Nuclear Energy Agency). Practically all international organisations involved in peaceful use of nuclear energy took part in the preparation of this conference which was to become the most important step in the assessment of the Chernobyl accident and its radiological consequences. However, the conference could not fulfil the task of an objective analysis of this severest accident in the history of peaceful use of nuclear energy. Such conclusion may be drawn from the following statement of given in the conference summary:

"Increases in the frequency of a number of non-specific detrimental health effects other than cancer among exposed populations, and particularly liquidators, have been reported. It is difficult to interpret these findings because exposed populations undergo a much more intensive and active follow-up of their state of health than does the general population. Any such increases, if real, might also reflect effects of stress and anxiety" [5].

It is evident from the quotation that the participants of the conference "One Decade after Chernobyl. Summing up the Consequences of the Accident" who had prepared the most important document of the conference — the summary, doubted even the reality of the increase in the incidence of general somatic diseases in the affected areas of Belarus, Russia and the Ukraine. It seems very strange because, as was mentioned above, a number of scientific papers [35-56] have been presented at the conference that demonstrated the manifestation of this phenomena in all categories of people affected by the Chernobyl accident. The significant increase in the morbidity in different somatic diseases in the the affected population has been recognised by the author of the Background Paper 4 of the Conference [57] which explained this increase on the basis of psychological factors and stresses.

The conference also rejected the possibility of hereditary malformations in the affected areas of Belarus, Russia and the Ukraine as a result of the Chernobyl accident despite of the existence of reliable data on such effects. Practically it has not changed the conclusion of the international radiation community that the consequences of the Chernobyl accident are negligible. The only exception was made for the strong growth of the thyroid cancer morbidity. Possibly, because there are no more arguments to reject the reality in this case.

It seems that the international radiation community is more interested to save the image of the nuclear industry rather than to protect people from the effects of radiation. This can be determined by every objective specialist as a sign of a crisis if the international radiation community which rejects reliable information in order to support its own point of view about the negligible radiological consequences of the Chernobyl accident.

A very plausible explanation for the above attitude of the International Scientific Radiation Community has been given at the Session of the Permanent People's Tribunal by a famous specialist in the field of the radiation medicine Dr. Rosalie Bertell [58].

According to Dr. Rosalie Bertell, the harmful impact of radiation caused interest of the specialists and the military because of the possible use of nuclear weapons in wars. A very interesting problem for planners of such wars was how much enemies could have been killed by nuclear weapons. Due to this reasons specialists in the field of radiation biology, radiation medicine and radiation protection had worked since the very beginning mostly for the military purposes. Later they have switched to problems of nuclear reactors' use for electricity generation. As a result of such involvement in solving of military and industrial problems, specialists in radiobiology, radiation medicine and radiation protection did not pay attention to the problem to protect the health of public from the harmful influence of radiation. This is also a reason for the international radiation community not to consider any medical effect of radiation other than fatal cancers and leukaemia, some teratogen and genetic effects as consequence of irradiation.

Certainly, such way of assessment of the radiological consequences is not acceptable. The life standard, not the number of fatal cancers, should be considered in case of a radiological accident like the Chernobyl accident. Has not this to be the primary task of the international radiation community to protect the people exposed to ionizing radiation?

Summary

The information given in the present report about the Chernobyl accident and its radiological consequences indicates a serious crisis of the international radiation community. The following signs of this crises can be discerned:

- The international radiation community did not recognise the real reasons of the accident for a long time.
- It could not make a correct assessment of the damage to the thyroid of the affected populations of Belarus, Russia and the Ukraine.
- Up to present time it rejects the reliable data on hereditary malformations.

- It is not able to accept reliable data on the increase in the incidence in all categories of people affected by the Chernobyl accident.
- The international radiation community supported the Soviet authorities in their attempts to play down the radiological consequences of the Chernobyl accident for a long time.

Acknowledgement

The constant interest of T.Imanaka for the problem of the role of the international radiation community in the assessment of the Chernobyl accident and its radiological consequences, as well as support from the Toyota Foundation are greatly acknowledged.

The assistance of Vladimir M. Malko in the preparation of the English version of the report and its computer variant is acknowledged.

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