

CONTROL OF INTERNAL EXPOSURE DOSES OF BELARUS POPULATION

V. MINENKO, V. DROZDOVICH, A. ULANOVSKI, V.I. TERNOV, I. VASILYEVA
Research Institute of Radiation Medicine,
Minsk, Belarus

Starting from May 1986 instrumental control of internal exposure is being carried out in Belarus using different equipment. In earlier, iodine period, the basic aim of the control was a mass screening of the population for defining of iodine content in thyroid. After the iodine period attention of the radiological control was focused on monitoring of caesium radionuclides content in human bodies of the inhabitants of radioactively contaminated territories. Goals of the control were changing, depending on the time that passed since the day of the accident.

Nowadays the National Commission of Belarus recognises entering of the Republic into rehabilitation period of the accident of the Chernobyl Nuclear Power Plant. Developed Conception of Protection Measures for the rehabilitation period for the population living at the territories affected by the radioactive contamination in the result of the Chernobyl catastrophe.

Control of internal exposure of the population was started to be carried out in May 1986 with mass measurements of radiological content in thyroid within the Republic population. In May-June 1986 brigades of dosimetrists measured radioiodine content in thyroid within more then 130,000 inhabitants. Estimates of thyroid exposure dozes were received on the basis of this data. They gave idea about doze distribution at the contaminated areas of Belarus. ~~Since July 1986~~ when the first whole body counter (WBC) appeared in the Republic, the work over monitoring of incorporated gamma-irradiators in human body has begun.

During 1988-1994 the number of home produced WBC devices was replenished at the account of our WBC devices in three main modifications that differ only by the detector size or measurements geometry (Table 1).

Tasks of the control system were:

- evaluation of radioactive substances content in order to find out people with higher content of radionuclides in their bodies;
- evaluation of individual dozes of internal exposure based on the data of direct measurements for people, included into special groups for examination;

Table 1 Number of WBC devices and number of examined people in 1986-94

	1986	1987	1988	1989	1990	1991	1992	1993	1994
Number of WBC devices	3	3	11	17	24	35	55	82	83
Number of examined people (thousands)	36	60	59	99	95	174	109	131	89

- evaluation of factual dose loads of population, who live at the contaminated territories, to plan protective activities.

According to the official point of view, radiological control should have been applied to the whole population living at the contaminated territory (about 2 mln. people). therefore in order to organise a mass control over internal irradiation, the following conception, based on multi-stage introduction of control, was adopted:

- at the early, post-accidental stage, internal exposure control is firstly introduced for the population of the territories highly contaminated with radioactive caesium, because maximum entering of radiocaesium into a human body with foodstuff is expected just there. With the increase of root entrance of radionuclides into local products the accent in the organisation of control is shifted into territories where high values of radionuclides migration were registered in the "soil-plant" chain;

- taking into consideration relevant technical complexity and small number of WBC devices they are placed in regional centres on the base of regional hospitals and the population to be examined is transported there in accordance with the schedule developed in advance.

First years of radiological monitoring organisation showed drawbacks of this conception. They included not full embracing of the population by the control with the presence of necessary technical means, very low productivity of WBC devices, that was connected with transportation of the people to the places of their examination; decrease of people's interest towards WBC devices and imperfection of the WBC devices themselves. In addition to all these drawbacks, artificial facts (overestimation of indexes) when measuring of the inhabitants of certain territories, where medium levels of the contamination of agricultural output of local production were explained through rather high values of "minimum detected activity" of WBC devices in use and comparatively small content of incorporated activity in people.

After evaluation of the radiational situation in the Republic, the NCRP of Belarus stated entering into the rehabilitation phase of the Chernobyl accident and developed the conception.

As stated by the NCRP, radiation protection of the population, which is conditioned by the Chernobyl catastrophe, is conducted with the aim to eliminate possibilities of development of remote consequences for the present and future generations. It is achieved by making collective radiation doses smaller, as well as by means of making individual doses smaller within the population carrying out dosimetric control as well as within a critical group.

All this made us recognise the conception of the organisation of mass control of population. In addition to the WBC devices that are currently in use in all areas, which have radioactively contaminated territories, it was suggested [1] to create groups of 2-4 mobile counters of human exposure with automatic WBC devices with high productivity and low "minimum detected activity", completed by groups of specialists, examining settlement according to the beforehand schedules and routes planned in advance. At the same time, acting fixed, non-movable WBC devices were shifted into the class of fixed, non-mobile devices and were modernised in order to decrease "minimum detected activity" and increase productivity.

At the result of realisation of these proposals there has been established the following hierarchical system in the Republic:

- the first level is made from fixed WBC devices with minimum detected activity on Cs-137 in the range 180-370 Bq on the human body;
- the second level is represented by mobile WBC laboratories with minimum detected activity about 200-700 Bq and productivity 120-180 people in one day;
- the third level includes simple monitors witnesses, radiometers of one-channel analyzer for accidental and first preliminary estimate off human body contamination with radionuclides with minimum detected activity from 700 to thousands Bq, that nowadays are on conservation.

LITERATURE

1. Minenko V.F., Ulanovski A.V., - Radiometric control of irradiation of the Belarus populations, -Zdravoohranenie Belarusi; 6(1990) 60-61
2. Protection Measures for the rehabilitation period for the population living at the territories affected by the radioactive contamination in the result of the Chernobyl catastrophe