DIRECT CLINICAL EFFECTS ON VICTIMS OF THE
CHERNOBYL NPP ACCIDENT

A.K. GUSKOVA, I.A. GUSEV
Biophysics Institute, Russian Federation State Science Centre,
Moscow, Russian Federation

The accident at Chernobyl NPP happened in April 26-27, 1986 was characterized by complex combination of a number of factors of radiation and non-radiation origin.

The staff of two accidental shifts and firemen called to eliminate fire were predominantly exposed by external beta-gamma radiations combined with possible applications of radionuclides in skin and mucosa and radiactive aerosol inhalation.

Similar combinations of radiation factors were found in our previous experience, which was the basis for urgent decision on the assessment of main damaging component importance for early health effects in individuals injured in April 26, 1986. The method of analysis of relationships between clinical pictures and dosimetry data in individuals admitted in Clinical Department of the Institute of Biophysics in April 27-28, 1986 (129 persons) represents the basic method of study.

Dosimetry assessments were done in vivo in all people surveyed (237 persons including both hospitalized patients and out-patient individuals) and these assessments were added by postmortem studies in all 27 early fatalities observed.

The scope of elaborated investigations will be described in poster illustrations.

Clinical observations included complete repeated clinical laboratory tests were also complemented by techniques of dose indications using cytogenetic data and blood indices dynamics.

Results

The determinative importance of intensive external gamma-beta exposure for clinical effects is established. Dose range of the external gamma exposure is 0.7 to 13 Gy. Skin doses caused by beta exposure were 10-20 times higher. Radionuclide body burdens were found to accumulate final dose of the same range as external dose for two patients only, which two patients had the radionuclide intake through damaged skin (vapour burn) and radionuclide inhalation (radioiodines and radiocaesiums determined the main part of internal doses in organs and body). All other patients had internal exposure of lungs of <0.8 Gy and thyroid doses were calculated to be more than 4 Gy in 8 persons including two patients with 11-13 Gy in thyroid.

Early clinical revealings were specific to the exposure of relatively uniform gamma radiation combined with beta radiation damage of skin itself (beta dermatitis).

Dose levels from indicated combination caused the development of isolated (in a few cases) and combined (in a majority of cases) manifestations of acute radiation syndrome (bone marrow syndrome, intestinal syndrome complicated by radiation dermatitis, mucositis and lung damage).

Recovering has practically taken place in all patients exposed by less than 4 Gy, two thirds of patients recovered for dose of 4-6 Gy and 2 patients from 21 individuals exposed by 6-13 Gy.

Main peculiarities of direct clinical effects of chernobyl accident consist in:

- high incidence rate of combined damage of different organs and skin, which, for instance, limited the effectiveness of treatment measures to supress post-radiation myelodepression (allogenic bone marrow transplantations, etc.);
- significant occurrences of skin injuries, which aggrevated clinical syndrome by toxic revealings and adult distress syndrome even for small depth of skin damage;
- mass character of both such severe damages and number of people involved in the accident, which caused relevant social psychological resonance; significant complications and duration of treatment of radiation damage of skin in the outcome of the disease.