6. CREH - Collaborating Centre for Radiation Effects on Humans (Hiroshima, Japan - Head, Dr Yutaka Hasegawa)

6.1 Brief Description of WHO Collaborating Centre for Radiation Effects on Humans (at Radiation Effects Research Foundation) and Its New Activities Since the Last REMPAN Meeting Held in Paris in December 1994

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1. Brief description of the Centre

The WHO Collaborating Centre for Radiation Effects on Humans is based on the Radiation Effects Research Foundation (RERF). RERF was established on 1 April 1975 as a non-profit foundation under Japanese Civil Law and according to an agreement between the Governments of Japan and the U.S.A.

The objective of RERF is to conduct research and studies, for peaceful purposes, on the medical effects of radiation on humans with a view to contributing to the maintenance of the health and welfare of the atomic bomb survivors and to the enhancement of the health of all mankind.

RERF has been designated as the WHO Collaborating Centre for Radiation Effects on Humans (CREH) since May 1979. The terms of reference of the Centre are as follows:

1) to provide WHO with all results of its scientific investigations on radiation effects on man, irrespective of the source of exposure;

2) to provide WHO with expert advice on relevant tasks, if requested;

3) to collaborate with WHO in special investigations relevant to the subject of radiation effects on humans. The kind and extent of collaboration will be agreed in each separate case and will depend on priorities set by WHO as well as the Radiation Effects Research Foundation.

CREH has been a member of REMPAN since October 1988 when the second meeting of REMPAN took place in Oak Ridge, U.S.A.

The main role of CREH in REMPAN is to provide advice on the methods for a long-term follow-up of health effects due to radiation exposure.

Point of contacts of CREH

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2. New activities of the Centre since the last REMPAN meeting held in Paris in December 1994

The specific activities as the WHO Centre since the last REMPAN meeting include the following:

(1) WHO/WPRO meeting of the directors of the WHO Collaborating Centres in Japan, 9-10 February 1995, Tokyo

I attended the above meeting and reported the recent activities of our Centre.

(2) WHO review meeting of the final report on the pilot phase of IPHECA, 13-17 March 1995, Obninsk, Russian Federation

I attended the subject meeting and contributed to the finalization of the report on the pilot phase of IPHECA.

(3) WHO/WPRO's inquiry about "radiotherapy departments in hospitals in Japan"

Dr Sima Huilan of WHO/WPRO requested the information on the above matter on 7 April 1995. I replied to him on 11 April 1995.

(4) Preparation and hosting of 6th REMPAN meeting held at our Centre in Hiroshima from 23-25 October 1995

According to the agreement made between Dr Kreisel, WHO Executive Director, and Dr Shigematsu, RERF Chairman, in January 1995, our Centre is hosting the sixth REMPAN meeting at the RERF auditorium from 23 to 25 October 1995. The staff of the Centre has been keeping busy in preparing for the meeting over the last several months.

6.2 Radiation Emergency Medical Preparedness in Japan

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Japan is only one nation who experienced the explosions of atomic bombs. There should have been much experiences in handling acutely exposed patients. Systematic outcomes from emergency medicine handling such patients are less known to us when compared with medical outcomes of delayed effects of the exposure A Japanese fishing boat "Happy Dragon No. 5" was exposed to the fall-out from nuclear bomb test at Bikini Atoll in 1954. 23 fishermen were suffered from acute radiation injuries. It was realized at that time that the facilities of researches and medical preparedness for acute and prolonged radiation injuries have to be instituted. Thus National Institute of Radiological Sciences (NIRS) was established in 1959. Since then NIRS experienced only one accident cases of acute radiation injury in which 6 young men were exposed from an iridium source of industrial non-destructive examination besides following studies of the exposed fishermen at Bikini. Acute radiation injuries usually occur inside of nuclear facilities, therefore, it is considered in this country that the organizations running the facilities are responsible for the accidents and governments are responsible only for public exposures. Little nation-wide systematic preparedness has been made for acute radiation injury cases. Medical measures for radiation emergency have been prepared mainly to protect the public. The care system for the severely injured in the radiation disaster, which has been maintained by Science and Technology Agency and local governments, and the emergency medicine system run by the Ministry of Health and Welfare are considered to be applied to the cases.

1. Regulations

In 1961 the Disaster Countermeasures Basic Act was established. The act aims a comprehensive and systemic administration for disaster prevention by defining the obligations of national and local governments and by making the basic plan and Central Disaster Prevention Council. After the nuclear accident at Three Mile Island in 1979 the emergency preparedness arrangements were strengthened in the aspect of nuclear power station emergency situations. Central Disaster Prevention Council issued in July 1979 a report titled "Urgent disaster

countermeasures to be taken for the nuclear facilities by the governmental agencies" specifying national and local headquarters for the emergency responses and an organization of specialists including radiation medicine specialists which is maintained by national government and dispatched to the local emergency response headquarters. In June 1980 Nuclear Safety Commission established a guideline entitled "Off-site Emergency Planning and Preparedness for Nuclear Power Plants." The guideline implements disaster counter measures and criteria for public protection. The nation-wide system for the preparedness is described in Figure 1. Local government can independently establish such disaster countermeasures stated below consulting to medical specialists dispatched from the central government. NIRS is permanently prepared to dispatch an radiation emergency medical team for the central government consisting from physicians, nurses, radiation physics specialists and radiation safety specialists. The protective measures are;

(a) Sheltering in house
(b) Sheltering in concrete building
(c) Evacuation of the area
(d) Restriction of food and water intake
(e) Iodine tablets intake
(f) Travel control
(g) Protective measures for staffs engaged in the protection.

The criteria for the measures are listed in Table 1 and Table 2 The guideline defines the radiation emergency medical system and also classifies the injured persons. The emergency medical center for decontamination is organized under the local emergency response headquarters. The role of the medical center is to perform contamination survey, surface decontamination and minor treatments to the injured if necessary on people in the evacuating area. The injured are categorized as follows.

(a) The first group
Non-exposed persons with chronic diseases, physically handicapped and with diseases aggravated by the confusion of emergency.

(b) The second group
Exposed persons with no symptoms or with low level surface or internal contamination.

(c) The third group
Exposed persons who require clinical observations and medical treatments

2. Care system in radiation emergency

The radiation emergency medical care system defined by the guideline has three categories of facilities which are primary medical facilities, specialized facilities for radiation medicine and a definite care hospital specialized in radiation injuries. The primary medical facilities are medical facilities of power plants and an emergency medical center which local emergency response headquarters institutes when necessary The primary medical facility practices only contamination survey and decontamination. When necessary a patient will be transported for injury cares or for decontamination either to a specialized facility of radiation medicine, which is established by the prefectural government where nuclear power plants are located, or to definite care hospital, which is NIRS. Figure 2 describes how the primary medical practice in a radiation emergency will be performed. The specialized facility of radiation medicine is usually a part of a major general hospital where one or more radiation medicine specialists work in oncology or hematology The prefectural government designates as the specialized facility by a contract one major general hospital in the prefecture where nuclear power plants locate. The decontamination facility which is usually built inside of the hospital is maintained by the prefectural government.

3. Medical dispatch teams

NIRS is responsible for medical response in radiation emergency and institutes the Permanent Committee for Nuclear Disaster Planning. Its subcommittee for radiation emergency medicine maintains three teams of medical and paramedical personnel.

Team No. 1 Medical dispatch team for radiation emergency.
Team No. 2 Medical team to practice at the Radiation Emergency Handling Suite.
Team No. 3 Medical team for severely exposed, particularly for the isolation room.

Team No. 1 will be dispatched to the Local Emergency Response Headquarters for advice and cooperation. NIRS is not only responsible for the protective disaster medicine but also for the cares on acutely exposed individuals. NIRS is nominated as the definite care hospital for radiation injuries by the guideline which NSC issued in 1980. Hence NIRS has been prepared to accept acutely injured and severely contaminated patients. A large decontamination facility has been maintained, which was actually used, besides periodical training, at the time of Chernobyl accident to perform surface decontamination of people who traveled in Ukraine. An inverse isolation rooms is also maintained in a hospital ward which is occasionally used for oncologic patients with training purpose. To practice the decontamination and treatment teams No. 2 and No. 3 of medical and paramedical personnel are also maintained. One is to perform decontamination at Radiation Emergency Handling Suite and the other is to treat the acutely exposed severe cases. Team No. 1 will be dispatched the accident site, therefore, it can choose in cooperation with other two teams which patient should be transported to NIRS. It is although our opinion that decontamination, particularly surface decontamination, should be done on the spot as soon as possible. Acutely exposed severe cases should be admitted to NIRS as soon as possible

4. NIRS as the center for radiation injuries

It is considered that NIRS, as the definite care hospital for radiation injuries, has to have following capabilities besides the clinical capabilities at radiation emergency.

(a) Clinical follow-up studies of exposed patients.

NIRS is involved in follow-up medical check-ups of patients with trotrast contrast media and fishermen exposed at Bikini islands.

(b) Researches for advanced life science knowledge to treat the acutely exposed.

Researches should be performed particularly in hematology and immunology to apply clinically the newest findings in life science to acutely exposed patients.

(c) Reference center for emergency medical practices for acutely exposed severe cases.

Acutely exposed severe cases are rare. But it can happen that such a patient might be transported to an emergency room of a hospital. We should have the capability to provide sufficient information to handle such patients to the hospital.

(d) Education and training center for physicians who treat acutely exposed severe cases.

Currently two courses of "Radiation Emergency Rescue and Care" has been annually provided to those who potentially involved in rescue activities in the emergency. Another course for physicians who would potentially handle the emergency will be soon instituted.

5. Summary

Radiation Emergency Medical Preparedness in Japan has been planned and carried out in the frame of off-site public protection. Much has not been discussed on the in-site emergency medical problems. But each nuclear facility has to have a counter-measure plan of radiation emergency which should includes medical measures for the emergency. Disaster countermeasure act and a guideline from NSC entitled "Off-site emergency planning and preparedness for nuclear power plants" establish the system for countermeasures in radiation emergencies. The guideline also establishes the medical plans in radiation emergencies, which includes the care system for the severely contaminated or injured. NIRS is designated by the guideline as the definite care hospital for radiation injuries and has been prepared to dispatch medical specialists and to receive the injured patients. NIRS is practicing clinical

follow-up studies of injured patients and is also active in researches in diagnosis and treatments for radiation injuries and in education and training for medical personnel. NIRS has the plans to be the reference center of emergency medicine in radiation injuries in Japan and in far east if necessary.

Table 1. Guidance for Indoor Sheltering and Evacuation

Projected dose equivalent		Measures	Persons
Whole body (mSv)	Thyroid		
10 - 50	100 - 500	Stay indoors	Infants, children and pregnant women
50 - 100	500 - 1000	Stay in concrete building or evacuate Stay indoors	Infants, children and pregnant women Adults
100 -	1000 -	Stay in concrete building or evacuate	All

Table 2. Guidance on the Ingestion Restriction of Contaminated Food and Water

Item	I-131 Concentration
Drinking water	1×10^2 Bq/L
Vegetables	6×10^3 Bq/Kg
Milk	2×10^2 Bq/L

Figure 1. Off - Site Nuclear Emergency Medical Response System

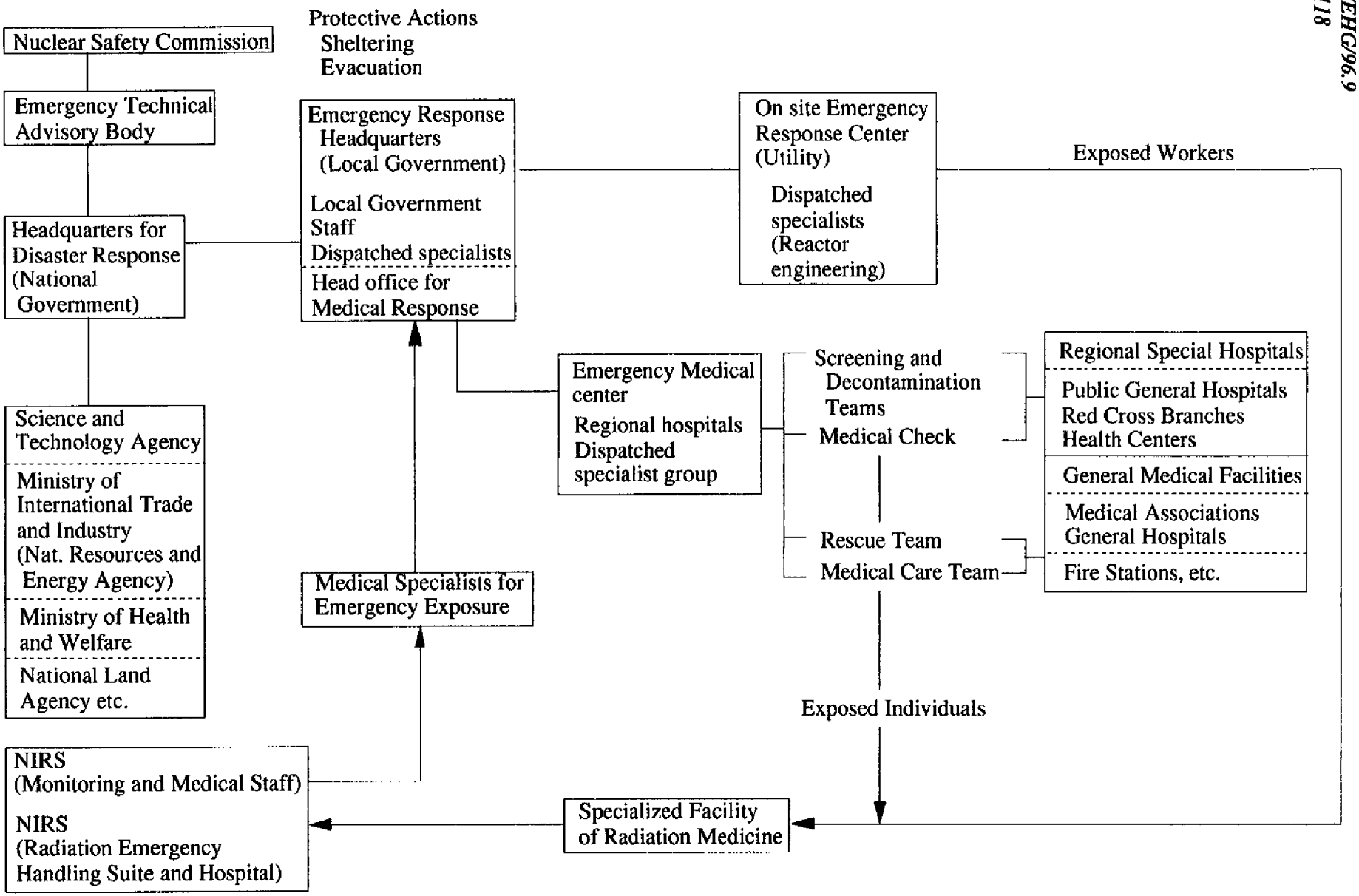
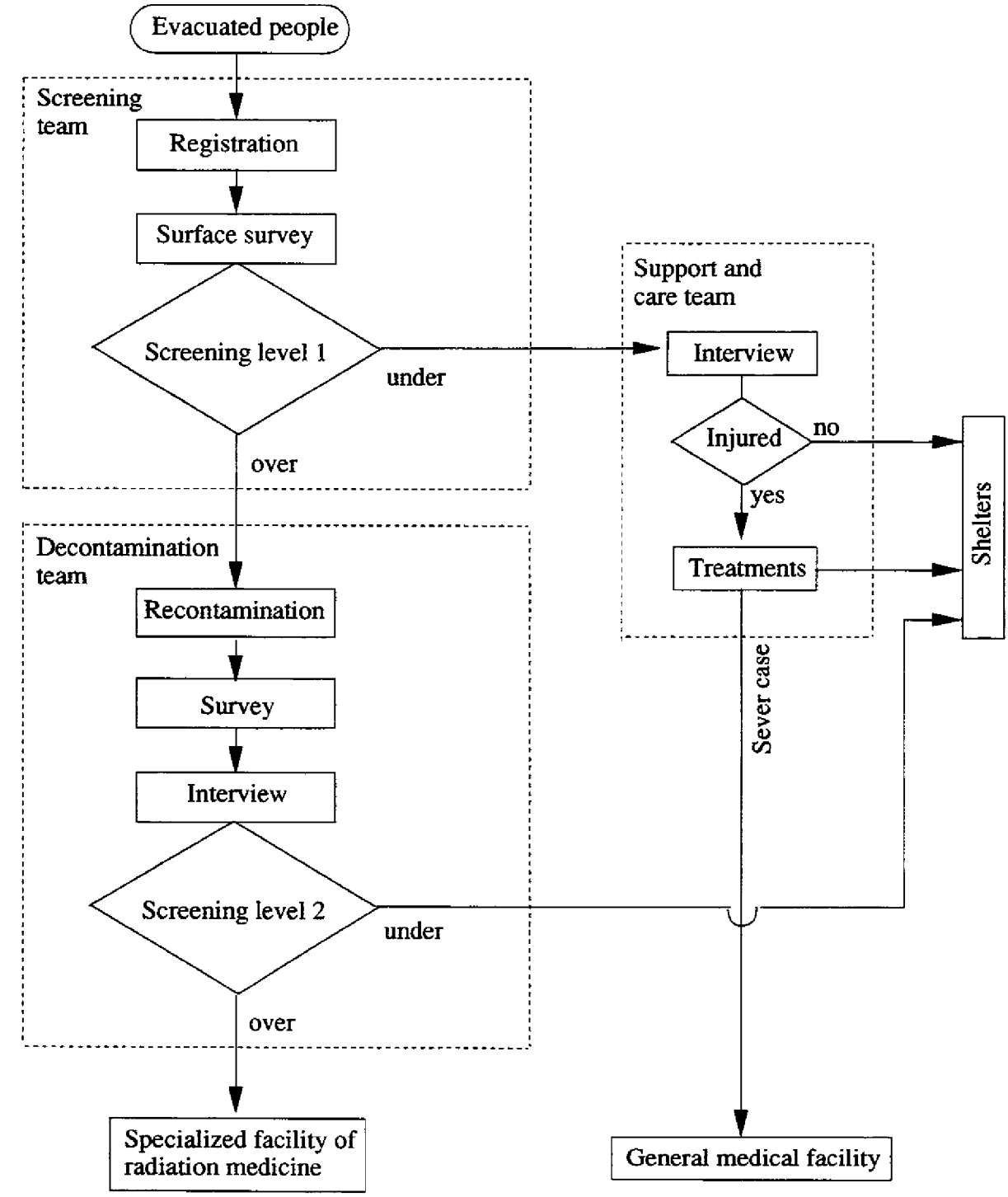


Figure 2. Mass Survey and Contamination Flowchart



Screening level 1
- Estimated total body dose equivalent 100mSv
- Contamination of nostril smear 1kBq
- Surface contamination density 40Bq / cm^3

Screening level 2
- Estimated total body dose equivalent 250mSv
- Contamination of nostril smear 10kBq
- Surface contamination density 40Bq / cm^3
- Thyroid contamination 30kBq

7. CCMRP - Collaborating Centre for Medical Radiation Pathology (St. Petersburg, Russian Federation, Head - Dr V.E. Komar)

7.1 Radiation emergency medical preparedness to nuclear accidents in Russian Federation

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The organization of the medical assistance in case of nuclear accidents in Russian Federation will be presented in general outline. Ministry of Public Health and Medical Industry and Ministry of Extraordinary Situations are responsible for the ensuring of the medical preparedness to nuclear accidents. A system is in a process of elaboration to provide this kind of the preparedness [1]. Obviously rendering emergency medical assistance to victims must be realized by the insitutions situated next to the potential dangerous units. Thus the primary stage to render first aid is ensured by the hospitals in the regions where such an accident is possible. Teams of a rapid reaction (TRR) based on local hospitals including appropriate specialists must be formed to render an emergency medical assistance to victims, to realize the initial triage and to hospitalize those, who need, to regional or central hospitals.

The regional Centres of the Emergency Medical Assistance (RCEMA) are established in big cities on the base of regional hospitals and they ensure the preparedness of the territories where the radiation dangerous units are situated. The Specialized Scientific and practical Centre of Emergency Medical Assistance (SSCEMA) which functions by means of Regional Centres, TTR and moving hospitals is supposed to be the main Institution engaging in rendering emergency medical assistance [1].

On the whole the six principal scientific and practical Centres in Russian Federation are engaged in medical problems of radiation effects on human beings at least as regards the Chernobyl accident [2]:

1. The Centre for Research in Medical Radiology, Obninsk.
2. All-Russian Federation Centre of Ecological Medicine, St Petersburg.
3. Institute of Biophysics of the Russian Ministry of Public Health and Medical Industry, Moscow.
4. Institute of Diagnostics and Surgery, Moscow
5. Institute of Radiation Hygiene, St Petersburg.
6. Central Research Institute of Roentgenology and Radiology, St Petersburg

The first of them is engaged in the problem of liquidators health state, their registration, medical observation and treatment. The State Russian Medical Dosimetry Register of recovery workers is in this Centre.

All-Russia Centre of Ecological Medicine is the lead establishment for the treatment and rehabilitation of recovery workers The Centre has a regional Register of liquidators as well as the register for military recovery workers.

The fourth from the aforesaid institutions also carrying out an observation of liquidators in respect of morbidity, mortality and disablement

The Central Research Institute of Roentgenology and Radiology is working, besides the medical observation and treatment of liquidators, on the problem of the consequences in progeny of irradiated people, specifically in aspects of a leukaemia risk.

Having a great experience in the sphere of radiation pathology the Institute studies some problems of acute radiation effects using the total and subtotal theurapeutical irradiation of patients suffered from cancer and Hodgkin's disease. The other guideline of its researches is an elaboration of the methods for biological dosimetry and bioindication of acute radiation effects as well as those in the late stage after irradiation.

Institute of Radiation Hygiene studies the consequences of the Chernobyl disaster for the health of the population in contaminated zones and estimation of individual and collective doses.

Institute of Biophysics tackels mainly the problem of acute radiation injuries arising from the nuclear accidents. The majority of Chernobyl victims suffered from the acute radiation disease and local injuries were treated in the hospital N6 based on the Institute. The guide on the organization of medical assistance in case of radiation accidents approved by the National Committee on Radiation protection has been published [3]. Instructions edited by Prof. A. Guskova were worked out in this Institute and affirmed by the Russian Ministry of Public Health in 1993 [4]. This problem is presented also in some other publications (for example, [5])

Species of accidents and variants of radiation injuries which arise in different situations are presented in these publications. A great importance is attached to the urgent information from an accident site to the local and government authorities, agency of the radiological control, RCEMA.

Diagnostics and treatment within the different periods leading off the moment of an accident are fulfilled in a form of the three successive stages.

The first stage corresponds to the moment of an accident and the nearest hours after it.

The tasks of the first stage are:

1. Limitation of the person number involving in the liquidation of the emergency consequences.
2. Limitation of the radiation doses received by persons who were near the source of irradiation at the moment of the accident.
3. Rendering emergency medical assistance according to clinical evidences.
4. Carrying out the measures to reduce the incorporation of radionuclides into the organism.
5. Determination of an order of priority and ways of victim transportation to the hospitals adapted to their admission.

Measures are undertaken to appreciate the individual doses of external irradiation including the information on the source, fields and geometry of irradiation, the time of the stay of a victim in the irradiation field, data of an individual dosimeter as well as the preparation of the material for EPR-spectroscopy.

These measures permit to determine the individual local or total dose to an approximation of 100% and to calculate the dose distribution in the body.

Tentative quantity and composition of radionuclides which could incorporate into an organism is appreciated and measures are undertaken to reduce the individual doses of an internal and superficial irradiation. It is possible at this stage to reduce internal doses to minimum level and to determine their values to an approximation of 2-3 times.

As the second stage it should be considered the first three days after the accident.

The goals of the second stage are to evaluate of an individual dose of total and local irradiation to an approximation of 50%, the absorbed dose distribution and a choice of methods of a medical managment. Internal doses of radionuclides are evaluated also to an approximation of 50-100%, measures to reduce the individual doses are fulfilled. The triage of patients is also a task of this stage.

The third stage coincides with the period of an acute radiation disease and local radiation injuries (till 6 months)

It demands the most possible accurate reconstruction of absorbed doses with the methods of physical and biological dosimetry During this stage all the methods of treatment and rehabilitation are carried out including social and psychological adaptation. It is necessary to determine the prognosis of issues of the acute radiation disease and local injuries with an evaluation of a disablement.

Doses from internal irradiation are determined to an approximation of 30-50% and measures to reduce them are carried out.

The measures of the third stage must be done in the specialized hospitals or the scientific and practical Centres for radiation pathology. The issues of an acute radiation disease and the necessity of the subsequent medical observation become obvious till 2-3 months leading off the moment of the accident.

All the persons suffered from an acute radiation disease and local radiation injuries are subject for the insertion and observation in the Register of the Institute of Biophysics. Liquidators and inhabitants of contaminated zones are enrolled to the Registers of the Centre for Research on Medical Radiology (Obninsk) and All-Russia Centre of Ecological Medicine (St Petersburg)

List of publications

1 Grachev, M.I., Kamyshenko, I.D., Korostin, A.S , Nemtsev, A.N. Emergency health care organization in radiobiological disasters. (in Russian) J. of military medicine, 1993, N4, pp 10-13

2. Souchkevitch, G. Participants in the clean-up operations following the Chernobyl disaster: state of the Health and Medical Monitoring in Belarus, Russian Federation and Ukraine Rev. Article, WHO/HG, Geneva.

3. Guskova, A.K., Barabanova, A.V., Drutman, R.D., Moiseev, A.A. Guide on the organization of the medical assistance in case of radiation accidents. (in Russian) 1989, Moscow.

4. Instructions to render medical assistance to victims of radiation accidents. (in Russian) Ed by A Guskova, Moscow, 1992.

5. Ivashkin, V.T., Baranov, A.E., Nadejdina, N.M., Barabanova, A.V Organization of the theurapeutical assistance in case of radiation injuries. (in Russian) J. of military medicine, 1993, N4, pp 22-27

7.2 New activities of WHO Collaborating Centre for Medical Radiation Pathology (CCMR) since the last REMPAN meeting in 1994

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The general description of the WHO CCMR based upon the radiological and radiobiological departments of the Institute was presented earlier at the Fifth REMPAN meeting in 1994.

The activities of the Centre during the mentioned period are concentrated on the following guidelines:

1. Studies on the health state of Chernobyl liquidators and their treatment in the radiological department to reveal especially an importance of the radiation effect on the background of different non-specific diseases. Both cytogenetic methods and the estimation of a lymphopoietic system status are used for this purpose.
2. Revealing of some responses of lymphopoietic system using the peripheral blood lymphoeytes after an acute irradiation in patients being under treatment for malignant tumours.
3. Estimation of a leukaemia risk in children born from Chernobyl victims. Only the results of the third item from the above-mentioned studies will be presented here in detail.

7.3 New activities of WHO Collaborating Centre for Medical Radiation Pathology - Estimation of leukaemia risk in children born from Chernobyl accident victims

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Some aspects concerning the problem of a leukaemia risk in the progeny of irradiated people and its connection with a chromosome mutagenesis is the object of our study.

We have investigated women (an average age of about 35 years) worked for a long time in 1986 within the limits of 30 km-zone around the Chernobyl nuclear power station and who are registered as the group of a heightened risk. Children aged from some months to 11 years born from these women were also studied. In some cases an examination of their fathers was also carried out.

The cytogenetic analysis consisted in a counting of chromosome aberrations and micronuclei in peripheral blood lymphocytes as well as a determination of polyploid cells. G-banding technique was used for an analysis of chromosome translocations.

The average level of chromosome aberrations in women peripheral blood lymphocytes was 2.65% including 0.19% of dicentrics, 1.78% single and 0.56% double fragments. In children the average level of chromosome aberrations was 2.12% (1.34 as a control level) including 1.16% single, 0.55% double fragments and 0.06% of dicentrics. Among 12 children studies 4 of them had important chromosome anomalies One of them (a girl, aged 5.5 years) has an addition to the short arm of the chromosome 13 revealed with the method of G-banding that correlated with the presence of dicentrics (0.5%) and a high level of polyploid cells. The mother and the father of this girl have the "liquidator" status. Only in the mother it has been possible to find out about 0.3% of dicentrics. At the same time the results of a cytogenetic analysis in the father was within normal limits. Another child (a girl aged 5 years) has an increase of the short arm of the chromosome 21 accompanied by the high level of chromosome aberrations and polyploid cells. In the boy aged 11 years whose father has the "liquidator" status and worked as well with radionuclides before the Chernobyl accident, it was found an addition to the arms of 21P and 14P. Besides it was revealed the two translocations 6P, 12P and 9P, 4P and the deletion 2g(-gter). Total frequency of chromosome aberrations in this patient is 4%. The cytogenetic analysis of the father (aged 42) does not show any significant difference with control values. In the boy aged 7 years a translocation in chromosome 1 was found out in 2.5% of cells. General clinical and cytogenetic data as well as the level of a body contamination of the parents did not show any significant difference in comparison with the control group although they have some tendency towards an increase of the general level of total chromosome aberrations.

In summary from 12 children studied hitherto in 4 of them stable anomalies of chromosome apparatus were revealed which correlated with a high level of total chromosome aberrations (in two cases) and radiation specific chromosome markers (in one case). These children can be probably attributed to the group of an increased leukaemia risk. Nowadays these studies are in progress especially in families where diagnosis of a leukaemia in children is proved.

8. CREA - Collaborating Centre for Radiation Emergency Assistance (Oak Ridge, TN USA, R.C. Ricks, Ph.D., Director; M.E. Berger, R.N., Ed.D., Associate Director; Ronald E. Goans, Ph.D., M.D., Medical Section Leader)

The CREA designated in 1980 is part of the Radiation Emergency Assistance Center/Training Site (REAC/TS), of the Medical Sciences Division at Oak Ridge Institute for Science and Education.

The REAC/TS was established in 1976 and has been operated since then by the Medical Sciences Division of Oak Ridge Institute for Science and Education in Oak Ridge, TN for the United States Department of Energy. The REAC/TS programme was initially established to provide the Department of Energy Headquarters and Field Offices, or contractor sites, 24-hour direct or consultative assistance regarding medical and health physics problems associated with radiation accidents. In 1980, REAC/TS was designated by WHO as the Collaborating Center for Radiation Emergency Assistance (CREA). The Center was redesignated on 13 June 1994 for a period of four (4) additional years.

A radiological emergency response team consisting of physicians, nurses, health physicists, coordinators, and necessary support personnel is on 24-hour call to provide consultative or direct medical and radiological assistance at the REAC/TS facility or at the accident site. The team has expertise and is equipped to conduct 1) medical and radiological triage, 2) decontamination procedures and therapies for external contamination and internally deposited radionuclides including DTPA chelation therapy, 3) diagnostic and prognostic assessments of radiation induced injuries, and 4) radiation dose estimation by methods that include cytogenetic analysis, bioassay and in-vivo counting. The REAC/TS serves not only as a treatment facility, but also as a central training and demonstration unit wherein U.S. and foreign medical, nursing, paramedical, and health physics personnel receive intense training in medical management for radiation accidents. Regularly scheduled courses of instruction for the occupational health physician and nurse, emergency physician and nurse, and health/medical physicist are conducted. A training team is also available for off-site training to meet the needs of both national and international groups.

The REAC/TS consists of a modern surgical/decontamination unit with a health physics support laboratory. It is located within the Methodist Medical Center of Oak Ridge where it serves as a dedicated entrance to the community hospital for radiation accident victims. Special construction features include adequate shielding for penetrating radiation, filtered air handling systems, and radioactive waste storage systems for contaminated fluids. A whole body counter is located within the facility. Laboratory support facilities for cytogenetic dosimetry and additional whole body counters are located adjacent to REAC/TS in the Medical and Health Sciences Division of Oak Ridge Institute for Science and Education. Surgical support services, clinical laboratory facilities, and a cadre of medical specialists (i.e. hematologists, orthopedists, internists, dermatologists, etc.,) are on 24-hour call through agreements with the Methodist Medical Center.

REAC/TS coordinates the national use of Ca-Zn DTPA for decorporation therapy. The REAC/TS maintains a DTPA Registry to assist in the determination of the safety and efficacy of DTPA. The DTPA Registry is a component of a larger database, the REAC/TS Registry system, of medically important information on radiation accidents. Through the REAC/TS Registry, long-term follow up of persons involved in previous radiation accidents is accomplished. Information on foreign radiation accidents continues to be added to the Registry through contact with physicians and health physicists in various foreign countries and through close liaison with other WHO Collaboration Centers. In addition, REAC/TS staff work closely with U.S. federal and state governmental agencies, as well as international organizations, to develop materials for medical management of radiation accidents.

The CREA is prepared to provide advice and medical assistance on a worldwide basis in cases of radiation overexposure. The CREA works closely with WHO Centers in Brazil and Argentina, as well as with the Pan American Health Organization to strengthen medical preparedness of American countries for radiation accidents by training activities, convening meetings, and sharing pertinent information.

The CREA has responded to a number of foreign radiation accidents at the request of the respective governments, the IAEA, or the WHO. Response consisted of advice and consultation via electronic means, providing written materials, on-site REAC/TS team deployment, and admitting individuals for evaluation in the REAC/TS facility. In this regard, international assistance has been provided to the West Indies, Argentina,

Venezuela, Jamaica, Mexico, USSR, Brazil, El Salvador, Israel, Spain, Belarus, China, Norway, Estonia, and during this reporting period, France, India, Russian Federation, South Africa, and Trinidad.

REAC/TS issues semi-annual newsletters which contain information relevant to activities of the CREA. Experts of the CREA actively participate in elaboration of international recommendations on the medical handling of overexposed persons, in cooperation with WHO, IAEA, and UNSCEAR.

The CREA terms of reference are the following:

- Serve as a focal point for advice and possible medical care in cases of human radiation injuries.
- Facilitate the establishment of equipment and specialized staff in human radiopathology.
- Assist in the establishment of medical emergency plans in the event of large-scale radiation accidents.
- Develop and carry out coordinated studies on human radiopathology and epidemiological studies that may be appropriate.
- Assist in the preparation of relevant medical documents and guidelines.

In the case of an actual radiation accident, the CREA can provide:

a) a survey team for rapid external radiation and/or contamination surveys with appropriate equipment;
b) a team for on-site emergency treatment/consultation;
c) transportation of patients;
d) facilities for medical investigation and treatment including;
   (i) bioassay services,
   (ii) whole-body monitors,
   (iii) radiochemical analysis of samples,
   (iv) specialized staff and hospital facilities for treatment of radiation injury,
e) follow-up medical supervision and treatment.

Since the last Collaborating Centers' meeting, the CREA has responded to 59 calls for radiological assistance in accidents or incidents involving 114 persons. Six persons were seen in the REAC/TS facility and REAC/TS provided assistance to the Methodist Medical Center emergency department on 3 occasions. The REAC/TS emergency response was directed to accidents/incidents involving exposure, contamination, or a combination. Physical and biological dosimetry assistance was provided, as well as coordination of DTPA therapy where indicated for internally deposited transuranics. Cytogenetic dosimetry was performed on 4 exposed individuals and DTPA chelation therapy was recommended for 6 internally contaminated individuals. Data obtained regarding these cases were added to the REAC/TS Radiation Accident Registry.

Other selected activities during the reporting period include:

- 10 training courses in radiation accident management were conducted in REAC/TS. 217 persons were trained, including physicians, nurses, health physicists, paramedics, and emergency planners. 12 training courses conducted in the United States in support of the Department of Energy; the Waste Isolation Pilot Plant; military sites; and private medical or health physics groups.
- Presented invited lectures in Chiba and Tokyo, Japan at the invitation of the Japan National Institute of Radiation Sciences.
- Participated in the meeting Radiological Accident: The Injured Victim, Logistic, Diagnostic and Therapeutic Approaches in Case of Accident Irradiation and Contamination, Grenoble, France.

- Assisted the U.S. Department of State during meetings with health protection officials in Montevideo, Uruguay.

- Assisted the IAEA Fellowships Division and provided training/independent study in radiation accident management for physicians from Brazil, Bulgaria, Egypt, Indonesia, Malaysia, and the Phillippines.

- Participated in the planning and conduct of a national nuclear weapons accident exercise at the Yorktown Naval Weapons Station in Virginia.

Selected activities planned for the near future include:

- Conduct a training course, "EMS Response to Radiation Accidents,"June, 1996, Cheyenne, WY.

- Participate in the 1996 International Congress on Radiation Protection and the International Conference, One Decade After Chernobyl: Summing up the Consequences of the Accident, April, 1996, Vienna, Austria.

- Continue emergency response activities and training in REAC/TS and other off-site areas.

The points of contact in CREA as well as in REAC/TS are:

Dr. Robert C. Ricks - Director
Dr. Mary Ellen Berger - Associate Director
Dr. Ronald E. Goans - Medical Section Leader

Staff/Consultant Physicians:

J.G. Davis
S.A. Fry
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