Annex III

Third Coordination Meeting of WHO Collaborating Centres
in Radiation Emergency Medical Preparedness and Assistance
(Leningrad, 21-24 May 1990)

WHO COLLABORATING CENTRES FOR RADIATION EMERGENCY MEDICAL PREPAREDNESS AND ASSISTANCE

1. CRERMA - Collaborating Centre for Radiation Emergency Response and Medical Assistance (Buenos Aires, Argentina, Director - Eng. Mr. J. Skvarca)

The point of contact for this Centre is the Department of Radiation Health Physics of the Ministry of Health of Argentina.

The Centre is based on the existing structures of two institutions responsible by law for ionizing radiation in Argentina:

a) Ministry of Health which, through its Radiation Health Physics Department on the national level and similar departments in the provinces, is responsible for X-ray sources and linear accelerators (protection, licensing, education, training etc.).

b) National Atomic Energy Commission (CNEA) which is responsible for nuclear plants and all radioactive materials (protection, training, etc.).

These two organizations work very closely together. In 1984 both institutions together with the Municipality of the City of Buenos Aires which coordinates the Civil Defense for the entire country, agreed by a special convention to establish a system called SAMARI (System for Medical Preparedness and Assistance to persons overexposed from radiation). This agreement covers three important items:

a) Distribution of duties in response to a radiation accident, including assignment for radiological emergency facilities and equipment;

b) Elaboration of emergency plans for a radiation accident, which should describe its typical features and measurements to be taken;

c) Identification of the experts and hospital facilities for preparedness and response.

The National Atomic Energy Commission has the capability to provide physical reconstruction of the accident, means of decontamination, instrumentation including whole-body counter units, stationary and mobile laboratories for environmental measurements and biological dosimetry.

The Health Ministry will provide hospital facilities. There are two national hospitals in Buenos Aires having special sterile rooms and other facilities such as a unit for treatment of burns. The Ministry will also provide the National Emergency Communication and Transportation Network (DINES) which has representatives in provinces.

At the international level, particularly for countries in Latin America, we have a strong and fast contact in coordination and cooperation in this field through the Programme of HSD of PAHO from Washington.

The plan of work for the period 1990/93 is the following:

1) To consolidate activities among the different components of the collaborating centre (CNEA, MCBA, Ministerio de Salud).

2) To establish technical and administrative contacts with relevant institutions in Latin America.

3) To support with expertise international training courses in radiation emergency preparedness and management (Toluca, Mexico - January 1990; Buenos Aires, Argentina - August 1990).

4) To provide technical assistance to spanish-speaking countries in Latin America (elaboration and improvement of the national legislation on radiation protection including preparedness for radiation emergencies).

5) To exchange technical documentation with other collaborating centres.

6) To render assistance similar to that provided in radiation accidents in San Salvador (El Salvador) and in Santa Cruz, (Bolivia).

7) To participate in international coordination meetings of WHO collaborating centres on radiation emergency.

8) To launch a research project to correlate physical dosimetry with biological indicators of overexposure in primates.

The biological indicators to be considered in the above-mentioned project are cytological indices (peripheral blood and bone marrow), free radical induction in bone and teeth measured by electron spin resonance techniques, biochemical changes (taurine concentration in serum and amilase activity in saliva), immunological tests (T and B lymphocyte count, immunoglobuline and antibody production in vitro). The effects will be studied at doses of 2, 4, 6, 8, 10 and 12 Gy. The full description is available in Spanish.

There were two major radiation accidents in Argentina. One occurred about 30 years ago with a ^{137}Cs industrial source. The other one took place five years ago at a small nuclear research reactor and the exposed worker died after 48 hours. A minor accident also happened 10 years ago with a ^{60}Co unit when the physician lost some of his fingers.

In improving the medical preparedness for radiation emergencies an important step has been the establishment of a network of "Liaison Institutions", usually Regional Hospitals of different States (provinces) in Argentina to involve all the country in coordination with the National Collaborating Centre. Special questionnaires were developed for hospitals to facilitate the triage.

Particular attention is paid to personal contacts among the responsible persons of the centres belonging to REMPAN. This contributes to the spirit of cooperation which is so important in emergency situations.

The point of quick contact and correspondence:

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2. CRPREMA - Collaborating Centre for Radiation Protection and Radiation Emergency Medical Assistance, (Yallambie, Victoria, Australia, Director - Dr K.H. Lokan)

In 1985 the Australian Radiation Laboratory (ARL) was designated as the WHO Collaborating Centre for Radiation Protection. ARL is operated by the Federal Department of Community Services and Health. Its role is to:

a) conduct applied research and investigation into matters relating to radiation health (both ionizing and non-ionizing);

b) assist the states of Australia, who have constitutional authority over health matters, by providing advice, guidance and scientific services by:

- preparing Codes of Practice and Guidelines relating to radiation health
- promulgating national regulatory standards (usually derived from ICRP)
- maintaining national measurement standards for exposure, absorbed dose and radioactivity
- providing a TLD personnel dosimetry system
- undertaking environmental monitoring on behalf of the states and at the national level
- maintain whole body monitoring facilities

The Laboratory functions at a national level by supporting a permanent committee (Radiation Health Committee) of the National Health and Medical Research Council, made up of the principal state radiation health officials, some additional experts, and a secretariat provided by ARL. The Director of ARL acts as chairman of the committee.

The Laboratory has a staff of 95 (40 professional scientists), a budget of A$4.5 million (US$4 million) and is quite capable in the fields of radiation measurement, dose assessment, and environmental monitoring in both ionizing and non-ionizing areas. In addition, it conducts frequent training courses in radiation protection, nuclear medicine (radiopharmaceuticals) and non-ionizing radiation measurement. It is quite common for ARL to have staff attached from South-East Asia, while they hold training fellowships from WHO and IAEA.

The Centre maintained oversight over occupational and public health aspects of ionizing and non-ionizing radiation. It assisted the Australian States, who had constitutional responsibilities for health matters, by providing advice, guidance and scientific support to State Health authorities. The Centre participated actively in the WHO global environmental monitoring programme.

In 1989 ARL was redesignated jointly with the Peter McCallum Hospital as a Collaborating Centre for Radiation Protection and Medical Radiation Emergency Assistance.

The Peter McCallum Hospital is Australia's foremost centre for cancer therapy, and a teaching hospital of Melbourne University. It serves as an emergency reference point for the State of Victoria.

The current terms of reference for CRPREMA are:

- to help in developing radioactivity environmental monitoring in the Region;
- to help in developing radiation protection standards and codes of practice for the safe and effective use of radiation;

- to provide technical advice and to organize personnel training in radiation health when needed;

- to disseminate on a regional basis information on radiation health;

- to participate in the regional dosimetry intercomparison programme.

- to help Member states in elaborating their plans for medical preparedness and first aid;

- to promote training of personnel in developing countries in medical preparedness and first aid;

- to define optimal methods for diagnosis and treatment for overexposure;

- to provide medical assistance to exposed persons, both on site and in specialized clinics (device to be provided by the Peter McCallum Hospital) subject to bilateral agreement between Australia and the country(s) involved.

The ARL would be the first point of contact in the event of a radiation emergency, capable of providing dose assessments and advice on corrective actions and would serve as the "window" in Australia to medical services equipped to manage irradiated patients (via the Peter McCallum Hospital)

Since the last coordination meeting in Oak Ridge (1988) there have been several developments. Firstly, the Australian Centre has made contact with the health ministries of all Member States in the Region, inviting them to nominate associated institutions in their country. The Centre will then act as a regional coordinator to encourage training and planning for radiation accidents, drawing on the experience of other Collaborating Centres in the REMPAN. To date, six out of fifteen countries have responded positively, and it is anticipated that there will be further responses along the same lines. There are very few nuclear reactors in the Region, so that the most likely radiation accidents are those involving the loss of control of strong radioactive sources, of the kind used in industrial radiography. Secondly, the Centre has arranged courses in handling radiation accidents, one on medical planning and care, and the other on health physics. These courses, each of five days duration, are to be presented in the main by the US Collaborating Centre based on REAC/TS. They will be held between 27 August and 7 September 1990. Five or six places in each course are being reserved for participation by scientists from other countries in the Region. Thirdly, in collaboration with the Natural Disaster Organization (a unit in the Defence Department, which normally reacts to major events such as floods, cyclones and large bushfires) an emergency plan has been developed for responding to radiation accidents likely to affect a large number of people.

Point of contact:

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Australia

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(Dr K. H. Lokan)

A potential liaison institution is:

National Radiation Laboratory (Department of Health), New Zealand

Equivalent institutions may exist in the following nearby countries:

Indonesia, Malaysia, Papua New Guinea, Singapore, Thailand, Fiji, Vannatu and other Pacific Island States.

3. CRPMPRA - Collaborating Centre on Radiation Protection and Medical Preparedness for Radiation Accidents (Rio de Janeiro, Brazil, Director - Dr L.A. Vinhas)

The terms of reference for the Centre are:

- to act as a focal point in Brazil for advice on radiation protection under normal conditions and on remedial actions in the case of overexposure and radioactive contamination;
- to take part in coordinated WHO programmes on general aspects of radiation protection, monitoring of radioactivity and medical preparedness for radiation accidents;
- to promote the establishment of equipment, development of techniques and the training of personnel;
- to participate in the preparation of relevant national and WHO documents and guidelines;
- to exchange information with WHO on developments in radiation protection;
- to assist in the elaboration of radiation emergency plans;
- in the case of a radiation accident, to take necessary measures to mitigate the consequences of the accident and to cooperate, if necessary, with other WHO collaborating centres.

The Centre is based on the existing structure of the Instituto de Radioprotecao e Dosimetria in collaboration with Furnas Centrais Elétricas, Hospital Naval Marcilio Dias, Instituto Nacional do Cancer, and Industrias Nucleares Brasileiras S/A.

The Institute of Radiation Protection and Dosimetry - IRD, of the National Nuclear Energy Commission - CNEN, is a centre for the development and research in Radiation Protection and Dosimetry. It gives support to the CNEN on the radiological control of nuclear installations and facilities where radioisotopes and/or ionizing radiation are used.

The following laboratories are available: health physics, cytogenetic dosimetry, whole-body counter unit, excreta analysis, film and TLD dosimetry, stationary and mobile laboratories for environmental measurements and the National Laboratory for Metrology of Ionizing Radiation which is a member of the IAEA SSDL's network.

Research is conducted on the development of environmental and metabolic models, and computer codes to assess doses under routine and emergency situations. The IRD coordinates the emergency planning and preparedness, and trains medical doctors in handling overexposed individuals, as was done during the Goiania accident.

Furnas Centrais Elétricas S/A is an electricity company operating the nuclear power station. It has a radiation emergency assistance centre located at Mambucaba (a district at 10 km from the reactor site). There are facilities at the centre for providing first aid to overexposed personnel and various types of body radioactivity monitors. Trained medical doctors and nurses for radiological assistance are available 24 hours a day. A radioecological laboratory is also in operation at the Mambucaba District.

Hospital Naval Marcilio Dias (Navy General Hospital) has 660 beds and all main medical clinics and other facilities such as a unit for the treatment of burns (16 beds) and a heliport for easy transfer of patients. Of special interest is the Nuclear Medicine Unit, which occupies an entire floor of the building with six isolated and shielded rooms for treatment of exposed or contaminated patients. During the Goiania accident this unit took care of the most seriously affected patients.

The National Cancer Institute is a 300 bed hospital and associated medical research institute of the Ministry of Health in Rio de Janeiro. Of the available facilities and services the following are relevant to the WHO Collaborating Centre; an immunogenetic laboratory for histocompatibility evaluation, a bone marrow transplant unit (with 7 reverse isolation and 2 laminar flow rooms), blood bank for supporting bone marrow transplants including provision of irradiated blood products, and basic research laboratories including cytogenetics and cell culture investigations. The framework of the Cancer Institute is excellent for training purposes.

Industrias Nucleares Brasileiras S/A, INB is a Company responsible for the design and operation of plants related to the fuel cycle. Its potential collaboration involves physicians and health physicists.

In normal situations, these institutions have their own programmes according to their goals. However, under accident conditions a joint action is activated by the Director of the Centre through the CNEN/IRD Emergency Response Plan.

3.1 Emergency Response Plan

The CNEN/IRD Emergency Response Plan must be put into action even when a potential abnormal exposure to individuals and/or to the environment is foreseen. In all such cases the WHO Collaborating Centre in Brazil will also be mobilized.

The following activities will be undertaken:

- Perform environmental survey;
- Assess the potentially absorbed dose to be received by individuals of the public;
- Assess the dose equivalent received by emergency workers due to the accident or remedial measures;
- Recommend countermeasures to reduce the individual and collective doses to the public and emergency workers;
- Perform the triage of individuals, animals, foodstuff and objects.

In order to make possible the execution of these activities, an Emergency Response Team - ERT has been established. The ERT is composed of CNEN/IRD staff members who, besides their routine tasks at the Institute, take part in ERT activities.

The Team is based on coordinated activities involving specialists and technicians in radiation protection and dosimetry together with administrative and logistic support staff organized as shown in figure 1.

The work on coordination of field operations and in 7 field response groups is carried out by 128 professionals divided into four units, in such a way that each unit is on call twenty-four hours a day, seven days a week each month.

In the case of individual exposure and/or contamination, the Triage Group is responsible for the identification of the victims. The group members include health physicists and medical doctors specialized in radiation hygiene. The victims are subjected to a preliminary evaluation and, if recommended, are sent to an appropriate therapy unit. Records are kept of all procedures such as diagnosis, therapy, medical follow-up, etc. and also on information related to radiation protection and technical failures which have resulted in accidental exposures.

The specialists called to attend the victims (real or potential) are organized as follows: dose assessment group (IRD), medical doctors specialized in radiation hygiene (IRD - FURNAS - INB) and medical doctors from the therapy units (Navy Hospital - Cancer Institute). Figure 2 shows the responsibilities of each group and their interfaces.

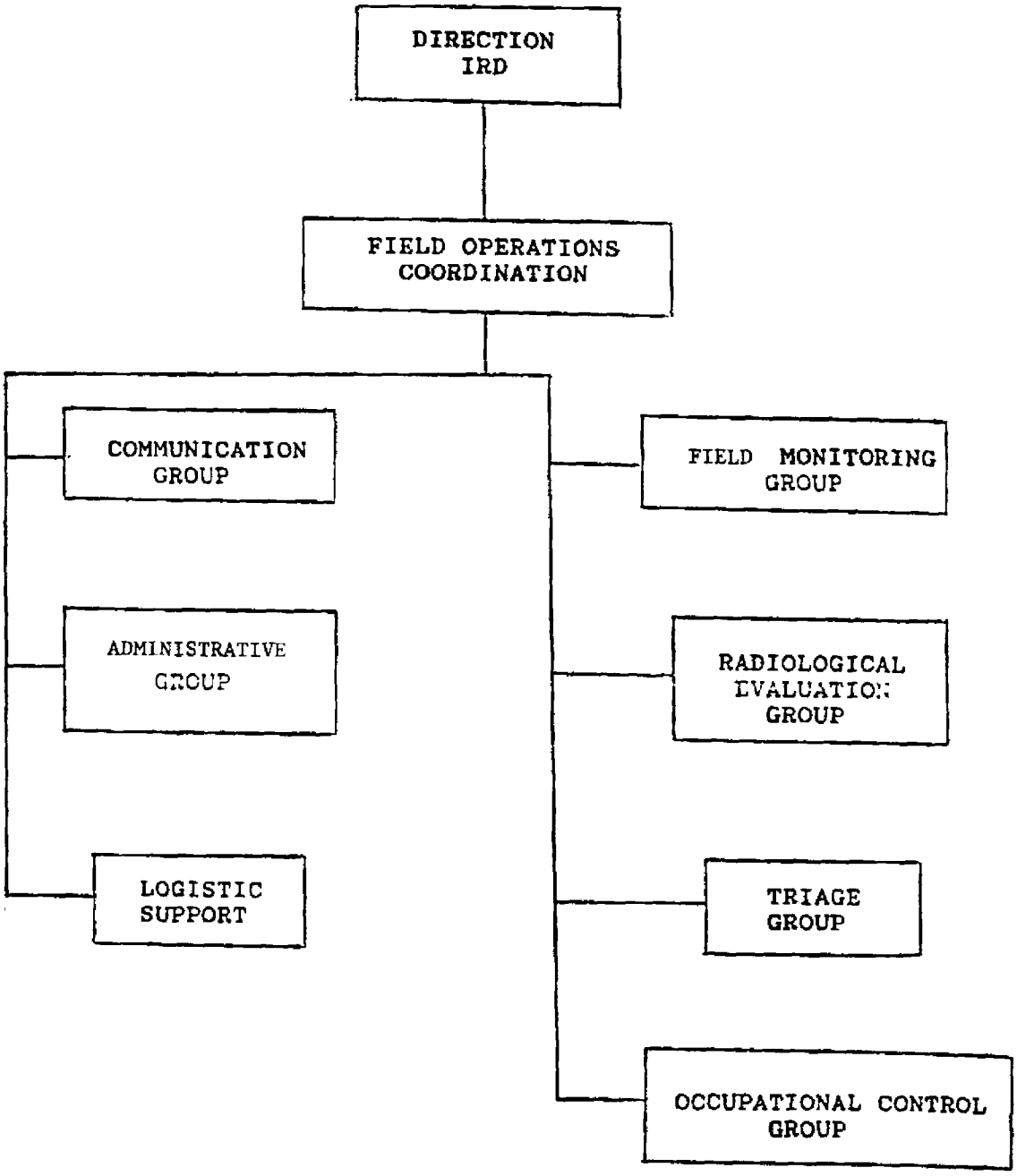

FIGURE 1 : CNEN/IRD EMERGENCY RESPONSE TEAM ORGANIZATION

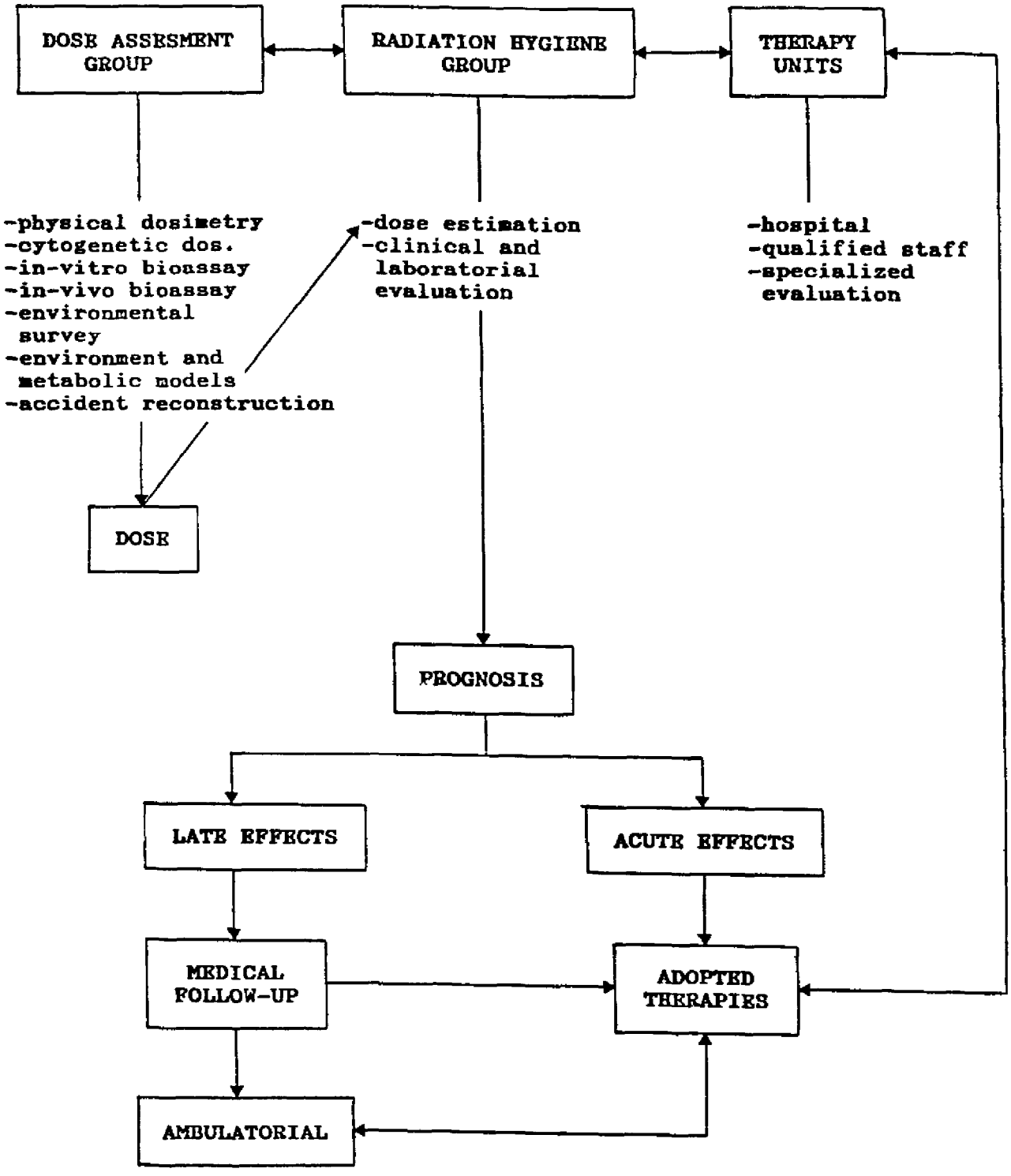

FIGURE 2: ATTRIBUTIONS OF EACH GROUP TO ATTEND RADIATION VICTIMS.

3.2 Working plan for the Centre in the period 1990-1993

a) Determination of infrastructure for providing radiological and medical assistance in the case of a nuclear accident or radiation emergency (including international assistance and cooperation);

b) Review of information of the Goiania accident with the purpose of using the experience for the elaboration of national emergency response plans in other countries.

c) To participate in relevant WHO meetings;

d) To provide advice or assistance, if requested, through WHO to other Member States (in particular to Portuguese-speaking countries);

e) To contribute to the elaboration of a regional WHO system for radiation emergency preparedness together with the USA and Argentina;

f) To contribute to training activities on the request of WHO through:

- organizing training courses in Brazil;
- providing lectures for training courses elsewhere;
- local assessment of radiological emergency response plans in other countries.

4 ICCR - International Collaborating Centre for Radiopathology (Le Vésinet, France, President - Dr H. Jammet)

The ICCR is an association based on 3 bodies; the Curie Institute (CI) which is an independent organization, the Commissariat of Atomic Energy (CEA) and the Central Service for Protection against Ionizing Radiation (SCPRI) belonging to the Ministry of Health of France. The ICCR was designated in 1980.

The main objectives of the ICCR are to provide Member States with recommendations and practical assistance on the medical handling of radiation emergencies and to strengthen their medical preparedness to radiation accidents.

In practical terms, the Curie Institute (CI), located in Paris, is a clinical base of ICCR, in particular for the treatment of overexposed persons.

The Commissariat on Atomic Energy of France (CEA), is a research base of ICCR. Experiments on radiation effects in animals, developments in methods of diagnosis of radiation injuries, dosimetric measurements for reconstruction of radiation accidents and other research activities are carried out at an institute located at Fontenay-aux-Roses (Centre of Nuclear Research, CNR).

The SCPRI contributes with its expertise in the field of radiation protection and provides its facilities for measurements of radioactive contamination including internal contamination in humans. First aid can be rendered to overexposed persons, especially in case of a large accident in an infirmary for 24 beds. The SCPRI has at its disposal 15 mobile laboratories trucks, trailers and a railroad car with 32 anthropogammametric sets) able to check, in total, more than 12,000 persons, or samples per day. There are complimentary means for a first check of eventual irradiation (dosimetry, clinical examination, etc.). The means of SCPRI can carry out a large "on site" checking to select contaminated and/or irradiated persons. Besides, numerous stationary means are available at Le Vésinet.

The SCPRI has developed a national network in France for the permanent survey of atmospheric radioactivity using a centralized system in which some neighbouring countries will participate. This permits a very early intervention of the mobile means.

The ICCR is the nucleus of a national network for the handling of overexposed or contaminated persons. The best services in the civil or military hospitals, competent in the treatment of victims in case of a radioactive emergency, are able to cooperate with the ICCR according to special contracts.

Duties of the above-mentioned institutions in the case of a serious radiation accident are the following:

Actual or suspected victims of the accident are taken to SCPRI which would serve as a centre of initial reception. Some of the persons examined at SCPRI may be transferred to the CI for diagnosis and treatment. The hospitals working under special contracts with ICCR may also be used.

The ICCR is on alert around the clock to provide assistance in the case of a radiation accident not only in France but in any foreign country which might appeal for help. Countries belonging to European, East Mediterranean and African regions are particularly taken under the umbrella of the ICCR services.

Experts of the ICCR actively participate in the UNSCEAR, ICRP and in elaboration of international recommendations on the medical handling of overexposed persons.

The ICCR provided medical aid to victims of radiation accidents including those in developing countries. It published in English and French 3 booklets describing its services and research activities, recommendations on planning nuclear accidents and guidance on the medical handling of irradiated persons. The booklets are available at WHO/HQ to be distributed upon request. The ICCR has been organizing training courses on radiation accidents. The next one is planned for February 1991.

The ICCR terms of reference are the following:

- to serve as a focal point for advice and possible medical care in cases of radiation injuries in humans;
- to facilitate the development of equipment and the formation of specialized staff in human radiopathology;
- assist in the elaboration of medical emergency plans for major nuclear accidents;
- initiate and carry out coordinated studies on human radiopathology and epidemiological studies that may be appropriate;
- assist in the preparation of relevant documents and guidelines.

In the case of an actual radiation accident, the ICCR could provide the following services;

- a team for on-site urgent measures and treatment;
- a team with appropriate equipment for rapid surveys of external radiation and/or contamination;
- transportation of patients;

- facilities for medical examinations and treatment including:
  a) bioassay service,
  b) whole-body counters,
  c) radiochemical analysis of samples,
  d) specialized staff and hospital facilities for treatment of radiation injuries;

- follow-up medical supervision and treatment.

The points of contact are:

Dr Jammet - President of the Centre
Professor Pellerin - Director of SCPRI
Professor Chanteur - Deputy Director of SCPRI
Professor Moroni - Head of Radiophysics Dept., SCPRI

Tel No. (1) 39 76 07 52
Telefax: (1) 39 76 08 96
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5. CREH - Collaborating Centre for Radiation Effects on Humans (Hiroshima, Japan, Director - Dr Y. Hasegawa)

This Centre is based on the Radiation Effects Research Foundation (RERF). The 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 USA.

RERF was preceded by the Atomic Bomb Casualty Commission (ABCC), which was established in 1947 by the US National Academy of Sciences with funding from the US Atomic Energy Commission. ABCC conducted an extensive health survey on A-bomb survivors with the cooperation of the Japanese National Institute of Health (JNIH) of the Ministry of Health and Welfare, which joined the research programme in 1948.

As it was considered necessary for these investigations to continue in full partnership between Japan and the USA, ABCC was reorganized in April 1975 into the present Foundation. Funds for its operation was provided equally by the Government of Japan through the Ministry of Health and Welfare and the Government of the USA through the Department of Energy and the National Academy of Sciences. It is managed by a binational Board of Directors and the scientific research activities are carried out under the recommendations of a binational Scientific Council.

The objective of the Radiation Effects Research Foundation 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.

Location: Hiroshima Laboratory — 5-2 Hijiyama Park, Minami-ku, Hiroshima City, Japan 732

Nagasaki Laboratory — 1-8-6 Nakagawa, Nagasaki City, Japan 850

a) Annual budget (1989): 4,116,521,000 yen

b) Total number of staff: 434 (312 in Hiroshima and 122 in Nagasaki)

c) Number of professional staff: 59 (46 in Hiroshima and 13 in Nagasaki)

d) Clinical facilities available, but no hospitalization facilities

e) No current activities with regard to radiation emergency medical preparedness and assistance

f) Major research programmes: as shown below

Studies	Number of Subjects	Year of Base Population	Year Commenced
Life Span Study (LSS)	120,000	1950	1958
Pathology Study	70,000	1950	1961
Adult Health Study (AHS)	20,000	1950	1958
In Utero Study	2,800	1945-46	1956
Genetic Study (F_1)			
Mortality	77,000	1946-	1960
Cytogenetics	33,000	1946-	1967
Biochemical Genetics	45,000	1946-	1975

Special Studies	Components	
AHS		
Cardiovascular disease	Incidence, risk factor	1965
Aging study	Osteoporosis, menopause, senile dementia	1970
Somatic cell study	Immunology, immune competence, mutation	1981
Cell biology	Radiation sensitivity, radiation carcinogenesis	1979
Cytogenetics	Chromosome aberrations	1965
LSS		
Cancer study	Case-control study, site-specific cancer studies	1979
Reassessment of A-bomb Radiation Dosimetry	US-Japan joint study	1981

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.

The main role of CREH in REMPAN is to provide advice in long-term follow-up of the population affected by a radiation accident.

6. CREA - Collaborating Center for Radiation Emergency Assistance (Oak Ridge, USA, Director - Dr R.C. Ricks; Associate Director - Dr S.A. Fry; Assistant Director - Dr M.E. Berger)

The CREA designated in 1980 is part of the Radiation Emergency Assistance Center/Training Site (REAC/TS), of Oak Ridge Associated Universities, Medical Science Division.

The REAC/TS was established in 1976 and has been operated since then by the Medical Sciences Division of Oak Ridge Associated Universities in Oak Ridge, Tennessee 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).

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 facility 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 Associated Universities. 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. Since the program began in 1976, REAC/TS has been involved directly or indirectly (consultatively) in the care of over 1,200 radiation accident victims.

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 data base, 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 earlier 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 serves as a focal point in the Americas Region for advice and actual medical assistance in cases of radiation overexposure. It contributes to strengthening medical preparedness of American countries for radiation accidents by training activities, convening meetings, assisting in elaboration of national plans for emergency actions etc. The CREA works closely with the centers in Brazil and Argentina to coordinate response in the Americas.

The CREA has responded to several radiation accidents in countries of the Region. On-site teams investigated the accidents. Exposed persons were subjected to medical investigation.

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

The CREA terms of reference are the following:

- serve as a focal point for advice and possible medical care is 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;
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.

The most recent example of providing medical assistance is a serious radiation accident in San Salvador, El Salvador (5 February 1989) which prompted mobilization of medical and health physics assistance for 3 patients hospitalized in Mexico City following transfer from San Salvador. The technical, dosimetric and medical aspects are described in Annex VII of this report. Follow-up of this accident is continuing with emphasis on periodic additional cytogenetic dosimetry, bone dosimetry by electron spin resonance, and routine medical surveillance.

The main activities of the CREA for the second half of 1990 are the following:

1. The center will assist the Government of Mexico in conducting a training course, "Medical Management of Radiation Accidents", June 21-29, Veracruz, Mexico. Physicians, nurses, and EMT's will attend this course. The course is offered in support of the emergency preparedness effort related to the Laguna Verde nuclear power plant located near Veracruz. The course is co-sponsored by the Pan American Health Organization (PAHO), Washington, D.C.

2. The center will conduct a two-day training course, "Management of Radiation Accidents", October 23, 24 in Toronto, Ontario, Canada. The course is offered in support of emergency preparedness efforts by the Province Organization and Ontario Hydro Company.

3. The center will assist the Government of Australia and the Australian Radiation Laboratory, which is part of the WHO Collaborating Centre in Australia, in conducting two week-long radiation accident management training courses. These courses are designed to teach medical and health physics personnel techniques of medical management of radiation accidents. The courses are scheduled August 27-31 and September 3-7, 1990 in Melbourne.

4. REAC/TS will conduct the third in a series of International Conferences entitled, "The Medical Basis for Radiation Accident Management". The Conference will be held in Oak Ridge, TN, December 5-7. It will focus on the psychological aspects associated with radiation accidents including those involving large populations. Presentations on selected accidents will include:

* Brief history of the accident
* Psychological effects on medical staff and emergency workers
* Psychological effects on the patient and patient's family
* Psychological effects on the general public
* Neurophysiological effects
* Long-term psychological consequences

Distinguished speakers will be invited to discuss the accidents at Chernobyl, Brazil, El Salvador, Windscale, Three Mile Island, Hanford, and other selected accidents. In addition to the above topics, discussions will include the role of various national/international groups in minimizing the psychological consequences, role of the media, and risk perception.

The conference will be preceded on December 4, 1990 by a session, "The Basics about Radiation" for conference attendees who do not have a background in the radiation sciences.

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

Dr Robert C. Ricks - Director
Dr S.A. Fry - Associate Director
Dr M.E. Berger - Assistant Director, Training Coordinator
Dr C.C. Lushbaugh, Pathologist, Consultant

Tel. no.: 24 hour emergency number (615) 481-1000 request REAC/TS be paged
(615) 576-3131
Telefax: (615) 576-9522
Telex: Department of Energy, Oak Ridge Operations 810 572-1076

7. CCMRP - Collaborating Centre for Medical Radiation Pathology (Leningrad, USSR, Head - Dr A.L. Dudarev)

The CCMRP designated in 1986 is based upon the Central Research Institute for Roentgenology and Radiology, USSR, Ministry of Health.

This Institute has accumulated a 30-year experience in radiation pathology. It has a staff of 700 and its activities in radiation protection include the protection of population and patients, the introduction of new methods for treatment of radiation injuries, medical supervision for late effects, and, if necessary, treatment of persons after radiation accidents. The structure of the Institute is the following:

- Department of Radiological Services Organization

- Patent and Information Division

- Department of Radiological Diagnostics

    - Division for Standardization and Improvement of Radiodiagnostics
    - Division for Radiological Diagnostics of Digestive System Diseases
    - Division for Radiological Diagnostics of Broncho-Pulmonary System Diseases
    - Laboratory of Nuclear Medicine
    - Laboratory of Computer Analysis of Image

- Clinical Radiology Department

    - Proton Neurosurgery Division
    - Solid Tumours Radiotherapy Division
    - Systemic Diseases Radiotherapy Division
    - Gynaecological Radiotherapy Division
    - Laboratory of Pathology

- Department of X-ray Endovascular Endoscopy and Operative Surgery

    - Division of X-ray Endovascular Endoscopy and Operative Surgery
    - Division of X-ray Endovascular and Operative Urology

- Medical Radiobiology Department

    - Laboratory of Radiation Injuries Diagnostics
    - Laboratory of Late Radiation Pathology
    - Laboratory of Cancer Therapy Radiobiology
    - Radiation Pharmacology Laboratory
    - Molecular Radiobiology Laboratory

- Biomathematics Laboratory

- Medical Biotechnology Department

    - Laboratory of Preparative Biotechnology for Radiation Diagnosis Therapy
    - Hybridoma Technology Laboratory

- Medical Radiation Physics Department

    - Dosimetry Services Basic Laboratory of the USSR Ministry of Health
    - Radiotherapeutical Technique Division
    - Medical Physics Laboratory
    - Radionuclide Technology Laboratory

The main objectives of the CCMRP are to provide Member States with recommendations on the medical handling of radiation emergencies and to strengthen their medical preparedness for radiation accidents. In the case of a radiation accident the CCMRP can provide medical assistance to some Member States upon their request.

Particular activities of the CCMRP are concentrated on the development of quantitative approaches in diagnosis, prognosis and treatment of radiation injuries.

The CCMRP terms of reference are the following:

In General

- serve as a focal point for advice and medical care in cases of radiation emergencies;
- assist in elaborating plans of medical preparedness for radiation emergencies;
- participate in coordinated studies on human radiopathology and radiation epidemiology;
- support WHO activities in the training of medical personnel for the medical handling of radiation emergencies;
- take part in international meetings, especially organized by WHO on the problems of overexposure and to contribute to producing guidelines in this area;
- collect and evaluate worldwide information on diagnosis and treatment of radiation injuries;
- exchange experience and information as well as to coordinate its activities with other WHO Collaborating Centres in the medical handling of radiation emergencies.

In Particular

Develop quantitative techniques for:

- the most plausible and quick prognosis of radiation injuries;
- assessment of effectiveness of diagnostic and therapeutic measures;
- simulation and interpretation of radiation-induced processes;
- evaluation of public health actions for protection of the population in the case of radiation accidents.

In the case of radiation accidents

To provide, if agreed in advance by bilateral regulations:

- an on-site emergency team
- admission of foreign patients for medical investigation and treatment
- follow-up medical supervision and treatment

During the last two years, one of the main objectives of the Centre was the provision of logistic and administrative support for international cooperation of Soviet institutions with organizations abroad interested in Chernobyl studies. The following countries and organizations have been visited to discuss joint research activities: France, Japan, USA, Belgium, Finland, the International Agency for Cancer Research and the Commission of European Economic Cooperation. Agreements on bilateral and international cooperation have been discussed and plans of actions developed. During the visits the exchange of experience on handling of radiation accidents was very successful, especially in the field of organization of environmental monitoring (France, Belgium, Finland), epidemiological projects, late effects risk assessment, psychological problems in the population of affected areas. The Centre participated in arranging a WHO mission to Moscow, Byelorussia and Ukraine. It also participated in a fact finding mission of IAEA. The joint research activities in Hungary, Bulgaria, Finland on biodosimetry and the assessment of population exposure have been continued.

A representative of the Centre took part in the elaboration of the WHO International Programme on the Health Effects of the Chernobyl Accident.

Inside the USSR, the most important task of the Centre was cooperation with various research organizations and public health services to collect and disseminate information and participate in various missions, inspections and meetings. The Institute of Biophysics is considered to be the leading institution in the assessment of health risk for the population, treatment of acute radiation injuries, establishment of guidelines and recommendations for medical supervision of workers and the population. The Institute closely cooperates with the National Radiation Protection Commission. Institute of

Medical Radiology of the Academy of Medical Sciences in Obninsk has extended a research programme on radiobiology and radiopathology and is responsible for maintenance of the National Register for the population living in the areas affected by the Chernobyl accident. The All-Union Centre for Radiation Medicine of the USSR Academy of Medical Sciences in Kiev has been designated for research and health management of the population and personnel involved in post-accident management. Similar activities are developed now at the Institute of Radiation Medicine of Byelorussian Ministry of Health. The CCMRP closely cooperates in Leningrad with the Institute of Radiation Hygiene of the Russian Federation Ministry of Health and with the Institute of the Marine Transport Hygiene which is responsible for radiation protection supervision of nuclear ice breakers and nuclear power plants. The system of close cooperation of all the above-mentioned institutions provides the opportunity for establishing interdiscipline projects, intervention and inspection teams and emergency planning activities.

Public information and education has received more attention in recent years. "Radiophobia" and psychological problems among the population living in the area affected by the Chernobyl accident sometimes create more serious problems than the public health management itself. Insufficient information and lack of education in radiation protection created credibility gaps between the public and the experts of the Ministry of Health. This is sometimes used by the "greens" to solve some local problems. The Centre representatives participated in many meetings with local health authorities and the public and produced a list of most frequent problems and questions to prepare relevant answers and publications. A simple WHO booklet for the population prepared jointly with collaborating centres would be helpful and might be of interest for various countries. The planned WHO Centre in Obninsk could provide independent expertise on population exposure and, if necessary, medical examinations.

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