4) Training of radiation scientists under the WHO fellowship me

In recent years, CREH has provided technical training to the following radiation scientists under the WHO fellowship :

- Dr Andrey P. Konogorov from Obninsk, the Russian Federation, from 1 to 17 December 1993
- Drs Andrew Pukhovsky and Vladislov Riabukin from Moscow, the Russian Federation, from 18 to 20 April 1994
- Dr Vladimir Saenko from Obninsk, the Russian Federation, from 18 July to 26 August 1994

5.3 Brief history of RERF

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.

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.

5.4 Locations, annual budget, number of staff and facilities

- Hiroshima Laboratory: 5-2 Hijiyama Park, Minami-ku, Hiroshima City, Japan 732
- Nagasaki Laboratory: 1-8-6 Nakagawa, Nagasaki City, Japan 850
- Annual budget (1994): 4,350,000,000 yen
- Total number of staff: 390 (286 in Hiroshima and 104 in Nagasaki)
  Number of professional staff. 51 (43 in Hiroshima and 8 in Nagasaki)
- Facilities:
  (1) Research laboratories
  (2) Clinics (no hospitalization facilities)
  (3) Computer center
  (4) Radioisotope facilities
  (5) Library

5.5 Major research

Studies	Number of Subjects	Year of Base Population	Year Commenced
Life Span Study (LSS)	120,000	1950	1958
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

5.6 Publication of study results

The research results of the Foundation are published as scientific papers in international and Japanese journals and as review chapters in books. The Technical Report Series printed at RERF from 1959–1992 has been discontinued, although special reports containing data too extensive, or otherwise unsuitable, for journal publication will continue to be produced when necessary.

A large body of RERF epidemiological data serves as a critical source of information for the reports of various international agencies and organizations, such as the International Commission on Radiological Protection (ICRP), the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), and the United States National Research Council's Advisory Committee on the Biological Effects of Ionizing Radiation (BEIR). RERF studies provide the fundamental and extensive data from which these agencies develop risk estimates and establish radiation-protection guidelines for occupationally exposed workers and for the general population.

An English-language newsletter, *RERF Update*, published quarterly since 1989, briefly reports news about RERF and summarizes recent scientific findings. Titles of articles published in the open literature, their summaries, and their complete journal citations are listed regularly in *Update*.

A bibliography of papers in the scientific literature, government reports, and other RERF publications is published in both English and Japanese annually.

5.7 RERF directions

RERF has been singularly successful in defining the human response to acute gamma and neutron exposures, but important gaps in knowledge remain to be filled. These include:

(1) recording the cancer experience of a larger fraction of survivors, especially those youngest at the time of exposure,
(2) using clinical studies to pursue important disease endpoints that are not well expressed by mortality,
(3) developing and testing biological markers of radiation exposure,
(4) completing the collection of lymphocyte and DNA samples from surviving parents and their offspring, and
(5) pursuing heritable effects
   - using advanced methods of DNA analysis to detect mutation, and
   - analyzing health records of the offspring to reveal potential changes in incidence and mortality rates of cancer and other relevant diseases.

5.8 Point of contacts

Dr Yutaka Hasegawa
Permanent Director
Radiation Effects Research Foundation
(Head, WHO Collaborating Centre for Radiation Effects on Humans)
5-2 Hijiyama Park, Minami-ku, Hiroshima City, Japan 732
Fax No. 011-81-82-263-7279
Tel No. 011-81-82-261-3131 (extension no. 104)
No. 011-81-82-261-3136 (direct)

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

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 me 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 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 centres 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 semiannual 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 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 137 calls for assistance regarding accidental exposure or contamination following radiation accidents. These calls for assistance include:

- 78 responses during January 1-December 31, 1993;

- 59 responses during January 1-November 30, 1994.

During the twenty three (23) months described above, 18 patients were seen in REAC/TS and the Methodist Medical Center in Oak Ridge. Overall, the REAC/TS emergency response was directed to accidents involving exposure, contamination, or a combination. Physical and biological dosimetry assistance was provided as well as coordination of DTPA therapy for internally deposited transuranics and medical consultation for accidents outside the Oak Ridge area. Four patients were admitted to REAC/TS for emergency treatment and/or diagnostic evaluation.

Other selected activities during the reporting period include:

- twenty three (23) training courses in radiation accident management conducted in REAC/TS. 484 persons were trained;

- twenty four (24) training courses conducted in the United States in support of DOE, WIPP, military sites, and private medical or health physics groups;

- provided assistance to the IAEA by conducting training courses in Egypt (February 93), Jordan (February 93), UAE (March 94), and Egypt (October 94);

- assisted PAHO/WHO in conducting training courses in Cuba (November 93) and Russia (June 94);

- combined follow-up of the San Salvador accident and co-authored paper presented on the case in the Second Consensus Development Conference on the Treatment of Radiation Injuries, Bethesda, MD, USA (April 93);

- participated in the Second International Symposium on the Radioactive Accident with Cesium-137 in Goiania, Brazil (December 93);

- participated in the 21st Scientific Meeting of the Japanese Association for Acute Medicine, Hiroshima, Japan (November 93);

- presented invited paper during Scientific Session of the 1993 General Meeting of the IAEA, Vienna, Austria (September 93);

- member of technical working group to develop a document entitled, "A Reporting System to Collect Information and Disseminate it to Member States on Accidents with Radiation Sources and Devices and Establishment of a Reporting System," Vienna, Austria (May 94);

- the cytogenetic dosimetry laboratory continued to perfect protocols for cryopreservation and subsequent culture of human lymphocytes, as well as chromosome "painting" techniques for evaluation of persistent radiation-induced translocations.

Selected activities planned for the near future include:

- conduct a training course, "EMS Response to Radiation Accidents," May 11-12, 1995, Gatlinburg, TN;

conduct the fourth in a series of REAC/TS conferences, "The Medical Basis for Radiation Accident Preparedness: Aspects of Patient Care," 1996.

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 Physicians:

S.A. Fry
W.W. Burr
J.G. Davis
D.E. Minner

Telephone number:	(615)576-3131 - 8:00 am to 4:30 pm Eastern Time Zone - Monday-Friday 24-hour Emergency Number - (615)481-1000 - request REAC/TS to be alerted
Fax number:	(615) 576-9522
Telex:	810572-1076 - Department of Energy, Oak Ridge Operations

REMPAN Fifth Meeting
Paris, France
December 1994

Summary of REAC/TS training activities (1993, 1994)

In-house

- 23 radiation accident management courses
- 484 persons trained (MDs, RNs, HPs, EMTs, others)
- 3511 persons trained since 1976

Off-site (US)

- 24 radiation accident management courses conducted in hospitals located in:

  - Colorado (2)
  - Florida (1)
  - Idaho (2)
  - Maryland (1)
  - New Mexico (6)
  - Pennsylvania (1)
  - Utah (3)
  - Wyoming (7)

REMPAN Fifth Meeting
Paris, France
December 1994

Summary of REAC/TS Courses Sponsored by IAEA and WHO (1993, 1994)

IAEA Sponsorship

- Radiological Emergency Preparedness, Cairo, Egypt (Feb 93)
- Radiological Accidents: Response Team Medical Emergency Training; Amman, Jordan (Feb 93)
- Training Course on Radiation Safety; United Arab Emirates (Mar 94)
- Medical Management of Radiation Accidents; Cairo, Egypt (Oct 94)

PAHO/WHO Sponsorship

- Medical Treatment of Personnel Exposed to External Radiation and/or Radioactive Contamination; Havana, Cuba (Nov 93)

REMPAN Fifth Meeting
Paris, France
December 1994

Summary of REAC/TS Radiation Response Activities (1993, 1994)

- Responded to 137 calls for assistance
- 12 persons seen in REAC/TS facility
- 6 responses in Methodist Medical Center
- Cytogenetic dosimetry performed on 6 individuals
- 21 new accidents added to REAC/TS Registry
  - « 7 U.S. accidents
  - « 14 non-U.S. accidents
  - « 48% (10/21) were medical misadventures

REMPAN Fifth Meeting
Paris, France
December 1994

Foreign Scientific/Medical Meeting Participation

- 1993 General Meeting of the IAEA, Vienna (Sep 93)
- 21st Scientific Meeting of the Japanese Association for Acute Medicine, Hiroshima, Japan (Nov 93)
- National Institute of Radiological Sciences, Chiba-Shi, Japan (Nov 93)
- 2nd International Symposium on the Radioactive Accident with Cesium-137, Goiania, Brazil (Dec 93)
- 10th International World Congress on Medical Physics and Biomedical Engineering, Rio de Janeiro, Brazil (Aug 94)

REMPAN Fifth Meeting
Paris, France
December 1994

REAC/TS Participation in Major Nuclear Exercises

- Federal Radiological Monitoring Assessment Center 93, Fort Calhoun NPP, Omaha, NE (Jun 93)

- Exercise Diver Mist, Joint US/UK exercise, England (Apr 94)

REMPAN Fifth Meeting
Paris, France
December 1994

Selected Planned Activities in 1995

- Conduct EMS Conference, May 11-12, Gatlinburg, TN
- Conduct 4th in a series of international conferences, "The Medical Basis for Radiation Accident Preparedness: Focus on Patient Care," (Oct/Nov) site to be determined
- Participate in planning and conducting U.S. Full Field Exercise for nuclear emergencies (Sep)

7. ICCR - International Collaborating Centre of Radiopathology (for Ionizing and Non-Ionizing Radiation), Fontenay-aux-Roses, 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 Protection Office Against Ionizing Radiation (OPRI) reporting to the Ministry of Health, Social Affairs and Labour of France. The ICCR was designated in 1980 and redesignated in November 1994 for four years.

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 (Institute for Nuclear Safety and Protection, IPSN)

The OPRI 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 investigation centre for 24 beds. The OPRI has at its disposal 15 mobile laboratories trucks, trailers and a railroad car with 32 anthropo-gammametric 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 OPRI 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 OPRI 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 OPRI which would serve as a centre of initial reception. Some of the persons examined at OPRI 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 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.

Between the two meetings of the REMPAN in 1990 and 1992 the International Collaborating Centre in Radiopathology (ICCR) of the WHO has progressed in three fields:

1. The ICCR is now competent for radiopathology, for both ionizing radiation and also non-ionizing radiation (ultraviolet, visible light, infrared, radiofrequencies, microwaves, low and extremely low frequencies, electric and magnetic fields).

2. The ICCR is based on its initial members: Curie Institut, French Atomic Energy and Ministry of Health, Social Affairs and Labour (OPRI). But the ICCR now has many associate laboratories and services from civil and military hospitals. All these associations represent 34 services for the treatment of severe aplasia, 20 services for the treatment of severe burns and 9 specialized centres in case of radioactive contamination.

3. The general and practical organization of the ICCR is adapted to three types of scenarios involving less than 10, between 10 and 100 and more than 100 victims of radiation accident. The following aspects are presented: the radiation accident management, the technical, health and medical intervention; the triage with distinction between external whole body or partial body exposure, external or internal contamination and accompanied or not with trauma and burns, the organization for emergency and non-emergency cases; the critics for the selection of laboratories and technics for the diagnosis and treatment of radiological aplasia, burns and contamination.