

Special Lecture

Proposed Collaboration between the 21st Century COE Program at Nagasaki University and WHO/HQ

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The Radiation and Environmental Health (RAD) Unit of WHO/HQ evaluates health risks to environmental and occupational radiation exposure. The programs promote radiation researches, provide advice on emergency medical and public health responses to radiation accidents, and advice national authorities on how to minimize any risk to human health. This paper discusses the scope and structure of the WHO/HQ RAD Unit and identifies areas for the establishment of future joint projects within the framework of the 21st Century Center of Excellence (COE) programs of Nagasaki University, "International Consortium for Medical Care of Hibakusha and Radiation Life Science".

WHO/HQ and Nagasaki University have been collaborating closely for a long time on the three projects: (1) Chernobyl Tissue Bank, (2) Telemedicine and (3) Emergency Radiation Medicine. In the area of scientific research on radiation-induced/associated carcinogenesis, Nagasaki University has substantial knowledge and expertise in the field, in addition to long-term epidemiological studies in Atomic Bomb survivors. WHO/HQ cooperates closely with a number of international bodies to elaborate guidance on radiation safety and health hazards based on valid scientific knowledge, advises national authorities how to prepare for and respond to radiation overexposure and what public health actions may be needed.

There are many areas where significant beneficial cooperation could occur between the two institutes and these are explored in this proposal.

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Introduction

Ionizing radiation has always been a part of human living environment. All materials on earth contain some radioactive substances. Along with natural radioactive sources in the Earth's crust and cosmic radiation, man-made sources also contribute to our continuous exposure to ionizing radiation. Anthropogenic environmental radioactive pollution is well known from nuclear weapons testing of the past, nuclear waste disposal, accidents at nuclear power plants, as well as from transportation, storage, loss and misuse of nuclear applications in medicine, industry and science.

Radiation activities in WHO/HQ are divided between two Departments. The Department of Essential Health Technology (EHT) that focuses evidence-based technologies and seeks cost-effective solutions for developing countries. The Medical Diagnostic Imaging Unit of this department is responsible for safety, training and better utilization of therapeutic radiation. I belong to another Unit called "Radiation and Healthy Environment (RAD)" which deals with envi-

ronmental and health issues as a part of "Sustainable Development and Healthy Environment (SDE)" Cluster including the Department for "Protection of the Human Environment (PHE)" that originated from "Radiation Medicine" after the Chernobyl nuclear power plant accident.

Hence the WHO/HQ RAD Unit is basically in charge of nuclear power plant accidents or other radiation related disasters as well as the natural radiation problem ascribed to radon, and medical care of people exposed to radiation. Other than these, issues related to non-ionizing radiation such as health effects of ultraviolet radiation or electromagnetic waves are also among the responsibilities of RAD Unit (http://www.who.int/topics/radiation_non_ionizing/en/).

Current Activities of WHO/HQ RAD Unit

Recently, along with the issues such as medical care of victims of nuclear power plant accidents, other responsibilities have been as-

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signed to WHO/HQ RAD Unit. These are related to the aftermath of the September 11 terrorist attacks, and focus on the international countermeasures against terrorism such as the defense against biological and chemical weapons as well as nuclear terror threats.

The main WHO/HQ RAD Unit's counterpart is the International Atomic Energy Agency (IAEA), which besides of the nuclear power problems and nuclear proliferation control issues is also in charge of monitoring the environmental radiation and safety maintenance. Therefore, environmental radiation in IAEA and health effects of radiation in WHO are the common areas of the agencies' activity. In fact, for the United Nation's gathering of data and scientific reports at the Chernobyl forum, environmental issues are supervised by IAEA and health effects by WHO. But unlike the centralized way of acquisition of the information on power plant disasters by IAEA, there is currently a group of departments in WHO that cooperate on the relevant health issues. In the case of depleted uranium problem in Iraq, United Nations Environment Programmes (UNEP) has the leadership in the program under which IAEA collaborates on the environmental and WHO on health issues.

A new concept of "World Health and Radiation Network" (WHARN) has been proposed by me that would allow comprehensive integration of radiation issues and coordination of the related strategies (Figure 1). The effects of radiation in man are principally identical irrespectively the exposure comes from an artificial or natural source. This premise is planned to be taken into consideration under WHARN that will further become one of the subjects of jurisdiction of RAD and/or EHT's radiation project, particularly of the Unit of Diagnostic Imaging and Laboratory Technology. The future prospects for an active pursue of this sharing of collaborative functions is to organize in the framework of WHO collaborative center that would include university's science program and may be related NGO. One common department within the WHO/HQ may be ideal to handle all the matters of radiation and nuclear medicine including environmental and medical sources. However, this remains to be further discussed.

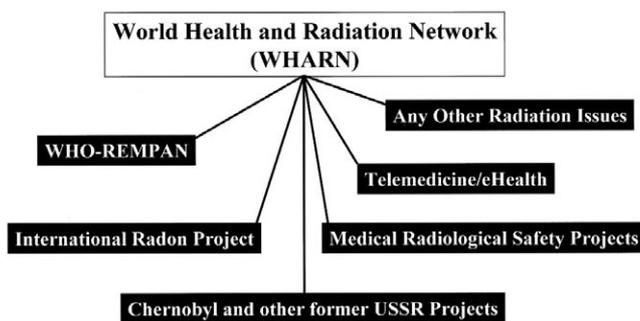


Figure 1. Proposal of function and structure of WHO/HQ RAD radiation programs under the new concept of World Health and Radiation Network (WHARN).

Possible Areas of Collaboration

Having in mind WHARN goals and plans of ionizing radiation program of WHO-RAD expansion on one hand and a need for local cooperation on the other, I would like to enquire about a possibility of establishing a collaborative project with Nagasaki University using the following directions:

- 1- Emergency Radiation Medicine programs for radiation-exposed victims (Hibakusha) through WHO-REMPAN coordination system, especially in the Far East Asian region
- 2- Programs related to the health effects of people exposed to the Chernobyl accident, Semipalatinsk atomic bomb testing site in Kazakhstan and the many accidents occurring in the former Soviet Union
- 3- The International Radon program
- 4- The Depleted Uranium program
- 5- The Hibakusha Medical Care program
- 6- The remote-area training and education programs (Telemedicine and eHealth)

WHO-REMPAN

The REMPAN activity plays a principal and critical role in providing an emergency medical response not only to the international society but to individuals overexposed to radiation in cases of accidents in close relationship with IAEA. Some aspects of the urgent medical care of Hibakusha (radiation-exposed victims) are available from WHO's Ionizing Radiation Program homepage (http://www.who.int/ionizing_radiation/a_e/rempan/en/). A quick look at the homepage shows a summary of radiation accidents data for public information, and issues of support and management of urgent diagnosis and treatment along with usual preparation and training advocated for radiation emergency situations. The educational materials of "Medical Preparedness and Response" jointly produced by IAEA and WHO was translated from English to Japanese with a CD-ROM in 2004 under Nagasaki University 21st Century COE Program as approved by IAEA/WHO. At present, there are no standardized common training and education courses on emergency radiation medicine even within the WHO-REMPAN collaborating centers. This issue remains to be solved in the near future with respect to regional and national particularities.

WHO commits secretarial function to organize the structure while actual medical care support activity is on REMPAN-designated WHO collaborative centers. From this point of view, in Japan, the Radiation Effects Research Foundation (RERF) in Hiroshima and the Atomic Bomb Disease Institute in Nagasaki are both officially designated by REMPAN as epidemiologic and international medical care collaborative centers. Additionally, the National Institute of Radiological Sciences (NIRS) in Chiba is expected to be officially nominated too. It can be anticipated that these three establishments will form the nucleus of a domestic/international medical care of Hibakusha in close cooperation with WHO/HQ. Perhaps in Japan, NIRS can

play the major role with RERF mainly dealing with epidemiological surveys and Nagasaki University as the center for supporting the international medical care cooperation.

In parallel, it is also important for the Far East Asian region to arrange for a base to handle possible nuclear power plant accidents and to provide consultations and efficiency assurance. The regional network on emergency radiation medicine is necessary to establish especially among China, Korea and Japan.

In Nagasaki University, there have been achievements in the long-term health survey of the Atomic Bomb survivors, management of data collection, and therapeutic modalities, as well as contributions to international medical care and health evaluation activities in Chernobyl and Semipalatinsk. These activities can form the basis of new initiatives for cooperation with WHO/HQ for training and educational programs in the field of radiological hygiene and medical care, as well as telemedicine and eHealth for the Far East Asia region in collaboration with governmental and non-government organizations such as Nagasaki Association of Medical Care for Hibakusha (NASHIM).

Radiation Exposure Problems in Developing and Developed Countries

Mishandling and operating the defective X-ray machinery or insufficient safety measures, along with the use of unnecessary excessive radiation because of insufficient knowledge of radiation basics needs to be controlled. WHO has a substructure called Medical Imaging Unit which deals with such problems in the developing countries. Unit's homepage (http://www.who.int/diagnostic_imaging/en/) delineates the activities, training and educational programs.

On the other hand, Japan has far surpassed the standards of all advanced countries having an exceedingly high number of CT scan machines, namely 15,000 units, that is nearly a half of the total number of all CT units existing in the world (Figure 2). Compared to individual annual radiation dose from natural sources that equals to 2 mSv, average annual exposure from medical usage of radiation is higher. It is estimated that the total sum of received doses adds up to 6 mSv which is greatly influenced by the number of CT scans taken. Cancer screening in adults, CT examination of children and recently

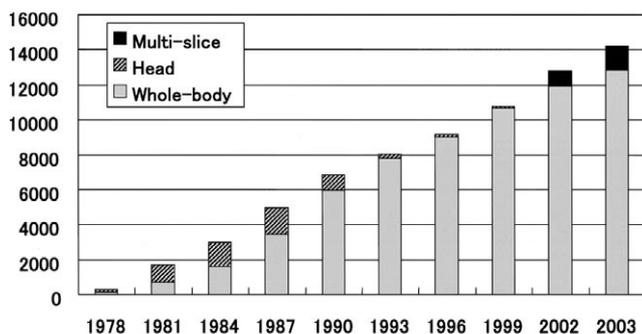


Figure 2. Annual increased number of CT in Japan.

introduced PET-based cancer screening with whole body CT scans have led average annual radiation dose in Japan to exceed the permitted standard safety levels. It has been reported in a paper in the *Lancet* issue dated Jan 2004 that based on the risk projection models from the atomic bomb victims, 1% of all adult cancers might have been caused by the medical use of radiation. Such estimates may be controversial and comprise a matter of debate but in case of Japan, the risk has been reported much higher, 3% (Figure 3). Although verity of this result needs to be confirmed yet, the report is alarming. While the developing countries may have a variety of problems with proper use of radiation in health care, it appears that in developed countries the excessive use of radiation in medicine has become an emerging problem. Further studies in this field are necessary as there are only few exact and evidence-based surveys on the medical use of radiation in developed countries. Obviously, advancement and progresses in medical care also necessitate the development of measures for radiation protection too.

As for cooperation between WHO and Japan, there is a possibility of proposing the collaborative projects to survey and study the problem of medical usage of radiation, in particular the role of CT scanning in cancer screening worldwide. It is believed that great efforts should be made to work out guidelines to resolve the issue of medical use of radiation. With regard to the problem of childhood CT scanning and higher radio-sensitivity of children, surveys need to be performed to evaluate radiation health effects. Similarly, PET for cancer screening through whole body CT scanning is a subject that requires accurate investigation to clarify the impact of increased exposure to medical radiation on the community.

Besides the diagnostic radiological problems, radiation cancer therapy is another topics in cooperation with IAEA how to keep the radiation safety as well as to promote treating cancers appropriately. Not only in developed countries but also in developing countries, a spiraling increase of cancer death is a big concern as a "silent crisis", which should be overcome by the well-organized partnership between WHO and IAEA.

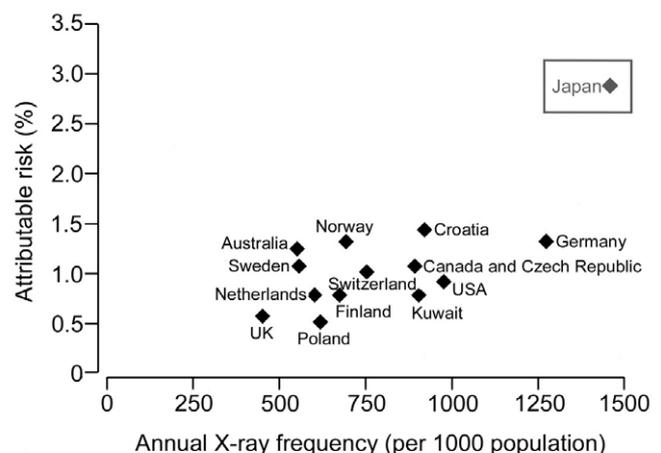


Figure 3. The risk of cancer attributed by medical diagnostic procedures in the developed countries (*The Lancet* 363: 345-351, 2004).

Decentralization Ideas

One of the big changes in WHO policy has been the decentralization doctrine to delegate more activities to the regional executive offices so that cooperation can be bolstered and the driving force for health care increased. Concerning this point, there is a possibility to strengthen regional coordination and relations in Asia through WHO/HQ RAD and Nagasaki University. In particular, collaborative programs in the framework of the Western Pacific Region Office (WPRO) may have special implications. The strategic areas of focus in the WHO/HQ radiation program are divided into 6 regions and several priorities exist (Figure 4). The focal activity of WPRO is es-

entially important for Nagasaki University.

It is necessary to employ two different categories of approaches to radiation programs. In Far East Asia, potential nuclear power plant problems are associated with the developed countries. Therefore, it is especially urgent to establish a link with REMPAN activities. Also, issues of handling the inappropriate and immature medical uses of radiation should be worked over. On the other hand, in South East Asia with multitude of islands there is a need in local health care that puts the problem of medical radiation in the forefront. Perhaps, this region may be connected with the Medical Radiological Imaging Unit, and appropriate new discussions should be raised. It is necessary to establish connections with many countries through regional WPRO coordinator with the purpose to promote cooperation in which WHO/HQ, the Japanese government, Nagasaki University and a selected model country will have exchanges among them and deepen these contacts as much as necessary. In such developing countries in the WPRO region, many territories definitely need comprehensive Telemedicine and eHealth programs to be initiated.

A Health and Environment Linkage Initiative (HELI) has been recently launched through WHO and UNEP as a global effort to promote and facilitate activity in developing countries to reduce environmental threats to human health in support of sustainable development objects. Concerning medical radiological problems, unnecessary and misused overexposure to radiation can be avoided and prevented but effective steps are definitely required at the practical and political levels. The idea of decentralization contemplates bi-directional cooperation through a good and more preferably, equal partnership between the developed and developing countries. Of

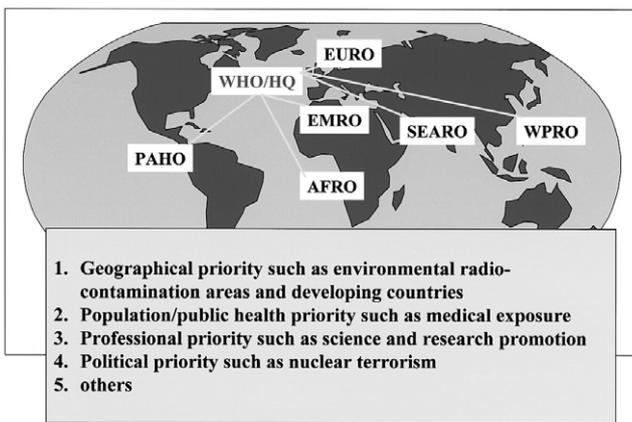


Figure 4. Strategic areas in the focus of WHO/HQ radiation programs.



Figure 5. Possible joint work between WHO/HQ and Nagasaki University in the framework of Dr. Yamashita's tasks at the WHO/HQ (No 1 to 4, respective working theme and projects). Red closed spots indicate location of atomic power plant station in the Asian countries in 2003).

course decentralization should also cover such issues as health burden, professionalism and politics.

We should thoroughly consider our advantages and disadvantages both in WHO/HQ and Nagasaki University, and then find out a solution to eventually create joint programs on radiation and human health under the mutual understanding and agreement. Frontiers of the work that I can do during two years at the WHO/HQ are summarized in Figure 5 indicating the possibilities for collaboration between the 21st Century COE Program at Nagasaki University and WHO/HQ.

Conclusion

All said above is not about organizing a joint undertaking with WHO participation or to make new expectations. It is about forming a solution finding-oriented structure of practical significance. Young medical society's graduates and doctors may certainly have short-term programs as their theme important for them, but those with dependent and self-reliant mind can devote themselves to challenge international organizations and use their experience to the best of Nagasaki. Undoubtedly, internationalization can really enrich both the univer-

sity society as a whole and gifted individuals as particular.

At the 60th anniversary of the atomic bombing, we would like to impart a second wind to the core of human health through dispatching talented initiative men overseas, to developing or developed countries. Nagasaki University's ideas in the field of radiation and nuclear medicine in the form of "Human Protection and Oversea Medical Assistance" projects, is this very goal. We really expect that the current young scientists COE symposium is a clue that will enable exchange between WHO/HQ and Nagasaki University to get stronger.

We have already cut the wedge between WHO/HQ and Nagasaki University by planting ornamental double-leaves cherry trees in front of WHO/HQ and on the ground behind the main building, as a symbol of World Peace in commemoration with the 60th year of Atomic Bombing in this 2005.

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