

RERF's Responses to the Fukushima Dai-ichi Nuclear Power Plant Crisis

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Radiation Effects Research Foundation

Immediately after the Fukushima Dai-ichi nuclear power plant crisis occurred on March 11, 2011, RERF convened its Committee for Radiation Emergency Medical Response (Chair: Chief Scientist Kazunori Kodama, Vice Chair: Information Technology Department Chief Hiroaki Katayama) and has since adopted the following measures based on deliberations led by the relevant committee (through April 30, 2015):

1. Dispatch of experts to affected regions and radiation measurement

- a. Dispatch of a radiation technologist to Fukushima prefecture for radiation measurement, March 16–22, 2011

Mr. Toshinori Kurisu, Chief of Technicians, Division of Radiology, Department of Clinical Studies, Hiroshima Laboratory (then Assistant Chief of Technicians in the Department of Clinical Studies, Hiroshima Laboratory) was dispatched to Fukushima prefecture as a member of an emergency assistance team sponsored by the Hiroshima International Council for Health Care of the Radiation-exposed (HICARE). This six-member team was organized to respond to the Fukushima prefectural government request to the Hiroshima prefectural government. In Fukushima, together with the staff of local health and welfare offices and public health centers, the team members used radiation survey meters to conduct radiation measurements at 12 evacuation sites, and provided consultation services to the evacuees.

RERF received a letter of appreciation for this effort dated March 23, 2011 from the HICARE President.

- b. Dispatch of a research scientist and a radiation technologist to Yamagata prefecture to provide guidance and training regarding radiation measurement, March 17–24, 2011

RERF dispatched Dr. Norio Takahashi, Consultant (then Research Scientist in the Department of Genetics), and Mr. Katsuhisa Yamasaki, Senior Technician in the Department of Clinical Studies in Nagasaki, at the request of the Yamagata prefectural government via Japan's Ministry of Health, Labour and Welfare. Dr. Takahashi and Mr. Yamasaki visited four public health centers and six evacuation sites in Yamagata prefecture, to provide guidance and training regarding radiation measurement using radiation survey meters.

RERF received a letter of appreciation for this assistance dated March 31, 2011 from the Yamagata Governor.

- c. Radiation measurement at RERF Hiroshima

Thirty-three persons who moved to Hiroshima from areas near the Fukushima nuclear power plant requested radiation measurements. Dr. Asao Noda, Assistant Chief, Department of Genetics and staff conducted these measurements using radiation survey meters and also tested three items (through April 30, 2015).

2. Information provision and consultation regarding radiation and health

a. Responses to inquiries from the general public and media

Since March 11, 2011, the date of the initial accident, RERF has been inundated with general public inquiries and media requests for information. During the first three days after the initial disaster, including Saturday and Sunday, RERF received more than 50 telephone inquiries regarding a wide variety of issues, not just about fields of research pursued by RERF. Based on such inquiries, a list of the most frequently asked questions was prepared on March 14 and distributed to all staff in preparation for further anticipated inquiries from outside RERF. Dr. Nori Nakamura, Consultant, Department of Genetics (then Chief Scientist), and the Public Relations and Publications Office served as official liaison to the media and to the general public, respectively.

b. Creation of a special webpage

On March 15, 2011, on the RERF website “What’s New” page, RERF notified the general public of availability of brochures regarding radiation health effects. On March 17, a special webpage related to the nuclear power crisis was created to provide information on a collection of questions and answers regarding radiation health effects, some relevant brochures, a listing of institutes related to health care for the radiation-exposed in Japan, and other related information from both Japan and abroad. An English version of the webpage was made available on March 18, and thereafter, the webpage has been updated when necessary.

After the accident, RERF website usage dramatically increased. The number of daily hits and visits increased from about 40,000 and 1,300, respectively, before the disaster to about 2 million and 30,000, respectively, afterwards, as of March 15, 2011. Thereafter, the numbers gradually decreased, but the number of hits over the past year averages about 2.43 times the pre-accident number, or about 97,300/day, with the number of visits about 1.84 times the pre-accident number, or 2,400/day. Furthermore, the Research Questions page on the external website has received a large number of questions during the period from the immediate aftermath of the accident to the present, with RERF research scientists responding to individual questions.

3. Biological dose assessment

Maintaining the emergency liaison system within the network in case of the occurrence of high-level radiation exposure, Dr. Yoshiaki Kodama, Director of the Biosample Center (then Chief of the Department of Genetics), who worked at that time as a member of the Chromosome Network Committee sponsored by the National Institute of Radiological Sciences, served on standby status. (At this point in time, Dr. Kanya Hamasaki, Research Scientist in the Department of Genetics, serves as a member of the aforementioned committee in place of Dr. Y. Kodama.) Since chromosome-based dose assessment is time-consuming and labor-intensive, it was decided that RERF would accept requests only from the said network and the Hiroshima University Radiation Emergency Medicine Promotion Center, a tertiary referral medical institute for western Japan. (No biological dose assessments have been conducted at RERF as of April 30, 2015.)

At the end of January 2013, Hirosaki University began chromosomal testing among residents of the town of Namie, Fukushima prefecture, with the aim of early-stage radiation-dose assessment. It was decided at the request of the university that RERF would

cooperate in this project. Dr. Y. Kodama and Dr. Hamasaki are the RERF leaders of this effort. RERF is responsible for working on image analysis, while Hirosaki University handles operations from blood collection and cultivation to preparation of samples. Image analysis was implemented for 405 people as of April 30, 2015. Besides the RERF research scientists, an investigator who serves as an advisor to the Institute for Environmental Sciences in Aomori prefecture and those from Osaka Prefecture University are working on the project as outside specialists.

4. Cooperation on the Fukushima Health Management Study to be conducted by the Fukushima Medical University

a. Cooperation through the Council of Radiation Effects Research Organizations

To prepare for the possibility of long-term epidemiological research on residents of the affected areas, RERF embarked on discussions on how to carry out such research on March 15, 2011. Subsequently, with increased worldwide attention on the nuclear power plant crisis, international organizations, governmental agencies as well as research institutes inquired of RERF about its possible responses in terms of conduct of such long-term epidemiological research.

With that in mind, on March 29, 2011, Dr. Toshiteru Okubo, Chairman, proposed to member institutions of the Council of Radiation Effects Research Organizations the establishment of a system for conducting long-term epidemiological research. The Council held an *ad hoc* meeting at the Fukushima Medical University on April 2. On April 25, a group of observers from the Fukushima Medical University visited RERF. On April 27, the sixth working meeting of the Council of Radiation Effects Research Organizations was held in Tokyo, attended by Dr. Okubo and Dr. K. Kodama. Dr. Okubo emphasized the need to conduct long-term epidemiological research and made concrete proposals. The Council then decided to nominate advisors for radiation dose estimation and long-term epidemiological research from among the Council members.

On December 19, 2012, the seventh working meeting of the relevant council, in which Dr. Okubo and Dr. K. Kodama participated, was held in Fukushima to discuss the Council's future support systems for Fukushima and other issues.

On September 13, 2013, the eighth working meeting of the relevant council, in which Dr. Okubo and Dr. K. Kodama participated, was held at the Nagasaki National Peace Memorial Hall for the Atomic Bomb Victims.

On September 16, 2014, the ninth working meeting of the relevant council, in which Dr. Okubo and Dr. K. Kodama participated, was held in Kyoto under the auspices of the Kyoto University Radiation Biology Center.

b. Participation in the Fukushima Health Management Study review committee

On May 13, 2011, a preparatory meeting for the Fukushima Health Management Study review committee (tentative name) was held at the Fukushima Medical University, attended by Dr. K. Kodama and Dr. Kotaro Ozasa, Chief of the Department of Epidemiology. On May 20, the government of Fukushima prefecture called on RERF to recommend a candidate to serve as a member of a review committee for the prefecture's Health Management Study on Fukushima Residents (hereinafter referred to as "Fukushima Health Management Study"). In response, it was decided that Dr. K. Kodama would assume the position of committee member. On May 25 and 26, faculty members from the Fukushima Medical University, as well as employees in charge at the Fukushima prefectural government, visited RERF and

toured the departments of Epidemiology and Clinical Studies. Subsequently, the visitors exchanged opinions and deliberated with RERF staff members.

On May 27, 2011, the first meeting of the Fukushima Health Management Study review committee was held at the Fukushima Prefectural Jichi-Kaikan, where the Fukushima prefectural government and the Fukushima Medical University officially announced that a health study of Fukushima residents would be conducted. Dr. K. Kodama and Dr. Ozasa were absent from the meeting. On June 12, the first meeting of the headquarters for implementation of the Fukushima Health Management Study was held at the Fukushima Medical University, attended by Dr. K. Kodama and Dr. Ozasa. On June 18, the second meeting of the Fukushima Health Management Study review committee was held at the Fukushima Prefectural Jichi-Kaikan, attended by Dr. K. Kodama. At this meeting it was decided that a basic survey (questionnaire) would be conducted to estimate radiation dose to which Fukushima residents were exposed and that the relevant survey would be commenced around the end of June, starting with areas of relatively high contamination. On July 24, the third meeting of the Fukushima Health Management Study review committee was held at the Fukushima prefectural government offices, attended by Dr. K. Kodama and Dr. Ozasa. At this meeting, participants discussed implementation of the basic study as well as more specific studies, including health examinations for those residing in the evacuation and other restricted areas and a thyroid study for children.

The fourth meeting of the Fukushima Health Management Study review committee was held on October 17, 2011, in Fukushima, a gathering that Dr. K. Kodama attended. At the meeting, a summary of an international symposium was reported and progress of the thyroid study was also discussed.

Subsequent meetings of the review committee were held in Fukushima, as follows: the fifth on January 25, 2012 (with the participation of Dr. K. Kodama); the sixth on April 26 (with the participation of Dr. K. Kodama); the seventh on June 12 (with the participation of Dr. K. Kodama); the eighth on September 11 (with the participation of Dr. K. Kodama); the ninth on November 18 (Dr. K. Kodama did not participate); the 10th on February 13, 2013 (with the participation of Dr. K. Kodama); the 11th on June 5 (with the participation of Dr. K. Kodama); the 12th on August 20 (Dr. K. Kodama did not participate); the 13th on November 12 (Dr. K. Kodama did not participate); the 14th on February 7, 2014 (with the participation of Dr. K. Kodama); the 15th on May 19 (Dr. K. Kodama did not participate); the 16th on August 24 (with the participation of Dr. K. Kodama); the 17th on December 25 (Dr. K. Kodama did not participate); and the 18th on February 12, 2015 (with the participation of Dr. K. Kodama).

RERF researchers participate in related committees, as shown below:

- Radiation Dose Estimation Expert Panel

On June 8, 2011, the first meeting in fiscal 2011 was held at the Fukushima Medical University, which Dr. Ozasa attended.

- Health Examination Expert Committee

On September 1, 2011, Dr. Ozasa was appointed a member of the Health Examination Expert Committee at the Radiology Research/Fukushima Health Management Center, Fukushima Medical University. He currently attends regular meetings via the internet to discuss implementation of health examinations among residents in the evacuation zones and other areas.

- Basic Survey Expert Committee and Radiation Dose Assessment Expert Committee

On March 1, 2012, Dr. Ozasa was appointed a member of the Basic Survey Expert Committee of the Center indicated in the above paragraph and attended regular meetings via the internet to discuss radiation-dose assessment based on a questionnaire survey conducted of all Fukushima residents. This committee was reorganized in April 2013 into the Basic Survey Expert Committee, which deliberates on simplification of questionnaires and improvement in response rates, and the Radiation Dose Assessment Expert Committee, which reviews comprehensive assessment of individual radiation dose based on information obtained by way of such questionnaires and other means. Dr. Ritsu Sakata, Associate Senior Scientist, Department of Epidemiology, was appointed a member of the former committee, with Dr. Ozasa serving as an observer. Dr. Ozasa was also appointed a member of the latter committee. These two expert committees were merged into a new committee, the Basic Survey/Radiation Dose Assessment Expert Committee, in September 2013. Dr. Ozasa and Dr. Sakata assumed the positions of committee member and observer, respectively, and they attend regular meetings of the committee via the internet.

- Sample Storage Expert Committee

On November 28, 2011, Dr. Waka Ohishi, Chief of the Department of Clinical Studies (then Assistant Department Chief), was appointed a member of the Sample Storage Expert Committee at the Radiology Research/Fukushima Health Management Center, Fukushima Medical University, for the purpose of providing advice on methods for preserving biospecimens in preparation for the Fukushima Health Management Study. On December 16, faculty members from the Fukushima Medical University and employees in charge at the university's Radiation Medical Science Center for the Fukushima Health Management Survey visited RERF and were provided explanations about departmental overviews, biospecimen storage, and data-management systems, followed by an exchange of opinions and discussion.

- Committee for Development of Monitoring Systems for Low-dose Radiation Exposure

Dr. Y. Kodama assumed the position of member of the Fukushima Medical University Committee for Development of Monitoring Systems for Low-dose Radiation Exposure as of July 1, 2012, providing advice to the university's project for the development of monitoring systems for low-dose radiation exposure.

- Technical reviewer in the screening for selection of businesses to develop the Fukushima Health Management Study data management system

On February 19, 2013, Dr. Katayama participated as a technical reviewer in the screening for selection of businesses to develop the Fukushima Health Management Study data management system.

c. Collaboration agreement reached between RERF and the Fukushima Medical University

On August 12, 2011, RERF and the Fukushima Medical University entered into a collaboration agreement in the fields of education, research, and health care. With regard to the Health Management Study targeting about two million Fukushima residents, RERF will provide expertise to the project, utilizing the Foundation's experience accumulated through decades of follow-up of A-bomb survivors in Hiroshima and Nagasaki.

5. Advice to the government and other organizations

On April 1, 2011, Dr. K. Kodama was appointed as one of the policy investigators (seven experts with medical licenses) serving the Cabinet Secretariat to provide advice regarding medical responses to the Fukushima nuclear power plant crisis. Thereafter, Dr. K. Kodama has participated on an as-needed basis.

On November 1, 2011, Dr. Okubo assumed the position of advisor for Koriyama city, Fukushima prefecture, providing expert advice regarding decontamination work and health management for residents as part of the city's nuclear disaster control efforts. In November 2011, Dr. K. Kodama was also appointed to serve as an advisor on the Advisory Committee on Radiation and Health for Fukushima Prefecture.

During the same month, Dr. Roy E. Shore, Vice Chairman, was appointed to serve as a member of the WHO Health Risk Assessment Working Group on the Fukushima Dai-ichi Nuclear Power Plant Accident.

On November 27, 2012, Dr. Ozasa was appointed a member of the study team on health management for the residents related to the Fukushima Dai-ichi nuclear accident, an advisory body to the Nuclear Regulation Authority, and attended five meetings.

On November 11, 2013, Dr. Y. Kodama became a member of the Ministry of the Environment research project for nuclear-power disaster influence in FY2013, responsible for research on methods for analyzing the health effect of radiation. Dr. Kodama participated in a technological examination committee regarding radiation dose estimation methods.

In January 2014, Dr. Okubo became chairperson of the Expert Committee to Review Epidemiological Research on Restoration Workers at the TEPCO Fukushima Dai-ichi Nuclear Power Plant, and Dr. K. Kodama became a committee member. This review committee was established under the director of the Industrial Safety and Health Department, Labour Standards Bureau, MHLW, and consists of seven experts. It was found that about 20,000 workers had engaged in restoration operations during the period from March 14 through Dec. 16, 2011 and that 173 individuals among the 20,000 were exposed to radiation exceeding the five-year dose limit of 100 mSv set for those working on regular operations. Hence the review committee will review planning of epidemiological research on these 173 workers. The review committee held the following meetings and put together a basic policy for issues to be considered relating to the planning of epidemiological research: the first on February 14, 2014; the second on February 27; the third on March 26; the fourth on April 21; and the fifth on May 16.

MHLW compiled a report regarding these meetings and announced it on June 4.

6. Epidemiological Study of Health Effects in Fukushima Emergency Workers

Based on the report compiled by the Expert Committee to Review Epidemiological Research on Restoration Workers at the TEPCO Fukushima Dai-ichi Nuclear Power Plant, the MHLW called for proposals in July 2014 from the public to conduct the aforementioned epidemiological research using the ministry's work-related disease research grants, and it was decided in October 2014 that RERF's proposal was awarded the grants. With regard to the relevant epidemiological study following the subjects for their lifetimes, it is projected that necessary budgets will be allocated for a significant period of time in a stable manner and that the study will be directed by the same research organization. For the time being, the provision of direct costs for the initial five years is scheduled. In FY2014, we sent a letter announcing the start of the relevant study to about 20,000 subjects who reside throughout Japan. We then conducted a preliminary study among emergency workers residing in Fukushima prefecture and compiled a report at the end of May 2015. With regard to the

full-scale epidemiological study starting in FY2015, an ethical review was recently conducted. The relevant study will be implemented across the nation in an orderly manner.

7. Others

The International Expert Symposium in Fukushima—Radiation and Health Risks, organized by the Nippon Foundation, was held on September 11 and 12, 2011, at Fukushima Medical University. Dr. Okubo served as a chairperson for session IIIa “Dose, Dosimetry and Dose Estimations of Contaminated Areas” and session IIIb “Radiobiology and Radio-epidemiology,” with Dr. K. Kodama delivering a lecture titled “Radiation and Cancer Risk in Atomic Bomb Survivors.”

On November 1, 2012, Dr. Misa Imaizumi, Division Chief, Division of Radiology, Department of Clinical Studies, Nagasaki Laboratory, became a member of the Ministry of the Environment committee for surveying the prevalence of nodular thyroid diseases and served until March, 2013. This committee performed thyroid ultrasound among those aged less than 18 years in three prefectures other than Fukushima prefecture, with the aim of collecting epidemiological findings required for assessment of the results from the Fukushima Health Management Study, and investigated the prevalence of nodular thyroid disease in Japan.

On February 25-27, 2013, the “International Academic Conference on Radiation Health Risk Management in Fukushima” organized by Fukushima Medical University was held in Fukushima. Dr. Okubo served as a chairperson for session 4, “Coordination and Cooperation with Domestic Members (2),” while Dr. K. Kodama delivered a lecture titled “Support for Fukushima provided by the Radiation Effects Research Foundation” in session 3 “Coordination and Cooperation with Domestic Members (1).”

The Minister of Health, Labour and Welfare presented a letter of appreciation to 1,458 organizations that have contributed to relief activities for the victims of the Great East Japan Earthquake. On April 22, 2013, RERF was awarded a letter of appreciation for its contribution to the activities, which are conducted by the Ministry of Health, Labour and Welfare’s Health Service Bureau.

On August 20, 2013, Dr. Imaizumi became a member of a committee of the Ministry of the Environment reviewing the follow-up of nodular thyroid diseases. She reviewed the results of detailed examinations on individuals determined as Grade B in the aforementioned three-prefecture survey conducted by the committee surveying the prevalence of nodular thyroid diseases (through March 2014).

In FY2013, the Ministry of the Environment and Fukushima prefecture held a series of expert-opinion exchange meetings regarding the health effects of radiation under the theme of “Radiation and health: To face anxiety.” As part of these meetings, Dr. Ozasa was invited as a lecturer at a meeting held to explore the subtheme of “heredity” on November 2, 2013 in Koriyama and delivered a lecture titled “Health effects of radiation: from the Radiation Effects Research Foundation.”

At the 6th meeting of the Ministry of the Environment’s Expert Committee to Review Epidemiological Research on Restoration Workers at the TEPCO Fukushima Dai-ichi Nuclear Power Plant, held on May 20, 2014, Dr. Ozasa explained the health effects of low-dose radiation exposure observed among A-bomb survivors and transgenerational effects among their children.

8. Visitors

Apr. 25, 2011	Six faculty members of Fukushima Medical University, including the Vice Chairman (Cases not accompanied by the note “in a visit to the Nagasaki Laboratory” visited the Hiroshima Laboratory.)
Apr. 26	The aforementioned group in a visit to the Nagasaki Laboratory
May 25-26	Three faculty members of Fukushima Medical University and one employee in charge at the Fukushima prefectural government
Dec. 16	One faculty member of Fukushima Medical University and three employees from the university’s Radiation Medical Science Center for the Fukushima Health Management Survey
Jan. 31, 2012	Four members of the Fukushima City Council
July 25	Nine assemblypersons of the Futaba Town Assembly in Futaba County, Fukushima prefecture
Aug. 7	Sixteen people from the Fukushima Prefecture Chamber of Commerce and Industry Joint Association
Aug. 21	Two employees from the Radiation Medical Science Center for the Fukushima Health Management Survey, Fukushima Medical University
Nov. 7	Two employees from the Health Promotion Section, Radiation and Health Management Office, Fukushima City Health and Welfare Center
Nov. 12	Two employees from the Health and Welfare Department, Fukushima prefecture involved in the Fukushima Health Management Study
Nov. 28	Three and two officials respectively from the towns of Namie and Futaba, Futaba county, Fukushima prefecture (accompanied by three staff from Hiroshima city)
Jan. 31, 2013	Five city assemblypersons, Kitakata city, Fukushima prefecture
May 14	Five farmers from Minamisoma city, Fukushima prefecture
Oct. 10	Two employees from the Radiation Health Management Center, Iwaki City Public Health Center, Fukushima prefecture
Oct. 10	Thirty-two members of the Council of Fukushima Municipal Development Associations
Nov. 5	Five members of the Nihonmatsu City Council, Fukushima prefecture
Nov. 11	One chief from the Koriyama City Fire Defense Headquarters, Fukushima prefecture; one association director from the Asakamachi neighborhood associations, Koriyama city; and one other person
Mar. 19, 2014	Three city assemblypersons, Iwaki city, Fukushima prefecture
Jul. 18	One faculty member of Fukushima Medical University in a visit to the Nagasaki Laboratory
Nov. 21	Three faculty members of Fukushima Medical University