

*The Great East Japan Earthquake,  
Fukushima nuclear power plant  
accident and Hiroshima University*







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①The first batch of members of the Radiation Emergency Medical Assistance Team (REMAT) lands on the river bed of the Abukuma River in a Japan Self-Defense Force helicopter. (4:00 p.m., March 13, 2011. Fukushima City)



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②Radiation survey is conducted on evacuated patients in buses. The buses are full of mostly elderly patients. (6:00 a.m., March 14. Minamisoma City)

③Evacuees have been transported to Soso Public Health and Welfare Office by police vehicles but are stranded there, waiting for their evacuation sites to be decided. (10:00 p.m., March 14)

④A scene of Futaba-machi photographed from inside a car headed for an off-site center near the nuclear power plant. Collapsed buildings are seen all over the place. (Just after 1:00 p.m., March 14)

⑤The Radiation Emergency Medicine Coordination Conference was set up at the Fukushima Prefectural Government Hall. The Conference functions as headquarters for conducting radioactive contamination screening and developing a system for providing radiation medicine for residents. (8:30 p.m., March 15. Fukushima City)





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⑥ Staff members transport injured persons to Fukushima Medical University Hospital by helicopter (Just after 10:50 a.m., March 16. On the grounds of Fukushima No. 2 Nuclear Power Plant in Naraha-machi, Fukushima Prefecture)

⑦ Decontamination tents are set up on a tennis court located in the corner of J-Village. (April 5, J-Village, Naraha-machi, Fukushima Prefecture)

⑧ Inside of J-Village, a facility functioning as a front-line base for SDF members and other workers engaged in operations in response to the Fukushima No. 1 Nuclear Power Plant accident (April 9. J-Village)

⑨ Protective masks and shoe covers that workers are required to wear when engaging in operations at Fukushima No. 1 and No. 2 Nuclear Power Plants (April 9. J-Village)



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⑩ Residents put on protective suits at a gymnasium that functions as a relay point for their temporary return home. (June 14. Kawauchi-mura Municipal Gymnasium, Fukushima Prefecture)

⑪ After their temporary return home, residents get off the bus and go back to the gymnasium for radiation measurement and other tests. (June 14. Kawauchi-mura Municipal Gymnasium)

⑫ A large decontamination tent was set up to admit radiation-exposed patients in need of advanced medical care. This tent remained here from March 16 to June 13. (On the premises of Hiroshima University Kasumi Campus)

⑬ In a meeting hall of emergency temporary housing in Fukushima City, Professor Kenji Kamiya of Hiroshima University (center) and Professor Seiji Yasumura of Fukushima Medical University answer questions from evacuees from Iitate-mura. (November 26)

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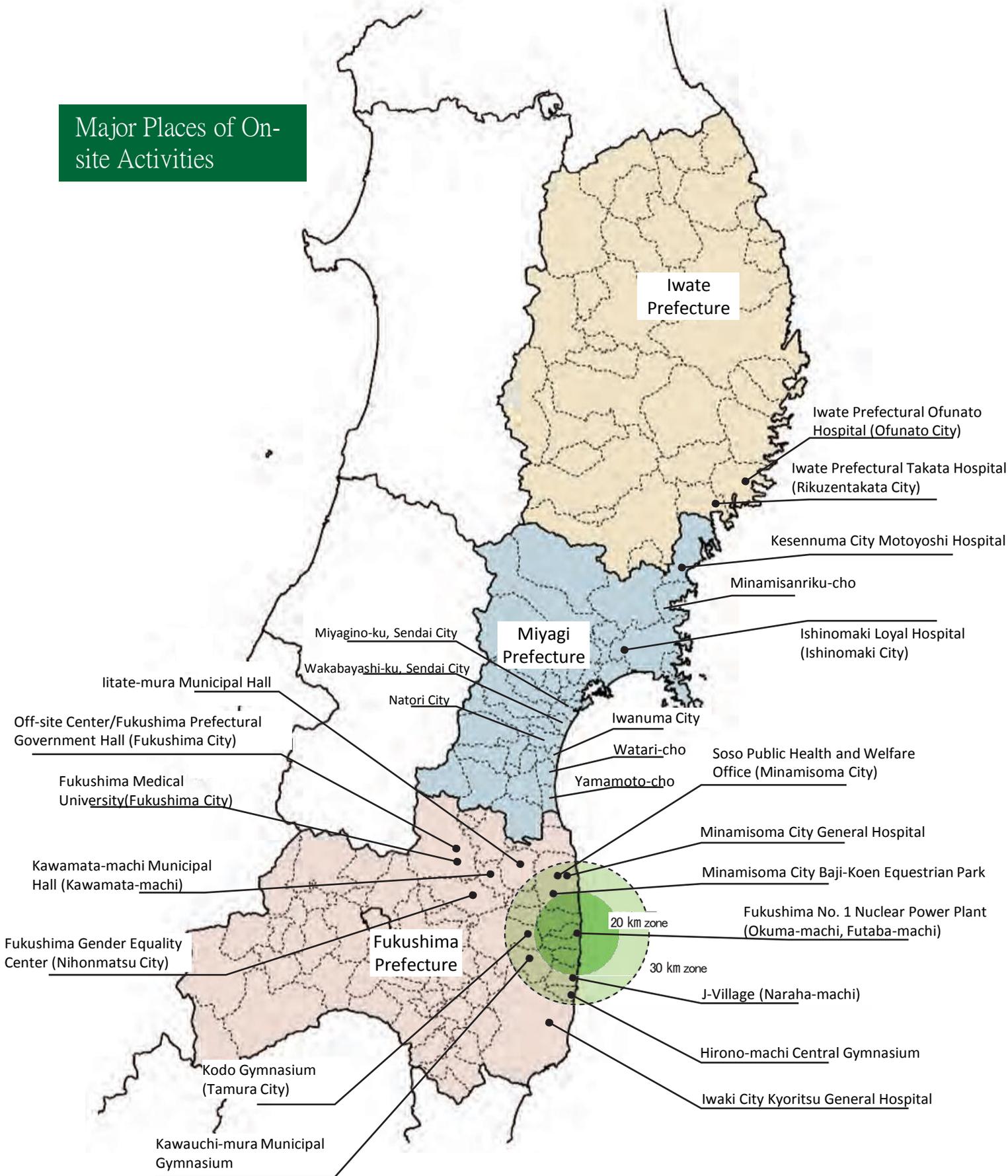




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# Major Places of On-site Activities



**Message from the President on the Publication of *The Great East Japan Earthquake/Fukushima Nuclear Disaster and Hiroshima University***



We are pleased to announce the publication of *The Great East Japan Earthquake/Fukushima Nuclear Power Plant Disaster and Hiroshima University*. The Great East Japan Earthquake that struck on March 11, 2011, and the ensuing nuclear disaster at the Fukushima No. 1 Nuclear Power Plant of Tokyo Electric Power Company (TEPCO) brought unprecedented devastation to Japan. The recovery and reconstruction from which will take several decades. This major catastrophe can also be viewed as a wake-up call to Japanese society regarding overconfidence in science and technology and a neglect of the importance of coexisting with nature.

Immediately following the earthquake/tsunami, dual natural disasters, and ensuing nuclear accident, Hiroshima University dispatched its Radiation Emergency Medical Assistance Team. With this first dispatch we began providing medical assistance and other kinds of support for reconstruction efforts in the disaster-hit areas, particularly Fukushima Prefecture where the nuclear power plant accident occurred. We recognize that assistance with reconstruction efforts in the disaster-hit areas as one of our most important missions and have engaged in relevant support activities primarily for two reasons: 1) Hiroshima University has been selected as a tertiary radiation emergency medical institution for the Western Japan Block and, therefore, is expected to play a pivotal role in providing radiation emergency medical care in the event of nuclear disasters; and 2) the university was founded in the world's first city to have ever suffered an atomic bombing. I would like to express my heartfelt appreciation to the faculty and staff of Hiroshima University for their thorough understanding of and earnest devotion to that mission. I am also proud to note that

many of our faculty, staff members, and students have, of their own volition taken the initiative to plan and implement various support activities for the disaster-stricken regions.

Despite the eager support activities conducted by Hiroshima University as well as many other organizations and individuals from both inside and outside the country, recovery and reconstruction from the devastation of the earthquake, the tsunami, and the radiation disaster fall far below the expectations of the residents of the disaster-hit areas, thus posing numerous challenges. In the years to come, in order to enhance our activities we believe it will be necessary to further strengthen our cooperation with the municipalities and organizations involved.

Almost two years have passed since we started our post-disaster support activities. At this juncture, we have decided to publish *The Great East Japan Earthquake/Fukushima Nuclear Disaster and Hiroshima University* in order to review our support activities, determine if we have met the expectations of the residents in the disaster areas, and apply the findings to our future efforts. With these shared objectives, many faculty members and students who have engaged in various support activities have contributed to this publication.

In conclusion, let me express my sincere hope that the disaster-stricken areas will be rebuilt and recover as soon as possible from the devastation caused by the earthquake/tsunami and nuclear accident.

March 1, 2013

Toshimasa Asahara  
President  
Hiroshima University

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As a Tertiary Radiation Emergency Medical Institution, Hiroshima University plays a pivotal role in radiation medicine in the disaster-stricken area.

No. of medical professionals dispatched from HU:  
1,327  
As of February 2013

A Tertiary Radiation Emergency Medical Institution refers to an institution capable of providing high-level emergency medicine for radiation exposure and of final acceptance for patients with severe symptoms. Hiroshima University has been selected as a tertiary radiation emergency medical institution for the Western Japan Block, and the National Institute of Radiological Sciences (NIRS) for the Eastern Japan Block. Ever since the Fukushima No. 1 nuclear power plant accident, Hiroshima University—mainly its Hospital, Research Institute for Radiation Biology and Medicine, and Radiation Emergency Medicine Promotion Center—has conducted a wide range of supporting activities, in coordination with NIRS.

19:05, March 11

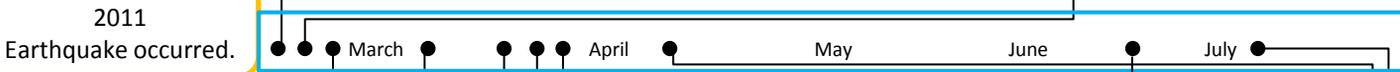
**Dispatched the Hiroshima University Hospital DMAT.**  
About five hours after the occurrence of the earthquake, the Hiroshima University Hospital Disaster Medical Assistance Team (DMAT), comprising two physicians, two nurses and one pharmacist left for the devastated regions. After providing medical services, the team returned to the Hospital on March 15.



March 12 - the present

**Established the Hiroshima University Radiation Emergency Medicine Committee / Dispatched the REMAT**  
In response to the declaration of a nuclear emergency situation, the Radiation Emergency Medicine Committee was set up on March 12, starting disaster victim support activities centering on radiation emergency medical care. On the same day, Hiroshima University dispatched the Radiation Emergency Medical Assistance Team (REMAT) No. 1, led by Prof. Koichi Tanigawa. Subsequently a series of REMAT were sent for supporting activities mainly at such places as the Fukushima Prefecture Government Hall, the Fukushima Offsite Center in the Fukushima Prefectural Government Office, Fukushima Medical University, and J Village. At present, our medical staff are working at the emergency medical room of the Fukushima No. 1 nuclear power plant.

14:46, March 11, 2011  
Earthquake occurred.



11/ March 16

**Hiroshima University Hospital completed preparations for treating radiation-exposed patients**  
Hiroshima University hospital completed preparations for accepting four serious cases and four moderate cases, so as to ensure that a total of 21 radiation-exposed patients (10 serious cases and 11 moderate cases) could be treated at the six hospitals in Hiroshima Prefecture that had concluded agreements as Radiation Emergency Medicine Cooperation Organizations.

April 1

**Prof. Kenji Kamiya, Chairman of the Radiation Emergency Medicine Committee, became a Radiation Health Risk Management Adviser to Fukushima Prefecture.**  
Prof. Kenji Kamiya was appointed as a Radiation Health Risk Management Adviser to Fukushima Prefecture. He has been working to provide Fukushima Prefecture with advice mainly on health management.



April 12 - the present

**Held a total of 83 lectures on such themes as radiation risks to human health.**  
To impart accurate knowledge to residents worried about exposure to radiation, we held 41 lectures in Fukushima Prefecture and 42 lectures outside the prefecture (as of August 2012).

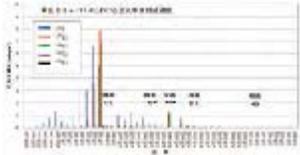
April 19

**Opened the Radiation Protection Fundamental Information Portal Site.**  
To disseminate accurate information on radiation to more people, Hiroshima University opened the Radiation Protection Fundamental Information Portal Site (in Japanese, English and Chinese).



March 20 – May 9 / April 12 – December 27

**Made measurements of radioactive materials at the Higashi-Hiroshima Campus**  
A professor at the Graduate School of Engineering made measurements independently. In addition, in response to a request from the Ministry of Education, Culture, Sports, Science and Technology, we conducted radioactive material measurements and reported the results.



April 2

**Signed the Cooperation Agreement with Fukushima Medical University.**  
Hiroshima University concluded the Cooperation Agreement with Fukushima Medical University, to establish closer coordination and cooperation in the fields of education, research and medical care.

July 28

**Concluded the Cooperation Agreement with Fukushima University.**  
Hiroshima University concluded the Cooperation Agreement with Fukushima University, with the objective of strengthening research, support and literary education of radiation medicine.



### ■ Major Activities

On March 12 Hiroshima University REMAT attended a conference of the NIRS nuclear emergency response headquarters, and flew to Fukushima in the helicopters of Self-Defense Forces on March 13, together with the REMAT of NIRS and experts from the Nuclear Safety Research Association (NSRA).

(1) At the Fukushima Prefectural Government Hall: Set up the Radiation Emergency Medicine Coordination Conference, to make plans for radioactive contamination screening and to compile and manage the data, while working as experts by offering health consultations for residents and conducting thyroid screenings for children.

(2) At the Offsite Center in the Fukushima Prefectural Government Office (nuclear emergency response headquarters): Determined the triage points, patient evaluation criteria, decontamination procedures and first medical response.

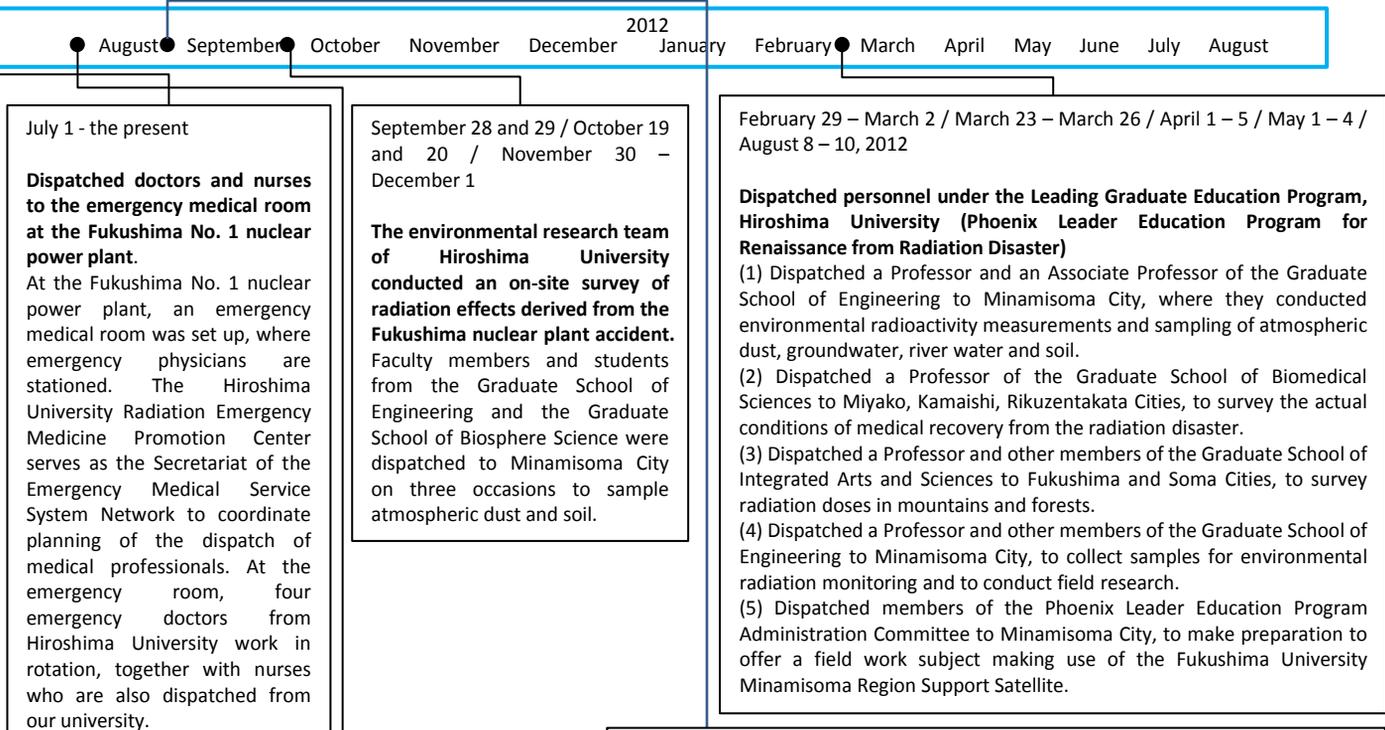
(3) Decided the patient transportation methods, transportation routes, medical facilities that would accept patients, and created a flowchart for patient transportation.

(4) At Fukushima Medical University: Provided physicians and nurses with advice and guidance on patient acceptance, etc., and supported special medical examination for internal exposure using the whole-body counter.

(5) At J Village: Provided expert guidance on the initial evaluation of radiation-exposed patients, and on radioactive decontamination; determined the patient transportation methods; and accompanied the patients when they were hospitalized.

(6) At a relay point for residents' temporary return to areas within 20 km from the Fukushima No. 1 nuclear power plant: Engaged in on-site progress management and guidance as a medical team, and treated the sick and wounded.

\* Two station wagons were deployed to secure on-site mobility (on March 12 and from the departure on March 15 to October 7). One local person was hired as an administrative staff member who provided logistic support for the dispatched DMAT. (April 18 – September 30)



August 8 – the present

**Conducted the special examination of internal exposure.**

At Hiroshima University Hospital, we have been conducting medical examinations of internal exposure to radiation using the whole body counter. The intended examination takers are residents of Fukushima Prefecture, including evacuees from the Prefecture, as well as those who have entered the evacuation zones designated by the national government.

September 2011 - / May 2012 – the present

**Implemented environmental monitoring for radioactive materials around the Fukushima No. 1 nuclear power plant.**

Upon request from the Ministry of Education, Culture, Sports, Science and Technology, Hiroshima University have carried out the following monitoring.

(1) Since September 2011: Environmental monitoring for radioactive materials within the emergency evacuation preparation zones

(2) Since May 2012: Environmental monitoring for radioactive materials within the zones in preparation for the lifting of the evacuation order and in other locations.

## Other Supporting Activities

### *Relief supplies*

Dispatch of relief supplies, including food, medicine and information appliances

In response to a request from Tohoku University, Fukushima University and other various institutes, Hiroshima University sent relief supplies to the disaster-stricken areas. These supplies were sent in six batches, starting from March 19. Among the items included were daily necessities such as food and heaters, medical products such as denture cleaners, and information appliances such as notebook computers and printers.



### *Acceptance of Disaster Victims*

Acceptance of affected undergraduate and postgraduate students and a researcher from Tohoku Gakuin University, Tohoku University and Kitasato University

Hiroshima University Law School accepted one student from Tohoku Gakuin University Law School. Our Graduate School for International Development and Cooperation accepted one researcher from Tohoku Gakuin University. Our Faculty of Applied Biological Science accepted one student from Kitasato University. Hiroshima University offered its Yamanaka Hall and other facilities as accommodations for these students.

### *Fundraising for the Great East Japan Earthquake*

Fundraising and Donations through the Japanese Red Cross Society

We asked our faculty members, students and others concerned with the University for their cooperation in donating to disaster victims. As a result, we raised donations totaling 19,822,748 yen as of the end of August 2011. These donations were all sent to the Japanese Red Cross Society.

**Donations raised between March and August 2011: 19,822,748 yen**

### *Support for Affected Students*

Exemption from Entrance/Tuition Fees

As part of its support for affected students, Hiroshima University granted five students total exemption from the entrance fee, 24 students total exemption from the tuition fee for the first semester, and 12 students total exemption from the tuition fee for the second semester. Moreover, we set up a financial counseling window for students affected by the disaster.

### **Dispatch or other supporting activities in response to requests from other institutes**

- Dispatch of doctors, pharmacists, etc. **22**

Dispatched doctors, nurses and other medical professionals to the affected areas to assist medical services at evacuation centers, etc.

- Screening surveys, radiation measurements, etc. **5**

Dispatched radiation experts who conducted radioactive screening and radiation dose measurements in Fukushima Prefecture.

- Dispatch of lecturers to deliver lectures on radiation-related themes **2**

Dispatched experts who delivered lectures or seminars for farmers in the disaster-stricken areas

- Overseas dispatch of investigators **1**

Dispatched investigators to Thailand where they conducted surveys to support recovery from earthquake and tsunami disasters.

- Creation of a map of tsunami-hit regions **1**

Created a map of tsunami-hit regions upon the request of the Association of Japanese Geographers. Our students also participated in map-making.

# Chapter 1

## Reviewing Two Years of Radiation Emergency

### Medical Assistance



On March 11, 2011, the Great East Japan Earthquake struck the Tohoku and Kanto regions. The subsequent accident at TEPCO Fukushima No. 1 Nuclear Power Plant developed into a major disaster that “will most likely be recorded in the textbooks of a future world history book” (National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission Report). This chapter looks back on how Hiroshima University judged the situation and acted in response to it.

## Determination to Make All-Out Efforts to Help Fukushima Recover From the Nuclear Accident as Researchers Based in Hiroshima, the World's First City to Suffer an Atomic Bomb Attack

Kenji Kamiya

Director of Radiation Emergency Medicine Promotion Center

Director of the Research Institute for Radiation Biology and Medicine



In 2004, Hiroshima University was designated as a local tertiary radiation emergency medical institution. Since then, based on the newly founded Radiation Emergency Medicine Promotion Center, the university has implemented various projects designed to develop a mechanism for providing radiation emergency medical care.

In the afternoon of March 11, 2011, the day on which the Great East Japan Earthquake hit, we were conducting a decontamination drill as part of our radiation emergency medical care training at the National Hospital Organization Kure Medical Center in Kure, south-western Hiroshima Prefecture. Hearing that the dispatch of Disaster Medical Assistance Teams (DMAT) had been ordered in response to the massive earthquake, we rushed back to Hiroshima. That night, the Prime Minister of Japan issued a declaration of “a nuclear emergency situation”. However, despite the declaration, considerable time passed without further government explanation concerning the situation of the reactors at Fukushima No. 1 Nuclear Power Plant nor the extent of environmental contamination due to radiation.

Despite no new information from the national government well into the morning of March 12, we took proactive measures and established a Hiroshima University Radiation Emergency Medicine Committee under the guidance of university President, Toshimasa Asahara. With this initial step taken, we had thereby begun substantive preparations for an accident that may involve radiation exposure. Furthermore, we called in the Director of Hiroshima University Hospital, Mitsuo Ochi, and Professor Koichi Tanigawa, Director of the Advanced Emergency and Critical Care Center, to add to our coordination team, and we dispatched the first-response group of the Radiation Emergency Medical Assistance Team (REMAT) to Fukushima.

As chairman of the Committee, I was asked to assume command of activities to be initiated or coordinated here in Hiroshima. Seven medical experts were appointed, including Professor Koichi Tanigawa and Professor Yoshio Hosoi, as members of the REMAT first-response group. I still vividly remember the indescribable sense of anxiety that I felt on that afternoon of March 12, when I saw off the National Institute of Radiological Sciences (NIRS) REMAT members from the Shinkansen train platform.

The scenes of the tsunami and the nuclear accident that appeared ceaselessly on our TV screens were utterly unrealistic and otherworldly. Something that I found particularly shocking was the images of hydrogen-air chemical explosions that were occurring at the reactor buildings.

Since the dispatch of that very first group, we have sent 37 subsequent groups, comprised of 1,244 total members (as of March 31, 2012), to Fukushima and conducted a range of activities to ensure safety and security for local residents in cooperation with the Fukushima prefectural government, the national government, NIRS, and Fukushima Medical University. Specifically, we helped rebuild the crippled system of radiation emergency medicine, provided support to the emergency rooms that were set up in J-Village, conducted radiation contamination tests on the premises of Fukushima No. 1 Power Plant, helped evacuated residents on various levels including health management, and to temporarily enter the restricted areas, and assisted with internal exposure testing at Fukushima Medical University.

We also asked Mitsuo Ochi (Director of Hiroshima University Hospital), and relevant professors from the Research Institute for Radiation Biology and Medicine (RIRBM), Hiroshima University Hospital, and Hiroshima

University Faculty of Medicine and Graduate School of Biomedical and Health Sciences, as well as Ryoichi Nishida (Executive Manager of the Management Support Office), Teruko Sainohara (Executive Manager of Nursing), and Toshio Kushima (Executive Manager of Medical Treatment Support) to join the Radiation Emergency Medicine Committee. Their participation in the committee made it possible for the Kasumi Campus to provide well-coordinated campus-wide support for our radiation emergency medical assistance activities. I would also like to thank President Asahara of Hiroshima University and Director Ochi of Hiroshima University Hospital who demonstrated excellent leadership in building this support mechanism.

Actions taken by the Committee included preparation and support for the radiation emergency medical teams to be dispatched; development of a system to admit patients to the university hospital as well as to the other hospitals that were parties to the cooperative agreement on radiation emergency medicine services; setting up decontamination tents ready to handle large number of individuals suffering from exposure; building a website; and carrying out contamination tests. Every day, we were extremely busy answering a flood of inquiries from range of affected parties including residents, the mass media, and administrative agencies. Executive Manager Ryoichi Nishida, Mr. Shigeo Hayashi, and Mr. Hisaya Azuma helped us greatly with all day-to-day office responsibilities.

In the process of engaging in these activities, I was appointed by the governor of Fukushima Prefecture to the post of Prefectural Radiation Health Risk Management Advisor. In that capacity, I have given a number of lectures both inside and outside of Fukushima Prefecture concerning radiation risks to human health and radiation protection. In so doing, I have been striving to disseminate accurate knowledge about health management and radiation, thereby easing resident's excessive worries about health hazards and preventing damage caused by the negative reputation of their communities associated with the nuclear accident and its aftermath. The total number of those who have attended my lectures has reached 20,375 (as of July 31, 2012). Also, as a radiology expert, I was appointed vice president of Fukushima Medical University, in which capacity I participated in the survey on health management that Fukushima Medical University conducted to protect the health of the 2.05 million citizens of Fukushima Prefecture. At the same time, I gave specialist advice to the national government concerning radiation risks and radiation protection.

As a researcher based in Hiroshima, a city that survived the atomic bomb attack, I am determined to continue our all-out efforts to facilitate the recovery of Fukushima in the years to come.



(left) President Asahara visiting the Offsite Center and exchanging opinions with national government officials

(right) Briefing session for residents concerning radiation risks to human health and radiation protection

## **Fulfilling Responsibilities as a Tertiary Radiation Emergency Medical Institution**

Mitsuo Ochi

Special Assistant to the President of Hiroshima University

Former Director of Hiroshima University Hospital



When the earthquake hit the Tohoku region on the afternoon of March 11, 2011, I was on a plane from Hiroshima to Haneda, Tokyo, to attend the preliminary discussions for a meeting. On March 31 of that year, I was to complete my two-term, four years of service as hospital director. What happened just before the end of my tenure turned out to be one of the most significant events of my life so far. All means of public transportation from Haneda Airport were suspended. I had no choice but to wait eight hours before I could get into a taxi and, at 2:00 a.m., finally reach the hotel where I had reserved a room.

The next day, March 12, I managed to get through to Kenji Kamiya, Director of the Research Institute for Radiation Biology and Medicine (RIRBM). Responding to the declaration of a nuclear emergency situation issued by the national government, we immediately set up the Hiroshima University Radiation Emergency Medicine Committee. As the only tertiary radiation emergency medical institution in the Western Japan Block, Hiroshima University is required to play a central role in cooperation with the RIRBM, the university hospital, and other relevant institutions.

In the event of radiation emergencies, we must dispatch a medical assistance team and other experts specializing in radiation emergencies, conduct contamination testing on residents and retain the relevant data, and provide residents, schools, and administrative offices with information concerning radiation effects. We actively carried out these tasks under the leadership of Kenji Kamiya, Director of RIRBM, and Professor Koichi Tanigawa, Director of the Advanced Emergency and Critical Care Center. I have also been constantly encouraged and very proud to witness the Radiation Emergency Medical Assistance Team performing a wonderful job in Fukushima.

Because I was the director of Hiroshima University Hospital at that time and was also about to assume an executive post (in charge of medical affairs) at the university from April, my main task was to prepare the hospital for admitting Fukushima patients who may be sent there and who may need emergency treatment after being exposed to radiation. If the number of patients were relatively small, we planned to carry out decontamination procedures in an advanced treatment room on the first floor of the in-patient ward. For a larger number of patients, we planned to perform decontamination procedures in the parking lot of the Resident House block. We also set up four decontamination tents (some objections were raised regarding this action). We then coordinated how to assign patients to several cooperating hospitals in the prefecture, and the respective transportation routes. As for medical equipment and pharmaceuticals, we prepared decontamination devices, whole body counters (WBC) ready and replenished those pharmaceuticals that might possibly become necessary given the radiation disaster circumstances.

We also decided to immediately send half of our stockpiled emergency food supply to the disaster-hit areas, because these areas were believed to be suffering a shortage of drugs, water, and food. Yet, at that moment, we had no available means of emergency transportation. After consulting with Ryoichi Nishida, former Executive Manager of the Managing Support Office of Hiroshima University Hospital, and obtaining approval from President Asahara, we decided

to use the university's own van for that purpose. Seeing our van fully loaded with emergency food supplies screeching off, I prayed with all my heart that the catastrophe would come to an end as soon as possible.

On March 30, I headed for Fukushima myself to meet with Yuhei Sato, Governor of Fukushima Prefecture, and Shinichi Kikuchi, Chairman of the Board and President of Fukushima Medical University to discuss with them how Hiroshima University could support Fukushima in the years to come. The earthquake's "claw marks" could be seen everywhere along the way to Fukushima. I saw long lines of cars outside gas stations waiting for fuel to be delivered.

Despite all this, there were some positive moments as well: Our van, loaded with food supplies, was doing a great job in Fukushima; Dr. Kikuchi a fellow orthopedist, with whom I had enjoyed many years of friendship, gave me a hearty welcome; Director Kamiya was officially appointed to the post of Fukushima Prefectural Radiation Health Risk Management Advisor; and I promised Governor Sato, chairman of the prefectural assembly, and the many others I met, that Hiroshima University Hospital would continue its commitment and support in Fukushima for as long as necessary.

In conclusion I would like to note that the Radiation Emergency Medical Assistance Team has dispatched over 1,300 professionals to Fukushima, including doctors, nurses, radiological technologists, and extensive support staff. I would like to express my deep respect and appreciation to all Hiroshima University staff members for their contribution, and pray from the bottom of my heart for the early recovery and reconstruction of Fukushima from the recent catastrophic event.



Firmly shaking hands with Governor of Fukushima Yuhei Sato (center)

## The Importance of Accurate Knowledge Is Brought Home to Us

Kazuaki Chayama

Executive and Vice President of Hiroshima University

Director of Hiroshima University Hospital



On March 11, 2011, at 14:46, a massive earthquake, with its epicenter off Tohoku's Sanriku coast, struck with a seismic intensity of 7. This major earthquake, combined with the ensuing tsunami, devastated areas all over eastern Japan. I would like to first express my heartfelt prayers for those who lost their lives and sincere condolences to their families.

I had planned to meet then Director of Hiroshima City Hospital, Dr. Osamu Oba, at Hiroshima City Hospital at 3:00 p.m. that day, however the meeting was postponed when I saw the unbelievable scenes of the tsunami unfolding on the TV screen.

That was followed by news of a nuclear power plant accident. Not knowing how much of what was being reported was actually true, Prof. Ochi, then Director of Hiroshima University Hospital, and I spent a long and uneasy time in a hospital meeting room, which would later come to be used as the radiation emergency headquarters.

From Hiroshima University, which is the tertiary radiation emergency medical institution in the Western Japan Block, many doctors, nurses, radiological technologists, and clerical staff were dispatched to the disaster areas to conduct health checkups, provide medical care, and give advice to workers at the crippled power plant and residents of the surrounding communities. As a member of the first group of the medical assistance team, Associate Professor Daizaburo Hirata (currently working at Mazda Hospital) was dispatched to Fukushima from the Department of Gastroenterology and Metabolism. The following story is based on Dr. Hirata's vivid account of what he experienced when dealing with radiation exposure in the disaster-stricken communities under the supervision of Professor Kenji Kamiya, Director of RIRBM.

Dr. Hirata left for Fukushima, carrying solid emergency food and PET bottles containing water. For the first few days, he had to live on the food and water that he carried on his person. He was forced to fetch water from a nearby river in order to flush the toilet. He collected a range of information while attending meetings to discuss what means of transportation to use in the event of personal injuries at the power plant.

In the photographs he took and brought back, we can clearly see the tense atmosphere in which our team members transported trauma patients by helicopter. We can also see scenes in which Dr. Koichi Tanigawa, a professor of emergency medicine and leader of the first-response group, wearing a protective full body suit, rushing to the disaster area to rescue sick and injured people. There was one specific story that made me appreciate how lucky we are to be able to live such a comfortable daily life. The episode was simply about how our team members were moved by the deliciousness of the curry rice served to them after several days living only on the emergency food rations that they had brought with them.

Fortunately, I am pleased to note, that since I took office as hospital director, the situation has improved to the extent that we have been able to gradually downsize our medical assistance system. Two years after the earthquake, it has become quite rare for us see the kind of horrifying scenes that were daily occurrences at the outset of our support efforts

in the disaster areas. Still, the life of the residents who returned home is hardly back to normal. Reportedly, they are still facing many problems, such as the lack of progress in decontamination processing and the lasting damage caused by misunderstandings about the effects of radioactive substances. The challenges they are facing hit home the importance of providing and disseminating accurate knowledge. With this awareness in mind, we are determined to continue fulfilling our responsibilities in cooperation with RIRBM.



Seeing off team members headed for Fukushima (Hiroshima Station)

## Spending Tense and Hectic Days

Ryoichi Nishida

Former Executive Manager of the Management Support Office of Hiroshima University Hospital

Superintendent of Hiroshima Hiramatsu Hospital



I feel embarrassed to confess that when the massive earthquake first struck, it never occurred to me that the ensuing tsunami would cause the horrendous catastrophe that it did. Nor did I imagine, when watching the televised images of the tsunami, that the tsunami would cause a state of emergency at Fukushima No. 1 Nuclear Power Plant.

On March 11, 2011, Executive of Hiroshima University and Director of Hiroshima University Hospital Mitsuo Ochi was in Tokyo on business. I tried to reach him to confirm his safety and to discuss what needed to be done in the days to come. But it was to no avail because all the mobile phones were out of service. I spent many subsequent anxiety-filled hours awaiting the restoration of cellular service. It was not until dawn on March 12 that I was finally able to get through to Dr. Ochi.

After that, Hiroshima University, under the guidance of Dr. Ochi and President Toshimasa Asahara and as the tertiary radiation emergency medical institution for the Western Japan Block, began providing various types of assistance to the disaster-hit areas under the leadership of Dr. Kenji Kamiya, Director of the Radiation Emergency Medicine Promotion Center. Being responsible for back-office services, I spent my days constantly on alert and ready for whatever may happen next until I left Hiroshima University at the end of June that year.

When the earthquake hit, the DMAT team wasted no time and headed out for the disaster area by the early evening of that same day, traveling from Kure to Yokosuka in a Self-Defense Force vessel and from there driving to the disaster area. The next day, Hiroshima University established the Radiation Emergency Medicine Committee. With its headquarters set up in a meeting room on the third floor of the university hospital's outpatient ward, the Committee members, together with Shigeo Hayashi, Leader of the Medical Policy Office, and Hisaya Azuma, Clerical Supervisor of the Radiation Emergency Medicine Promotion Center, worked around the clock, dispatching staff members to the disaster areas, carrying out communication and coordination work with staffers working on site, and negotiating with the head office of the university corporation.

In retrospect, however, I never felt tired or pressured by these seemingly endless tasks, mainly because I had no concerns over the human, material, or financial resources that were to be needed for these activities. This was all thanks to the support and encouragement of President Asahara, Executive Ochi, Director Kazuaki Chayama of Hiroshima University Hospital, and Director Kamiya of the Radiation Emergency Medicine Promotion Center. This point is noted because it was said that unlike Hiroshima University, Nagasaki University was forced to reduce the number of nurses being dispatched due to a lack of financial resources.

As it was difficult for the university hospital alone to gather all the experts required for on-site relief activities, we asked the Technical Center to dispatch radiological technologists and the head office of the university corporation to dispatch clerical staff. Furthermore, from April 18<sup>th</sup>, we had the good fortune of being able to bring on staff retired office

workers of Fukushima University. The participation of all these staff members greatly facilitated our activities. Also, I will never forget the unobtrusive but strong support extended from Tomomitsu Kawamoto, Financial and General Affairs Executive, and Tetsuhiro Takeuchi, Head of the Office of the Secretary, both of Hiroshima University.

Meanwhile, I have been to the disaster area only once: I accompanied President Asahara when he was to attend a signing ceremony for a cooperation agreement between Fukushima Medical University, Hiroshima University, and Nagasaki University. At that time, the Tohoku Shinkansen was yet to fully resume service and trains were not operating on a regular schedule. From Nasushiobara station, which was then the final stop, we headed for Fukushima—still about 100 km away—by a car dispatched from Hiroshima University. I remember how the highway leading to Fukushima was buckled and undulating. We visited the Offsite Center and other facilities but our schedule was so tight that we were not able to spend enough time to properly thank our university staff members for their services in the disaster areas.

There are so many things in our disaster relief activities that are worth noting. I was greatly impressed, among other things, by the activities of Director Kamiya and Professor Yoshio Hosoi. I would also like to express my heartfelt respect for the dedicated on-site services of doctors from our hospital's department of emergency and critical care medicine led by Professor Koichi Tanigawa, Associate Professor Nobuyuki Hirohashi, and Assistant Professor Yasumasa Iwasaki. Dr. Takuma Sadamori and his staff built a TV conference system as well as wireless communications and global positioning systems, which helped us communicate with two vehicles dispatched from the university. I cannot emphasize enough how his service contributed to the success of our support activities.

In some respects, the recent disaster was undeniably man-made. Having been born and brought up in Hiroshima, I often visit the Peace Memorial Park. The latest catastrophe reminds me of the epitaph inscribed on the cenotaph that reads, "Rest in peace, for the error shall not be repeated." Although I am aware that there are debates over the interpretations of these words, I am convinced that no one will deny that we should never repeat such man-made disasters as the one we have recently experienced in the wake of this earthquake and tsunami. Now is the time to think hard again about the meaning of this epitaph.



The Radiation Emergency Medicine Committee meet frequently in response to the constantly changing situation



## Chapter 2

# From Hiroshima to Fukushima



Based on its many years of engagement in medical care for atomic bomb survivors and research into radiation disaster medicine, Hiroshima University today functions as the only tertiary radiation emergency medical institution in western Japan. Immediately after the recent disaster, in the face of so much conflicting and confusing information, Hiroshima University wasted no time in reaching the disaster-stricken communities, establishing a system for radioactive contamination screening and radiation emergency medical care for the evacuated residents.

*From Hiroshima to Fukushima*

## **Medical Activities in Response to the Fukushima No. 1 Nuclear Power Plant Accident**

Koichi Tanigawa

Deputy Director, Radiation Emergency Medicine Promotion Center



As a member of the Hiroshima University Radiation Emergency Medical Assistance Team (REMAT), I started working in Fukushima shortly after the occurrence of the disaster. Reflecting the role we were expected to play in each phase of the disaster, REMAT activities were classified into four parts: (1) acute-phase activities immediately after the occurrence of the disaster; (2) establishment of a radiation emergency medical system at J-Village; (3) assistance with evacuated residents' temporary entry into restricted areas; and (4) activities at an emergency medical care facility on the grounds of Fukushima No. 1 Nuclear Power Plant.



### (1) Acute-phase activities immediately after the occurrence of the disaster

After the accident of March 11, 2011, three REMAT members, namely Koichi Tanigawa and registered nurses Naoko Takeoka and Natsuko Kimoto, headed for the National Institute of Radiological Sciences (NIRS) in Chiba City on March 12. On March 13, together with Dr. Yoshio Hosoi and members from NIRS, we arrived at the headquarters in Fukushima Prefecture in a Japan Self-Defense Force (SDF) helicopter. At the headquarters, we worked with officials from the Fukushima prefectural government and experts from Fukushima Medical University to draw up a plan for on-site activities.

Early in the morning of March 14, at the Soso Public Health and Welfare Office in Minamisoma City, we conducted a radiation survey on patients waiting to be evacuated, who were still in hospitals and care facilities inside the 20-km area.

We also helped establish a system for admitting radiation-exposed patients to Fukushima Medical University. Meanwhile on March 16, we flew to the grounds of the crippled nuclear power plant by SDF plane in order to transport a patient who had suffered a chest injury to Fukushima Medical University, where we performed decontamination and treatment.

After that, as members of the medical team at the Offsite Center established in the Fukushima Prefectural Government Office, we engaged in activities such as coordination of activities among medical institutions admitting radiation-exposed patients, formulation of a flow chart for patient transportation, and preparation for the temporary entry of residents into the restricted area.



## (2) Establishment of a radiation emergency medical system at J-Village

Following the shutdown of radiation emergency hospitals inside the 20-km area, it was urgently necessary to develop a system for providing medical care for workers who may be exposed to radiation while engaging in the crippled power plant's recovery operations. By the end of March, we decided to use J-Village, located 20 km south from Fukushima No. 1 Nuclear Power Plant, as a triage center and undertook work to prepare J-Village to function as a facility substituting for the closed radiation emergency hospitals.



## (3) Assistance with evacuated residents' temporary entry into the restricted area

During the evacuated residents' temporary entry into the 20-km area that started from May, we assisted in providing emergency medical care and radiation surveys for those who temporarily returned home.



## (4) Activities at an emergency medical care facility on the grounds of Fukushima No. 1 Nuclear Power Plant

In Fukushima No. 1 Nuclear Power Plant, every day thousands of workers were engaged in around the clock recovery operations. In order to quickly respond to serious emergency cases or radiation exposure that might arise during the process of recovery operations, No. 5/6 Emergency Room (5/6 ER) was established in July inside the No. 5/6 Reactor Service Building within the grounds of Fukushima No. 1 Nuclear Power Plant. Because the 5/6 ER had to operate on a 24/7 basis, we gathered doctors specializing in emergency and critical care and radiation emergency medicine, as well as nurses and radiological technologists from all over the country to work in rotation. To manage this system, a Fukushima

No. 1 Nuclear Power Plant Emergency Medical Service System Network was established. As an institution representing this Network, we engaged in the coordination and dispatch of medical staff, the development and preparation of relevant facilities, and the establishment of an emergency medical service system at Fukushima No. 1 Nuclear Power Plant.



*(1) DMAT mobilization*

**From DMAT (Disaster Medical Assistance Team) to REMAT (Radiation Emergency Medical Assistance Team)**

Nobuyuki Hirohashi

Associate Professor

Emergency and Critical Care Medicine, Department of Applied Sciences

Hiroshima University Graduate School of Biomedical & Health Sciences



On the afternoon of March 11, 2011, the TV screens were all showing the scenes of the tsunami breaching the seawalls and rushing farther and farther inland, submerging everything in its path. On the night of the same day, as members of the DMAT (Disaster Medical Assistance Team) were mobilized effectively for the first time, we were driving eastward on the Sanyo Expressway, when we received instructions from the prefectural government to board the Kunisaki, Maritime Self-Defense Force's tank landing ship which was about to depart from Kure. In the early morning of March 13, we arrived at the Port of Yokosuka and drove northward along an undulating and cracked road. As our final destination, DMAT headquarters ordered us via EMIS (Emergency Medical Information System) to head for Fukushima Medical University. Once in Fukushima City, in the face of the scenes of landslides in residential areas, crumbled roof tiles, and people waiting in long lines in front of supermarkets, we fully braced ourselves for DMAT operations.

In the afternoon of March 13, we reached Fukushima Medical University, where we were then ordered to head for Fukushima Gender Equality Center in Nihonmatsu City with the team dispatched from the National Hospital Organization Kure Medical Center. As soon as we arrived at the Gender Equality Center, we saw a long line of people, beyond which we found DMAT members in yellow protective suits, carrying radiation survey meters. We put on protective suits ourselves and joined the other members. In that process, we realized that, although we were initially dispatched as DMAT, we must in actuality function as REMAT. After the hydrogen-air chemical explosions, our primary responsibility was conducting radiation surveys on evacuated residents, as well as firefighters, paramedics, police officers, emergency relief team members, and other individuals coming in and out of the Gender Equality Center. The center accommodated 120 patients, as well as nurses and doctors evacuated from hospitals within the 10 km area around Fukushima No. 1 Nuclear Power Plant, and other people associated with the situation. Reportedly (sources of reports unknown), these individuals were contaminated with radioactive substances. I conducted radiation surveys with nurse Sasa on individuals stepping in and out of the Gender Equality Center. In that process, I found eight serious cases of radiation contamination from among the patients staying in the Center. I decided to give them treatment and transport them to other hospitals in cooperation with other staff members. We repeatedly made phone calls to all the hospitals in the surrounding areas that the paramedics had told us about. It was just after 12:00 midnight that we finished transporting all eight patients to other hospitals. We finally reached our accommodations on March 14, at 4:00 a.m. That afternoon we helped coordinate our final task, the operation of helicopter ambulance services at Fukushima Medical University. With this, we had completed our Fukushima mission as DMAT and on March 15, we returned to Hiroshima.

As Hiroshima University is a tertiary radiation emergency medical institution I have had the opportunity to receive relevant training for radiation exposure. Still, despite this training, I felt somewhat at a loss when our team had to

switch our mode of operation from DMAT to REMAT with virtually no information available regarding what was going on, nor how to deal with the circumstances. At the end of the day however, it turned out to be a unique and valuable experience for me to respond to the adversity in a creative and flexible way. Particularly when considering the close cooperation with my fellow team members who were also my colleagues at the university hospital's emergency and critical care center, as well as with staff members from the National Hospital Organization Kure Medical Center with whom we were sent to the Gender Equality Center.

After this mission, I have continued serving as a member of REMAT at Fukushima Medical University, OFC (Offsite Center), J-Village, and currently, at the Emergency Room of Fukushima No. 1 Nuclear Power Plant. As the cleanup operations for the Fukushima nuclear accident are expected to take several decades before their completion, I hope to continue playing an active role in both disaster medicine and radiation emergency medicine.



March 13. Hirohashi (left) and nurse Sasa in front of the Gender Equality Center

*(1) DMAT mobilization*

**Need for Sharing Accurate Information and Providing Mental Care**

Maiko Hara

Nurse

Advanced Emergency and Critical Care Center

Division of Nursing

Hiroshima University Hospital



On the day on which the Great East Japan Earthquake struck, Hiroshima University Hospital DMAT immediately headed out for Miyagi Prefecture. From safety and health considerations, we decided to travel by car and Japan Maritime Self-Defense Force tank landing ship. However, while on our way to Miyagi Prefecture the news of the accident at Fukushima No. 1 Nuclear Power Plant came in and, at that moment, our destination was changed to Fukushima Prefecture. Facing a lack of information about the local situation and being poorly equipped for providing radiation emergency medicine, we were very worried and concerned about what awaited us ahead. Despite these challenges, we committed to our mission within our group and then committed to doing our utmost to develop a relationship of trust with the other DMAT teams.

On arrival at the Fukushima Prefecture DMAT headquarters, we were assigned to conduct radiation exposure tests at Fukushima Gender Equality Center in Nihonmatsu City. In the Center, there were about 290 people, including patients and medical professionals who had been evacuated from hospitals that lay within the 10-km radius of the nuclear power plant and staff members of the Gender Equality Center and public health centers.

We quickly performed triage and provided treatment to eight patients who were in the most serious condition and in need of immediate hospitalization. Before leaving the Center, the eight patients were tested for their individual radiation dose, which revealed that their exposed doses exceeded the specified dose limits. In cooperation with SDF personnel, we carried out decontamination procedures for all eight patients and transported them to hospitals by ambulance. Outside the Center, we performed radiation dose measurement and decontamination procedures for residents evacuated from within the 20-km radius, residents of elderly care nursing facilities who were evacuated from within the 20-km area in an SDF plane, as well as firefighters, paramedics, police officers, and emergency relief workers who had participated in rescue operations. Additionally, we helped coordinate the operation of helicopter ambulance services at Fukushima Medical University, and assisted in office procedures at the DMAT headquarters.

What I felt was the most difficult challenge from our recent mission was the overwhelming lack of information and extensive disruption of information networks in the face of the devastation caused by the massive earthquake, coupled with the damage done by the ensuing nuclear accident resulting in radiation exposure. To establish a chain of command necessary for conducting medical relief activities and to ensure our own safety, it is vitally important to share accurate information and keep track of the current situation. However, because the recent disaster occurred far from where we usually operate, we had no means of grasping not only the status of the disaster-hit areas, but also our own situation. Information was snarled and unreliable, sometimes hindering our activities and making it difficult for us to find a means of available transportation at any given moment.

Another challenge was that while DMAT team members had participated in a number of drills designed to deal with various disaster situations, it was frustrating to find that it was difficult to properly utilize what we had learned through such drills. We found disaster victims horrified by the unexpectedly enormous devastation caused by the earthquake and tsunami, scared of the invisible damage from radiation exposure, suffering from a sense of isolation owing to the lack of information, and despairing at the gloomy outlook for their future lives. Their sufferings brought home to us the importance of providing not only medical assistance but also accurate information from an early stage of relief operations, thereby helping to relieve the disaster survivors' mental stress and emotional anxiety.

I visited Fukushima Prefecture a total of three times to participate in REMAT activities. While engaging in my mission, I saw many catastrophic scenes and experienced numerous strong aftershocks. And yet, I also felt the strength and warmth of the people there. During each visit, I was encouraged to see the landscape and people of Fukushima recovering from the devastation—gradually but steadily—and promised myself to continue working harder for them in the years to come.



In front of the *Kunisaki*, a Japan Maritime Self-Defense Force tank landing ship

(1) DMAT mobilization

**Having a Very Hard Time Securing Accommodation**

Hiroko Unei

Vice Executive Manager of Pharmaceutical Services

Division of Pharmaceutical Services

Hiroshima University Hospital



After the earthquake struck at 14:46 on March 11, 2011, Japan's Ministry of Health, Labour and Welfare requested all DMATs, through the EMIS (Emergency Medical Information System), to stand ready for mobilization. At 17:17, in response to the issuance of the mobilization order, we formed our DMAT. Dispatched as a coordinator, I engaged in keeping an activity log, managing money by recording expenses, securing food for team members, and securing accommodation, thereby facilitating our team's medical assistance activities.

At 19:00, we left Hiroshima University Hospital in one of the hospital's cars. While driving along the Sanyo Expressway, we were informed that the *Kunisaki*, a Japan Maritime Self-Defense Force tank landing ship, was to depart from the Port of Kure at 22:00 and that the ship could also transport cars. Therefore, we changed our plans and headed to Kure Port, where we boarded the ship at 21:40 to travel to the disaster areas. Members of DMATs from Kure Medical Center, Hiroshima Prefectural Hospital, and JA Hiroshima General Hospital were also aboard the ship. Because it was our first DMAT mission, all members from the various DMATs were very anxious. The time we spent together, sharing each other's feelings, both during the voyage and following disembarkation greatly encouraged us when carrying out our actual activities in Fukushima.

We entered the Port of Yokosuka in the early morning of March 13 and disembarked at 7:30a.m. When driving northward along the Tohoku Expressway, led by an SDF vehicle, we received news about the nuclear accident involving radiation exposure at Fukushima No. 1 Nuclear Power Plant. We changed our destination to the Fukushima Prefecture DMAT headquarters set up in Fukushima Medical Hospital. At 14:00, we arrived at the Fukushima Prefecture DMAT headquarters, where we were ordered to go to the Fukushima Gender Equality Center in Nihonmatsu city with members of Kure Medical Center DMAT.

In sub-zero temperatures, we conducted radioactive contamination screening until one o'clock in the morning, of March 14. Patients included about 100 evacuated residents, as well as 200 other individuals, such as elderly care nursing facility residents, fire fighters, paramedics, police officers, and emergency relief workers, who were suspected of having been exposed to radiation. We also performed screening on about 120 patients and medical experts who were also suspected of having been exposed while working at hospitals in Namie-machi and Futaba-machi.

On March 14, we arrived at the Fukushima Prefecture DMAT headquarters at 14:45 and helped with the coordination of the operation of helicopter ambulance services until 18:00. After that, we assisted in office procedures at the DMAT headquarters until 21:00. That night, we stayed in Utsunomiya. On March 15, after our return to Hiroshima University Hospital at 17:10, we reported on our activities to the hospital director.

Because it was our first-ever DMAT operation and we had to work in very cold weather, I could see that our team members were stressed and exhausted. Adding to the anxiety, on the night of March 13, it was extremely difficult to

find a place for us to stay. We finally secured our accommodations after I called the Division of Pharmaceutical Services by mobile phone designed for use during disasters and one of our colleagues was able to arrange for our accommodation.

Securing food is also vital. The SDF provided us with information concerning the inventory status of gasoline and other supplies at each convenience store or service area near the locations of our activities, so that we could replenish our food and gas while moving from one place to another. On the night of March 13, we bought rice balls from a nearby *izakaya* (Japanese-style pub). But on the 14th, we found almost all food and supplies had disappeared from the shelves of service areas, and so we subsisted on bread and whatever else was available.

What the recent mission taught us, among other things, is the importance of conducting drills and training in normal times. Although we were fortunate enough to be able to secure both food and accommodation, we also realized how important it is to secure sufficient food, supplies, and the money necessary for activities before departing for disaster areas. During missions of this kind, coordinators must carry out a range of activities that are not required when providing medical services at normal times, such as ensuring communications, keeping activity logs, and securing food and accommodation. For the smooth implementation of DMAT activities in the years ahead, I believe at least two coordinators are necessary for each team.

Finally, let me express my sincere respect for those who are making dedicated efforts in the disaster areas and my deep appreciation to SDF personnel and many, many others for their warm and helping hands.



Radioactive contamination screening using GM survey meter

*(2) Establishing the Radiation Emergency Medicine Coordination Conference*

**Remaining in NIRS and Making All-Out Efforts to Collect Information and Provide Supplies**

Fumio Suzuki

Professor Emeritus

Hiroshima University

(Then: Professor [Special Appointment], Department of International Radiation Emergency Medicine, Research Institute for Radiation Biology and Medicine)



On March 12–17, 2011, I participated in the activities of the Hiroshima University Radiation Emergency Medical Assistance Team as a member of the first group to be dispatched. In the afternoon of March 12, our group, led by Prof. Koichi Tanigawa and including one doctor, two nurses, and one radiological expert, headed for the National Institute of Radiological Sciences (NIRS) aboard a Shinkansen train, changing trains at Tokyo Station to the JR Sobu line. (Prof. Yoshio Hosoi joined the group at NIRS.) Upon arrival, we attended a liaison meeting at the NIRS Nuclear Disaster Response Headquarters and discussed how to work together in response to dispatch requests from agencies such as the Emergency Operation Center (EOC) of Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT).

While team members moved to Fukushima City in an SDF helicopter on March 13 and 14, I remained at NIRS for six days from March 12 and worked with NIRS staff, collecting information from EOC and the Offsite Center (OFC), discussing ways to secure and transport the necessary supplies and personnel, and exchanging opinions about how best to respond to requests from various organizations. In particular, I negotiated with Hiroshima University Radiation Emergency Medicine Committee (Radiation Emergency Medicine Promotion Center) as to how to provide emergency food for dispatched staff and other disaster preparedness supplies, as well as radiation protective supplies that NIRS alone could not afford to provide. I also kept Hiroshima University Radiation Emergency Medicine Committee updated about requests from team members working on site and matters discussed at NIRS liaison meetings.

Initially, it was completely impossible to establish contact with the OFC or EOC, while NIRS was thrown into utter confusion trying to respond to a flood of inquiries from all over the country. Also, on March 15, in response to MEXT's request, emergency relief team members from Osaka University, Ehime University, and other institutions began to arrive at NIRS one after another, leaving NIRS full of people who still did not know what to do. There was also a problem to secure enough food to last during our stay in the disaster areas. Due to rumors about possible food shortages hoarding of foods, both perishable and nonperishable, had begun in Chiba City, as well as in other parts of the country.

I also had trouble communicating with dispatched team members and Hiroshima University because I did not take my PC with me (I would like to note that, in the event of a major disaster, email is a more reliable means of communication than telephone). NIRS gave treatment to injured persons who were carried in by ambulance. Also, the NIRS' monitoring van contributed enormously not only in conducting radiation dose surveys on many evacuated residents, but also by transporting supplies and people for emergency medical care.

The most important step to take in the event of radiation emergencies is to secure a sufficient amount of emergency food, radiation protection devices, other essential supplies, as well as a means of transportation (cars) that can

help the dispatched personnel to travel and work freely and independently in disaster-hit areas. Hiroshima University's team was lucky to have two cars that ensured its members' free movement. Tertiary radiation emergency medical institutions also need to be fully equipped with facilities and personnel for admitting radiation-exposed patients.



Attending a meeting at the NIRS Nuclear Disaster Response Headquarters

*(2) Establishing the Radiation Emergency Medicine Coordination Conference*

**Soul-Searching Experience as a Radiation Biology Researcher**

Daisuke Iizuka

Associate Professor

Department of Experimental Oncology

(Then: Department of Molecular Radiobiology)

Research Institute for Radiation Biology and Medicine



On March 12–17, 2011, I was in Fukushima as a member of the first group of Hiroshima University REMAT. At the National Institute of Radiological Sciences (NIRS), the Fukushima Prefecture Government Hall, and Fukushima Medical University, we provided support for the transportation of patients who were suspected of radiation exposure, we gathered situational information and communicated with Hiroshima University. At the Fukushima Prefecture Government Hall, we also extended support for radiation contamination screening conducted at evacuation centers in Fukushima Prefecture.

It was on March 12, the day after the Great East Japan Earthquake struck, that the first REMAT group was sent to Fukushima. We engaged in activities in a situation where the status of the reactors was changing by the minute. With virtually no information about what was going on, we carried out our mission, anxious about what we were going to do if the condition of the reactors became critical. The situation at NIRS and the Prefecture Government Hall was so chaotic that I often felt at a loss regarding what needed to be done. Because public transportation was disrupted between the NIRS (Chiba City) and Fukushima, we had to travel in an SDF helicopter. Just one of a series of extraordinary experiences associated with this operation. I still remember vividly how nervous I was throughout our mission.

There are many things that I could have done better. Most importantly, I should have asked myself questions such as “What can someone who is not allowed to provide medical treatment do?” and “What kind of knowledge would be necessary?” in the event of a nuclear disaster.

As the government expanded the size of the restricted area, more and more residents were obliged to evacuate from their communities. While engaging in my activities, I learned that evacuation procedures did not work for some of the more vulnerable individuals such as those who were already sick or in need of constant nursing care. This situation resulted in the loss of lives. The fact that the off-site center of Fukushima No. 1 Nuclear Power Plant hardly functioned and was moved to Fukushima City is another unfortunate outcome of the lack of preparedness and imagination for an actual nuclear disaster. I suspect that inadequate crisis management was a major contributing factor to the worsening circumstances surrounding this incident.

This kind of accident should never happen again. Despite this, it would be impossible to immediately stop using nuclear power. Through my REMAT activities, I came to have a strong conviction that the most important step to take at this moment is to improve the government’s crisis management system. As a radiation biologist, I am determined to continue doing whatever I can to better understand the biological effects of long-term radiation exposure, which has become a major concern for the Japanese people in the aftermath of the Fukushima nuclear accident.



Checking the contamination status of a patient in the contamination test room of Fukushima Medical University Hospital (Iizuka left front)

## *(2) Establishing the Radiation Emergency Medicine Coordination Conference*

### **A Sense of Helplessness in the Face of Dying Elderly People**

Daizaburo Hirata

Doctor, Department of Gastroenterology, Mazda Hospital

(Then: Assistant Professor [Special Appointment], Radiation Emergency Medicine Promotion Center)



On the morning of March 12, 2011, the day after the massive earthquake struck off the Pacific coast of Tohoku, Hiroshima University was requested to send its medical assistance team to the disaster area. In the afternoon of the same day, we headed for the National Institute of Radiological Sciences (NIRS) in Chiba Prefecture. At NIRS, we had an initial debriefing and discussed the situation in the disaster areas and the best ways to respond. On March 13, I traveled in a helicopter to Fukushima City, located 63 km from Fukushima No. 1 Nuclear Power Plant.

Under the leadership of Dr. Koichi Tanigawa and in cooperation with NIRS, Hiroshima University, a tertiary radiation emergency medical institution, established a Radiation Emergency Medicine Coordination Conference in Fukushima City. We began our activities by rebuilding disrupted systems for radiation emergency medicine and contamination screening for evacuated patients. We also confirmed wide-area transportation routes, established a medical care system at Fukushima Medical University, and helped in the transportation of persons who had been injured at the Fukushima No.1 Nuclear Power Plant.

With DMATs gathered from all over the country, there were more than enough experts capable of conducting screenings. However, as no chain of command had yet been established someone needed to step forward. Dr. Tanigawa was the person who took the initiative in coordinating the screening for evacuees in a safe and orderly manner.

Meanwhile, elderly residents of nursing care facilities who were not able to walk by themselves or eat via their mouth could not be admitted to the regular evacuation centers or be properly fed at the facilities. Unfortunately, while waiting in minibuses for their destinations to be decided, many of these people lost their lives. I felt helpless when I heard about their deaths, because I could not do anything useful for them.

Where there were no facilities to accommodate such elderly persons or medical equipment and supplies to treat them, I felt quite useless. Since information and communication was snarled at the Fukushima Prefectural Government where our activities were based and the streets of Fukushima were also in a chaotic state, it was extremely difficult to find accurate information, making our mission even more challenging.

As it turned out, I just helped out here and there under the instruction of Dr. Tanigawa, without being able to play a substantial role as a doctor. During my five-day stay in Fukushima, aftershocks struck continuously and explosions at the nuclear reactors continued. I spent my days there anxious about how the catastrophe following the earthquake and tsunami would turn out and how the invisible radioactive substances would affect us. It was my first experience working in an actual disaster-hit area. The experience brought home to me that, before being a gastroenterologist, first and foremost I am a doctor, and I must act like one.



Meeting of the Radiation Emergency Medicine Coordination Conference

*(2) Establishing the Radiation Emergency Medicine Coordination Conference*

**Conducting Screening at the Public Health Center on Patients in Need of Nursing Care**

Naoko Takeoka

Deputy Head Nurse

ICU

Division of Nursing

Hiroshima University Hospital



In response to the Great East Japan Earthquake and the accident at TEPCO's Fukushima No. 1 Nuclear Power Plant that occurred on March 11, 2011, I departed for the disaster areas as a member of the first group of the Radiation Emergency Medical Assistance Team (REMAT) on March 12.

At the National Institute of Radiological Sciences (NIRS) in Chiba, which was our first destination, a disaster response headquarters had already been established to collect information and undertake necessary measures. However, it was almost impossible to communicate with the Nuclear Emergency Response Headquarters (Offsite Center) near Fukushima No. 1 Nuclear Power Plant, making it extremely difficult to grasp the changing situation. NIRS and Hiroshima University REMAT had tense talks until late at night on what to do where.

The next day, March 13, we headed for the disaster response headquarters set up at the Fukushima Prefecture Government Hall. At dawn on March 14, in response to the information that patients at facilities and hospitals as well as residents in the 20 km evacuation radius from Fukushima No. 1 Nuclear Power Plant were still stranded, we sped to the Soso Public Health and Welfare Office in Minamisoma City to offer our services. We conducted radiation contamination screening in cooperation with the staff members of the public health and welfare office. Many of the patients brought in by buses one after another in order to find shelter and undergo screening procedures were either elderly or bedridden and in need of nursing care. Yet, few of them were attended to by medical experts. There were several patients who had been injured during evacuation and we needed to take care of them. Although we were dispatched as a radiation emergency response team, as it turned out, what we actually did, was to provide medical care. Screening continued from the early morning to midnight. Staff members of the public health and welfare office, who were disaster victims themselves, continued attending to the patients and residents.

From March 15, we started attending meetings at the radiation emergency response headquarters set up in the Prefectural Government Hall in Fukushima City. At the headquarters, medical teams from across the country gathered and had daily meetings and regular briefings on the current status of the screening process and ways to respond to the anxieties and other problems facing residents. During the meetings, these medical teams also drew up a radiation exposure response manual. With regard to patients exposed to high-dose radiation at Fukushima No. 1 Nuclear Power Plant, Fukushima Medical University readied itself to admit them. We then went to the medical university and confirmed the preparation status of its decontamination room and confirmed the operational procedures concerning patient transportation and admittance.

What I found most difficult in performing our REMAT activities was the lack of information concerning the nuclear accident. During our mission, we had no opportunity to deal with high-dose radiation exposure cases. However,

when we saw many elderly and/or bed-ridden patients who were not provided with adequate medical care at the public health center in Minamisoma, we recognized the devastating consequences of the massive disaster and nuclear accident.

In those days, people in Fukushima worked together to overcome the tremendous difficulties, in spite of all the anxieties and mental and physical stress they suffered. In retrospect, there were things that we could have done better to support them. We need to continue sharing updates about the nuclear accident and discussing what needs to be done in the field of radiation medicine in the years to come.



Elderly patients and facility residents evacuating in minibuses

## *(2) Establishing the Radiation Emergency Medicine Coordination Conference*

### **Feeling Our Way through the Mission with No Operation Standards**

Natsuko Kimoto

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When I first saw the news of the earthquake on the TV, I just said to myself, “Oh, what an awful disaster!” as if I did not have much to do with it. So when I was asked to go to the disaster-hit areas as a member of the Radiation Emergency Medical Assistance Team (REMAT) and said “Yes,” it still didn’t seem real to me. I departed for the REMAT mission before giving enough thought to what I should do or could do.

Our operations started on March 12, 2011. Because it was only a day or so after the occurrence of the earthquake/tsunami and ensuing nuclear accident, things were in utter chaos wherever we went—NIRS in Chiba, the disaster response headquarters in Fukushima City, the public health center: Everywhere. Communication infrastructure was disrupted, making it impossible for our phone calls to get through. Thus, we made our way to the disaster areas without any concrete information concerning the status of the nuclear power plant or the evacuated residents.

Upon arriving in Fukushima, we found that a radiation emergency response headquarters had been set up. As the chaotic situation continued, I was assigned to collect information from online news sources via mobile phone. During our operation, I also met evacuees when I accompanied team members who were engaged in screening procedures. I was very impressed by the disaster victims who, though not knowing what was going on, were desperately trying to understand the scope of the situation. After Fukushima Medical University completed preparations for admitting patients exposed to high-dose radiation, we were ready to go into action at any given moment. Unfortunately, despite our preparedness, we did not have the chance to help admit radiation-exposed patients while in Fukushima.

During our mission, 24 hours a day we stood ready to respond immediately to the changing situation of the nuclear power plant. There were many stressful days waiting without being able to take time off. Furthermore, no operation manuals and an undecided operation length added significantly to our psychological stress.

In downtown Fukushima, not many buildings were destroyed and there were no obvious signs of devastation. However, as we drove closer to the nuclear power plant, we saw more and more collapsed buildings and impassable roads. In fact, these roads prevented access by car within a 5-km radius around the power plant. Everything I saw as we drove through Fukushima both frightened me and made me realize the massive damage caused by the earthquake. Up to that point in my life, I had never experienced such a real, major disaster. My experience in Fukushima made me feel a direct sense of immediacy that I think will remain a valuable lesson for the rest of my life.

Until the recent disaster, the major responsibilities of nurses in radiation emergency situations were the reception of exposed patients, preparation of decontamination procedures, and other steps necessary for admitting patients. All these activities assumed the hospitalization of exposed patients. In the recent mission, however, it was the first time we had been dispatched to such a disaster area. With little knowledge about what was to be done, we had to feel

our way through our mission, adapting our activities to an ever-changing situation. In the future, it is a necessity to establish a radiation emergency medical assistance system that also covers the activities which need to be carried out on site by the dispatched medical teams.



A scene before receiving evacuated residents for a radiation survey

### *(3) Screening Residents for Radioactive Contamination*

#### **Examining the Level of Radiation Accumulated in Children's Thyroid Glands**

Satoshi Tashiro

Professor

Department of Cellular Biology

Research Institute for Radiation Biology and Medicine



On March 25–30, 2011, as a member of the fifth group of the Radiation Emergency Medical Assistance Team (REMAT), we carried out activities primarily at the Fukushima Prefecture Government Hall and Offsite Center (OFC). SPEEDI data which predicts the dispersion of radioactive iodine in the air, was made available just before our arrival. This data revealed the risk for residents, and more importantly their thyroid glands, of being exposed to radioactive iodine in municipalities outside the evacuation zones such as Iwaki City, Iitate-mura, and parts of Kawamata-machi. In view of the high incidence of thyroid cancer among the children who survived the Chernobyl accident, it was important to examine the level of radiation in the thyroid glands of children in these municipalities.

With the advice of the Nuclear Safety Commission of Japan and in cooperation with Fukushima Prefecture, the nuclear emergency response headquarters conducted examinations on the region's children to measure the levels radiation contamination in their thyroid glands. The first examinations were carried out in Iwaki City on March 25, followed by Kawamata-machi on March 28 and Iitate-mura on March 29. Through the concerted efforts of the response headquarters, experts gathered in Fukushima Prefecture from all over the country, as well as personnel from the affected municipalities, it took only three days to examine more than 1,000 children for their level of radiation exposure.

To accurately detect weak radiation in children's thyroid glands, we needed to secure a place where the background dose was no more than  $0.2 \mu\text{Sv/hr}$ . In Iwaki City, the radiation level in the air had already fallen below this level and so we were able to safely use an examination room in the Iwaki City Public Health Center.

However, in Kawamata-machi and Iitate-mura, where the radiation level in the air remained as high as  $1 \mu\text{Sv/hr}$  or more, we had a more challenging time finding a suitable place for testing. In Iitate-mura, in particular, where there were few large concrete buildings that could function as an effective shield against radiation, I spent a whole day with the Deputy Executive Manager of Medical Treatment Support, Hiroomi Sumida, going around the village and measuring doses in all prospective buildings. Unfortunately, we could not find a suitable location where the background dose was low enough. We even discussed the possibility of taking children to Kawamata-machi for examination. However, after further consideration we decided to do a more comprehensive check within the assembly house at the village government office, (which had already been checked for radiation dose and found unsuitable for our purpose) and we were able to identify a small space behind the chairperson's seat that met our radiation level's criteria.

During our thyroid dose examination of these local children, we were relieved to find that no children who we were able to examine exceeded the target screening level. However, of important note, not all children in Fukushima were checked for the level of radiation in their thyroid glands. This, coupled with the limited accuracy of the screening, requires that follow-up examinations be carried out on the health effects of radiation on children.



Examining children's thyroid dose in the Iitate-mura Village Assembly House

### *(3) Screening Residents for Radioactive Contamination*

#### **Reality of Radiation Survey of Children's Thyroid Glands in Kawamata-Machi**

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Hiroshima University



I was in the disaster areas from March 29 to April 5, 2011. On March 29, I exchanged information with the Emergency Medicine Division of Fukushima Medical University Hospital. On March 30, we conducted children's thyroid radiation dose survey in Kawamata-machi. On the 31st, I was at the Offsite Center, discussing how best to transport radiation-exposed patients with the Self-Defense Forces, the Emergency Medicine Division of Fukushima Medical University Hospital and Hiroshima University. On April 1–5, I participated in the establishment of a medical team at J-Village.

From March 28 to 30, the children's thyroid radiation dose examinations were conducted in Kawamata-machi and Iitate-mura where radiation doses were relatively high. I acted as leading physician in the examination conducted in Kawamata-machi on March 30.

On that day, we went to Kawamata-machi with a team of radiological measurement technicians, measured the air radiation dose where the examinations were to be conducted, and then following a measurement that showed the radiation dose was within the acceptable parameters we checked and prepared the location for the examinations. Until the evening we then examined local children for thyroid gland radiation exposure using a NaI (TI) scintillation survey meter.

The previous day, Prof. Satoshi Tashiro and Dr. Hisayoshi Kondo, Vice Director of the DMAT Secretariat of Japan's Ministry of Health, Labour and Welfare had secured a location with a low background radiation exposure dose which was suitable for the survey. The staff of the Kawamata-machi Municipal Government were also very cooperative, in helping us to smoothly carry out the examination. Although the clothes of some of the evacuated residents were contaminated and these individuals needed to undergo decontamination procedures, none of them exceeded the radiation dose screening standard.

Examinations took place in a community hall where all people were asked to change from shoes to slippers. Furthermore, everyone was asked to not open the main entrance to the community hall and the door of the entrance hall simultaneously. Many children to be examined were accompanied by their parents, and they all looked relieved to hear the examination results which indicated that none of the children were contaminated.

Since it was expected that many residents might be moving to a new community in the future, we asked them to write down their cell phone numbers, rather than their home phone numbers, as their contact information. As for the children who were accompanied by their school teachers, we failed to obtain their contact details. We should have implemented a more effective approach to maintaining contact with all of the examined children.



Reception of children for thyroid dose examination



To keep the indoor air dose low, all people were asked to change from shoes to slippers at the entrance and not to leave the two doors open simultaneously

### *(3) Screening Residents for Radioactive Contamination*

#### **Building an Examination System from Scratch**

Hiroomi Sumida

Deputy Executive Manager of Medical Treatment Support

Division of Medical Treatment Support

Hiroshima University Hospital



I was dispatched to Fukushima for the first time on March 25, 2011. Roughly two weeks after the disaster, activities to help disaster victims remained disorganized. Our initial mission was to organize the data obtained from screening conducted at every evacuation center and give advice to those engaging in radiation measurement and report on problems.

One of the most serious problems was children's thyroid gland exposure to Iodine-131. On March 24, 66 children were tested for their levels of thyroid exposure in Kawamata-machi and they were reported to have “no problems” in this regard. However, because the background dose (BG) was very high in the place where measurement was carried out, some experts pointed out the low reliability of measurement accuracy.

To address this problem, NIRS reviewed examination conditions. Based on the review results, the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Ministry of Economy and Industry (METI), and Hiroshima University were to work together to establish a thyroid gland exposure survey system. From Hiroshima University, Prof. Satoshi Tashiro and Senior Specialist Toshio Fujimoto and I were assigned to carry out that task. Based on the SPEEDI data concerning the distribution of radioactive substances, we decided to examine children aged 0–15 who resided in Iitate-mura (in which the air dose was then 10  $\mu$  Sv/h), Kawamata-machi (an air dose of 6  $\mu$  Sv/h), and Iwaki City (an air dose of 1.5  $\mu$  Sv/h).

The examination requirements presented to us were very strict. The air dose measurements at all locations on those days were very high, with even Fukushima City measuring as high as 3.5  $\mu$  Sv/h, making it extremely difficult to find an environment that met the examination requirement of BG of 0.2  $\mu$  Sv/h or less.

On March 26, we went to Iwaki City. When setting up (assessing) the environment, in consideration of the possible effects of fallout, we made it a point to choose a location close to the center of a reinforced concrete facility. Fortunately, we were able to find a suitable place for examination inside the Iwaki City Public Health Center where regular screening was being conducted for residents. We explained the procedures and other important points (including conditions set for measuring devices) to the radiological measurement technicians. After overseeing the radiation measurement of the first several children, we left the public health center. In Iwaki City, 137 children were examined.

On March 27, we looked for a facility for examinations in Kawamata-machi. Initially, we intended to use the community hall for that purpose. As it turned out, however, the community hall had been closed and was being used for storing relief supplies. Therefore we had to ask the relevant offices for permission to use the hall for our purpose. Although we were allowed use the community hall, there were few spots inside the facility that met our criteria. Finally, we found an adequate location in the hallway on the second floor. Since we needed to examine many disaster victims (631 individuals), we set up our examination site in a way that would best ensure efficient procedures and carefully

clarified each staff member's responsibilities. On March 28, examinations were conducted with the cooperation of the Nuclear Physics Group.

On March 29, we were to begin our environmental assessments in Iitate-mura. We had a briefing session in the village council office and gained approval to undertake the environmental assessments. The village council, however, asked us to conduct the assessments in public facilities. As a result of the preliminary assessment of the inside of the offices, the only site that met our examination conditions was the back of the village meeting hall. We looked for other facilities in the village that would meet our examination requirements, but air radiation doses were high everywhere and there was no other place that met our requirements. Ultimately we set up an examination system inside the assembly hall.

As an examination run-through we asked the village council officials to bring in several children. Though the situation in the village was very severe, we departed after communicating the examination procedures to Yuji Akiyama, a radiological technologist. In Iitate-mura, 315 children were examined.

From this mission, I learned that it requires a concerted effort among the many different affected parties to build an effective examination system from scratch.



Demonstrating how to examine children for thyroid gland exposure (at the Iitate-mura village council office)

### *(3) Screening Residents for Radioactive Contamination*

#### **My Heart Ached to See Children in Contaminated Clothes**

Nobukazu Abe  
Radiological Technologist  
Division of Medical Treatment Support  
Hiroshima University Hospital



It was on March 16, 2011, five days after the earthquake, that I, a radiological technologist, was dispatched to Fukushima as a member of the second group of Hiroshima University's Radiation Emergency Medical Assistance Team (REMAT). It was the day after the news came out that a massive amount of radioactive substances had been released into the environment from Fukushima No. 1 Nuclear Power Plant. Understandably, information coming in from the affected areas was mixed and confusing. Not knowing exactly what I was to do, I departed for the disaster area with a great sense of anxiety. Yet at the same time, I felt a strong sense of mission purpose because I was the first radiological technologist to be appointed as a REMAT member.

That evening, while snow was falling we arrived at the Fukushima Prefecture Government Hall in which the Radiation Emergency Medicine Coordination Conference, our headquarters, had been set up. As soon as we stepped into the headquarters, I remember being overwhelmed by the tense feeling shared by the experts and workers gathered from around the country. At that time, the outdoor air dose in Fukushima City was as high as 10  $\mu$  Sv/h, despite being about 50 km away from the nuclear power plant.

Our team's mission was to conduct radiation contamination screening and provide first aid for evacuated residents and local residents. For three days from March 17 to 19, we screened about 1,100 individuals at screening sites set up in the municipalities of Fukushima City, Koriyama City, and Kawamata-machi. At evacuation centers, there were many people who had been evacuated from coastal areas without bringing any personal belongings. Fortunately, we found no person who exceeded the screening level and needed to undergo decontamination procedures. However, there were several people who had suffered mild contamination, mainly on their clothing.

What still stands out in my memory is when we screened two elementary school age sisters. Both were contaminated specifically in the buttock area of their clothing. When I had them take off their pants and underpants and reexamined them, the reading dropped substantially. What presumably happened to them was that the radioactive substances fell on the ground with snow and the two sisters sat on the wet ground side by side. My heart ached when I imagined the sight of the two little girls sitting together innocently.

During the screening procedures, on the orders of the headquarters, we wore Tyvec coveralls, masks, gloves, and other protective gear. Frightened at the invisible risk of radiation, residents would anxiously ask us "Are we all right?" We answered them, "Of course. You are all right." However, I wonder if they really believed our words when we were fully dressed in protective garments and they were not.

I had engaged in radiation emergency medicine for about one year before the recent major disaster struck and had been working seriously in that field. And yet, I cannot deny that even I was thinking somewhere in my mind that a radiation disaster of this kind "was unlikely to happen." As a radiological technologist from Hiroshima University, the

only tertiary radiation emergency medical institution in western Japan, I believe that there are many more things I can do. While it is unpleasant to imagine the possibility of a reoccurrence of this kind of accident, we must take every possible precautionary step based on the assumption that “it will happen.”



Screening at an evacuation center

### *(3) Screening Residents for Radioactive Contamination*

#### **Always Keeping Radiation Exposure Control in Mind**

Yuji Akiyama

Radiological Technologist

Division of Medical Treatment Support

Hiroshima University Hospital



I engaged in activities as a member of the Hiroshima University Radiation Emergency Medical Assistance Team (REMAT) from still snowy March to sizzling hot July, 2011. The activities we conducted at the Fukushima Prefecture Government Hall changed over time following the initial chaos of the nuclear power plant accident.

When we started our activities on March 29, scars of the earthquake devastation were apparent everywhere: Cracked road surfaces, long lines of cars waiting in front of gas stations, and collapsed houses among them. While in Fukushima, I placed particular emphasis on controlling the radiation dose to which our team members were exposed. Every morning, I telephoned Dr. Tanigawa's group at J-Village to check the readings of their pocket dosimeters.

Although our group's activities were centered at the Fukushima Prefecture Government Hall, Hiromi Sumida, a radiological technologist who was a member of the REMAT group dispatched immediately before ours, participated in thyroid gland screening away from the headquarters, so I was unsure about what my responsibilities should be at the prefectural government hall. I collected information and thought of what we, the radiological technologists dispatched as REMAT members, should focus on in our activities. As it turned out, I engaged myself primarily in continuing the thyroid gland screening of children in the evacuation centers, collecting and reporting radiation exposure screening data each day to the experts and officials concerned, and coordinating screening group dispatch, as well the group's preparations for the morning and evening meetings.

During thyroid radiation exposure screening for children in Iitate-mura, I conducted surveys on infants and young children. Wearing masks, these children were prohibited from playing outside their houses. My heart ached to hear their mothers speak so worriedly about their children.

I also had the opportunity during my mission to participate in radiation exposure screening in Kawamata-machi. Many of the residents I met had been evacuated without taking anything with them and later returned home by car to collect their personal belongings before returning to the evacuation centers. As a result, these "repeat-evacuees" added significantly to the number of evacuees who need to be tested for radiation contamination.

By the time I began my second round of activities, the national government had prohibited entry into a designated "20-km radius restricted area" around Fukushima No. 1 Nuclear Power Plant. At the Fukushima Prefecture Government Hall, although the number of people that needed screening was decreasing, the need to screen cars and other belongings that residents had brought out of the 20-km restricted zone was increasing.

I attended meetings to coordinate a plan that allowed residents to enter the restricted zone during a specific, pre-determined time and the follow-up screening procedures needed following their exit from the restricted zone. I also took part in drawing up questionnaires for the residents concerning radiation exposure. Our activities at the prefecture government hall changed as the post-disaster situations changed. One of the challenges involved in our mission was how

to appropriately adapt our activities to these ever-changing situations.

During my REMAT operations, I learned how important it is for workers in this kind of mission to quickly understand their roles and the ever-changing environment. I also strongly felt the importance of ensuring communication and reporting. As a radiological technologist engaging in radiation emergency medical assistance in Fukushima in the aftermath of the nuclear accident, I always kept in mind that radiation exposure control was my major responsibility.



Screening residents for exposure

### *(3) Screening Residents for Radioactive Contamination*

#### **Ready for Action Even While in Bed**

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Patient Support Center  
Division of Management Support  
(Then: Chief of Medical Affairs Group)  
Hiroshima University Hospital



On March 25–29, 2011, I participated in REMAT activities mainly at the Fukushima Prefecture Government Hall and the Offsite Center (OFC). I asked members dispatched from the head office of the university corporation, together with nurses, to collect information at OFC and send data to the Radiation Emergency Medicine Committee. I myself was engaged in gathering information at the Fukushima Prefecture Government Hall, keeping track of our team’s activities, reporting current situations to the headquarters of the Radiation Emergency Medicine Committee, preparing activity reports, and driving official university cars whenever needed, particularly during emergencies.

Although we were initially briefed on our operations, situations changed so rapidly that we were constantly gathering up-to-date information and adjusting in response to what was actually happening. Following our initial briefings, things changed the next morning: The doctors on our team were suddenly asked to head for J-Village. We checked, confirmed, and communicated both how to transport them and what they would be needed to do.

On March 27, at the request of Prof. Satoshi Tashiro, I drove radiological technologist Hiro-omi Sumida, as well as officials of the Ministry of Education, Culture, Sports, Science and Technology and of the Nuclear and Industrial Safety Agency to Kawamata-machi in order to secure a location for another round of children’s screening. Driving along roads that had been given emergency repairs, with the obvious signs of the earthquake and tsunami everywhere, I couldn’t help feeling the sheer enormity of the devastation.

I was also involved in transporting testing equipment to the Iitate-mura Municipal Hall, supporting local activities such as radioactive contamination screening in Kawamata-machi on March 28 and 29, and during the intervening time, picking up the sixth REMAT group. Regarding driving, the navigation system in our official car was only helpful to a certain extent. I was not familiar with the geography of the disaster-hit areas. Roads were blocked everywhere and so I often relied on the navigation system to find other less damaged roads, whose surfaces nonetheless were also rough, somewhat buckled, and uneven. In short, I was particularly cautious whenever I found myself driving. Also, in consideration of possible night calls, I would go to bed prepared to go into action at any moment.

Furthermore, to stay ready to drive to J-Village, which was located some distance from where we were staying, I always double-checked how much gas was left in the car and confirmed which designated gas stations were open, so that I could refuel should the need arise.

I identified several challenges during my mission. As phone calls tended to be delayed and the information fragmented, I had a hard time checking and responding to the changing situations in a timely manner. As a result, I could not always report to the headquarters of the Radiation Emergency Medicine Committee quickly enough. Using official

cars in an emergency, I realized how vital it is to keep track of road situations, refueling locations, the status of supplies loaded in the vehicles, stay prepared to respond to emergencies, and to ensure communication among team members.



Medical Activities at J-Village

#### *(4) Medical Activities at J-Village*

##### **Importance of Sharing Feelings Associated with the Mission**

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On April 8–12, 2011, I participated in the establishment of a medical assistance team at J-Village (JV) as a member of the eighth group of REMAT. Located about 20 km away from Fukushima No. 1 Nuclear Power Plant (1F) and bordering on the restricted zone, JV was being used as a frontline base for “on-site coordination” of post-nuclear-accident responses carried out by TEPCO and the SDF. At JV, workers changed clothes before going to 1F and, on their return from 1F, underwent radioactive contamination screening and decontamination procedures. As a medical base, JV was required to function as a triage point where decisions were made as to which cooperating hospital each patient should be admitted to. Emergency patients from the restricted zone were to be taken to JV in a TEPCO car and undergo decontamination and triage processing there. After that, they were to be transported to Iwaki City or Fukushima City by ambulance, SDF helicopter, or another designated vehicle.

The medical team at JV consisted of our radiation emergency medicine group, the TEPCO medical group, and the SDF medical group. Comprising a chief doctor from the Japanese Association for Acute Medicine and three other staff members (one doctor, one nurse, and one clerical staff) from Hiroshima University, the radiation emergency medicine group mainly engaged in primary responses for workers exposed to radiation in the restricted area. Meanwhile, the TEPCO medical group (one doctor and two nurses) took care of workers inside JV with health complaints and the SDF medical group took care of SDF personnel. However, in emergency situations, all three groups were to cooperate with each other and coordinate their activities.

On April 9, the base of the radiation emergency medicine group moved from a meeting room in JV to the medical center attached to JV. Although the medical center had been a mess of medicines and supplies until only a few days previous, it had been tidied up and was in a fairly good condition by the time we moved in. Still, the water supply and sewage system remained out of order. Upon moving in we confirmed what medical resources were already there, identified and secured the items necessary for us to properly provide medical services at the center, and confirmed triage procedures for any emergency patients brought in.

During our five-day mission, two workers from the 1F were carried in as emergency cases. Although both cases turned out to be minor—one suffered heat stroke and the other a sprained knee—it still took more than three hours for them to arrive at a cooperating hospital by way of JV. On April 11, the greatest aftershock (with a seismic intensity of six) struck, resulting in a power outage at JV and disrupting our communication lines, which left JV unreachable for some time. Fortunately, within a few hours, power supplies were restored and communication lines were back in order. If we had had several patients at that time, however, we would not have been able to provide adequate care while we had no electricity, water, or means of communication.

One of the problems identified during this mission was my lack of preparedness. I was lacking in basic knowledge about disaster medicine and radiation emergency medicine. In my first mission to a disaster-hit area, I found myself bewildered by the actual disaster situation, which was so completely different from that inside a hospital. I also realized the importance of sharing and communicating information. In particular, I renewed my understanding about the importance of communicating not only the situations we faced but also the feelings associated with our activities among team members. Particularly when different members who are coming and going on a daily basis are to function as an effective team under the same leader throughout.

In closing, I would like to offer my sincerest prayers for those who lost their lives in the earthquake and tsunami. It is my strong hope that the disaster areas will recover from the devastation and the nuclear disaster will end as soon as possible.



April 10. Patient transportation drill in an SDF helicopter CH47 (author with Chief Doctor Koriyama)



April 12. In front of the medical center attached to J-Village

#### *(4) Medical Activities at J-Village*

##### **Working the Best We Could with Limited Supplies**

Junko Otodani  
Deputy Head Nurse  
Advanced Emergency and Critical Care Center  
Division of Nursing  
Hiroshima University Hospital



On April 8–12, 2011, about a month after the occurrence of the Great East Japan Earthquake, I was in Fukushima as a member of the Radiation Emergency Medical Assistance group, assigned to establish a clinic in the medical center at J-Village, a frontline base in response to the Fukushima No. 1 Nuclear Power Plant accident.

Crowded with Fukushima nuclear power plant workers and SDF personnel, J-Village was chaotic. J-Village itself had been damaged by the earthquake and so SDF provided equipment that substituted for the main building's utility lifelines. At the medical center where our activities were based, electricity was available but the water supply and sewage systems had not yet been restored. Despite being a medical facility, we could not properly wash our hands due to the lack of water.

The medical center itself was slightly damaged by the disaster. We began by cleaning up the rooms strewn with many different objects and checking which medical equipment remained usable. Inside the medical center, there were no supplies necessary for providing emergency medicine or radiation emergency medicine. We discussed with both the TEPCO hospital staff and SDF medical team members how best to secure the minimum supplies necessary for our activities and how to receive patients at the medical center. I felt strongly the importance of cooperating closely with experts from a range of fields when building a medical service system.

In the meantime we had to take care of some of the Fukushima power plant workers that had suffered health problems such as heat stroke or minor injuries. Fortunately, because none of them had suffered radioactive contamination, we were able to treat them using regular procedures. However, medical supplies brought in by TEPCO hospital staffers were so limited that we were forced to work out creative ways to substitute what was missing with what was available. For instance, we used cardboard to fashion a splint. We also were able to cool water using a small amount of refrigerant for a patients suffering from heat stroke. Meanwhile, as we found out that it would take nearly two hours to transport patients to hospitals from Fukushima No.1 and therefore we could not handle sudden changes in patient conditions, we discussed how to respond in the event of radioactive contamination, how to reduce the time needed for transporting patients, and how best to prevent heat stroke.

Since our mission also included the establishment of a wide-area patient transportation system, in cooperation with the SDF, we conducted a simulation of carrying patients in an SDF helicopter.

Throughout my five-day mission, I was able to help develop, the foundations of an emergency medical care system in the medical center's emergency room. Additionally, I help communicate what we had accomplished thus far to the staff members of the next group to be dispatched following our departure. However, in order to most effectively provide radiation emergency medical care at J-Village, an operation manual needs to be drawn up.



Meeting of medical teams at J-Village

#### *(4) Medical Activities at J-Village*

##### **Sharing Knowledge across Job Boundaries**

Keiichi Hara

Chief

Medical Affairs Group

Division of Management Support

(Then: Chief of Dental Satellite Group)

Hiroshima University Hospital



On April 8–12, 2011, our team worked at J-Village, the facility being used as a frontline base for workers engaged in operations at Fukushima No. 1 Nuclear Power Plant (1F) and Fukushima No. 2 Nuclear Power Plant (2F), and within the 20-km zone from 1F. The aim of our activities was to provide these workers with medical care. Specifically, we worked to improve the environment of the medical center attached to J-Village, thereby enabling it to function as a headquarters (medical facility) for our radiation emergency medical assistance teams to provide medical services to emergency patients (including radiation-exposed patients who underwent decontamination procedures).

My responsibilities as a member of the clerical staff were to make the necessary arrangements for moving our emergency medical team from dispatch location to the medical center and to subsequently collect on site information.

On the first day of our mission, we arrived at J-Village by way of Fukushima Airport. Dr. Nobuyuki Hirohashi, who led the previous team, guided us through the facility and updated us on the current progress.

J-Village was crowded with staff in protective overalls waiting to depart for their respective missions and noisy with the sound of workers carrying out their activities, as well as broadcast information about buses bound for 1F and 2F. This hectic atmosphere made me realize that we were still in a state of emergency (only a month after the nuclear accident). At this time, roughly 2000 people were working at 1F and 2F every day.

The headquarters managed by TEPCO were furnished with communications and office equipment (fax machines and photocopy machines). Piled up around these communications and office machines were cardboard boxes containing protective overalls for power plant workers and the food that they would need to bring to 1F and 2F. Although TEPCO was harshly criticized by the media for the insincere behavior of its top management, I was strongly impressed to see TEPCO employees work tirelessly on the front lines. In those days, this kind of reality was not fully reported to the public, most likely due to press restrictions.

While electricity was available, water supplies remained disrupted and so we did not have water to wash our hands. Fortunately, we had no problem with drinking water or food because we commuted from a hotel in Iwaki City. However, the TEPCO medical team who stayed at J-Village were not so lucky and found themselves unable to take a bath. I felt a strong sense of respect for the TEPCO employees who, in such a severe environment, selflessly devoted themselves to their work. The dispatched REMAT teams worked in shifts of 4–7 days for each mission, with the name's list of staffers working on site (including our team's members) being updated daily to keep everybody aware of the current staff. This demonstrates one example of just how exacting the mission was.

While we were there, the communication infrastructure and utility services gradually returned to normal.

Internet connections were established and a TV conference system was made available. Despite these positive developments, challenges such as the disrupted water supply remained.

What struck me most during my mission was that, in a situation where we could not see the prospect of resolving the nuclear disaster (due to lack of information) and where medical supplies and various other things were in short supply, workers from different teams gathered knowledge and combined strengths across job boundaries in order to overcome difficulties and accomplish their missions together. For this kind of teamwork to be most effective, we must learn to help and support each other not only in emergency situations but also during our regular daily work activities (although this may be a difficult task in reality).



Looking after an emergency patient carried in from 1F



## Chapter3

### Caring Deeply about the Disaster-Stricken Areas



In May 2011, we established the Outpatient Department for Radiation Health Services at the Fukushima Medical University to launch special examinations for internal exposure using a Whole Body Counter. Moreover, we provided support for temporary return home programs, in which evacuees visited their homes in restricted areas (within 20 km of the nuclear power plant) to retrieve their belongings. The emergency medical room at the Fukushima No. 1 nuclear power plant has also been operating around-the-clock to respond to the health management of site workers at the plant.

## **Major Responses to the Accident at Fukushima No. 1 Nuclear Power Plant of Tokyo Electric Power Company**

Yoshio Hosoi

Former Deputy Director,

Radiation Emergency Medicine Promotion Center;

Professor, School of Medicine, Tohoku University



While at work in Tokyo on March 12, 2011, I received a call from the Ministry of Education, Culture, Sports, Science and Technology at around 10:00 and went directly to the National Institute of Radiological Sciences (NIRS). In the afternoon of March 13, I arrived at Fukushima City traveling in a helicopter belonging to the Japan Self-Defense Forces (JSDF). I met Professor Choichiro Tase of the Department of Emergency Medicine, Fukushima Medical University, at the Fukushima Prefecture Disaster Response Headquarters to be briefed about the situation within the affected areas. A room on the 4<sup>th</sup> floor of the Fukushima Prefectural Government Hall was the base for our activities.

In the afternoon of the same day, I was asked by physicians of the Disaster Medical Assistance Team (DMAT) what they should do since they had run out of water for decontamination, prepared by the JSDF for the screening of evacuees in Nihonmatsu City. I suggested that the screening level should be raised from 6,000/10,000/13,000 cpm to 100,000 cpm to evacuate residents more smoothly. Accordingly, Fukushima Prefecture changed the screening level to 100,000 cpm on March 14.

At around 17:00, I visited Fukushima Medical University with the staff of the prefectural government to explain to hospital executives about radioactive contamination, which was expected to be produced by the Fukushima nuclear power plant accident, and how to protect against it. In addition, I suggested that radiation-exposed patients should be transferred from the gymnasium to the Decontamination Ward, and that the JSDF's decontamination facilities should be relocated to the side of the Decontamination Ward. These suggestions were approved.

At around 19:00, I delivered a lecture about anticipated radioactive contamination and how to protect against it to more than 100 professors, associate professors, and head nurses of the Clinical Department. After the lecture, we discussed the effects of radioactive iodine on fetuses and the effects of Iodine gargling on radiation protection. I was deeply impressed by the intelligence of the participants and their academic attitude. Then, I called the Nuclear Safety Research Association to request the calibration of the Whole Body Counters (WBC) at Fukushima Medical University.

At around 0:30 on March 14, I received a phone call from the Ministry of Education, Culture, Sports, Science and Technology. I was given instructions to evacuate and perform screening on residents who were still living within 20 km of the nuclear power plant but unable to evacuate by themselves, such as hospitalized patients. Two physicians and two nurses of Hiroshima University, two staff members of NIRS and I went to the Soso Public Health Center in Minamisoma City to perform the screening. The screening revealed that external contamination levels of evacuees, such as police officers engaged in evacuation guidance and residents who conducted outdoor activities, exceeded 13,000 cpm. This confirmed that my suggestion to change the screening level to 100,000 cpm was right, and gave me a sense of relief.

From the end of May through the middle of September 2011, medical examinations for police officers and firemen were conducted at Fukushima Medical University every week to check their internal radiation exposure, using the Whole Body Counter. I participated in the medical examinations in order to explain their results. In August 2011, I launched WBC examinations at Hiroshima University, targeting evacuees from Fukushima Prefecture. Since July 2012, I have provided outpatient care and given counseling on radiation-related issues at the Minamisoma City General Hospital.



Screening of people evacuated from the Fukushima No. 1 nuclear power plant  
(At the Soso Public Health Center in Minamisoma City on March 14)

*(1) Special Medical Examination for Internal Exposure at Fukushima Medical University*  
**Supporting Secondary Radiation Emergency Medicine  
at Fukushima Medical University**



Masao Kiguchi  
Vice Manager,  
Department of Medical Support, Hiroshima University Hospital

When I was carrying out health surveys as a member of the 10th group at the Fukushima Prefectural Government Hall on April 19, 2011, I heard that Fukushima Medical University had requested support from radiological technologists of Hiroshima University. This was because a Nagasaki University radiological technologist and a technician of the Nuclear Safety Research Association, who were stationed there, would return to Nagasaki and Tokyo, respectively, and be dispatched only once a month from the following week. I rushed to Fukushima Medical University, where those involved, a physician, nurse and the chief radiological technologist of the Decontamination Ward, and a physician of Nagasaki University, were all discussing how they could conduct operations in the future.

The major medical tasks of secondary radiation emergency medicine institutions include accuracy control of the Whole Body Counter (WBC), which is used to measure radioactive materials taken into the body, examination of internal contamination, and examination of external contamination of patients. In addition, there are a broad range of daily management operations, including managing the cleaning of the WBC room, background measurement of the WBC, measurement of environmental doses, thyroid monitoring for ICU and NICU staff, thyroid surveys at day nurseries, and contamination tests for air ambulances.

The staff members of Fukushima Medical University were concerned that in some cases their radiological technologists could not respond to such operations because they were busy with their usual hospital work, despite their best efforts at balancing these responsibilities. With this in mind they requested additional support from radiological technologists at Hiroshima University. Therefore our responsibilities expanded to include these support activities, in addition to participating in morning and evening survey coordination meetings held at the Government Hall.

Our main activities were simulation drills for transporting and dealing with injured and sick people due to contamination in a time of disaster and calibration of the WBC, which was performed with Professor Yoshio Hosoi. In addition, Professor Hosoi provided outpatient care for radiation exposure three days per week.

The 16th group, dispatched from May 12 to 16, made preparations for the establishment of an Outpatient Ward for Radiation Health Services at the Fukushima Medical University Disaster Response Headquarters. Professor Hosoi and Dr. Akira Otsuru of Nagasaki University undertook medical examinations in the outpatient ward. Workers susceptible to radiation exposure, such as police officers and firemen, were given priority in the medical examinations. These examinations included a behavior survey, medical interview for PTSD, blood tests, urine tests, WBC, and other radiation-related health services. In the case that psychiatric services were necessary, consultations were provided.

For WBC measurement, with time and efficiency in mind, dose evaluation was carried out using NaI (TI) detectors. Furthermore, we discussed with Mr. Yusa, a senior radiological technologist from the University of Tokyo how best to achieve smooth operations regarding WBC measurements.

On May 16, 10 staff members of the Futaba Fire Station and a Self-Defense Force official visited the Outpatient Ward for Radiation Health Services. Their radiation dose was calculated using WBC measurements and found to be 0.015-0.05 mSv ( $^{134}\text{Cs}$  and  $^{137}\text{Cs}$  only), a very small amount. We surmised that this was due to the fact that they wore full-face protection masks while at work.

It is the responsibility of tertiary radiation emergency medical institutions to provide continuous support to secondary radiation emergency medicine institutions. To fulfill this responsibility, procedures need to be developed where radiological technologists can contribute to medical examinations and take appropriate and prompt action.



(left) Staff of Fukushima Medical University, Nagasaki University and the University of Tokyo at the Decontamination Ward

(right) Staff member undergoing a medical checkup using a WBC equipped with NaI (TI) and Ge detectors

*(1) Special Medical Examination for Internal Exposure at Fukushima Medical University*

**Researchers Should Take the Initiative in Providing On-Site Support.**



Shinji Suga

Chief, Radiation Control Technology G, Technical Center

I was dispatched to Fukushima Medical University, a secondary radiation emergency medical institution, every other week between May 29 and September 1, 2011, and during December 11 and 17, 2011. My main activities were to evaluate internal radiation dosages in WBC examinations using the Whole Body Counter (WBC), which were conducted at Fukushima Medical University, conduct response training for emergency transport from the Fukushima No. 1 nuclear power plant, and participate in regular meetings held at the Off-Site Center to share information.

WBC examinations were conducted in collaboration with the staff of the Fukushima Medical University Hospital and support staff from Nagasaki University, mainly targeting firemen and those working within 20 km of the Fukushima No. 1 nuclear power plant. Many of them were people involved in local governments who were involved in outdoor activities even after vapor explosions had occurred at the plant.

Emergency transport training was conducted in cooperation with institutions involved in fire-fighting operations, the Japan Self-Defense Forces (JSDF), the staff of Fukushima Medical University and the support staff of Nagasaki University. In the training with the JSDF, the grounds of Fukushima Medical University were used as the landing site for helicopters, where large-scale emergency transport training for radiation-exposed patients was carried out using helicopters. The atmosphere during training was tense since the massive earthquake had just occurred.

In Fukushima City the radiation dosage rates and levels of radioactive materials in the environment were significantly different from that during normal times. Accordingly, it was difficult to evaluate internal radiation doses using the WBC. As the WBC is an open-type device, we have to take into account the influence of high background radiation levels and implement antipollution measures against radioactive materials around the WBC.

There are very few people who can make an accurate measurement of internal radiation exposure using a WBC. In addition, since each WBC device has different features, a great deal of knowledge and experience is required to make a proper evaluation. Accordingly, human resource training for the WBC should be established in order to properly educate radiological technologists at locations equipped with WBCs and other radiation measuring devices.

I felt that it was very significant that I was able provide support as a technical staff member during this time. However, I believe that there were problems concerning the working conditions, where some staff were obliged to do extra work, while carrying out their usual operations. Measures should be taken to recruit the necessary personnel. Moreover, I believe that teaching staff, who engage in research on radiation on a routine basis, should take the initiative in providing on-site support during an emergency situation such as this.



Meeting held at the Off-Site Center

## *(2) Supporting Residents' Temporary Return Home*

### **Providing Continuous Support for Residents' Temporary Return Home**

Akira Sakai

Professor, Department of Radiation Life Sciences,  
School of Medicine, Fukushima Medical University

(Then: Lecturer, Department of Hematology, Hiroshima University Hospital)



I belonged to the Department of Hematology and Oncology, Research Institute for Radiation Biology and Medicine. From that department, Assistant Professor Keiichiro Mihara first visited Fukushima as a member of the 2nd group of the Radiation Emergency Medical Assistance Team. Later, he was replaced by Professor Akiro Kimura, who was then followed by me. The duration of each visit was four or five days. I visited Fukushima before Golden Week in May 2011. As Director Kenji Kamiya had an office at Fukushima Medical University, I transferred the baggage of the staff of Hiroshima University stored at the Off-Site Center to this room during Golden Week.

Around that time, a program in which support would be provided for the temporary return home of Fukushima evacuees was announced, and Hiroshima University decided to join the program. From that point onwards a group of four staff members, comprised of a clerical staff member, a radiological technologist, a nurse and a physician, has been continuously engaged in support activities. For the temporary return home, three gymnasiums located just outside the 20-km evacuation perimeter around Fukushima No. 1 power plant were used as staging areas. Two members from each family were allowed to visit their homes for two hours, while wearing protective suits. We interviewed them in the staging area before they left for their homes. Then, after they returned, we performed radiation screening on their clothing and baggage and performed a physical condition examination as well.

Approximately 20 residents rode per bus, with 15 to 20 buses leaving separately for pre-determined areas. Prior to departure, detailed explanations about the procedures were given to the residents and they then put on their protective suits before boarding their pre-assigned buses and returning to their homes. In each case, all residents departed by noon and began returning around 2 o'clock in the afternoon.

Although up to two big bags (provided by Tokyo Electric Power Company) of belongings were permitted to be taken out per family, in principle, many families had prepared extra bags. At individual staging bases, Japan Self-Defense Forces (JSDF) officials wearing protective suits were waiting for residents in decontamination tents. Fortunately, high radiation doses were not detected on any of their baggage or protective suits.

We conducted our support activities during the rainy season. Residents who returned home reported having trouble moving around while wearing their protective suits – this might have been due to the increased levels of humidity during the rainy season. Our clerical staff member, radiological technologist and nurse, who met the residents as they returned from their homes and performed screening at the “hot” zones, reported that they worked in a constant sweat.

Since many of the residents visiting their homes were elderly, with health problems typical of the elderly such as hypertension and diabetes, we were concerned that they might suffer from heatstroke. However, as those involved from Tokyo Electric Power Company undertook every possible measure to ensure safety, only a few people were taken to medical clinics.

Subsequently, it was no longer necessary to wear protective suits when wearing a long-sleeved shirt. Thus, the rules about clothes and screening methods were gradually simplified. The first temporary return home program finished before the Obon holidays in August. Since then, temporary return home programs by car have also been permitted.

I sincerely hope that the evacuees can return to their old lives as soon as possible.



Treatment room at the Radiation Emergency Medical Care Unit in Fukushima Medical University Hospital

## *(2) Supporting Residents' Temporary Return Home*

### **Our Greatest Concern – Heatstroke**

Shinya Matsuura

Professor, Department of Radiation Genome Disease,  
Research Institute for Radiation Biology and Medicine



I was dispatched to the Off-Site Center as chief of the 9th group of the Radiation Emergency Medical Assistance Team (REMAT), one month after the Fukushima nuclear power plant accident occurred. Around that time, the national government and prefectural and relevant municipal governments had decided to conduct temporary return home programs in response to the continued requests from affected residents.

At the Off-Site Center, a manual for temporary return home programs was being developed, and I joined in to help. For these temporary return homes, residents were required to wear a protective suit and not to eat or drink while at their homes. In addition, information conforming to the rules for radiation controlled areas were included in the manual. A radiation controlled area refers to an area where radiation dose levels are high and require special management, similar to a radiation research facility. As a Japanese person, I felt very sorry that these areas, where people had lived a normal life without any anxiety previous to the earthquake, were now treated in the same way as a radiation controlled area.

The temporary return home programs were launched at the end of May 2011, and I engaged in the programs in June and August. Hiroshima University REMAT, comprised of a physician, a radiological technologist, a nurse and a clerical staff member, were involved mainly in health management of residents at the staging areas for the temporary return home trips, under the auspices of medical teams from the Ministry of Health, Labour and Welfare.

At the staging area where I was assigned, over 200 residents gathered. After receiving an explanation from the Nuclear and Industrial Safety Agency, they put on the necessary gear and headed for their residential areas using more than a dozen chartered buses. We carefully created a list of residents visiting their homes based on the departure of the buses and checked individual medical interview sheets to monitor their health. After the buses departed, we set up a radiation survey venue to prepare for their return. It was one of our more important tasks to properly guide the residents returning from the restricted areas to the survey venue.

We were most concerned that the residents in their protective suits might suffer heatstroke in the extremely hot weather. Upon their return we checked their physical condition and conducted a radiation survey to test for radiation contamination of the belongings that they brought from their homes. Although some residents felt unwell, there were no patients with severe symptoms. After all the residents had returned to their evacuation destinations, we checked that the survey venue was not contaminated, and completed our task as REMAT.

There was one case where a resident was not allowed to return home due to a health problem we found during the health checkup prior to departure. We felt very sorry for this because he had looked forward to returning home enormously. Considering this I feel more detailed explanations should have been given in advance to the residents.

One year later, I visited the evacuation areas again. From the train window I saw a field of grass spreading to the base of some nearby mountains. Seeing this I realized that these used to be farmlands, filled with rice paddies and crops. I hope that the affected areas will soon recover from the radiation disaster and return to a crop-filled state.



Staff of Hiroshima University waiting for residents to return from visiting their homes

## *(2) Supporting Residents' Temporary Return Home*

### **Working Hard to Grasp the Situation of People Who Would Visit Their Homes**

Hiroataka Matsui

Associate Professor, Department of Cancer Molecular Pathology, Research Institute for Radiation Biology and Medicine



Over the two days from June 25 to 26, 2011, I was dispatched to the Hirono Town Gymnasium in Fukushima Prefecture to support the residents' temporary return home visits to the restricted areas. Adjacent to the south of J-Village, the gymnasium is located more than 20 km from the Fukushima No. 1 nuclear power plant.

After arriving at Hirono Town, I found that the shoulders of roads that had collapsed were still left untouched even though two months had passed since the earthquake. Although electricity was available, water supplies continued to be disrupted. Accordingly, residents had difficulty living there, though the town was not designated as an evacuation area.

Under these circumstances, the roles of our team dispatched from Hiroshima University were to check the health condition of residents who would visit their homes temporarily and to perform screening for external exposure and recheck their health condition upon their return. Charged with supervising the screening, we assumed the responsibility for making detailed arrangements with a range of staff members in order to unify our policies and not cause confusion.

In supervising the screening we were responsible for various tasks. We were to confirm the number and check the health condition of the people who would temporarily visit their homes. Furthermore, since the group included not only residents but also police officers, rescue members, drivers of the chartered buses, and staff from animal welfare groups, the number of people who would enter the evacuation areas was not fixed until the actual day of departure. With this in mind we worked hard to adjust accordingly to the concerns of the returning residents, while at the same time collaborating with the staff members from the various other agencies involved. One of our other important tasks was to conduct a survey of surface contamination of the residents on their return from their homes, while attempting to not impose any further strain on the elderly residents, who had been wearing non-porous protective suits throughout the day.

During my two days there, I was able to conduct support activities for the temporary return home in a favorable manner without any serious problems. To perform the necessary activities efficiently and effectively, mutual cooperation was indispensable among staff members of the government agencies, the local governments, firemen, police officers, employees of the power companies, Self-Defense Force officials, and the many others involved who were usually engaged in other jobs and had no direct connection to each other. To this end, I believe that it is necessary to respect each person's and the overall group's unique skills and their abilities to properly undertake their own duties.



Support team for temporary return home

*(2) Supporting Residents' Temporary Return Home*

**Struggling to Make Adjustments Due to the Difference  
in Responses of Individual Institutions**



Eiji Nishimaru

Radiological Technologist, Department of Medical Support, Hiroshima University Hospital

I was first dispatched as a member of the 4th group of the Hiroshima University Radiation Emergency Medical Assistance Team from March 22 to 26, 2011, and subsequently joined the 11th, 17th, 24th and 32nd groups.

At first, I engaged mainly in activities at the Prefectural Government Hall and the Off-Site Center to manage residents who served as volunteer surveyors and to create transportation flow charts for trauma patients suffering contamination from the nuclear power plant accident. After the situation at the power plant began to calm down, I joined the medical teams providing support to residents temporarily visiting their homes in the restricted areas to retrieve their belongings.

Requests for participation in support activities for the evacuated residents' temporary return home trips were made when I worked as a member of the 17th group. I joined the venue preparation work, a rehearsal of the temporary return home program, and the first temporary return home program (at the Furumichi Gymnasium in Tamura City on May 21). Many, many institutions, organizations and individuals were involved in this temporary return home program: the Ministry of Economy, Trade and Industry (overall control of temporary return home programs and activities related to venues and vehicles); Tokyo Electric Power Company (guide for residents and radiation exposure control); Ministry of Health, Labour and Welfare; Ministry of Education, Culture, Sports, Science and Technology; Hiroshima University; National Institute of Radiological Sciences; National Disaster Medical Center; Hirosaki University (medical teams); DMAT (relief teams); Federation of Electric Power Companies of Japan; hospitals and research institutions throughout the country; educational institutions (survey of residents and baggage); staff of the local governments; local police officers and firemen; and volunteers concerned with pet protection.

I was involved in all the support activities for the evacuated residents' temporary return home trips, which were conducted at four sites: Furumichi Gymnasium in Tamura City, Baji Park in Minamisoma City, Kawauchi Village Gymnastic Center in Kawauchi Village, Futaba County and Hirono Central Gymnasium in Hirono Town, Futaba County. While supervising mainly "hot" zones and screening floors, I observed many problems.

The most serious concerned the activities in the so-called "hot" zones. There were issues to be resolved involving guiding the residents from the buses, disposal of protective shoe covers, transportation of baggage from buses and within "hot" zones, survey methods and standards for the residents and their baggage, and finally guiding the residents with their baggage after undergoing the survey.

After the first temporary return home program finished, medical teams addresses the various issues that occurred at each site. However, detailed countermeasures were taken independently at each site, because the responses of individual institutions varied, individual adjustments were required. When efficient operation of the temporary return home trip program was difficult, medical teams from Hiroshima University stepped in to fill the need. I am extremely grateful for the medical team members of Hiroshima University for their generous cooperation.

I was very happy to participate in support activities for the evacuated residents' temporary return home program as a member of the medical staff. I always took care to conduct activities with respect for the residents and tried to view things from their perspective. At first, the local residents made many complaints. However, over time these complaints gradually decreased because individual institutions made a concerted effort to hold discussions before the actual home visits, which strengthened their sense of unity. This made me fully realize the importance of communication.



Adjustments being made with the Federation of Electric Power Companies of Japan at a “hot” zone

*(2) Supporting Residents' Temporary Return Home*

**Residents Complain of the Prohibition of Taking Out Foodstuffs.**

Chikako Fujioka

Radiological Technologist,

Department of Medical Support, Hiroshima University Hospital



On June 11, 2011, I first joined the medical teams of the Radiation Emergency Medical Assistance Team (REMAT) in Fukushima Prefecture as a member of the 24th group. When the 22nd group was dispatched to Fukushima on June 4, a temporary return home program started, in which evacuated residents visited their homes temporarily. When the 24th group was dispatched, the program was still not running smoothly. I remember how challenging things were at that time, compared to when I was dispatched on July 29<sup>th</sup> as a member of the 34th group.

The most significant role of the medical teams of Hiroshima University REMAT was to provide health care for residents, which included checking whether their physical condition was adequate for a temporary return home trip, and carrying out a subsequent check-up upon their return. Temporary return home programs were conducted for a variety of purposes, such as retrieving goods and pets, confirming the state of homes, and to pay respects to the souls of the victims.

The temporary return home program provided the opportunity for residents who had not yet returned home after the earthquake to visit their homes for the first time in three months. Although only a maximum of two representatives of each family were allowed to return home, participants had great expectations for the program. Since residents were at first required to wear protective suits, dehydration was of great concern because it was the steamy rainy season. Later, simpler protective suits were adopted.

On June 11, I engaged in support activities at the Furumichi Gymnasium. The reception of residents was carried out twice, according to the destinations of residents, Futaba Town and Okuma Town. A total of 302 residents participated in the program: 132 people consisting of 99 residents, 33 staff members and five buses for Futaba Town; 170 people consisting of 122 residents, 48 staff members and eight buses for Okuma Town.

After distributing medical interview sheets and providing an explanation to all the participants, we checked their health condition in collaboration with a relief team. We created the final list of residents who would visit their homes and picked up residents for whom medical attention was required in the hour and a half before they got on the buses. After residents returned, we sequentially performed screening on them. Our role was not only to check their condition but also to promptly transfer residents in poor condition from “hot” zones to “cold” zones, where a relief team stood by.

Although there were concerns about the elderly, nobody became severely ill, and only one person felt slightly ill due to the heat. Individual monitoring of residents showed that their contamination level was no more than 28  $\mu$ Sv. Decontamination was therefore not necessary for either the residents or their belongings, with the maximum allowable GM count being 7,000 cpm.

The majority of the things that the residents brought back from their homes were health foods, tobacco, and medicines. However, foodstuffs and other products to be taken orally were not permitted to be brought out from the point of view of safety and were confiscated. This was because of concern over foodstuffs spoilage or contamination after

having been left abandoned following the accident. However, the residents complained strongly about this, and ultimately they were allowed to take out foodstuffs during their temporary return trips.

Staff members formed teams and took turns joining support activities. In some cases when all of the team members were being rotated concurrently, new members had trouble carrying out operations because none of them were completely familiar with the proper flow of operations. In addition, in the beginning it took a long time to coordinate activities with other teams (Ministry of Economy, Trade and Industry, Federation of Electric Power Companies of Japan, etc.). I believe that in a situation like this, the most important points are cooperation and communication among individual organizations beyond the boundaries of job categories.



Staff making preparations for reception of residents at the venue for temporary return home

## *(2) Supporting Residents' Temporary Return Home*

### **Joining DMAT Based on Valuable Experience**

Hidehisa Yamaoka

Radiological Technologist, Department of Medical Support, Hiroshima University Hospital



I was first dispatched to Fukushima as a member of the 7th group of medical teams from the Hiroshima University Radiation Emergency Medical Assistance Team (REMAT) on April 4, 2011. At that time, it was a transition period between the acute phase and the chronic phase of the disaster, where medical needs were changing on a daily basis. I remember checking the information provided by various institutions and doing my utmost to grasp the situation and deliver accurate information to the headquarters at the Fukushima Prefectural Government Hall and the Off-Site Center. Subsequently, I also joined the 13th, 22nd, 27th, 34th, and 37th groups.

On June 4, I first participated in a temporary return home program as a member of the 22nd group (at the Furumichi Gymnasium in Tamura City). It was approximately two weeks since the program had been launched, and the situation was still confusing. Flexible responses were thus required on site. The most important purpose of support activities for a temporary return home program was to provide security and safety for the residents, and to perform radioactive contamination assessments. Some staff members from other institutions did not understand this, which sometimes caused confusion and misunderstandings. However, ultimately due to cooperation and communication between individual institutions comprised of many, many volunteers, the program ran successfully with nobody becoming sick or getting injured.

On August 26, a temporary return home program was conducted for residents who had lived within 3 km of the Fukushima No. 1 nuclear power plant for the first time. Although I had participated in temporary return home programs several times, the program conducted this time created a different atmosphere. Since many members of the media were accompanying the residents, the Central Gymnasium in Hirono Town, which served as a staging area, was filled with a stronger tension than normal. In the heat of late summer, residents wearing non-porous Tyvek protective suits came back from their homes without any real problems, although they were all drenched in sweat. One woman felt a little ill, but she received medical treatment at an aid station and returned home safely. The faces of the staff members showed their relief that they had not encountered any serious problems.

Thanks to these valuable experiences, I took a special interest in disaster medical care. Several months after I was dispatched, I participated in a training course for members of the Japan Disaster Medical Assistant Team (DMAT) and became a member. My team members and I are making concerted efforts to develop our skills in order to respond to any disasters that may occur in the future.

When disasters occur, it is not only the medical care provided by teams that is of great importance, but also collaboration with other organizations, regardless of whether they are from the public or private sector. Such collaboration is not formed without mutual respect and trust.



Arrival site for buses for the temporary return home (Baji Park in Minamisoma City)

## *(2) Supporting Residents' Temporary Return Home*

### **Saying “Welcome Back” to Residents Who Returned with Much Baggage**

Kafumi Nishinaka

Chief Nurse,

Department of Nursing, Hiroshima University Hospital



Immediately after the Great East Japan Earthquake, the first thing that I saw, before viewing the images of the earthquake and tsunami, was another chief nurse, my co-worker, in a great flurry of activity, making arrangements for the dispatch of DMAT. I realized that something very serious had occurred. Soon afterwards the Radiation Emergency Medical Assistance Team was dispatched to provide support services. Four months after the earthquake, I participated in a temporary return home program from July 22 to 26, 2011.

In this program, residents were permitted a temporary visit to their homes located in the restricted areas within 20 km of Tokyo Electric Power Company's Fukushima No. 1 nuclear power plant, where evacuation orders were issued after the accident. The main condition of the program was that residents could only return for up to two hours. We provided them with support services, including a physical check-up prior to departure and then performing radiation screening as well as a follow-up physical upon their return.

Our medical team consisted of three staff members, a clerical staff member, a radiological technologist, and a nurse. We engaged in support activities at a staging venue over five days. Getting up at 4 o'clock every morning, we got dressed, prepared our bags and left for the Fukushima Prefectural Government. Every morning, we mutually observed each other's behavior, while monitoring each other's physical condition, and hoped that residents whom we would see could visit their homes without any difficulties.

On the day of departure for the temporary return home trip, evacuees gathered at a staging area between their individual evacuation centers and their evacuation destinations, and headed out to the restricted areas by bus after being equipped with protective suits and dosimeters. Every day we sent off approximately 400 residents, who wore protective suits, that were more like sauna suits with an ambient temperature of approximately 30°C making it difficult for the residents to move freely. They stayed at their homes for approximately two hours and came back carrying the belongings that were allowed to be taken out. As they returned, we said to everyone, “Welcome back.” When we heard them say, smiling, “We are all right. Thank you,” even though they were sweaty and muddy all over, we felt their great underlying strength. After their radiation dose levels were measured to confirm their safety, residents headed back to their evacuation destinations without further problems.

One of the events that most strongly impressed us was a memorial service held in Okuma Town on July 24. Residents carrying bunches of flowers went to where their homes had been located prior to the tsunami, and following the memorial service came back with empty hands. For the first time in Fukushima, I could find no words to say.

I believed that it was “cooperation” that sustained our support activities, which required safety and prompt actions. Such cooperation included lectures delivered by nurses at the ICU/Advanced Emergency and Critical Care Center before we were dispatched to the affected areas, instructions from our predecessors, interaction with other staff members at the staging areas and, in particular, support from other members of medical teams, whom I met on the day

when I left for affected areas.

We were told by the staff of the Ministry of Health, Labour and Welfare, and the Ministry of Economy, Trade and Industry, who supervised the medical teams, that every medical team from Hiroshima University was to maintain active cooperation and to demonstrate our cooperation to members of other universities. I believe that disaster training drills and courses based on these experiences in Fukushima should be provided. Furthermore, Hiroshima University Hospital should initiate these measures and work to strengthen both its internal cooperation within the institution as well as cooperation with other universities and national agencies, particularly assuming that other disasters are likely to occur.

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Preparation meeting for a temporary return home program (at a staging venue)

## *(2) Supporting Residents' Temporary Return Home*

### **Caring Deeply about the Hearts of Residents**

Tomohiro Sasa

Nurse, Department of Nursing,

Advanced Emergency and Critical Care Center



From June 6 to 11, 2011, I provided medical support to residents at the Furumichi Gymnasium in Tamura City and at the Kawauchi Village Gymnastic Center. These sites served as staging points for temporary return home visits to restricted areas within a 20-km radius of the Fukushima No. 1 nuclear power plant.

In the health checks carried out at staging points before residents left for their homes, I checked approximately 150 to 330 medical interview sheets per day. I asked the residents directly about their condition and when needed I selected those among them who I thought should be examined by a physician. In addition, while checking residents' medical history, current medicines, and confirming whether their physical condition could tolerate the temporary return home, which would take around four to five hours, I identified residents to whom we needed to pay particular attention.

The medical information on the residents who would visit their homes temporarily was organized into documents to be shared among groups as varied as medical teams from the Ministry of Health, Labour and Welfare, physicians in charge, medical teams of the Japan Red Cross Society, the Disaster Medical Assistance Team (DMAT), rescue crews, safety officers. These documents were distributed to these groups before the residents left for their homes. Arranging the documents to be shared with other medical teams was very busy work because there wasn't much time before the residents left for their homes by bus. However, this was indispensable for an effective support system.

I engaged in one temporary return home program at a gymnasium under a clear sky in June. Since I wore a sealed protective suit, I felt hot compared to the outdoor air temperature. In these circumstances, when the buses returned from the home visit, I got on first in order to examine the residents. If I found anyone who felt ill, I carried out an early observation and made arrangements for them to be given priority in getting off the bus.

Since the interior of the buses used for temporary return home visits were fully covered with curing sheets, the aisles of were very slippery. While carrying heavy luggage and unable to watch their step in the narrow aisles, residents had difficulty getting off buses. I helped them carry their baggage to prevent them from slipping or falling from the bus. Then, I checked their physical condition at the survey venue.

All the evacuees looked forward to returning to their homes and were filled with delight. On the other hand, they still worried about invisible radiation, the intermittent aftershocks, and their lives ahead considering the prospects of a prolonged evacuation and continued unemployment. When returning home, they saw the miserable state of their houses and to make matters worse, in some cases a few houses had been broken into by thieves and household goods had been stolen. Upon returning from their homes, many residents were deeply saddened. Unfortunately, I was not given enough time to carefully listen to them and therefore was unable to provide adequate psychological or emotional support.

From these experiences, I believe that the establishment of a relationship of trust with members of other organizations through careful and open communication, as well as collaboration in performing operations are essential to the establishment of an effective initial response system for medical care following a radiation disaster.



Staging venue for a temporary return home program before departure

## *(2) Supporting Residents' Temporary Return Home*

### **Relieved by Residents' Smiles**

Yasuhiro Ochi

Nurse, ICU,

Department of Nursing, Hiroshima University Hospital



I engaged in support activities as a member of the 24th group of the Hiroshima University Radiation Emergency Medical Assistance Team from June 10 to 13, 2011. The roles of the 24th group were to provide support services for temporary return home visits to restricted areas around the Fukushima No. 1 nuclear power plant. We performed screening on the residents and the belongings they had retrieved from their homes to check whether or not they were contaminated by radioactive materials, and made a prompt response when injured or sick persons were found before, during, and after the temporary return home visits.

The Furumichi Gymnasium in Tamura City and Baji Park in Minamisoma City, which are located approximately 20 km away from the Fukushima No. 1 nuclear power plant, were used as staging areas for the temporary return home visits to the restricted areas. The residents travelling to their homes were determined in advance, with most arriving at the staging areas individually.

Residents who finished the reception procedure were interviewed in order by medical staff about their physical condition. However, when the residents arrived and met friends and acquaintances, they often left their seats to confirm each other's safety. Sometimes due to this movement within the group, I had trouble remembering who had been interviewed and who had not.

The wearing of protective suits was necessary for residents when visiting their homes. Since it was the middle of June and gradually getting hotter, those wearing protective suits felt as if they had taken a sauna. As a matter of course, their homes were not air-conditioned. We also had to wear protective suits when responding to residents who had returned to the staging areas.

All the residents were fatigued due to their prolonged evacuation. They returned from their homes carrying heavy luggage and drenched in sweat. Although they were only allowed to take out one bag of belongings, because they did not know when they would return home next some brought more. I often wondered how much stress they were enduring. Despite these circumstances, when residents replied to us with a smile, I felt deeply relieved.

At the staging areas, there were various officials, such as medical staff members like us, staff of Tokyo Electric Power Company and the Federation of Electric Power Companies of Japan, firemen, police officers, and accompanying personnel. The medical staff members in charge of screening, such as ourselves, were prepared in advance and well aware of the flow of activities and operations and simply oversaw the flow of activities during the day.

Since the manpower was insufficient, the roles of staff members and the practical operation methods were often unclear. Accordingly, those involved in different types of activities had to cooperate with each other and respond to the specific circumstances. We often had trouble performing our duties smoothly because working conditions and methods differed among staging areas and staff members. Fortunately, the 24th group completed its two-day posting without too much difficulty.

Through these activities, I gained a new appreciation of the importance of understanding individual roles and their respective purpose. Furthermore, it is important to clarify what needs to be done given such a confusing situation. With this in mind, I believe that we should conduct training on a routine basis, simulating what roles we should play and what is likely to be lacking during these types of emergency situations.



Staging venue (residents putting on protection suits)

*(2) Supporting Residents' Temporary Return Home*

**Trying to Provide the Best Support from the Perspective of the Disaster Victims**



Teruo Nishioka

General Chief, Managing Support Group,  
Graduate School of Education (Then: Chief, Audit Office)

From June through July 2011, as a medical team staff member, I assisted in the health management of residents and staff members who would enter the restricted areas (mainly distribution and collection of medical interview sheets) and reception operations for them when they returned to the staging areas.

Regarding the temporary return home programs, an increasing number of residents were being allowed to visit their homes around the time when I was dispatched. One program in which I engaged was conducted on a very large scale, where approximately 400 residents from two towns visited their homes in 20 separate buses.

Accordingly, a small number of medical staff members had to deal with a large number of residents. We conducted medical interviews with all the residents, organized their information for each bus and provided directions (transfer of information on residents, such as names, who needed special attention due to health problems) to the staff members and rescue crews who would accompany the residents. While working on the front line of the program, we had to complete all of our tasks within a limited amount of time before the buses left..

Moreover, since there was a shortage of goods at the gymnasium being used as the staging base for the temporary return home, we had to take action according to the circumstances. When the residents returned to the staging area after visiting their homes, staff members also had to wear protective suits, because the residents' protective suits and luggage had the potential of being contaminated by radioactive dust.

Since I was dispatched from June through July, during the height of summer, I felt as if I were in a sauna when I worked with a protective suit over my clothes. Once the residents began to return from their homes, we had to do physical check-ups of nearly 400 people virtually at once without any chance to drink any fluids. Thus, we were forced to work in very physically demanding conditions.

Many people had been forced to evacuate their homes due to the nuclear power plant accident caused by the earthquake and tsunami and had been unable to return home until now. Importantly, they had to wear protective suits when entering their homes which made for a very uncomfortable physical experience. Taking into everything into the consideration, I tried to provide the best possible support I could from the perspective of the disaster victims.

However, when the buses returned from the restricted areas in such quick succession, we were fully occupied with the task at hand. Due to the sheer volume of people and work to be done in such a limited amount of time, I found myself often responding to residents in a businesslike manner. Reflecting on the day's events as well as my behavior, I would do my best to modify my manner and address any other concerns the following day.

We reviewed our all of our job responsibilities daily (in particular, guiding buses that came back from restricted areas, guiding the returning residents and their belongings, etc.), with a focus on those the aspects of the day that disrupted our activities, and in turn attempted to modify these issues for the next day, thereby responding to residents



## *(2) Supporting Residents' Temporary Return Home*

### **Appreciating the Value of Simply Talking**

Kengo Toda

Senior Specialist, Medical Affairs G,

Management Support Office, Hiroshima University Hospital

(Then: Chief, Hospital Information System G)



I engaged in support activities as a member of the Radiation Emergency Medical Assistance Team (REMAT) at a staging area for the temporary return visits for residents who returned to their homes in restricted areas (within 20 km of the Fukushima No. 1 nuclear power plant). The Furumichi Gymnasium in Tamura City, which was located approximately 20 km away from the Fukushima No. 1 nuclear power plant, was used as a staging venue. I conducted support activities for three days from June 4 to 6, 2011.

On the evening of June 3, I participated in a briefing session held at the Fukushima Prefectural Government Hall in Fukushima City. In the briefing session, the purpose and procedures of the temporary return home program that would begin on the following day, as well as the roles of individual members were explained and clarified.

Our activities included the supervision of the staging venue, providing assistance to returning residents, offering support for REMAT (physicians, nurses, radiological technologists, etc.), and coordinating communications. To ensure the safety and security of residents who would visit their homes, I mainly engaged in coordinating communications as a clerical staff member. We aimed to share information between not only members of the medical dispatch teams but also the staff members of the Ministry of Health, Labour and Welfare, police officers, firemen, Self-Defense Force officials, staff members of the Japanese Federation of Electric Power Companies, and many others, all of whom were conducting support activities at the staging venue. In addition, I distributed and collected medical interview sheets to the residents before they returned home, compiled the number of people who would actually enter the restricted areas, explained the procedure of the home visits, and guided residents after they came back from their homes.

Of particular note, the area where I had problems was with compiling and confirming the number of people who would be entering the restricted areas. Since bus drivers, radiation administrators, safety managers, police officers, firemen, people sent in to collect pets, and journalists all accompanied the residents to their homes, it was a wide range of people to check in a very short amount of time. On June 4, when I participated in the temporary return home program for the first time, I struggled to organize even some simple jobs, and feel that I wasted time in just trying to get things done.

Furthermore, I am afraid that I failed to take prompt action and coordinate communications appropriately on more than one occasion. These are the personal lessons that I need to reflect on and learn from. This time, I had preliminary discussions about our activities, unlike my previous dispatch in March, in which I visited affected areas with no background knowledge. However, despite these discussions, I still found myself confused by the atmosphere of the staging venue, how to communicate with the various persons involved and, in particular, how to talk to residents.

On the first day of the temporary return home program, Dr. Koichi Tanigawa, who was responsible for supervising the staging venue, clearly stated that our mission was to ensure the safety and security of the residents before, during, and after the temporary return home visit. Dr. Hirofumi Maruyama and the members of the 22nd dispatch group

held a preliminary meeting for the temporary return home visit and another meeting to review our activities after the program had ended. In part due to the appreciation expressed by the residents, I was able to complete my support activities without any major miscalculations, though I feel I could have done better in my tasks.

Through these experiences, I realized once again the importance of sharing awareness and information, as well as the value of simply being talked to and cared for by others.



(upper left) Holding a briefing session for residents

(upper right) Checking important points in preparation for the home visits

(lower left) After finishing our support activities

### *(3) Emergency Medical Room in the Fukushima No. 1 Nuclear Power Plant*

#### **Using Our Knowledge of Radiation and Emergency Medicine**

Yasumasa Iwasaki

Lecturer, Department of Emergency and Critical Care Medicine,  
Hiroshima University Hospital



The Great East Japan Earthquake became a combined disaster that included a very large magnitude earthquake, the damage caused by the ensuing tsunami, and the Fukushima No. 1 nuclear power plant accident. As a tertiary radiation emergency institution, Hiroshima University was engaged in DMAT activities and radiation emergency medical activities. In particular, we focused on responding to the nuclear power plant accident. As a staff member of Hiroshima University, I conducted support activities at the Fukushima Prefectural Government Hall, the Off-Site Center, the J-Village and the emergency medical room, while assisting DMAT activities and temporary return home programs.

#### **1) DMAT activities**

On the day that the earthquake occurred, DMATs across the country received a call for support from the Ministry of Health, Labour and Welfare. Soon thereafter we headed out to the Fukushima Gender Equality Center in Nihonmatsu City. The center housed approximately 120 evacuated patients, transferred from hospitals, who were likely to have been exposed to radiation. I undertook the screening of seriously-injured patients and made arrangements for their transfer to other hospitals. In addition, I performed contamination screening on residents who arrived of their own accord or were transported by helicopter.

I was most deeply impressed by the fact that a young female nurse, who was evacuated from a hospital with patients potentially exposed to radiation and was housed in the center, worked hard for patients while fighting the fear of her own radiation exposure. She even asked me whether or not she could have a baby in the future. Immediately after the earthquake, all residents, including health professionals, were frightened by the unknown surrounding invisible radiation including insufficient information and a lack of knowledge.

#### **2) Activities at the Off-Site Center in Fukushima Prefecture**

An Off-Site Center (OFC) refers to a facility serving as a center for emergency response measures, established at the time of a nuclear disaster based on Article 12 of the Act on Special Measures Concerning Nuclear Emergency Preparedness. When a disaster occurs, relevant institutions gather at OFCs to take emergency measures in cooperation, and to coordinate countermeasures against nuclear disasters, and work for their smooth implementation.

At OFC, as a member of the medical teams, I monitored the safety of residents and workers at the nuclear power plant and made adjustments to ensure their safety, while communicating with the various institutions. What is most important in disaster medical care is said to be the chain-of-command structure, or command and control. In a time of disaster, it is important to make a prompt assessment of the situation at hand. In order to do so, I believe that it is most effective when representatives of individual institutions with decision-making authority, assemble in one place.

### 3) Activities at the emergency medical room in Fukushima No. 1 nuclear power plant

Over 2,000 workers were still working in the nuclear power plant each day attempting to resolve the situation after the accident. Meanwhile, the areas within 20 km of the nuclear power plant were designated as evacuation areas, where even ambulances could not travel – even though they are called when an accident occurs in the power plant.

To handle this situation, an emergency medical room to provide medical care and treatment was established in July 2011, utilizing an existing building in the nuclear power plant. A physician, a nurse and a radiological technologist are stationed there on a round-the-clock basis in order to respond immediately to accidents and manage the health care of workers. Their tasks require knowledge of radiation and emergency medicine. Accordingly, I believe that the Department of Emergency and Critical Care Medicine of Hiroshima University is the most appropriate to take charge of such tasks.

It has been nearly two years since the earthquake, and memories of the earthquake are now fading away from people's consciousness. However, whenever I pass through evacuation areas to visit the Fukushima No. 1 nuclear power plant, I realize that there are still so many people in Fukushima who cannot return to their normal lives. Hiroshima University will continue to provide support until all residents regain their old lives as they were prior to the earthquake. As a staff member of Hiroshima University, I will continue to keep visiting Fukushima in order to continue contributing to the post-quake recovery no matter how small the contribution may be.



Emergency medical room in the Fukushima No. 1 nuclear power plant, equipped with devices available for emergency response operations

### *(3) Emergency Medical Room in the Fukushima No. 1 Nuclear Power Plant*

#### **Creating a Manual for Nursing Care Activities in the Emergency Medical Room**

Ryota Iiboshi

Vice Chief Nurse,

ICU, Department of Nursing, Hiroshima University Hospital



In July 2011, four months after the Great East Japan Earthquake, the emergency medical room was established on the 1st floor of the service building in front of Units 5 and 6 of the Fukushima No. 1 nuclear power plant of Tokyo Electric Power Company (5/6 ER). At first, nurses were not continuously stationed at 5/6 ER. Therefore, it was difficult for physicians alone to provide the best medical care.

Accordingly, male nurses were dispatched from medical facilities across the country to ensure that nurses were continuously stationed in the 5/6 ER. I was dispatched to 5/6 ER in November 2011 and February in 2012. The roles of nurses in the 5/6 ER were: (1) to care for injured and sick people and help doctors provide medical care; and (2) to develop and control the medical care environment in the emergency medical room.

During the entire period working in the 5/6 ER, we were visited by three workers. I helped a doctor stitch up the finger wound of a worker who suffered a finger contusion when he caught it on loose cables. I also assisted in the medical examination of a worker with cold symptoms and helped a doctor stop the nosebleed of a worker by applying pressure to his nose with his own hand while the doctor inserted bosmin gauze into his nose.

5/6 ER was stocked with hygiene materials, internal and external medicines, injection medicines and ME equipment. My role was to confirm whether or not the hygiene materials and medicines were maintained at the correct stock level, keep them in order and properly organized, and check the ME equipment. Moreover, I also confirmed the number of hygiene materials and checked medical equipment in the ambulance, which we kept on standby in order to transport sick and injured persons suffering from radiation exposure.

Since nurses worked in two-day shifts at the 5/6 ER, I had to develop a working environment so that any newly assigned nurses could continue nursing care activities seamlessly.

With this in mind I worked to create a nursing care activities manual during free moments at work. I believed that an effective transfer of our job responsibilities when new nurses took over was a key element to conducting unified nursing care activities. Although we had guidelines for nursing care activities in the 5/6 ER, it was not clear enough that we could understand what needed to be done without consultation with the previous shift of nurses. Therefore, I initially created some guidelines for what nurses should do during the two days that they were on the job. Then, after a few changes and revisions, we had a manual for nursing care activities in 5/6 ER, that focused on the key points of what was required when taking over from the previous nursing shift.

However, since nurses were dispatched from medical facilities across the country and worked in short-term shifts, I was unable to confirm whether they were able to take over the jobs effectively. I am still curious about this. What is important, is to continue providing the best medical care and to develop a system where jobs are taken over effectively regardless of which nurses are dispatched to the 5/6 ER. Furthermore, as the jobs responsibilities are passed from shift to shift in a short time frame between nurses who are meeting for the first time, it is crucial to cultivate an effective system

of communication.



Checking medicines in 5/6 ER

#### *(4) Supporting in the Background*

##### **Taking Charge of Transporting Goods and People on Site**

Takao Fujioka

Chief Manager, Graduate School of Biosphere Science

(Then: Chief Manager, Risk Management Group, Financial and General Affairs Office)



##### **March 14, 2011**

I was assigned to provide logistical support to DMAT and the Radiation Emergency Medical Assistance Team.

##### **March 15**

I left Hiroshima University Hospital at 16:30 in a car fully loaded with disaster supplies, such as equipment, water, and food. The weight of these supplies was enough to bulge the car's tires. I was instructed to reach the National Institute of Radiological Sciences (NIRS) in Chiba Prefecture by the following morning. Mr. Kengo Toda of Hiroshima University Hospital accompanied me. While passing through Otsu City, a large-scale aftershock occurred with the seismic center in Shizuoka Prefecture. Initially, both the Tomei Expressway and the Chuo Expressway had been closed to traffic, however, while driving through Suwa City, we received information that the Chuo Expressway was now reopened to traffic and thus headed for Tokyo via the Chuo Expressway.

##### **March 16**

We arrived at NIRS at 5:30 in the morning. At 11:30, we left NIRS for Fukushima with relief supplies and two physicians from Fukui University. We took the Tohoku Expressway, where travel was restricted to vehicles for disaster recovery assistance. Although the expressway had just been reopened it had not yet been repaired and thus we could occasionally feel our car jump a little from bumps in the road. We arrived at the disaster prevention center next to the Fukushima Prefectural Government Hall at 16:30. We delivered the supplies to the medical teams of Hiroshima University and went to our accommodation (Sugitsuma Hall). I felt a little uneasy to see the scenes on the television in the hotel lobby, watching the explosions at the Fukushima No. 1 nuclear power plant.

##### **March 17**

I got up at 7:00 in order to drive a physician to the Nasushiobara Station on the Tohoku Shinkansen line, which had been reopened. Unsettlingly, just as I wiped the snow from my car with my bare hand, I heard a warning on the radio saying that people should be careful not to touch the snow. We left at 7:20 and arrived at the Nasushiobara Station at 9:10. After seeing the physician off, I travelled back to Fukushima and arrived at 12:30. At my accommodation, I negotiated a discount on the hotel charges and secured a room at a guest house for that evening. At 14:30, I left the Fukushima Prefectural Government to drive two NIRS physicians back to their headquarters. After arriving at NIRS at 19:00, I had a physical check-up to determine if I had been exposed to radiation and thus underwent decontamination. I went to the guest house at 21:00. An aftershock occurred late that night.

##### **March 18**

After medical supplies arrived at NIRS from Hiroshima University, I left there at 14:00 and headed back to Fukushima Medical University. I obtained instant cup noodles in Chiba City, which were unable to be procured in Fukushima. I reached Fukushima Medical University at 20:00. After handing over the medical supplies to the President, I arrived at my

accommodation at 20:30.

### **March 19**

At 11:30, I headed for the Nasushiobara Station to pick-up workers of the next shift, together with a reporter from the Chugoku Shimbun newspaper. A physician and a staff member arrived at 13:50 and we left the station and headed for their accommodation. We arrived at 16:20. At 21:00, the departing physician and I went to Utsunomiya City in separate cars (accompanied by two drivers who would take the cars back to Fukushima). At 23:55, I reached my hotel in front of Utsunomiya Station.

### **March 20**

I set off from Utsunomiya, taking the 9:32 shinkansen train and arrived at Hiroshima University Hospital at 15:30. After measurements for radiation exposure and a debrief meeting were over, I was released from my duty.

This is the record of my activities.

When I was requested to provide logistical support, I felt a little uneasy because I was not sure what was going on in Fukushima nor where I would stay. In addition, I heard about the nuclear power plant accident. However, I was accustomed to long-distance driving, am someone who is able to sleep anywhere, and did not have much knowledge about the risk of radiation. Therefore, I believed that I was suitable for this job. Although I was not sure that I could get the job done efficiently, I readily agreed to the request without asking anything further questions, because I believed that this would provide a good opportunity for a simple person like me to be helpful during an emergency situation. Additionally, since I am involved in disaster-prevention measures through an association at my workplace which deals with risk management, this was a great experience. I sincerely hope all the affected areas will recover as soon as possible.



A public vehicle leaving Hiroshima University Hospital with a full load of relief supplies (March 15, 2011)

#### *(4) Supporting in the Background*

##### **Connecting Individual Institutions through Web Conferences**

Takuma Sadamori

Assistant Professor, Department of Emergency and Critical Care Medicine,  
Hiroshima University Hospital



From the day after the earthquake, in the Radiation Emergency Medicine Committee established at Hiroshima University Hospital, I was engaged mainly in coordinating relevant institutions to prepare for the reception of patients, to be transported over a wide range of areas. While at work, I was often asked by each institution how many patients would be transported and the extent of their injuries. However, to be honest I was unable provide adequate details because I could not get the necessary on-site information. At the meetings held immediately following the earthquake, all the reports we received were like this: “When I made contact with Mr. So-and-so, I found that he was busy with such-and-such today.” Moreover, information from the National Institute of Radiological Sciences (NIRS) was also far too often fragmented and confusing. Although this was partly to blame on an unprecedented disaster, the main problem was that we had not been trained to make regular contact with each other on a routine basis.

I was dispatched to Fukushima on March 19, 2011. I conducted support activities as a member of the medical teams mainly at the Off-Site Center (OFC) established in the Fukushima Prefectural Government Hall. While becoming tired of dealing with the mountain of documents that were distributed one after another, I converted them to PDF files to send them to Hiroshima University. Although I knew that these files would create an excess of information, I had no alternative but to do so because I believed that I should not select information at my discretion. Of all the institutions, only Tokyo Electric Power Company introduced a video-conferencing system as a means to share information. On the evening of March 22, members of the medical teams discussed the introduction of video conferences because they wanted to see what was going on at meetings held at NIRS. Although the introduction of a video-conferencing system was not an easy job, I promised to make efforts to this end. I left Fukushima the following day.

On March 23, when I visited several companies in Tokyo to return communications equipment, which we had borrowed, with a word of thanks, I heard at Nippon Television Network Corporation that Cisco Systems G. K. had offered their services and a video-conferencing system called “WebEx” was available free of charge. After confirming the operation of the system, I decided to implement it. Users of the system could participate in conferences wherever they were, using either video or voice-only devices, as long as their PCs, smart phones, tablets or other devices could be connected to the Internet. Moreover, the system would require only a brief explanation about how to use it for the new users visiting one after another and also provide a secure communication environment. This new system cleared away many of the communication challenges that we faced at that time.

On March 24, I explained the on-site needs for a web conference system and in turn the gained approval from the Radiation Emergency Medicine Committee for the introduction of the “WebEx” system. We held a video conference between Hiroshima University and NIRS on March 25 and the first web conference between Hiroshima University, NIRS, and OFC at 18:30 on March 26. At the web conference, it was determined that physicians at OFC should report their daily activities and that we should hold web conferences regularly to exchange information. It was approximately 90

hours since we first discussed the introduction of video conferences at OFC. Then, the J-Village and the Japan Association for Acute Medicine joined our web conferences. I believe that we should devise various means to share information in the future so that we have a flexible approach depending on the degree of damage to the infrastructure.



Holding a web conference (Hiroshima University Hospital)

#### *(4) Supporting in the Background*

##### **Securing Personnel Ready for Emergencies**

Masahiko Nishida

Clerical Staff, Hospital Information System G, Management Support Office, Hiroshima University Hospital

(Then: Clerical Staff, Information Promotion G, Office of Community Relations, Public Relations and Academic Information)



I was dispatched to Fukushima from March 29 to April 4, 2011. My major tasks were to coordinate communications between the Radiation Emergency Medical Response Headquarters (REMRH) and on-site physicians, nurses, and technical experts, as well as to transport physicians, nurses, and technical experts in case of emergency. However, since a signing ceremony for a partnership agreement between Fukushima Medical University, Hiroshima University, and Nagasaki University was held during my dispatch, I spent most of my dispatch time transporting and accompanying presidents, directors of hospitals, and chairpersons to and from the ceremony venue.

Making use of my standby time, I created briefing papers of my activities to submit to REMRH as well as job-handover documents to convey information surrounding transportation to the incoming groups, based on my experience of having lived in Fukushima City and the information obtained during my dispatch period.

After I was requested to visit Fukushima, it took many days before I was actually dispatched. However, I had not been given any concrete information concerning what to take with me and where to stay until a meeting was held on the eve of my departure. As a result, after this meeting I had to rush around to find and buy missing items. In addition, because the length of my dispatch was increased, I was forced to change the schedule of visitors and other work.

After I arrived at Fukushima, I sometimes worried whether or not my activities were really of any help to the disaster victims, because all I did was transport persons involved and stand by at the Off-Site Center (OFC) and was not given the opportunity to make direct contact with either the disaster victims or the affected areas.

Half a month had passed since the earthquake, and collapsed buildings had been to a large extent cleared away. However, I was deeply shocked when I saw a landslide at the Fushiogami Intersection on Route 4 in Fukushima City. I still have a vivid recollection of the twisted ground and the houses leaning at terrible angles. When I was dispatched again in July 2011 and visited there privately in January 2012, the intersection had still not been repaired. However, I heard that the restoration work had finally been completed in June 2012.

Despite the circumstances, some recreational facilities, including a games arcade where my friend worked, were still doing a vigorous business. I was very impressed by this determination. Later, I heard from a friend that many students visited these recreational facilities because lectures were canceled at Fukushima University, Fukushima Medical University, and other local universities.

Midway through my dispatch period, the two physicians assigned to OFC were transferred to J-Village and the two clerical staff members departed OFC with the last of the provided vehicles used for transporting people to and from various destinations. Consequently, there were only nurses left at OFC, and we were placed in this situation for a long time, where there was no means of transportation available for the free use of Hiroshima University staff. If another

emergency such as workers being involved in a radiation accident, had occurred during these circumstances, we could not have carried out our role to transport the necessary personnel to the required areas.

These circumstances were brought about due several unexpected events happened concurrently. Fortunately, since adverse emergency events did not occur, this situation did not lead to any problems. However anticipating future contingencies, I believe that personnel for guiding operations and public relations should have been secured separately so that someone and some vehicles were always available on stand-by in the event of possible emergencies.



Around the Fushiogami Intersection in Fukushima City on March 13, 2011 (photographed by a friend of the author)

#### *(4) Supporting in the Background*

##### **Engaging in Support Activities as a Disaster Victim**

Tomoaki Watanabe

Then: Contract Expert Staff, Medical Policy G, Medical Policy Office

(Hired on site as personnel for logistics support to the dispatch teams)



On March 11, I was working at my previous workplace in Fukushima Prefecture. Although the earthquake lasted slightly longer than usual, it was not strong enough to cause my office bookshelves to tip over, possibly because my workplace was located over 80 km away from the coast. There was no problem with our electricity, and gas supplies were restored in a day. However, since there was no water supply, we had to receive water from a water tank truck for approximately one week, which was the first such experience of my life.

At that time, the number of goods available in stores gradually decreased, and the convenience stores closed. In addition, we had considerable difficulty finding gas stations with available supplies. Despite this, we lived a normal life for a while, though securing water to flush the toilets was an ongoing challenge.

Since we could not obtain reliable information other than the news on the television and radio, we never imagined that the radioactive contamination was spreading. Experts repeatedly reported on television with absolute certainty that the containment vessels, which were made of 20 cm thick steel, as well as concrete that was over 1 m thick, would neither explode nor be subject to a meltdown, and that the Fukushima nuclear power plant was completely different from that in Chernobyl. How could they say that? Weren't they excellent think-tank members, of whom Japan boasted to the world?

During my lifetime I can no longer enjoy my kitchen garden, sea fishing in Soma, edible wild plants, mushroom picking, or river fishing. Activities which I had looked forward to during my retirement. We still cannot truly grasp the extent of the situation inside the nuclear reactors.

Even in an area over 80 km away from the nuclear power plant where my home is located, the ambient radiation dosage will remain much higher than usual for several decades to come. I do not want to accept such an unreasonable situation, but this is the real world. If there are no technologies available to control the radioactivity escaping from the nuclear power plant, this accident can be said to be a man-made disaster. One which I am unable to forgive regardless of the reasons or excuses.

From April 18, approximately one month after the earthquake, through to September 30, 2011, as a member of Hiroshima University I engaged in support activities at the Off-Site Center (OFC) in the Fukushima Prefectural Government Hall and the office of Dr. Kamiya at Fukushima Medical University.

At OFC, I was mainly involved in reporting the situation surrounding Fukushima No. 1 nuclear power plant of the Tokyo Electric Power Company and sending a variety of data and information from individual organizations to the headquarters at the Medical Policy Office in a timely manner.

After transferring to Fukushima Medical University, I mainly engaged in taking physicians, medical technologists, nurses, clerical staff members as well as Dr. Kenji Kamiya of Hiroshima University to and from various destinations. In addition, I confirmed the daily schedule of activities, reported on activities, and dispatched simple

messages via e-mail. Every morning, I participated in meetings held at the disaster countermeasure office at Fukushima Medical University (participants: persons involved at Fukushima Medical University, physicians and nurses from Nagasaki University, as well as Self-Defense Force officials up to the midway point of the dispatch period) together with the staff of Hiroshima University, to share information. Moreover, I sat in on teleconferences held between the relevant locations at around 15:00 every day.

When the accommodation for physicians changed from a prefectural facility to a private hotel, they experienced a slight inconvenience concerning the parking lot, though it wasn't an insurmountable problem. At OFC, I caused staff members some trouble because at first I was not very good at the scanner operations.

I joined the activities for a temporary return home visit that was conducted in Kawauchi Village (dose measurement, provision of detailed explanations and advice, etc.), which was a very useful, personal experience. I would like to express my heartfelt thanks to all those involved at Hiroshima University, who since the outset of this disaster, have been unrelentingly committed to support activities from the perspective of the disaster victims, in spite of the unprecedented personal risks.



Meeting held at Fukushima Medical University each morning



## Chapter 4

# University-Wide Efforts for the Earthquake



Specialists throughout the university visited affected areas, not only to provide radiation medical care but also to identify the victims of the tsunami who had died, investigate the radioactive contamination in the environment, and manage the health of the surviving disaster victims. In addition, *Tsunagari-tai*, a student volunteer group, visited temporary housing in affected areas to help with the care of those affected by the disaster.

*(1) As a Specialist*

## **Helping to Identify the Deceased**

Hiroko Oka

Assistant Professor (Special Appointment),

Department of International Collaboration Development for Dentistry

Institute of Biomedical & Health Sciences



At the end of March 2011, I received an e-mail from Dr. Takashi Takada, Dean of the Faculty of Dentistry. The e-mail said that the Hiroshima Prefectural Dental Association required us to make a list of dentists who could be dispatched to affected areas, based on a request to help identify the dead by the National Police Agency. Our major tasks were to examine and report the findings of the oral cavities of dead bodies, to create dental charts, and to check these charts against the dental data made during the victims' lifetimes.

Hiroshima University does not offer a course in forensic dentistry. Accordingly, the identification of dead bodies is handled by the Hiroshima Prefectural Police Dental Association. Since I had previously participated in training programs provided by this association, I offered my assistance to Dr. Takashi Takada. A total of six dentists were concurrently dispatched from Hiroshima Prefecture, three of whom were teaching staff at Hiroshima University.

As several weeks had passed since the earthquake, we had obtained some information about on-site activities from dentists from Tohoku University and other prefectures, who had been previously dispatched. Moreover, immediately after we arrived in Miyagi, we received information on how to carry out our activities from the Miyagi Prefecture Dental Association's representatives. We were told to always do what we could do without straining ourselves, depending on the circumstances at hand.

From the second day, dentists from our group visited postmortem examination sites in Kesenuma City, Minamisanriku Town, and other areas in Miyagi Prefecture in teams of two, under the arrangement of the Miyagi Prefectural Dental Association. I made up a team with Dr. Hiroyuki Kawaguchi also of the Faculty of Dentistry, Hiroshima University.

After the remains of the deceased victims had been washed to remove the mud and dirt on the surfaces of the bodies by police officials and had been examined by physicians the bodies were transferred to the sites where the dentists would confirm their identities. Individual workspaces for identification of the bodies were located side-by-side and were not separated by walls or other partitions. The procedures for the identification varied depending on the sites. In some locations, we had to start by opening bags where the corpses were stored, while kneeling on the floor. In other sites, we were able to concentrate exclusively on creating dental charts of dead bodies, which were laid out on work tables, while receiving assistance from police officers.

I sometimes had to remove sludge and liquid from the oral cavities of dead bodies to create dental charts, while crawling on my hands and knees, or remove shattered dentures from the oral cavities in order to piece them back together. These were very tough tasks indeed. However, the most terrible thing for me personally was that while I was working behind the curtains, I could hear the bereaved relatives crying while repeatedly opening and closing body bags.

No dentist, including me, had imagined that they would have to identify so many dead victims each day,

moving our faces close to those of the bodies and hearing the bereaved relatives sobbing. Through my experience on site, I realized that we needed not only textbook knowledge but also clinical experience and a sense of responsibility to identify the bodies. Moreover, I feel that it is important for every dentist to learn at least the basic skills of forensic dentistry, including not only identification of the deceased but also abuse and medical lawsuits, and prepare accordingly on a daily basis.

Although I was required to visit the affected areas immediately, I was able to be in contact with my family and the staff of my workplace throughout the dispatch period. In addition, I had friendly conversations with team members from Hiroshima Prefecture every day when we reported to each other our individual activities after our work. These talks provided me with great support. When I initially left Hiroshima Station for the affected areas, and then again when I departed Tokyo Station in the early morning following the completion of my dispatch, the President of the Hiroshima Prefecture Dental Association and Dr. Kurihara of the Faculty of Dentistry came to the station to see me off. I still deeply appreciate their consideration. I promise not to allow these memories of the disastrous earthquake to fade in the future.



Creating dental charts (Dr. Tsuyoshi Fujita, Department of Periodontal Medicine)

When engaging in the identification of dead bodies, we wore both medical gloves and cotton work gloves. In Miyagi Prefecture, we used dental charts that adopted a “Fukushima” format. The team members from Hiroshima Prefecture identified a total of 110 dead bodies and checked 23 dental charts against the dental data of victims over five days.

*(1) As a Specialist*

### **Creating a Tsunami Damage Map Based on Aerial Photographs**

Hideaki Goto

Associate Professor, Department of Geosphere System Science,  
Graduate School of Letters, Hiroshima University



The Great East Japan Earthquake and tsunami disaster, which occurred on March 11, 2011, caused enormous damage to the Tohoku region. The devastation was spread over such a wide area that it was not only extremely difficult to grasp its geographical distribution but also a difficult challenge to gather and provide up-to-date information. Accordingly, I felt the necessity to quickly assess the distribution of damage and, as accurately as possible to provide useful data to all of the groups and institutions which would be conducting relief activities and formulating reconstruction plans. With this in mind, I set up a team for creating a map of the tsunami caused damage in the Disaster Response Headquarters of the Association of Japanese Geographers. Specifically, I made a minute and stereographic interpretation of aerial photographs, which were taken immediately after the earthquake, to create the tsunami damage map and to make it available on the web. The secretariat for the team was established at Nagoya University.

Although the Association of Japanese Geographers and other institutions were creating tsunami damage maps, the map created by our team contained different features from other maps. Firstly, several physical geographers made precise and stereographic interpretations of aerial photographs and created a map based on their discussions. Secondly, clearly detailed the flooded areas as well as the serious disaster areas (areas where many houses had been swept away by the tsunami). Third, the seamless publication and upload of the map to the web was able to be realized at an early stage.

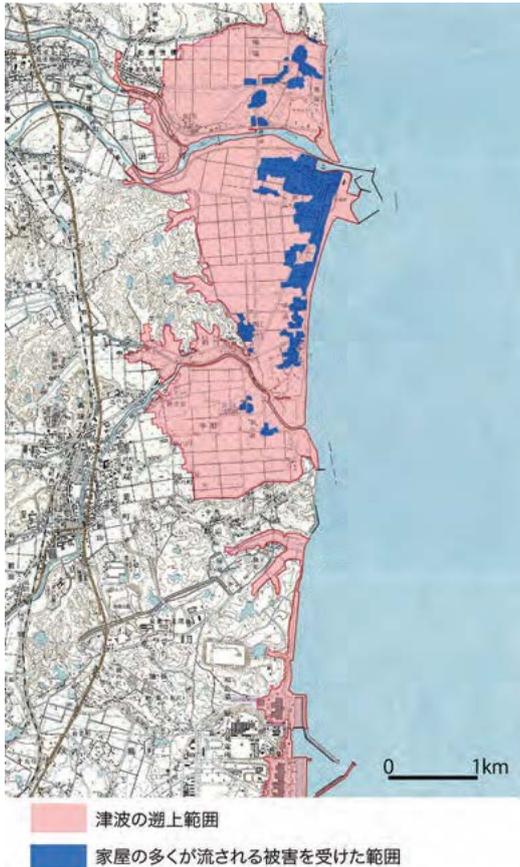
A stereographic interpretation can clarify the spatial behavior of a tsunami, which in turn leads to less reading mistakes. This enabled us to create a precise map covering a wide area in a short amount of time without having to conduct field surveys. Moreover, since the serious disaster areas were promptly identified on our map, it was used across diverse fields ranging from the government and industry to academia and the private sector.

In order to create a map covering such a wide area, we needed to analyze a great deal of materials, including aerial photographs and topographic maps, which required the collaborative work of many researchers. Consequently, we spent a lot of time and energy in communicating with each other and making arrangements for the division of roles and decision-making structure. At the same time, we discussed the mechanism of the earthquake and tsunami, which had then caused the nuclear power plant accident. We puzzled over how to strike a balance between our academic interests and responsibility versus the task of creating a tsunami disaster map.

We learned the following lessons: (1) the importance of taking aerial photographs immediately (within several days) after a disaster occurs; and (2) the importance of mapping and building a system for information exchange. To check specifically which areas were hit by a tsunami, photos should be taken while traces of the tsunami remain, preserved on the ground. In addition, it is indispensable to establish a system for photo interpretation that enables us to quickly double-check the interpretations, as well as to effectively divide the roles between data administrators, persons in charge of computerization of GIS figures, and persons in charge of the publication of these maps on the web. Moreover, due to the variety of information contained within the maps, we had to develop a system to prevent map information from

being used beyond the scope of its guaranteed accuracy, such as for legal uses.

In the near future, a massive earthquake is anticipated to occur along the Nankai Trough. To respond to such an earthquake, Hiroshima University, which is located reasonably far from the anticipated affected areas, is expected to assume an essential role. For the details of the activities of our team, please refer to the “Significance and Background of Mapping the Areas Hit by the Tsunami on March 11, 2011, Northeast Japan” (Nobuhisa Matsuda, Nobuhiko Sugito, Hideaki Goto and others; E-journal GEO, 2012).



[blue area] Inflow areas of tsunami

[pink area] Areas where many houses were swept away by the tsunami

Part of the “Iwaki-Futaba” map, a map of the area affected by the tsunami caused by the Great East Japan Earthquake on March 11, 2011, by the team at the Disaster Response Headquarters of the Association of Japanese Geographers

図 日本地理学会災害対応本部津波被災マップ作成チームによる2011年3月11日東北地方太平洋沖地震に伴う津波被災マップ「磐城双葉」の一部(後藤作成の原図)

(1) As a Specialist

## **Radioactive Contamination Survey and Information Disclosure Should Be Continued.**

Kiyoshi Shizuma

Professor, Division of Energy and Environmental Engineering,  
Institute of Engineering, Hiroshima University



### **1. Measurement of atmospheric radioactivity at the Higashi-Hiroshima Campus**

When the Fukushima No. 1 Nuclear Power Plant accident occurred, the reactor buildings for Units 1, 3, and 4, as well as a Unit 2 pressure suppression room, all exploded. This caused enormous radiation damage to Fukushima Prefecture. Members of the Laboratory for Comprehensive Radiation Research, Graduate School of Engineering, began to collect atmospheric dust on March 20, 2011. After Iodine-131 was first detected on March 31, its level continued to rapidly increase until April 7. Although other types of nuclides, such as Cesium-137, Cesium-134, Cesium-136, and Tellurium-132, were detected, the amount of the detected atmospheric radiation dose was very small. This information was reported to the Crisis Management and Disaster Response Headquarters and was announced at a press conference by Hiroshima Prefecture and Hiroshima University.

Although a tiny amount of Cesium-137 and Cesium-134 were observed during April, they were not detected in and after May. Measurement data were published on the Hiroshima University website. I believe that information released by Hiroshima University helped to reduce the anxiety of local residents.

### **2. Measurement of radiation in environmental samples in Fukushima**

On March 15, Dr. Shinzo Kimura (currently Associate Professor, Dokkyo Medical University) and NHK TV crews entered the area 1.7 km away from the Fukushima No. 1 Nuclear Power Plant to obtain a range of samples. Some of these samples were delivered to our laboratory for measurement. We conducted a gamma-ray nuclide analysis using a germanium detector, and performed autoradiography of Chinese cabbages, pine needles, and mushrooms. The measurement results were introduced on an NHK TV program, “*Network de Tsukuru Hoshano Osen Chizu* (Radioactive Contamination Map Created through a Network [of Scientists])” on May 15. I believe that information on radioactive contamination should be published as early as possible, and that continuous activities are necessary to provide information on an ongoing basis.

### **3. Estimation of internal radiation dose by urine bioassay**

On May 5, Dr. Nanao Kamata (Professor Emeritus, Hiroshima University) and Dr. Osamu Saito (Fukushima Watari Hospital) collected urine samples (of 11 adults and five children) in Iitate Village and Kawamata Town in Fukushima Prefecture. The urine samples contained in plastic bottles were brought to our laboratory to be assayed by a gamma-ray method. Consequently, Cesium-137 and Cesium-134 were detected in the samples of all 16 subjects. In addition, Iodine-131 was detected in the urine samples of five subjects.

On May 30, urine samples were again collected from the same 16 subjects (excluding one person who refused). In the second measurement, Cesium-137 and Cesium-134 were again detected, though Iodine-131 (with a half-life of 8

days) was not.

They also conducted an oral survey of the activities of residents (about the time spent indoors and outdoors, etc.). Based on the survey results, they estimated the internal radiation dose from cesium and, in addition, thyroid radiation dose for persons in whom Iodine-131 was detected. The survey was conducted with the approval of the Ethics Committee of Hiroshima University, and the survey results were published in a scientific paper. However, there was little data concerning the measurement of thyroid radiation dose following the nuclear power plant accident. Moreover, measurements using the Whole Body Counter did not begin early enough. In these circumstances, data from the urine bioassay became invaluable as actual measured data. Furthermore, if more urine samples had been collected in March and April, thyroid radiation doses could have also been estimated in more people.

#### **4. Measurement of radiation in breast milk**

At the invitation of a citizens' group, I visited Fukuyama City in September to perform a comparative calibration of simplified dosimeters used by citizens and a scintillation survey meter that I took with me. Two nursery school principals also asked me to investigate radiation in approximately 40 kinds of foodstuffs, such as milk and vegetables, which would be used for school lunches. According to the measurement, there were no foodstuffs that contained a significant amount of radiation.

Then, hearing a participant say that a mother who had come from Fukushima to Hiroshima was worried about the influence of radiation on her breast milk, I decided to conduct an investigation into the levels of radiation in breast milk. I analyzed the breast milk of six women evacuated from Fukushima and one woman who had been living in Hiroshima. Our results showed that cesium was present in the breast milk of all the woman from Fukushima as well as the woman living in Hiroshima. However, no cesium was detected in the breast milk from each person in the second round of examinations. With this in mind, we felt that the contamination of breast milk was caused by foodstuffs.

#### **5. Environmental radiation survey in Minamisoma City**

The Fukushima Radiation Disaster Reconstruction Assistance Team was established in June under the Vice President of Hiroshima University, and engaged in an environmental radiation survey in Minamisoma City with Associate Professor Takeshi Naganuma of the Graduate School of Biosphere Science. We carried out the measurement of radiation levels in various foodstuffs, groundwater, tap water, and field soil, as well as air radiation levels in the surroundings of private homes and inside houses upon the request of residents. In addition, we continued to take samples of atmospheric dust over a period of one year from October in order to investigate how radiation was drawn up from the ground and scattered by forests. We found in our results that no radiation was drawn up from the ground. Moreover, we investigated water and bottom sediment in irrigation ditches because of residents concerned about possible contamination. The survey results showed that although the water in irrigation ditches was not contaminated, cesium was found in the bottom sediment.

Subsequently, we conducted another survey at several spots from the mouth to the upper reaches in all the major local rivers (Niida River, Ota River, Mizunashi River, Mano River, and Odaka River) flowing through the city. The survey results to this point showed that the contamination levels in the bottom sediment was low at the river's mouth and became progressively higher as we moved up river. The upper reaches of the rivers located to the northwest of the

Fukushima Nuclear Power Plant are known to be heavily contaminated. We should continue to investigate how contamination in the upper reaches spreads downstream and how decontamination work affects the downstream areas.

In November 2011 and May 2012, we held debriefing sessions about the survey in Minamisoma city, which were attended by approximately 100 residents on each occasion.



Sampling for the environmental radiation survey in Minamisoma City (March 2012)

*(1) As a Specialist*

### **Supporting Prescription Work at the Ofunato Hospital which Escaped Devastation**

Satoru Izumitani

Senior Staff of Medicine, Department of Pharmaceutical Services

Hiroshima University Hospital



I supported prescription work in a hospital dispensary at the Iwate Prefectural Ofunato Hospital. The urban areas in Ofunato City and neighboring Rikuzentakata City were devastated by the tsunami which followed the earthquake. The Iwate Prefectural Ofunato Hospital located on the mountainside was the only hospital that escaped damage. Since local residents visited the hospital in large numbers, the workload of the hospital staff far exceeded their permissible limits. As there were very few dispensing pharmacies that could handle external prescription requests in the city, all external prescriptions were being filled by the hospital dispensary.

On April 7, three days after I visited the hospital, an aftershock of seismic intensity of no lower than 6 occurred late in the night. Immediately, we made preparations for receiving sick and injured people due to the aftershock. We made temporary, simple beds by adjusting the reclining angle of sofas in waiting rooms and we prepared necessary infusion solutions and emergency medicines. Once preparations were completed we were on standby for several hours. Fortunately, no patient visited the hospital, and medical care was provided as per usual the next morning. However, since the power supply was cut off throughout Iwate Prefecture due to the aftershock, the entire hospital became a very challenging place to work until the power was restored.

Although there was not enough food, utilities such as electricity and water had been restored. I was offered a meeting room of the hospital as a napping room and was in turn given a mattress and blankets. The conditions seemed to be relatively favorable.

Meanwhile, much to my annoyance, there was a great shortage of information on how to travel to the hospital. It was approximately 80 km from the Iwate Hanamaki Airport to the Ofunato Hospital. However, I was unable to obtain accurate information about whether or not transportation systems were functioning properly, the situation of highways from the airport to the hospital, and the extent that utilities had been restored. Moreover, I had no idea who I should ask about this information. In short it was extremely difficult to get accurate information.

When supplying support services in local areas, it is vital to secure rental cars (for transportation) because they are a necessary means of transportation on site. However, it was difficult to secure rental cars, because most of them were already being used by local residents who had lost their private cars in the tsunami leaving only a small number available for rent.

In principle, disaster assistance should be offered in a manner that allows both rescue workers and those living in the affected areas to be as self-sufficient as possible. However, if potable water can be procured on site, rescue workers don't need to carry a personal supply when visiting affected areas, and which will allow for more effective, long-term support activities. On this occasion, because I didn't have information regarding available water supplies, I took potable water with me from Hiroshima which made travel difficult and cumbersome, and was a great strain.

An electronic dictionary and a tablet computer were very useful tools as information sources (drug catalogues).

If public wireless LAN or Wi-Fi are available, they would allow us to connect to the Internet and in turn be able to obtain more accurate information in a timely manner (though batteries need to be secured).



Making preparations for receiving sick and injured people (photographed by the author)

*(1) As a Specialist*

### **Supporting the Health of Disaster Victims**

Michiko Moriyama

Professor, Department of Adult Nursing, Division of Applied Life Sciences,  
Institute of Biomedical & Health Sciences, Hiroshima University



I engaged in support activities in Miyagi and Fukushima Prefectures, as a medical staff member of the Primary Care for All Team (PCAT), of the Japan Primary Care Association.

From June through September, 2011, we provided 24-hour-a-day care on a two-shift system at an isolated shelter for patients with infectious diseases in the Short Stay Base (SSB) of the Ishinomaki Royal Hospital in Ishinomaki City, Miyagi Prefecture (main care provider: Mariko Mizukawa, a graduate school student at our research laboratory). We engaged in nursing for infectious diseases as well as the management of chronic diseases and rehabilitation care. In addition, we made coordinated for patients to be smoothly transfer from the shelter to temporary housing in cooperation with MSW. We also performed screening tests for depression and PTSD to provide specialized care.

From August 2011 to January 2012, the Hiroshima City Council of Social Welfare recruited volunteers to visit the temporary housing in Minamisoma City in Fukushima Prefecture and conducted various activities for disaster victims. We checked residents' health conditions and offered health consultations (approximately 90% of residents participated). In order to detect any abnormalities as early as possible, we did full body examinations, as well as vital sign checks, blood glucose level measurements, and listened to any complaints they may have had. Many residents to whom we provided treatment and guidance had chronic diseases as well as disorders caused by the earthquake. When we identified an abnormality, we made contact with local health nurses in order to connect patients to the appropriate local institutions.

While waiting for their blood-pressure to be taken, some residents talked quietly about their situation at the time of the disaster, their family members who were separated from them or lost, their anxiety about the future and the hardships that they faced when escaping the nuclear power plant accident. Their discussions had a great impact on me.

On January 7 and 8, 2012, I visited the Department of Nursing at the Motoyoshi Hospital in Kesenuma City, Miyagi Prefecture. The hospital was forced to change its operating mode to mainly one of outpatient care and visiting care services because it was no longer able to function as a conventional hospital. We interviewed the hospital staff about their issues and subsequently suggested countermeasures.

From April 1, 2012, through March 31, 2013, we dispatched a health nurse (Hazuki Kamon, a graduate from the Nursing Program) to Yamamoto Town, Watari County, Miyagi Prefecture, for an extended period (on a grant from new year card donations). We managed the health care for disaster victims residing in both temporary housing and in their own homes, using a remote biosensor monitoring system, located at the Kasumi Campus of Hiroshima University, as well as on site. In addition, Ms. Kamon visited individual homes while working as an assistant staff member of a community general support center in order to compensate for an on-site manpower shortage. She received guidance from local experienced health nurses which was an inspiration for personal growth.

Around Christmas time, students at Hiroshima University Attached Elementary School and Attached Shinonome Elementary School created approximately 1,000 Christmas cards and sent them to disaster victims. These cards were appreciated so much that they became a topic of conversation in all affected areas. Moreover, this card exchange helped to initiate an interaction between the students and the disaster victims (funding came via a grant from new year card donations).

Temporary housing is located in remote areas that have limited traffic access, where individual rooms are very small and there is little privacy. Residents have been cut off from their family members and have lost their jobs. Their normal lives have been destroyed. Under these circumstances, it is very difficult for them to act positively. Without fundamental support, they cannot resume their normal lives. Although we all knew that we needed to provide support to them, we were particularly frustrated because we also knew that we could not be involved with fully resolving all of these issues.

Since many of the medical facilities and their equipment were badly damaged, a new care service system needs to be developed. However, no matter how enthusiastic we are about the establishment of a new system of care, we will always be required to make adjustments in order to satisfy the immediate interest and needs of the people. At this point I feel like I have reached the limit of my ability to provide support, simply because I am unable to provide constant assistance from Hiroshima, which is so far from the affected areas.



Checking health conditions at an assembly room of temporary housing in Minamisoma City

*(1) As a Specialist*

### **My First Experience of Visiting Care and Rehabilitation**

Takuya Niimoto

Doctor, Department of Orthopedic Surgery, Higashihiroshima Medical Center

(Then: Graduate Student, Department of Orthopaedic Surgery,

Graduate School of Biomedical & Health Sciences)



I participated in a medical support program for affected areas conducted at the Iwate Prefectural Takata Hospital for two weeks from October 31, 2011. The program that I joined was the Chugoku & Shikoku Block Medical Support Program for Affected Areas, where orthopedic surgeons from university hospitals in the Chugoku and Shikoku regions were dispatched to the Iwate Prefectural Takata Hospital by rotation every two weeks to provide medical support.

Takata Hospital resumed medical care at a temporary clinic from July 25, an evacuation destination, two days after the earthquake. An average of 250 patients visited the hospital each day, of whom approximately 60 came to the orthopedic surgery department. Sixty percent of the patients suffered from degenerative diseases such as gonarthrosis, spondylosis deformans, osteoporosis and lumbar canal stenosis. After the earthquake, hospital staff members were also committed to home care, including visiting temporary housing to provide rehabilitation treatment and medical care, aiming to offer community health care just as they did before the earthquake. The hospital director as well as physicians, and many other care givers were also victims of the earthquake lived in temporary housing in Sumita Town located an approximately 30-minute drive from the clinic (I also stayed at a hotel in the town).

Following the earthquake, Dr. Yoshiyuki Osawa, from the Department of Orthopedic Surgery of the Osaka Seamen's Insurance Hospital, worked full-time at the hospital. I provided support not only for the usual outpatient care but also for visiting care and rehabilitation. On a personal note, I was embarrassed by the fact it was my first experience to offer home care, such as rehabilitation visits. Although my main purpose at the hospital was to conduct support activities for medical treatment in affected areas, I was able to grow both personally and professionally due to the variety of challenges I encountered. For this I am deeply appreciative of my time in Iwate.

In the areas that had been hit by the tsunami, there was nothing but ruins and rubble. Meanwhile, on hilly areas with relatively little damage, a city hall, a post office, restaurants and convenience stores were temporarily built one by one, which offered a growing level of independence to the lives of affected residents. A restructuring plan for the hospital is currently ongoing. The site where the Takata Hospital will be rebuilt has been determined, and the design for the building has been completed. The reconstruction of the hospital will be one of the first steps towards full independence and recovery from the earthquake for Rikuzentakata City and its citizens.

Before the earthquake, approximately 70,000 pine trees had been planted as a windbreak at Matsubara Beach in Rikuzentakata. The beach, renowned for its aesthetic and magnificent view was devastated by the tsunami and only one lone pine tree was left standing. When I visited, there had already been an announcement that preserving it would be difficult and the tree would probably need to be cut down. Despite this, the dignified tree, appeared to stand as a monument of hope, praying for the reconstruction of the town, gently watching over its residents rather than a symbol of fear of the earthquake. Sadly, the pine tree, heavily damaged by seawater, was finally cut down on September 12, 2012.



Physicians and nurses with whom the author conducted support activities (author in the center)

*(1) As a Specialist*

## **What I Witnessed in Miyagi and Fukushima**

Yukio Urabe

Professor, Program of Physical Therapy,

Institute of Biomedical & Health Sciences, Hiroshima University



An unprecedented earthquake occurred on March 11, 2011. Since I had worked as a volunteer after the Great Hanshin-Awaji Earthquake, I engaged in support activities at an evacuation center in Miyagino Ward, Sendai City, Miyagi Prefecture, for a week in the middle of April. This was in response to a request from the Rehabilitation Support Program of the Disaster Response Headquarters, Japanese Physical Therapy Association. Since the affected areas were in utter confusion at that time, it was through trial and error that I determined what I should do and how I could help. For example I helped a high school girl, who had fallen down while riding her bicycle over an uneven road, that had been raised approximately 20 cm by the earthquake.

At the end of August, there was a shortage of manpower at the Rehabilitation Department of the Minamisoma City General Hospital in Minamisoma City, which contained an emergency evacuation zone for the nuclear power plant accident. Of fifteen paramedical staff members, only three physical therapists remained on site after the earthquake. When I visited the hospital in September, all of them were exhausted, both physically and emotionally, having been working non-stop to the limits of their capacity. Accordingly, I formulated a plan, in which other physical therapists from around Japan would be dispatched to the hospital one by one, on a one-week rotation system from October. I was able to assemble volunteer physical therapists which we were able to dispatch to the hospital over a seven month period ending in April, 2012. The Japan Primary Care Association provided a transportation allowance to dispatch volunteers, and we ultimately succeeded in assembling forty physical therapists.

As cardinal rules for our volunteers, we set goals of responding to patients and hospital staff with a smile and of doing our best to lighten the workload of the full-time physical therapists. We also did our utmost to not to place any further strain on them. Whenever possible, the volunteers also joined in providing medical care at the hospital from October in the middle of autumn. As the situation was an extreme state of emergency, patients needed to be dealt with on the basis of triage protocol, all volunteers were committed to providing as high-quality medical care as they possibly could. Thanks to the careful consideration of hospital administrators in coordinating volunteer accommodation, food, and many other things, everyone was able to work effectively towards the accomplishment of our initial goals. I believe that the sights of the affected areas around the hospital are etched into the memory of all of the volunteers.

We were required to play different roles depending on the stage of clean-up and reconstruction following the earthquake. In the early stages, we needed to focus on preventing any decrease in the physical strength of disaster victims. However, due to a lack of planning and confusion surrounding the earthquake's aftermath, this was not so easily achieved.

Although our support activities were concluded in April 2012, the Phoenix Leader Education Program (Hiroshima Initiative) for Renaissance from Radiation Disaster was launched as a "Leading Program" in the Graduate Schools of Education at Hiroshima University. My hopes are that graduate students in the Program of Physical Therapy

at Hiroshima University, who participated in the volunteer activities, will enter the program. Within this program, I would like to stay involved in the reconstruction efforts of the affected areas by continuing to conduct fieldwork in Fukushima Prefecture.



A large ship stranded next to Karakuwa Station on the Ofunato Line in the suburbs of Kesenuma City (photographed in March 2012)

*(1) As a Specialist*

### **Providing Medical Care to Patients with Cerebrovascular and Other Disorders**

Tomoyuki Kono

Vice Chief Physician, Department of Neurology,

Kobe City Medical Center General Hospital

(Then: Physician, Department of Clinical Neuroscience and Therapeutics,

Division of Integrated Medical Science, Graduate School of Biomedical Sciences)



I engaged in medical assistance for affected areas at the Iwaki Kyoritsu Hospital in Iwaki City, Fukushima Prefecture from March 19 through 30, 2012.

With a population of approximately 340,000, Iwaki City is the central city in the Hamadori area, Fukushima Prefecture. When the Great East Japan Earthquake occurred on March 11, 2011, the area suffered a lower six category earthquake on the Japanese scale. This resulted in approximately 40,000 houses being either completely destroyed or seriously damaged. Currently, the city serves as a base for the activities of workers working in the Fukushima No. 1 Nuclear Power Plant. The central part of the city has almost fully recovered from the disaster, and its population has in fact grown since the earthquake and tsunami.

We provided medical assistance from September, 2011 through to March, 2012. The Association of Japanese Medical Colleges played a central role in dividing universities across the country into seven blocks and dispatching a total of 274 physicians to hospitals in cities across the Tohoku region. With 25 departments and 828 beds, the Iwaki Kyoritsu Hospital, where I was dispatched, was a central hospital in the Hamadori area and received a total of 76 physicians in three departments (Departments of Anesthesiology, Emergency, and Neurology).

I was involved in medical services in various hospital wards. Since the hospital originally had not employed full-time neurologists (it had only provided outpatient care by a part-time physician once a week), physicians at the Departments of Brain Surgery and General Medicine shared the care of patients with emergent neurological disorders. During my dispatch, I was the primary physician for nine patients with cerebrovascular disorders, one patient with meningitis, and two patients with epilepsy. The majority of patients at our hospital suffered from cerebrovascular disorders, as was the case with other hospitals in the city. Fortunately, the Iwaki Kyoritsu Hospital had a sub-acute rehabilitation ward with 44 beds, where I was able to provide medical care without problem. Dr. Minagawa of the Department of Rehabilitation cooperated with me in providing care. However, physicians at the Department of General Medicine, who did not specialize in neurology, shouldered a heavy burden because they were forced to take care of patients outside their field of specialization. Due to this I became acutely aware of the need for full-time neurologists.

Since I was free on Saturdays, Sundays, and a public holiday during my dispatch, I travelled to the Pacific coast, Lake Inawashiro, and Mt. Bandai to observe the local situation. Interestingly, the central area of Iwaki City, located less than 10 km away from the Pacific coast, was not affected by the tsunami. However, when I visited the area surrounding Onahama Port, it resembled the devastating scenes that I had seen so often on TV. Although no local residents were to be found, there were a few people with cameras who seemed to be from other prefectures. The area was filled with a strange silence. As I headed north along Route 6 from Onahama, I found the road had sunk in many places.

Around J-Village, which was a base for operations at the Fukushima No. 1 Nuclear Power Plant, there were many police vehicles. Upon seeing this I realized that the area was still in a state of emergency.

Our medical assistance for the affected areas ended with my dispatch. I would like to extend my deepest appreciation to Dr. Minagawa and many other staff at the Iwaki Kyoritsu Hospital for their generous support.



Review session for rehabilitation cases at the sub-acute rehabilitation ward

(2) As a Student Volunteer

### Happy to Hear the Words, “Come Again”

Sara Enomoto

4th Year, Faculty of Integrated Arts and Sciences

(Captain, First Dispatch Team of the *Tsunagari-Tai*)



From September 14 through 20, 2011, the first dispatch team of the *Tsunagari-tai*, held a handcrafting workshop at the Nipperia temporary housing site in Sendai City, Miyagi Prefecture. We had heard in the press that the elderly in affected areas tended to stay at home. We held this event to encourage people to take up a hobby again, and together we made small handicrafts and folded origami. We also made postcards and candles in a joint event with other groups from Hiroshima University. During the intervals between our activities, we distributed sweets from Saijo, Hiroshima, and Hiroshima University, which were supporting our activities. On the final day, we cooked *okonomiyaki* (Japanese-style pancakes) to serve to local residents. In our free time, we joined volunteer activities such as debris removal, which were organized by the Volunteer Center.

Our biggest challenge was formulating plans from scratch when we had no acquaintances on site and had no previous experience carrying out volunteer activities. We struggled to coordinate and organize our activities, including deciding what to do, examining local needs, building connections locally, procuring goods and funds, and advertising for volunteer members. We felt our way blindly through the entire process, with many of our plans needing to be started over from the beginning. Although it was challenging, we did our best for six months out of sheer will to do something beneficial for the disaster victims.

Looking back on our activities, including the preparation period, I can't help but think that we should have done more to collaborate with local residents. Since there were limitations on what we could do, enthusiasm alone was not sufficient to accomplish our goals. It was difficult to understand local needs and our group faced the difficult task of understanding an overall sense of purpose for our activities.

We were insufficiently prepared for our activities due to a lack of knowledge and experience. If we had divided our roles more clearly, made more detailed preparations, and rehearsed our activities in advance, perhaps we could have been more effective. Meanwhile, I learned that as a group we could work more effectively and accomplish better results by sharing a clear common goal.

The local residents who participated in our activities treated us in a very and friendly manner despite of our poor performance. In fact, we were often heartened by local residents even though it was our goal to raise their spirits!

I was very happy to hear the residents say, “I really enjoyed your events. Please come again.” By making direct contact with disaster victims and seeing affected areas with my own eyes, things became more familiar to me. I became determined to stay involved in the reconstruction efforts, even though I live in Hiroshima far away from the affected areas. I believe that this was the most significant effect the experience had on me.



Although I was worried about how many people would participate in our first-ever event, many people joined

(2) As a Student Volunteer

### Listening to Requests of Residents through Home Visits at Temporary Housing

Akari Ichigi

3rd Grade, Faculty of Economics

(Captain, Second Dispatch Team of the *Tsunagari-Tai*)



Serving as Captain of the second dispatch team of the *Tsunagari-tai*, I visited Ishinomaki City, Iwanuma City, Sendai City and Watari Town, Miyagi Prefecture. We held gatherings in assembly rooms at temporary housing sites, where we set up four activity booths (for free space, creation of postcards, *origami*, and handicrafts). We invited local residents to join us.

We had distributed questionnaires to individual households in advance in order to ask residents what type of support they wanted from us. We then visited the households to collect the questionnaires. We received a range of requests ranging from cleaning ventilation fans, to singing or talking.

As three months had passed since the first team had been dispatched, and nine months since the earthquake, we expected that the needs in the affected areas might have changed. Therefore, it was difficult to be certain what we should or could do. We tried to our best assess the needs of the local residents by making contact with students from Tohoku University. We also referred to the data from the Great Hanshin-Awaji Earthquake. Furthermore, because our team was large, 23 volunteers, and we conducted our support activities across a wide range of areas, it took a while to secure all of our accommodation.

While conducting activities, I realized that the system and atmosphere of temporary housing, which had steadily increased in number since the earthquake, varied from place to place. In some cases, we could not carry out our activities as intended. This forced us to react depending on the circumstances we faced.

This time we began to visit individual households. This was proved to be very successful because we were able to provide support to those residents who, for various reasons were unable to physically come to our activities. Conversely, many residents did not return our questionnaire because they seemingly felt embarrassed to ask for assistance. In the future we need to do a better job of considering the feelings of all residents, and in turn improve the method for conducting our questionnaire survey.

We held our gatherings, aiming to connect Hiroshima and Tohoku and to help create relationships between the residents living in the temporary housing. Positively, following our events we periodically saw residents, who had become acquainted with each other at our gatherings, returning home together. Moreover, in the temporary housing that the first dispatch team had visited, residents were continuing to make origami cranes. Something they had enjoyed with the previous group of Hiroshima University volunteers. I realized that we had succeeded in helping the elderly people, with little to do during the day, to find an activity to do while living in temporary housing. Many residents even remembered the names of the volunteers who had visited there on the previous occasion, and said to us, “Thank you for visiting us again.” I realized the importance of continuing to visit the same temporary housing.

Since it is expected that the number of volunteers will decrease over time and due to this the disaster victim’s loneliness is expected to increase, it is important to continue conducting support activities. However, it is difficult to

provide support to affected areas and to understand local needs while living in Hiroshima. Accordingly, I believe that we should further develop our activities by coordinating with university students living in the Tohoku region.

Moreover, it is important not only to continue to dispatch support teams, but also to disseminate information in Hiroshima about what we learned on site and the details of the current situation in those disaster-affected areas.

I would like to continue to deliver a message from the affected areas saying, “Never forget us.”



Enjoying eating together while having a chat

(2) As a Student Volunteer

### Interacting with Disaster Victims on a One-to-One Basis

Haruka Onimura

2nd Grade, Faculty of Education

(Captain, Third Dispatch Team of the *Tsunagari-Tai*)



I engaged in support activities from February 15 through 24, 2012, as Captain of the third dispatch team of the *Tsunagari-tai*. The team provided support in the Nipperia temporary housing in Wakabayashi Ward, the *Kyukan* (old building) temporary housing and the Public Zone 2 temporary housing in Watari Town, and the Mitazono 2nd and 3rd temporary housing in Natori Town, all of which were located in Sendai City, Miyagi Prefecture.

Our major activities included: (1) providing educational support to children in temporary housing and the neighboring affected areas; (2) holding gatherings (for handmade items, chatting, potluck lunch parties, etc.) in temporary housing; (3) holding gatherings in cooperation with students, voluntary organizations, and social welfare councils in the Tohoku region and visiting individual households; and (4) holding a symposium to support reconstruction assistance activities by students in the Tohoku region. Through these activities, our goal was to show we cared for all disaster victims and to provide them with emotional and mental support.

At the gatherings, volunteer students and disaster victims interacted with each other on a one-to-one basis through activities such as making handmade items, and carrying out lunch parties. They shared special moments, sometimes talking through tears and sometimes laughter. We shared in the emotions of the people in affected areas.

In home visits, we met people who did not want to leave their homes, or were physically unable to do so and wanted support from us. By establishing close relations with these individuals we did our best to support their personal needs. Moreover, we tried sharing detailed information in cooperation with social welfare councils.

Regarding educational support and while always taking safety into account, we made a concerted effort to meet the needs of the local children, who wanted to do nothing but play, partly to be typical kids and partly to release their stress.

In student symposiums, we spent our time holding valuable discussions with other students, focusing on Hiroshima and Tohoku and the status of students. Specifically, we became acquainted with students from Watari Senior High School during this dispatch. We visited their high school and carried out activities together, thereby enhancing our relations. I believe that we took a big first step in building on our relationships with high school students that can be developed in future dispatches.

In gatherings, many volunteer members felt confused and a little upset because they did not know how they should respond to disaster victims when they talked about the tsunami in the middle of a conversation. Although we gave special consideration to safety when we played with children as part of educational support, it was a challenge to manage all the risks.

Throughout the dispatch period there were a number of issues and points which I reflected upon. I learned the importance of managing risk, not only of people in affected areas but also of those involved from other areas around Japan, including the volunteers from Hiroshima. I intend to use this as a lesson for personal growth. Also, although it had

only been two months since the second dispatch team visited the affected areas, the situation and needs of the areas had undergone great changes. I have kept it in mind that I will continue to take action, and continue to gather detailed information on the local needs as volunteer dispatches continue to take place in the future.



Warmly interacting with a wide range of generations while carrying out volunteer activities

(2) As a Student Volunteer

## There Are as Many Needs as the Number of People

Tsumugi Tomiie

3rd Grade, Faculty of Economics (Captain, Fourth Dispatch Team of the *Tsunagari-Tai*)



From March 10 through 18, 2012, the fourth dispatch team of the *Tsunagari-tai* conducted support activities based in Ishinomaki City, Wakabayashi Ward in Sendai City, Iwanuma City, and Natori City in Miyagi Prefecture. We mainly engaged in four activities: home visits, gatherings, assistance for children, and holding workshops. We aimed to establish and strengthen networks with the affected areas by conducting our activities together with local students. We began our preparations thanks to the third dispatch team. In addition, since we carried out support activities soon after the third dispatch teams visited affected areas we were able to pick up from where they left off. And thankfully the local students responded positively and carried on by participating in our activities as well. This was very helpful for us.

On March 10, 2012, we visited Ishinomaki City, in cooperation with the Ishinomaki Tourist Association. On March 11, we participated in a Gathering for Residents and Volunteers held at Tohoku University. On March 12, we held a gathering at the Nipperia temporary housing complex in Wakabayashi Ward, Sendai City. On March 13 and 14, we conducted activities, such as home visits, holding a gathering, and offering assistance for children, at the Iwanuma temporary housing complex. On March 15, we held the *Tsunagari* (connection) Talk session at the Sendai City Civic Activity Support Center to interact with local students. On March 16 and 17, we engaged in support activities, such as home visits, holding a gathering, and assistance for children, at the Mitazono 2nd temporary housing complex in Natori City. On March 18, we provided support to children at the Simomasuda Community Center in Natori City.

While conducting support activities, we were confronted with questions like: What is support? What are volunteer activities? What is needed in affected areas? From the moment we began the preparations for our activities, we were worried about whether they would be helpful or appreciated when we finally met the disaster victims face to face.

After finishing our daily activities on site, we held meetings and made preparations for the next day's activities. One concern was that during these end-of-day wrap up sessions some of our members pushed themselves even further due to anxiety and concerns about upcoming activities. Consequently, they sometimes appeared worn out when conducting support activities on the following day. This made me fully aware that volunteers needed to be vigorous and healthy, and take good care of themselves.

The temporary housing complexes that we visited during this dispatch each had their own atmosphere and regional characteristics depending on the location. Moreover, individual disaster victims, both men and women, living in the temporary housing were a range of ages and had a range of outlooks. When trying to address their needs under these circumstances, we tended to turn our attention to the needs of the group as a whole or the overall needs of the Tohoku region. However, I realized that there were as many needs as there were people, and what was truly needed by each of these individuals were the true needs of Tohoku.

Over three years have now passed since the earthquake and what we need to do now is to share the lessons we learned and the experiences we saw and felt in the affected areas to other people so that the earthquake is not forgotten. Although there are many issues that confront us when carrying out volunteer activities, all volunteers need face the

challenges and to continue considering what can be done to improve the situation. I believe that the most important thing is to have a positive attitude focused on caring for those in front of us who are in need of support. I would like to continue reflecting not only on my role as a volunteer but also who I am as a person in my everyday life.



Residents chatting with each other, while making local sweets

(A gathering in the Nipperia temporary housing in Wakabayashi Ward, Sendai City)

(2) As a Student Volunteer

### Efforts for Reconstruction Leading to Regional Development

Yoshiaki Teramoto

2nd Grade, Faculty of Integrated Arts and Sciences

(Captain, Fifth Dispatch Team of the *Tsunagari-Tai*)



The fifth dispatch team of the *Tsunagari-tai* engaged mainly in six activities in Wakabayashi Ward in Sendai City, Ishinomaki City, Iwanuma City, Watari Town in Watari County, and Yamamoto Town in Miyagi Prefecture from August 20<sup>th</sup> through 31<sup>st</sup>, 2012.

First, we held gatherings at temporary housing, aiming to promote interaction between residents. In gatherings held in assembly rooms, we enjoyed making handicrafts, paper cuttings, and wooden items with residents and, at the same time, carefully listened to whatever they wanted to talk about.

Second, we visited individual households. Responding to requests from residents in temporary housing, we visited individual households to clean their ventilation fans and listen attentively to what they had to say. Through home visits, our goal was to meet individual needs, which could not be identified during large events such as gatherings.

Third, we conducted volunteer activities at strawberry farms. In Yamamoto Town, many strawberry farms were destroyed by the earthquake. We provided assistance to these farms, which were managed by general farmers and corporate bodies that were aiming to rebuild them.

Fourth, we participated in volunteer activities organized by the Volunteer Center in Sendai City. For example, we sifted through a field in order to take away the rubble that became buried there following the tsunami.

Fifth, we provided support to children living in temporary housing. We not only assisted them with their studies but also played outdoors as much as they wanted as part of their daily recreation activities.

Sixth, we held *Tsunagari* (connection) Talk sessions, where we discussed how reconstruction support should be provided with students from affected areas. Divided into groups, we talked about how best to provide earthquake reconstruction support through joint efforts between students from affected areas and those from Hiroshima. At the end of the discussions we shared our opinions amongst the entire group of participating students.

During all of these six activities, we cooperated with university and high school students from the affected areas. In particular, many high school students participated in volunteer activities at the strawberry farms. In fact I have subsequently heard that they continued to engage in the voluntary activities after we left.

On a separate note, I did my best to ensure that all volunteer members stayed healthy enough to provide support throughout our dispatch period. However, some members did become ill due to the fierce summer heat and our tight schedule. Accordingly, we adjusted our activities which included concluding meetings earlier and changing our schedule to include rest time. I was also emotionally exhausted from our activities and intense schedule. In future dispatches, groups need to pay more attention to fostering an environment where volunteer members can be involved in support activities while maintaining as healthy a physical condition as possible.

When visiting affected areas, I realized that reconstruction efforts were in fact leading to regional development. In the temporary housing complexes that we visited, residents declined support that may have limited their independence.

In affected areas, people are working long days to speed the reconstruct efforts. Some farmers strove to restore their tsunami-damaged strawberry farms because strawberries are the symbol of Yamamoto Town. In addition, we met high school students who undertook volunteer activities, with their student council playing a leading role, aimed at the reconstruction of affected areas. I hope that we will be able to continue providing emotional support to people in affected areas as well as supporting and encouraging the reconstruction efforts.



Volunteer members and a representative of a farm working together at the Yamamoto Strawberry Farm in Yamamoto Town







## Afterword

On March 11, 2011, the Great East Japan Earthquake (an earthquake of unprecedented and devastating magnitude) struck an extensive area of Eastern Japan. The ensuing nuclear disaster that occurred at TEPCO's Fukushima No. 1 Nuclear Power Plant resulted in the release of massive amounts of radioactive substances into the environment, leaving a legacy of anxiety and concern about radiation exposure that yet linger today, three years after the accident.

In response to this disaster, Hiroshima University has made university-wide efforts to provide radiation emergency medical care and various other types of assistance to the disaster-hit areas. In the field of radiation emergency medicine, in particular, the university has played a central role as a tertiary radiation emergency medical institution, in cooperation with the National Institute of Radiological Sciences (NIRS). So far, the university has dispatched a total of 1,300 experts to aid in radiation emergency medical assistance.

This booklet contains testimonials written by a range of 55 faculty members, staff, and students of Hiroshima University who have participated in post-disaster support activities during the past two years. While the number of words for each writer was limited, all contributors describe their experiences and feelings candidly.

In 1977, Hiroshima University published *Research on Atomic Bomb Disaster at Hiroshima University: "The Fire of Life and Death" Academic Edition*, a collection of articles concerning various aspects of the atomic bomb disaster written by experts across diverse fields ranging from natural sciences to the humanities. Then university President, Haruo Takeyama, described the significance of the publication as follows: "As scholars and students learning at an academic institution founded in a place where many local people lost their lives in the atomic bomb disaster, we publish this book to mourn for those who died. At the same time, in the belief that the ultimate goal of learning is the welfare of mankind, we at Hiroshima University are determined to make a close scrutiny again of the atomic bomb disaster, which is an unforgettable event in human history and the inner motivation for the university's academic pursuits."

In the same way, this collection of records aims to reexamine our past efforts and thereby find ways to improve our future assistance activities. It is our strong hope that, with the knowledge and experience that Hiroshima University has accumulated concerning the atomic bomb disaster as the inner motivation for its academic pursuits, we can help disaster victims not only in Fukushima but also in all regions affected by the earthquake/tsunami and nuclear accident.

Under the leadership of Chairman Kenji Kamiya, Director of the Radiation Emergency Medicine Promotion Center, the editorial committee comprising Kiyoshi Yamane (Leader of the General Affairs Group, Financial and General Affairs Office), Mitsue Waki (Leader of Public Relations Group), Shigeo Hayashi (Leader of the Medical Policy Group), and Masaya Yamauchi (member in charge of public relations and coordination, designated by Hiroshima University Hospital), carried out the editorial work. Photographs of on-site activities were provided by Hisaya Azuma, Clerical Supervisor of the Radiation Emergency Medicine Promotion Center. The cover design is the work of Haruki Tamaru, a second-year student majoring in Art Education in the Faculty of Education, Cluster 4. I would like to express my heartfelt appreciation to each one of them for their respective contributions.

With regard to job titles, we used the titles that the writers used when addressing themselves. Any inconsistency in this regard is the editors' responsibility.

March 1, 2013  
Masaya Yamauchi  
Editorial Committee





The Great East Japan Earthquake, Fukushima nuclear power plant accident and Hiroshima University

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