

Great East Japan Earthquake

— Before and after —

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Introduction

Great East Japan Earthquake: 14:46 March 11, 2011

When I returned to my hospital in Iwaki, Fukushima, there was a thunderous roar coming up from below, after which I was assailed by violent shaking like I had never experienced before. The reinforced concrete building creaked as it shook widely with the enormous waves of energy propagating repeatedly up from the bottom of the earth. A tsunami warning was then issued, after which a giant tsunami carrying a tremendous amount of energy transmitted through the ocean water bore down upon one seaside community to the next, from the Tohoku Pacific coast to Ibaraki and Chiba prefectures.

Making matters worse following this natural disaster of a scale seen once in a thousand years, the Fukushima Daiichi Nuclear Power Plant owned by Tokyo Electric Power Company (TEPCO) experienced a melt-through and explosions starting the following day, March 12. This development robbed 140,000 people from the surrounding communities of their places to live and was a man-made disaster that struck the sharpest fear into many Japanese, including those in the Tokyo metropolitan area.

The disaster victims as well as we who were taking action onsite faced an overwhelming dearth of information that is supposed to be provided by the government during an emergency. The hunger I felt with all my heart while leading all the support efforts that I could, including the Japan Medical Association Team (JMAT), as a disaster victim on the one hand and as the Japan Medical Association (JMA) officer in charge of

disasters in the face of this situation is still engraved in my body and soul.

Events Before the Great East Japan Earthquake

Tokaimura nuclear accident: 10:35 Thursday, September 30, 1999

The Tokaimura nuclear accident, in which large amounts of neutron radiation and gamma rays as well as fission products were released for about 20 hours with the reactor in criticality, began when alarms were sounded in a conversion test building at the facility operated by JCO in the town of Tokaimura. Residents who passed nearby the accident site on the Joban railway line and the Joban Expressway made inquire with medical institutions in the city of Iwaki. I received lots of information and many questions at that time, as I had been the director in charge of emergency and disaster medicine at the Iwaki Medical Association since April 1998.

I immediately reported the situation to then-director of the Health Center, Shogo Asahina, and made an urgent request. As a result, a radiation dose measurement service using a handheld Geiger counter was hastily arranged and provided from the following day at the Iwaki Health Center to residents who requested it. A total of over 800 people came for the service, 10% of them residents from northern Ibaraki. Although this was an inadequate response, there is no boundary to actions that can be taken for the peace of mind and safety of residents in a radiation disaster. This event made it clear that building disaster prevention schemes based on this truth is fundamental.

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This had become my basic stance as someone who participates every year in emergency drills for the TEPCO nuclear power plants in Fukushima. It also became the basis for a request I made at a later date for the stockpiling, above and beyond the national regulations, of our own iodine preparation for all Iwaki residents in case of a nuclear accident in the city. This stockpile was created before the TEPCO Fukushima nuclear accident, put in place at the city's health center, and distributed to residents after the accident.

9.11 terrorist attacks in NY and WMA 2002 General Assembly in Washington

In April 2000 I was elected president of the Iwaki Medical Association and at the same time continued to be in charge of emergency and disaster medical responses as vice-president of the Fukushima Medical Association, a position to which I had been appointed.¹ The large-scale terrorist attacks on the World Trade Center buildings in New York and other targets on the morning of September 11, 2001 was an event that once again seared into the breasts of relevant parties worldwide the importance of disaster preparedness against both natural and man-made disasters.

The Scientific Session Program at the General Assembly of the World Medical Association (WMA) held in Washington D.C. from October 2–6, 2002 took up a wide variety of subjects including preparedness to large-scale disasters, infectious disease, and terrorism under the central theme of “Responding to the Growing Threat of Terrorism and Biological Weapons” in light of the horrific tragedy of the previous year's international terrorist attacks. I voluntarily attended the assembly as an associate member of the WMA and was deeply impressed by the stance of the American Medical Association and interested parties who disclosed extremely pragmatic and full contents. I returned to Japan with many documents and a desire to establish the foundation of disaster medicine in Japan.

On the way home, my suitcase had been prized open during the flight from New York and my commemorative WMA's congress bag with all the documents related to disaster medicine had been stolen. Luckily, my wife Atsuko's suitcase was fine, and it contained a second set, as she had listened to all the lectures with me. As I was filing a claim at Narita Airport, I realized that the WMA bag and all the documents had been



Fig. 1 The author and his wife at the World Medical Association 2002 General Assembly Scientific Session

distributed for free at the meeting venue. So, I ended up filing a claim only for the suitcase whose lock no longer shut. But this incident taught me the important lesson that truly important things are priceless and the importance of backups—things that we have to consider when thinking about life and disaster medicine (**Fig. 1**).

Agreement regarding Medical Relief during a Disaster: January 2004

On January 5, 2004, Fukushima Prefecture and the Fukushima Medical Association signed an Agreement regarding Medical Relief during a Disaster based on repeated discussions on regional disaster prevention planning for Fukushima prefecture during disaster prevention meetings held at the prefectural government office.² The Fukushima Medical Association is positioned as a designated local public institution under laws such as the Basic Act on Disaster Control Measures (1961) and what is called the Civil Protection Law (Act concerning the Measures for Protection of the People in Armed Attack Situations, etc.; enacted in 2004 and amended in 2008). In settling the negotiations, the Medical Association inserted a clause indicating that while it would take responsibility for medical relief planning and medical relief teams, on the flip side, the Prefecture would grant retrospective approval after the dispatch of medical relief teams deemed necessary by the Medical Association when faced with circumstances in which emergency action is unavoidable. This clause ensures that the government accepts our decisions and actions based on

physicians' professional autonomy as stated in the WMA Declaration of Seoul on Professional Autonomy and Clinical Independence.³

In addition, the agreement stipulates that the Prefecture shall bear expenses for medical team formation, participation in drills, and for actual deployment, settlement of actual costs such as medical supplies carried, and financial aid if by any chance team members are injured, contract a disease, or die during medical relief efforts. This arrangement is grounded in the basic concept that team members act as quasi public servants throughout all medical relief efforts. Moreover, a provision has been included indicating the entire agreement shall be reviewed every year, thereby preventing the agreement from becoming a dead letter.

Even before the agreement was signed with the Prefecture, I was an active participant in prefectural emergency drills conducted at Fukushima Airport in disaster scenarios, based on a disaster prevention agreement made directly between the airport and the Fukushima Medical Association. The annual emergency drill was usually planned for early dawn on a weekday so as to not affect aircraft operations. To ensure that I made it on time from Iwaki, I would take two days to participate, staying at the nearby Bobata hot springs the day before. It was by some curious chance, in relation to radiation exposure medicine, that the inn I usually stayed at on those occasions was well known for its radon hot springs.

In Fukushima prefecture, the majority of hydro-, thermal, and nuclear power generation since the Meiji Restoration (1868) has been conducted under the control of TEPCO and supplied roughly a third of power consumed by the Tokyo metropolitan area. Additionally, TEPCO also controls the water rights to Lake Inawashiro in the center of the prefecture, creating a special environment in which the prefectural government conducts river administration while the entire water system is under the control of TEPCO. In other words, the entire prefecture is like a giant backyard for the Tokyo metropolitan area. Within the prefecture, the Hamadori region in particular functioned as one of the world's leading nuclear energy stations, having a total of 10 power-generating facilities: 6 reactors at TEPCO's Daiichi Nuclear Power Plant and 4 reactors at its Daini Nuclear Power Plant. After I took charge of emergency and disaster medicine at the Fukushima

Medical Association, I had a place prepared for myself in a corner of the prefectural government's medical team stationed at the Fukushima Prefecture Offsite Center in Okuma Town and participated in annual emergency drills.

M6.9 earthquake off the Sanriku Coast: 6:39 November 15, 2005

At 6:46 a tsunami advisory was issued for central part of Hokkaido's Pacific coast and the Pacific coast of the Tohoku region (Iwate, Miyagi, and Fukushima prefectures). Tremors from 3 to 1 on the Japanese earthquake intensity scale of 1 to 7 were observed from Hokkaido to the Kanto region and the largest tsunami, at 0.5 meters, struck the city of Ofunato at 7:35. This apparently harmless earthquake happened to occur on a morning for which a nuclear disaster prevention drill had been planned at Fukushima's Offsite Center.

Since April 2002, I have participated every time in the prefectural government's medical team during drills at the Offsite Center. On this day I had left Iwaki early and was heading to the center, but arrived a little late because of traffic congestion. Meanwhile, the Offsite Center was waiting for reserve firefighters, fire corps volunteers and police officers, who had gone to inspect the coast and estuary barrages when the tsunami advisory was lifted at 8:38. I remember that the drill started about an hour late—a little after 9:00—as a result.

The drill itself proceeded smoothly, but conversation in the center turned to concern that it would likely be hard to respond, including the securing of personnel, in the event of a combined disaster in which a nuclear accident occurred at the same time as an earthquake-induced tsunami. Nevertheless, after completing the planned drill, this concern was not brought up in successive discussion. Consequentially, and unfortunately, the real meaning of this experience was not realized until after experiencing the Great East Japan Earthquake.

1st WMA Asian-Pacific Regional Conference: September 2006

In April 2006, I was elected as an executive board member of the JMA and here too took over emergency and disaster work, where it became one of my heavy duties to be involved in disaster responses for all of Japan. Since then I promoted the dispatch and putting into practice

of information by both national agencies and prefectural medical associations so that the idea behind of the above-mentioned Agreement Regarding Medical Relief During a Disaster signed between Fukushima Prefecture and the Fukushima Medical Association could be shared by all prefectural medical associations as a basic principle of the JMA. At the same time, I repeatedly talked with the WMA as the JMA's international affairs representative and as the secretary general of the Confederation of Medical Associations in Asia and Oceania (CMAAO), which brought into shape the idea of holding a regional conference of the WMA.

The 1st WMA Asian-Pacific Regional Conference, held at the Hotel Chinzanso in Tokyo on September 10–11, addressed the two topics of earthquake and tsunami countermeasures and infectious disease under the theme of disaster preparedness and response. The conference also discussed, under the title, “State of the Profession,” means of increasing the autonomy of physicians and medical association activities, rooted in professional autonomy. Other subjects also have significance today, but we narrowed the focus on earthquake and tsunami and looked at responses to the 2004 Indian Ocean earthquake and tsunami, which had earlier struck Indonesia. Discussion started with an unavoidable mechanism of the high earthquake and tsunami risk throughout the entire Asia and Oceania region, and widened to future preparedness and possible responses.⁴

JMAT creation proposal: March 2010

Right away I asked that the JMA's Committee on Emergency and Disaster Medicine be composed not only of block representatives of prefectural medical associations and physicians who are specialists in emergency and disaster medicine, but also include the director of the Self-Defense Forces Central Hospital as well as observer participation by the Guidance of Medical Service Division in the Health Policy Bureau of the Ministry of Health, Labour and Welfare (MHLW), the Fire and Disaster Management Agency of the Ministry of Internal Affairs and Communications, and the Japan Coast Guard, plus the participation of Dr. Makoto Akashi, the Executive Director of the National Institute of Radiological Sciences in order to respond to all conceivable situations. The committee as well as a subcommittee organized under Dr.

Toshio Ido (Immediate Past President of the Okayama Medical Association) added ex-post verification of experiences during the Great Hanshin-Awaji Earthquake of 1995, the Mid Niigata Prefecture Earthquake of 2004, the Noto Hanto Earthquake of 2007, and the Niigataken Chuetsu-oki Earthquake of 2007. This resulted in the committee proposing, on March 10, 2010—one year before the Great East Japan Earthquake—the creation of the JMAT. A press conference was held the same day and the JMAT creation announced. The nationwide announcement of JMAT creation appeared on the JMA's newsletter the following day, by strange coincidence March 11.⁵

Response to the Great East Japan Earthquake

Support through cooperation in and outside Japan

The purpose of JMAT operations was to provide health support for the approximately 400,000 people who survived in a 150-km sphere in addition to the nearly 20,000 lives lost in the enormous damage of the Great East Japan Earthquake. I will avoid saying much about this here, as details have been published in the Japan Medical Association Journal and elsewhere.^{6–10} However, the transport of medical supplies to the afflicted areas, which came about through the US military, the Japan Self-Defense Forces, and the good will of many people, was the pioneering figure of the US's Operation Tomodachi.¹¹

The JMA set up a disaster response headquarters on March 11, the first day of the Great East Japan Earthquake, and made a collective effort to respond around the clock with nearly 200 people, from officers to office staff. The JMA aimed to create a system for JMAT operations that could meet changing needs by acting as a coordinator between prefectural medical associations afflicted by the disaster and those dispatching teams. As much as ¥1.9 billion (approx. USD 20 million as of April 2013) donated mainly by sympathizers in medical associations around the country was delivered immediately to afflicted medical institutions through medical associations in the affected areas.

Moreover, in addition to receiving reimbursement from the government for actual expenses of operations conducted under the umbrella of

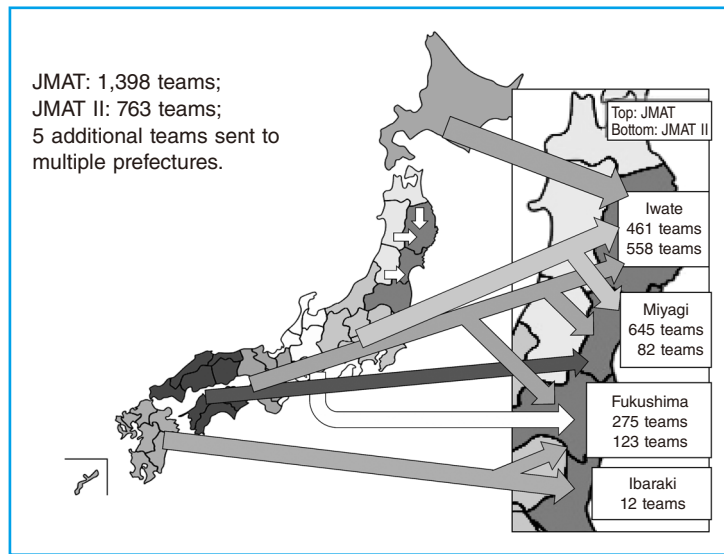


Fig. 2 JMAT and JMAT II dispatches (updated as of February 4, 2013)

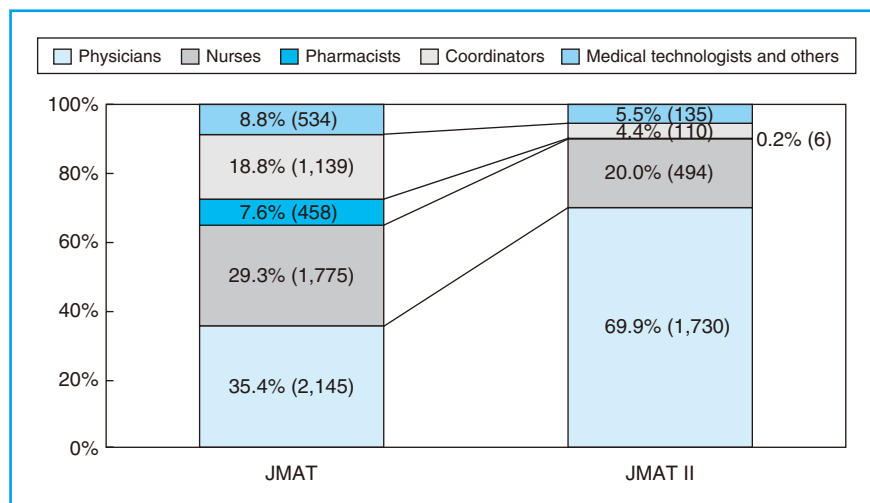


Fig. 3 Breakdown by occupation of JMAT and JMAT II participants in the Great East Japan Earthquake (updated as of February 4, 2013)

Numbers of people are represented in parenthesis.

the JMAT and compensation as an activity of quasi public servants, with the consent of the MHLW, the JMA started up its own accident insurance and established an insurance system in all operations. The JMA negotiated with the National Police Agency and obtained emergency vehicle stickers that enabled teams to travel to the affected areas. The JMA also made it possible for teams going on-site during the early phase to get free tickets on Japan Airlines and All Nippon

Airways flights and to receive priority supplies of gasoline. Further, the JMA requested the Ministry of Land, Infrastructure, Transport and Tourism to reopen expressways running through the affected areas.

The JMA received support and assistance from many and a wide variety of people and organizations in and outside Japan, such as donations from outside Japan, including from the Taiwan Medical Association, and the stationing

of Dr. Maya Arii of the Harvard Humanitarian Initiative at the JMA's office. And the various problems occurring before our eyes were dealt with, from health support for evacuation shelters to cooperation in dispatching autopsy teams, support in establishing temporary clinics, and support in reconstructing afflicted medical institutions.

Thanks to the well-intentioned efforts of medical personnel from throughout the country, JMAT operations reached a total of 1,398 teams on which 6,054 people participated, including 2,145 physicians, by the end of operations on July 15, 2011. Since then, the JMA has continued to be involved in support efforts, given the situation on the ground in the afflicted areas, which have not been able to recover completely from the tremendous damage. Thirty-four medical-related groups (18 organizations) as well as government-affiliated agencies launched the Survivors Health Support Liaison Council, for which the JMA serves as secretariat. Efforts were switched over to JMAT II operations, which carry on medical support activities that are broader than disaster support. As of February 4, 2013, a total of 763 teams with 2,475 people, including 1,730 physicians, have been dispatched and are carrying on operations even now (**Figs. 2 and 3**).

Efforts for better information sharing

The Japan Medical Association Research Institute, which is the JMA's think tank, also responded to the Great East Japan Earthquake with concerted efforts. These included field investigations in areas damaged by the tsunami, collection of data relating to JMAT operations, and consideration of the problem of compensation for loss relating to the nuclear accident.^{12–15} In order to prepare for potential complex disasters close to home, the JMA held, one year after the earthquake, a training course on JMAT activities in disaster medicine¹⁶ (which will be certified for the JMA's continuing medical education credit) on March 10, 2012 and a symposium on health policy “Disaster Medicine and Medical Associations” the following day.¹⁷ Since then, content has been added and enriched and made available on the JMA's website and other sources.

Based on reflections after the disaster of personnel in charge of information, it was agreed that combining multiple information media was realistic, as there is no single medium that can definitively cover many different events, and

within that the need to share information became a common view. That is why in 2012 the Liaison Council of Prefectural Medical Associations on Disaster Medicine conducted an emergency communications demonstration that attempted to link clinical records and evacuation shelter information during a disaster via cloud computing, assuming disaster scenarios such as an earthquake directly beneath the Tokyo Metropolitan area. The demonstration used the Wideband InterNetworking engineering test and Demonstration Satellite (WINDS) called “KIZUNA” operated by the Japan Aerospace Exploration Agency (JAXA), with which Iwate Prefecture had past results, and also included simultaneous Internet transmission to prefectural medical associations. Based on the demonstration's good results, the JMA and JAXA signed an agreement on demonstration experiments using the satellite KIZUNA in disaster medical activities and held a press conference at the same time on January 30, 2013.

After the Great East Japan Earthquake

The problem of radiation exposure and radioactive contamination

According to Dr. Jose Luiz Gomes do Amaral, president of the WMA in 2012, it is difficult to avoid the fact that disasters of a certain level take on the aspect of a complex disaster in developed societies. It is also a fact that there is no place on Earth that could be called safe with absolute certainty.¹⁷ The problem of radiation exposure and radioactive contamination resulting from the Fukushima Daiichi Nuclear Power Plant accident following the Great East Japan Earthquake, in particular, emerged at an unprecedented scale. What is more, the spread of contamination brought about a major problem greatly exceeding the conventional administrative framework and predictions and raised widespread anxiety that still has not been brought under control. Considering the truth of responses that were actually made, although a disaster response headquarters was set up in the Fukushima Prefecture government office during the Great East Japan Earthquake, the prefectural government was utterly negative regarding medical association participation and the building of a cooperative relationship. This is extremely difficult to comprehend, given the point of the already signed Agreement regarding Medical Relief during a

Disaster and considering the lives and health support for citizens of the prefecture.

On October 22, 2008, the national government under the Taro Aso Administration conducted a nuclear disaster prevention drill with the scenario that the emergency cooling system failed after the usual reactor cooling system had failed at the Fukushima Daiichi Nuclear Power Plant, releasing radioactive material offsite. On October 20 and 21, 2010, during the Naoto Kan Administration, disaster prevention drills were conducted with a similar scenario at the Hamaoka Nuclear Power Plant. Ahead of the latter, a comprehensive disaster prevention drill for the Iwaki region was held in the city of Iwaki in August 2010 with the scenario of a large tsunami triggered by a M7.7 earthquake (intensity 6 lower on the Japanese scale) off the Fukushima coast. Assuming that these kinds of drills were not made use of at all in the actual Great East Japan Earthquake of March 11, 2011, there is a need to create a system for improving skills through effective drills and ex-post verification, beyond the framework of routine work by the government alone.

International Physicians for the Prevention of Nuclear War World Congress: August 2012

On August 26, 2012, the International Physicians for the Prevention of Nuclear War (IPPNW) held its 20th World Congress at the International Conference Center Hiroshima. I was invited to the congress and gave a lecture on “JMAT Operations in Response to the Great East Japan Earthquake and the Fukushima Nuclear Accident.” This was an opportunity to present the picture that JMAT activities were the realization of a vision to provide continuous support from the acute phase, when teams work in cooperation with the Disaster Medical Assistance Team (DMAT), until medical care in the afflicted areas has recovered, and convey the fact that the nationwide call for support activities for medical care at first-aid stations for evacuees and for local medical institutions turned into an operation that was Japan’s largest medical support effort.

Additionally, I reported on activities on the ground in the disaster-stricken area of Fukushima Daiichi Nuclear Power Plant accident, including original information gathering and disclosure. While there was a tumultuous atmosphere at the venue just at that time, with remarks flying about from an anti-nuclear movement, the program

was run with a clear division between determined opposition to nuclear weapons, which are an inhumane use of nuclear power, and discussion of the peaceful use of nuclear power.

I stressed that my report was based on experiences on the ground and also that we physicians, who practice the peaceful use of nuclear power in clinical care, always strive in future to minimize the risks while maximizing the benefits to patients of radiodiagnosis and during treatment. While there were opinions that completely deny the application of nuclear power and calls for practical information disclosure on the Fukushima Daiichi Nuclear Power Plant accident, those kinds of remarks disappeared as the presentation proceeded.

Conclusions

Need for comprehensive health policy and health support

My heart truly aches at the fact that today, nearly two years since the Great East Japan Earthquake, the communities destroyed by the earthquake and tsunami have not been restored, let alone revived. Still more, the district where the nuclear power plant is located and nearby areas from which whole communities were forced to evacuate due to the nuclear accident in Fukushima prefecture and the subsequent radioactive contamination, have only called for decontamination; the disposal of rubble has hardly even begun, to say nothing of the building of new communities. In such a situation, only the delay in responding to the people of the areas that accepted nuclear power plants in compliance with national policy stands out.

Nuclear power stations, regardless of whether they decommission their reactors or continue operations, need integrated policy making covering everything from fuel refinement through use to final disposal, a scientific basis to underpin those policies, and policy agreement that will carry them out. Considering the Fukushima nuclear accident, which saw explosions and resulted in a major disaster even though the plant was under an emergency shutdown, work processes that are assured to be safe and health support for the workers engaged in that work will most likely be necessities for more than a few decades.

Further, there is a pressing need for comprehensive policy and health support for evacuees

from radioactive contamination in addition to health support for evacuees from natural disaster. Above all, active national involvement is expected in the creation of a long-term support system for young people—especially children—with the elimination of trivialized frameworks that are limited to Fukushima prefecture and the inclusion of evacuees who have scattered around the country and residents of areas with relatively high radioactive contamination that spread from the Tohoku to the Kanto region. I also think that cordial and considerate accountability must continue to be fulfilled for the many members of the general public that cannot get rid of growing anxiety caused by looking at the current situation.

Peaceful use of nuclear power

On my way back from the UNESCO 8th International Conference on Bioethics Education held in Tiberias, Israel on September 2–5, 2012, I had the opportunity to stop by the Israel Academy of Sciences and Humanities and stand face-to-face with the statue of Einstein in the garden. When looking back at the footsteps of Einstein, I was certain that humanity, which obtained new knowledge and a source of energy in the 20th

Century, has an obligation and a role to raise its voice in strong opposition to the misuse of science that harmed so many people with atomic bombs and has an adverse effects on the global environment.

On the other hand, however, I reaffirmed my belief that Japan, precisely because it suffered the crippling damage of atomic bombs and experienced the Fukushima nuclear accident, should not abandon its world-leading role in contributing to the field of ensuring the peaceful use and safety of nuclear power based on humanity's wisdom. I believe that because human civilization, which established cultural life using Prometheus' fire, set sail over the open seas, made possible safe transport through the skies, and even bent its steps into outer space, accomplished today's development by sincerely facing unforeseen accidents at every point in time and being cautious about the abuse of new technologies and power.

Lastly, I offer heartfelt condolences for the people who lost their lives in the Great East Japan Earthquake and my sympathies to the survivors. I should also like to express my respect and appreciation to all the medical personnel who were engaged intently in medical operations in the afflicted areas.

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