HIROSAKI UNIVERSITY

Radiation Environment and Medicine 2021 Vol.10, No.2 115–121

REM
Radiat Environ Med

Report

Virtual Meeting Report: "The 3rd Workshop on Radiation Research and its Related Issues and the 7th Educational Symposium on Radiation and Health by Young Scientists (ESRAH2020)"

Yoshiaki Sato[1†], Kazuki Hasegawa[1†], Mizuki Sakamoto[1], Yoko Suzuki[1], Valerie Swee Ting Goh[2], Eka Djatnika Nugraha[1, 3], Ryo Nakayama[2], Tomoki Koiwa[1], Ryoju Negami[1], Kazuki Narumi[1], Chutima Kranrod[4, 5], Chanis Pornnumpa[6], Takakiyo Tsujiguchi[1] and Toshiya Nakamura[2*]

[1]*Department of Radiation Science, Hirosaki University Graduate School of Health Sciences, 66-1 Hon-cho, Hirosaki, Aomori 036-8564, Japan*
[2]*Department of Bioscience and Laboratory Medicine, Hirosaki University Graduate School of Health Sciences, 66-1 Hon-cho, Hirosaki, Aomori 036-8564, Japan*
[3]*Centre for Technology of Radiation Safety and Metrology (PTKMR), National Nuclear Energy Agency (BATAN), Jl. Lebak Bulus Raya No. 49, Jakarta 12440, Indonesia*
[4]*Institute of Radiation Emergency Medicine, Hirosaki University, 66-1 Hon-cho, Hirosaki, Aomori 036-8564, Japan*
[5]*Natural Radiation Survey and Analysis Research Unit, Department of Nuclear Engineering, Faculty of Engineering, Chulalongkorn University, Bangkok 10330, Thailand*
[6]*Department of Applied Radiation and Isotope, Faculty of Sciences, Kasetsart University, Bangkok 10900, Thailand*

Received 2 March 2021; revised 2 June 2021; accepted 8 June 2021

The virtual meeting of the 3rd workshop on Radiation Research and Its Related Issues and the 7th Educational Symposium on Radiation and Health by Young Scientists (ESRAH2020) Joint Symposium was held online during November 21–23, 2020. This symposium brought together diverse researchers and graduate students (3 lecturers, 13 oral presenters, and 52 attendees), who had lively exchanges of opinions on various issues related to radiation. In addition to the lectures on radiological research under the pandemic of coronavirus disease 2019 (COVID-19), radionuclides in food, and radiological emergency response, there were poster presentations by graduate students and young researchers. In this report, we summarize the lectures and oral sessions, and describe our experience of holding a virtual symposium, which was our first such attempt, necessitated owing to the COVID-19 restrictions.

Key words: radiation, education, virtual symposium

1. Background of this symposium

Ionizing radiation causes DNA damage, both directly and indirectly[1)], and could affect human tissues, which might cause mutations, cell death, and cancer[2)]. By contrast, radiation also contributes positively through its physical and biological applications in medical procedures such as image diagnosis and radiotherapy, but as mentioned

*Toshiya Nakamura: Department of Bioscience and Laboratory Medicine, Hirosaki University Graduate School of Health Sciences, 66-1 Hon-cho, Hirosaki, Aomori 036-8564, Japan
E-mail: toshiyan@hirosaki-u.ac.jp

†The authors contributed equally to this report.

Table 1. List of educational lectures

	Title	Presenter	Affiliation	Country
1	How to survive COVID-19 as a radioecology research?	Tibor Kovács, Ph.D.	University of Pannonia	Hungary
2	The development of guidelines for radioactivity in food in non-emergency exposure situations	Kevin Kelleher, Ph.D.	International Atomic Energy Agency	Austria
3	Radiological emergency response and risk communication for first responders	Antony Hooker, Ph.D.	University of Adelaide	Australia

above, its negative effects on normal tissues and human health must be taken into account. Large amounts of artificial radionuclides were released into the environment after the accident at the Fukushima Daiichi Nuclear Power Plant (F1-NPP) in 2011[3-5], which increased the awareness among the public toward radiation safety[6]. Moreover, Rokkasho Village in Aomori Prefecture, in the northern part of Japan, has several nuclear facilities, such as the low-level radioactive waste disposal facility[7, 8]. Therefore, it is important to train human resources to be able to respond to any emergency.

The first meeting on radiation effects between representatives from Hirosaki University and Hokkaido University was held in 2008, and it has been held annually since 2014 as the "Educational Symposium on Radiation and Health by Young Scientists" in the wake of the accident at F1-NPP[9-12]. Another meeting about the effects of radiation on human health and the environment, radiation protection, radiation detection, and radiation emergency medicine is held annually since 2018 among the representatives of Hirosaki University and four Thailand universities. These symposia help the young researchers establish interpersonal relationships, build networks with other budding young scientists, and enhance their knowledge about radiation and its effects on human health.

However, the coronavirus disease 2019 (COVID-19) pandemic has directly or indirectly impacted not only every human being but also our research[13]. Because of the pandemic, the symposium was on the verge of being canceled. Fortunately, owing to the approval of the participants, we could hold the symposium online as "The 3rd Workshop on Radiation Research and its Related Issues and the 7th Educational Symposium on Radiation and Health by Young Scientists (ESRAH2020)". This symposium was the first such online event in Hirosaki University, which was organized primarily by students.

2. Utilizing technology for the virtual symposium

In the wake of the COVID-19 restrictions, the organizing committee had to find new ways to give the right opportunities to young researchers and students to obtain information and present their researches. During the pandemic, many Japanese universities, including Hirosaki University, conduct online classes using tools such as Microsoft Teams. Hence, the organizing committee decided to hold an online symposium using Microsoft Teams, which offers video conference features including sharing screens and files. The following important functions of Microsoft Teams have allowed the organizing committee to run the symposium smoothly by constantly monitoring chat rooms to address the technical issues facing participants: (i) Committee members control what participants can do in the meeting such as mute and share content; (ii) It enables end-users to view and read the files online, without downloading the actual presentations; (iii) We can run multiple meetings at the same time; (iv) The "raise-hand" feature allows the chairperson to see who has a question at the moment, making it easier to proceed.

3. Summary of educational lectures

Current topics concerning the relationship between radiation risk communication, human health, and researchers facing COVID-19 were discussed by three eminent researchers. The titles of the lectures and talks are summarized in Table 1. The current state of the latest studies on radiation was presented in the lectures and discussions.

3.1. Lecture I: How to survive COVID-19 as a radioecology research?

Dr. Tibor Kovács from Pannonia University, Hungary, gave a lecture titled "How to survive COVID-19 as a radioecology research?". Traditionally, education and research in colleges have been based on long-term planning. However, the pandemic requires rapid response to infection control. Educators and researchers working in universities have to reorganize and restructure the education and research plans within a short time. Most of the universities have moved to online teaching systems using a variety of applications to achieve the two main goals of continuing research and teaching productivity. However, this poses a major challenge in fields that rely on experimentation, such as radiochemistry and radiation ecology. Therefore, to carry out these activities without interruption and to ensure productivity, a major

restructuring of the profile was necessary. Initially, the speaker reflected on the basics of research management, classifying research into four categories: survey research, comparative research, historical research, and exploratory research. Next, he mentioned survival strategies in nature and introduced the food chain as a typical survival response to rapid changes in environmental parameters. The food chain involving herbivores and parasites corresponds to the collection of research data, which does not serve as a valid research strategy in the times of COVID-19. Meanwhile, the food chain involving nutrient organisms relies on existing research data. Therefore, it is a good, but it is not the best, research strategy in the times of COVID-19.

Dr. Kovács also introduced the ongoing research being conducted in his laboratory, including transfer factors in bioaccumulation, positron emission tomography–magnetic radio imaging (PET-MRI) studies using labeling, and 3D reconstruction studies of Computer Tomography. By utilizing the basics of research management and survival strategies, it was possible to maintain the research productivity. This result was very significant for researchers who had to make changes in their research plans and seems very important for future research. On the other hand, the depth and success of international cooperation took a major hit due to travel restrictions. Research through international cooperation was the most affected by the COVID-19. Examples include transfer factor measurements in Morocco and Kazakhstan, indoor Radon surveys in Iran, and aerosol monitoring in Japan. Moreover, the speaker introduced the research done during COVID-19. To maintain the productivity of research through international cooperation, it is hoped that COVID-19 will be brought under control as soon as possible and that safety will be ensured.

3.2. Lecture II: The Development of Guidelines for Radioactivity in Food in Non-emergency Exposure Situations

Dr. Kevin Kelleher of International Atomic Energy Agency (IAEA), Austria, introduced "The Development of Guidelines for Radioactivity in Food in Non-emergency Exposure Situations." IAEA is developing international guidelines for the levels of radionuclides in food in non-emergency exposure situations. Most of the radionuclides in food have natural origins, such as ^{40}K and Uranium-series nuclides. However, many artificial radionuclides discharged by atmospheric nuclear weapons tests in the 1960s and long half-life nuclides such as ^{90}Sr and ^{137}Cs remain, even after more than 60 years. These radionuclides are mixed with grains and dairy products and cause excessive exposure when people consume them, thereby, the relationship between food and radioactivity is important. However, the current guidelines for radioactivity in food are incomplete, and the guidelines developed by the Food and Agricultural Organizations of the United Nations (FAO) after the Chernobyl accident in 1986 focus on only artificial radioactivity and do not apply to natural radioactivity. The IAEA guidelines for artificial radioactivity and foodstuffs developed after the nuclear accident do not apply to non-emergency exposure situations, because the exposure from the ingestion of food is less than 10 mSv. In a non-emergency, on the other hand, the exposure is much higher. An extensive review of the levels of natural and artificial radioactivity in food has been conducted by IAEA to develop guidelines for radioactivity in food with different approaches being adopted for natural radioactivity and man-made radioactivity. For natural radioactivity, IAEA has used two data sets of natural food samples. To evaluate these, we went through the scientific literature and reports of the last 50 years and extracted all the radioactivity concentration measurement data from these scientific publications. Next, the two datasets are compiled in a single set and a request was sent to IAEA member countries to measure radioactivity levels in each food item from the list. By cross-checking these two datasets, it was ensured that there was no overlap between them. This merged dataset contains approximately 2,000 units of data of radioactivity in each food item that IAEA lists in its guidelines. According to the summary of the data, ^{210}Po was the most commonly measured radionuclide in food, and the energy damage due it its presence was also very high. The next most important radionuclide in terms of exposure was ^{210}Pb. Interestingly, the number of measurements of ^{226}Ra exceeded those for ^{210}Pb. This may be attributed to the ease of measurement of ^{226}Ra. The guideline levels were obtained by statistical analysis of this large data set based on the upper 95% values for the defined food subcategories. On the other hand, a different method needs to be applied to artificial radioactivity because we cannot use data available in the scientific literature for measurement of artificial radionuclides in food, as in many cases, these are results of large-scale nuclear accidents. If data obtained after the F1-NPP accident in 2011 were introduced into the data set and guidance levels were evaluated in the same way as for natural radioactivity, the cesium concentration would be too high to be used in non-emergency exposure situations. For artificial radioactivity, instead of this method, dose and activity concentrations are measured. We cannot measure dose in food but can link formula (1) between ingested dose and the activity concentration in food.

$$\text{Ingested Dose} = A \times M \times e_{ing} \quad (1)$$

"A" is the activity concentration in food (Bq/kg), "M" is the consumption rate (kg/year), "e_{ing}" is the dose conversion factor (Sv/Bq). It was reconfirmed in this

Table 2. List of workshop lectures

No.	Title	Presenter	Affiliation	Country
1	Statistical-based modeling and nanoDot OSL dosimetry for evaluation of potential factors contributing to radiation-induced skin injury during Transarterial Chemoembolization	Siritorn Buranurak, Ph.D.	Khon Kaen University	Thailand
2	Correlation of intraabdominal and intrahepatic lipid content assessed by MRI/MRS with biofluid lipid and glucose metabolic profiles	Khin Thander Htun, Ms.	Chiang Mai University	Thailand
3	Low-dose radiation enhance cytotoxicity of pirarubicin, chemotherapeutic agent, in K562 and K562/adr leukemic cancer cells	Khin The Nu Aye, Ms.	Chiang Mai University	Thailand
4	Effect of Fas ligand to enhance apoptosis of human lung cancer cells cotreated with retinoic acid-inducible gene-I-like receptor agonist and X-ray irradiation	Yoshiaki Sato, Mr.	Hirosaki University	Japan
5	Regulation of radiosensitivity of radioresistant cells via hyaluronan synthesis inhibitor	Kazuki Hasegawa, Mr.	Hirosaki University	Japan
6	Development of novel and self-healing radiation shielding hydrogels from poly(vinyl) alcohol (PVA) composites	Kiadtisak Saenboonruang, Ph.D.	Kasetsart University	Thailand
7	Development of X-ray computed tomography (CT) acquisition and image reconstruction system by using fluorescent screen and digital camera	Manasavee Lohvithee, Ph.D.	Chulalongkorn University	Thailand
8	Development of computer codes to simulate some aspects of experiments and applications with neutrons	Sunchai Nilsuwankosit, Ph.D.	Chulalongkorn University	Thailand
9	Identifying indoor radon sources in Pa Miang, Chiang Mai, Thailand	Spitcha Chanyotha, Ph.D.	Chulalongkorn University	Thailand
10	A comprehensive exposure assessment from the viewpoint of health and human activities in a unique high natural back ground radiation area	Eka Djatnika Nugraha, Mr.	Hirosaki University	Japan
11	Loong-term measurements of radon and thoron exhalation rates from surface using the vertical distributions of their activity concentrations	Oumar Bobbo Modibo, Mr.	Hirosaki University	Japan
12	Shortening of chemical PCC assay in radiation emergency medicine	Ryo Nakayama, Mr.	Hirosaki University	Japan
13	Comparing whole blood and isolated peripheral blood mononuclear cell cultures in cytokinesis-block micronucleus assay with different harvest protocols and humidity during cell spreading	Valerie Swee Ting Goh, Ms.	Hirosaki University	Japan

project that ^{210}Po is the largest factor of the ingestion dose. However, the estimated dose is found to be higher than the earlier values, which means that further investigation is required. The content including the aforementioned information will be compiled into a technical document by the end of 2021.

3.3. Lecture III: Radiological emergency response and risk communication for first responders

Dr. Antony Hooker from Adelaide University, Australia, gave a lecture entitled "Radiological emergency response and risk communication for first responders." This lecture talked about the radiation emergency prevention processes in Australia, especially focusing on South Australia (SA), and about recent studies on radiation risk. SA has various involvements with radiation. There are many uranium mines such as Olympic Dam, Beverly, Four mile, and Honeymoon. In terms of medicine, the first proton therapy equipment in the southern hemisphere was installed at a facility in SA. Moreover, many radioactive materials are transported in SA. Therefore, the SA government formulated the State Emergency Management Plan (SEMP) and State CBRN (Chemical, Biological, Radiological and Nuclear) Plan for prevention and response to radiation emergency to supplement a similar national emergency plan. To execute the plans and provide a unified team approach in case of CBRN incidents, the State Multi-Agency Response Team is formed, which consists of members from police, metropolitan fire service, country fire service, ambulance service, and any other agency necessary to render safe the incident. The Environmental Protection Authority (EPA) also plays an important role in radiation emergencies. In an incident involving radioactive material, officers of the EPA's Radiation Protection Branch will conduct radiological assessments and provide expert advice on

radiation safety and the management, containment, removal, and disposal of radioactive material. Various "first responder training sessions" are held in SA every year to develop and maintain such human resources. All the training programs involving radioactive materials use real radiation sources. However, according to Prof. Hooker, there are some challenges faced during training as they "rarely exercise outside of first response", and emphasized the need for further training such as recovery/waste disposal and medical retrieval.

First responders should acquire comprehensive knowledge about radiation and its protection because they will be exposed to radiation risk. Prof. Hooker introduced some researches about the radiation risk. General researches suggested that radiation exposures exceeding 100 mSv can induce cancer and 100 mSv and less can have slightly less critical effects, which may be difficult to perceive in the short-term. The exposure in CT tends to increase because the number of multi-detector row CT procedures performed each year is increasing approximately five times faster than the population growth rate. Therefore, recent epidemiological researches have shown a cancer risk in children after CT exposure, and researchers and agencies publish papers or reports to review the CT exposure studies[14]. Some other researches such as the review of epidemiological researches for all cancers in nuclear workers show that a relative risk of more than 1 indicates a positive association between radiation exposure and cancer mortality while a relative risk less than 1 indicates a negative association. Prof. Hooker also introduced other researches and suggested the necessity for more research on low-dose radiation effects. Research on low-dose radiation involving a pKZ1 mouse mutation assay revealed that priming low doses of X-radiation prevent inversions normally caused by high doses in the pKZ1 mouse prostate[15, 16]. In the end, he talked about the research status and his current investigation of immunological effects of inhaled environmentally relevant levels of radon gas on the lungs.

4. Summary of workshop lectures

Workshop lectures included oral speaker presentations and discussions. Multiple topics (Table 2) were presented by the researchers and graduate students from Thailand and Japan. The studies on environmental radiation (Table 2, No. 9-11), presenters showed the data on the main sources of indoor radon, which has been identified as the leading cause of lung cancer mortality after smoking, and the exposure assessment including characterization of exposure and radiotoxicology in the areas with high natural radiation. Additionally, a long-term measurement technique of radon exhalation rate using a passive radon-thoron discriminative monitor was introduced. Their works are very important for understanding chronic external/internal exposure and health risk. In the presentation on the development of novel radiation shielding (Table 2, No. 6), the data demonstrated that poly(vinyl) alcohol (PVA) hydrogel containing Sm_2O_3 and other chemical compounds is a novel radiation shielding material. The addition of those chemical compounds to PVA hydrogel will be able to help prolong the materials' lifetime and reduce operational costs. In the study on the training of nuclear engineers (Table 2, No. 8), the presenter discussed the issues faced in learning about the operation of nuclear reactors and other neutron-related equipment. He said, in order to help the study and the conducting of the experiments involving the neutrons, three simulation codes were developed so that the engineers could get an experience of handling the actual equipment. The presenters who investigated the radiation effect on cancer cells (Table 2, No. 3-5) introduced the potential promising cancer radiotherapy focusing on anti-cancer drug pirarubicin, the agonist of pattern recognition receptors, and hyaluronan synthesis inhibitor from their *in vitro* studies. Their studies improved our understanding of radiation and cancer biology. The presentation on biodosimetry (Table 2, No. 12 & 13) discussed the studies on developing conventional methods for dose estimation to improve the efficacy of radiation emergency medicine. In brief, the presenters described a new method for shortening the chemical premature chromosome condensation (PCC) assay for high dose exposures, and the alternative method as compared to the current method of cytocentrifugation for peripheral blood mononuclear cell cultures in cytokinesis block micronucleus (CBMN) assay. Research on diagnostic radiology explored the possibility of improving the X-ray CT acquisition system. (Table 2, No. 7). An assessment of the relationship between ectopic fat in the abdomen and liver and glucose metabolic profiles using magnetic resonance imaging/magnetic resonance spectroscopy (MRI/MRS) (Table 2, No. 2) and the development of image-guided procedures during transarterial chemoembolization (Table 2, No. 1) were also introduced.

5. Poster presentations by young scientists

In the poster sessions, there were 19 presentations by young scientists and graduate students from eight countries including Hungary, Cameroon, Kazakhstan, Iran, Indonesia, Singapore, Thailand, and Japan. The subjects included a range of research topics such as "Radiation Biology", "Radiation Emergency Medicine", and "Radiation Measurement & Protection" (Fig. 1). The organizing committee created a room on Microsoft Teams for each poster presenters and uploaded the poster files into the room. During the poster session,

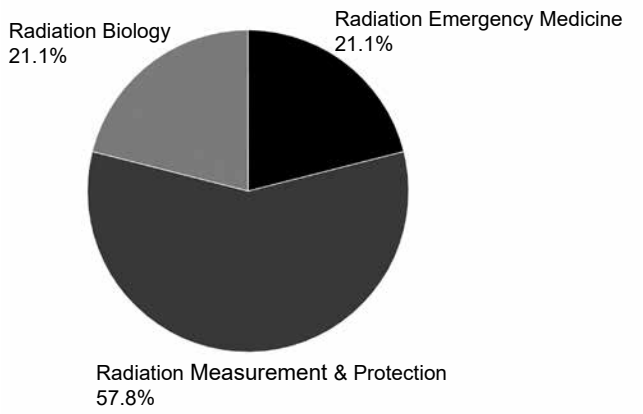

Fig. 1. Percentage of each category in the poster session for young scientists.

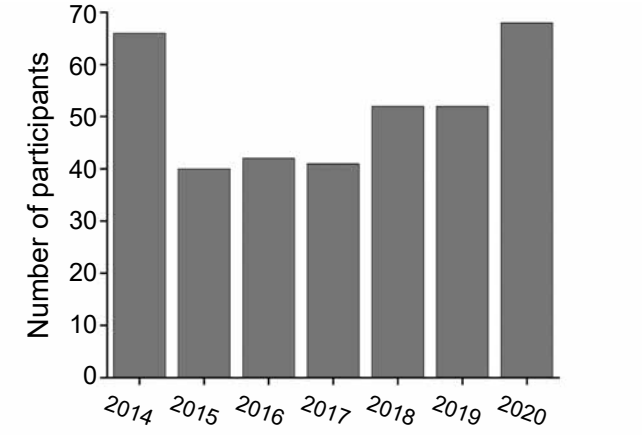

Fig. 2. Trends in symposium participants.

the organizing committee set up a meeting in each poster presenter's room to encourage active discussion and to allow for conversations between the questioner and the presenter. A lively discussion took place during the Q&A session, which was very meaningful for both the presenters and the participants. At the closing ceremony of the symposium, Mr. Ryoju Negami (Hirosaki University) and Dr. Chu Trung Tien (Ha Noi University) won the poster award for "Performance test of passive-type electrostatic radon monitor using silicon photodiode" and "Characteristics of ^{210}Po in fish species in Dong Thai Lake, Hanoi, Vietnam", respectively. The poster session provided an exciting opportunity for young researchers and students who do not usually discuss in English, and was a meaningful place for future research development.

6. Summary of benefits

The workshop and symposium were held online for the first time and the virtual symposium was as successful as the physical events. The number of participants in this symposium was 68, the highest ever (Fig. 2). The benefits of holding the symposium online were as follows; (i) No cost for travel and other expenses, making it easy to participate as compared to a physical event. A virtual symposium is that you can access them from anywhere in the world; (ii) The discussion for the presentation remains in the chat room, and young researchers and graduate students can get a lot of information from the chat room; (iii) The method of using Microsoft Teams is relatively simple and can be carried out by a committee of mainly graduate students.

7. Troubleshooting

Multiple problems were encountered and solved throughout the event. Because the committee allowed all participants to join the conference teams a day before the symposium to confirm their participation and enabled the presenters to share their screen, all problems were identified and addressed even before the actual symposium started. However, we still encountered some problems such as: (i) When the speakers were not able to share their slides themselves, the technical controller had to manage the presenter's slides; which caused lags at times; (ii) There were a few people who could not join our teams. We were able to solve this problem by changing the email address used for the invitation email although the cause remains unknown.

8. Conclusions

In this report, we summarized the first attempt to hold the third bilateral workshop and ESRAH2020 online, discussing the methods adopted and the problems encountered. We realized that the virtual symposium was as effective as the physical symposium. However, the physical symposium allows people to build relationships and network effectively, which was not possible in the virtual event. Taking into account the positives of the virtual event, we would like to hold the subsequent symposium physically as well as online once the COVID-19 threat ends.

Author Contribution

Conceptualization: [Toshiya Nakamura, Takakiyo Tsujiguchi], Writing a draft: [Yoshiaki Sato, Kazuki Hasegawa, Mizuki Sakamoto, Yoko Suzuki, Valerie Swee Ting Goh, Eka Djatnika Nugraha, Ryo Nakayama, Tomoki Koiwa, Ryoju Negami, Kazuki Narumi, Chutima Kranrod, Chanis Pornnumpa], Methodology: [Yoshiaki

Sato, Kazuki Hasegawa, Mizuki Sakamoto, Yoko Suzuki], Supervision: [Toshiya Nakamura],

Funding

This international symposium was supported by Strategic Theme 3: "International Education and Research Project based for Safety & Security on Radiation Medicine", Hirosaki University, Japan.

Conflict of Interest

The authors declare that they have no conflict of interest.

References

1. Yoshikawa Y, Yamasaki A, Takatori K, Suzuki M, Kobayashi J, Takao M, *et al*. Excess processing of oxidative damaged bases causes hypersensitivity to oxidative stress and low dose rate irradiation. Free Radic Res. 2015;49(10):1239–48.
2. Hall EJ and Giaccia AJ. Radiobiology for the Radiologist. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2006.
3. Hosoda M, Tokonami S, Tazoe H, Sorimachi A, Monzen S, Osanai M, *et al*. Activity concentrations of environmental samples collected in Fukushima Prefecture immediately after the Fukushima nuclear accident. Sci Rep. 2013;3:2283.
4. Ohnishi T. The disaster at Japan's Fukushima-Daiichi nuclear power plant after the March 11, 2011 earthquake and tsunami, and the resulting spread of radioisotope contamination. Radiat Res. 2012;177(1):1–14.
5. Endo S, Kimura S, Takatsuji T, Nanasawa K, Imanaka T, Shizuma K. Measurement of soil contamination by radionuclides due to the Fukushima Dai-ichi Nuclear Power Plant accident and associated estimated cumulative external dose estimation. J Environ Radioact. 2012;111:18–27.
6. Hamada N and Ogino H. Food safety regulations: what we learned from the Fukushima nuclear accident. J Environ Radioact. 2012;111:83–99.
7. Baba Y. The problems facing nuclear power in Japan-emphasising law and regulations. Nucl Law Bull. 2002;69:16–28.
8. Kishimoto H. Japanese site for ITER; Rokkasho. Fusion Eng Des. 2003;69(1-4):553–61.
9. Nakamura T, Yoshino H, Yamaguchi M, Tsujiguchi T, Chiba M, Hosoda M. Report on the 1st Educational Symposium on RADIATION and HEALTH by Young Scientists (ESRAH2014). Radiat Emerg Med. 2015;4:58–62.
10. Tsujiguchi T, Yamaguchi M, Nanashima N, Chiba M, Terashima S, Fujishima Y, *et al*. Report on the 2nd Educational Symposium on Radiation and Health by Young Scientists (ESRAH2015). Radiat Environ Med. 2016;5:65–71.
11. Matsuya Y, Tsujiguchi T, Yamaguchi M, Kimura T, Mori R, Yamada R, *et al*. Educational Activity for the Radiation Emergency System in the Northern Part of Japan: meeting Report on "The 3rd Educational Symposium on Radiation and Health (ESRAH) by Young Scientists in 2016". Radiat Res. 2017;187(6):641–6.
12. Saga R, Tsujiguchi T, Yamaguchi M, Fukushi Y, Fujishima Y, Matsuya Y, *et al*. Meeting Report on "The 4th Educational Symposium on Radiation and Health (ESRAH) by Young Scientists in 2017". Radiat Environ Med. 2018;7:121–4.
13. Shah P and Zampella JG. Use of systemic immunomodulatory therapies during the coronavirus disease 2019 (COVID-19) pandemic. J Am Acad Dermatol. 2020;82(6):e203–4.
14. Mathews JD, Forsythe AV, Brady Z, Butler MW, Goergen SK, Byrnes GB, *et al*. Cancer risk in 680,000 people exposed to computed tomography scans in childhood or adolescence: data linkage study of 11 million Australians. BMJ. 2013;346:f2360.
15. Hooker AM, Bhat M, Day TK, Lane JM, Swinburne SJ, Morley AA, *et al*. The linear no-threshold model does not hold for low-dose ionizing radiation. Radiat Res. 2004;162(4):447–52.
16. Zeng G, Day TK, Hooker AM, Blyth BJ, Bhat M, Tilleyet WD, *et al*. Non-linear chromosomal inversion response in prostate after low dose X-radiation exposure. Mutat Res. 2006;602(1-2):65–73.