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Report

Meeting Report on "The 4th Educational Symposium on Radiation and Health (ESRAH) by Young Scientists in 2017"

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With many nuclear facilities located in Japan, it is necessary to prepare for radiation accidents. Radiation accidents such as that at the Fukushima Daiichi Nuclear Power Plant and the Chernobyl nuclear accident caused the release of radioactive substances. Because of such accidents, the influence of radiation on human health began to receive greater attention. In Aomori Prefecture, northern Japan, Hirosaki University is the focal point for preparing for disaster and cooperating with local residents. Therefore, accurate knowledge and experience on the influence of radiation on the human body is required. Since 2014, the *Educational Symposium on Radiation and Health (ESRAH) by Young Scientists* has been co-hosted with Hokkaido University. To support the learning of young researchers, top-class researchers from abroad are invited to give educational lectures, facilitating the international exchange of ideas between researchers in various fields. In this meeting, networks and knowledge among young researchers are cultivated, and the human resources capable of playing a role in radiation emergency medicine are nurtured. The 4th ESRAH meeting took place in 2017. Herein we report the meeting findings.

Key words: radiation accidents, educational symposium, radiation effect

1. Introduction

On March 11, 2011, after the accident at Fukushima Daiichi Nuclear Power Plant following the earthquake and tsunami, radioactive substances were released from the damaged plant into the environment. After this accident, the influence of radiation on human health started receiving more attention. Aomori Prefecture, northern Japan, has several nuclear facilities. Therefore, Hirosaki University, in this prefecture, is the focus for preparing for disaster and cooperating with local residents. At Hirosaki University, the "Institute of Radiation Emergency Medicine" and "Center for Radiation Support and Safety" conduct studies on the effects of radiation on the human body and the dynamics of radioactive materials in the environment, as well as educational activities related to radiation. However, this field is presently facing a scarcity of human resources. It is therefore important to educate young people to build knowledge and skills in radiation emergency medicine.

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Aimed at young researchers, the *Educational Symposium on Radiation and Health (ESRAH) by Young Scientists* has been organized by Hirosaki University, co-hosted with Hokkaido University, since 2014. The 1st and the 2nd ESRAH were held at Hirosaki University, Japan in 2014 and 2015[1, 2], the 3rd ESRAH was held in Hokkaido University, Japan in 2016[3]. These symposia demonstrated the high quality and diversity in fields of radiation research, with many of the young scientists establishing rapport and networks amongst themselves.

In 2017, the 4th Educational Symposium on Radiation and Health (ESRAH2017) by Young Scientists was held at Hirosaki University, Japan. At this meeting, five educational lectures and more than 20 poster presentations by graduate students and young researchers were given. Here, we report the details of ESRAH2017.

2. Educational Lectures

Current topics concerning the relationship between radiation accidents and human health were discussed by six top-class researchers. The titles of the lectures and talks are summarized in Table 1. The current state of the latest research on radiation was well-presented in the lectures and discussions.

Educational Lecture I

Dr. Tibor Kovács of the University of Pannonia, Hungary, gave a lecture entitled "Radioisotopes in the service of politics," which introduced radioisotope usage as tracers and for assassination. Early reports[4] show that, radioisotopes were used for labelling articles such as coins, paper, and fabrics. Several applications have been reported so far, with success in tracing a person or object. However, there are few reports that discussed the health concerns associated with radioisotope labeling. However, according his lecture, several cases of the use of radioisotopes for assassinations are known. A recent famous example from 2006 is the case of Alexander Litvinenko[5]. He ingested 4.4 GBq of polonium-210, resulting in an organ dose in the range 20-100 Gy[6]. Because the symptoms were similar to other illnesses, medical diagnosis was difficult. Dr. Kovács concluded that unfortunately the criminal or political applications of radioactive materials continue to be popular, and only a small number of the total cases are known because of confidentiality. From the perspective of radiation emergency medicine, this lecture reminded us that we must be prepared for cases not only due to radiation accident, but also due to intentional contamination by radioactive material.

Educational Lecture II

Dr. Lorrie Wong of the University of Hawaii at Manoa gave a lecture entitled "Simulation Training in Disaster response for Healthcare Students". She has developed simulation programs for healthcare students and for interprofessional team collaboration. This lecture focused on how to train healthcare workers to respond to disasters, discussing three components of the training. The first component is the core curriculum content delivery via modules that contain lectures and video content. In this core curriculum, students can learn about disaster definition, the two categories of disasters, i.e., natural disaster and man-made disaster, community and personal disaster management plans, triage and local and federal assistance. The second component is the practice of the technical skills of first aid and triage. The students practice triage using case studies and first aid training. The third component is disaster simulation as a tabletop exercise for which the students practice to prepare for triage and perform first aid in the initial response phase, and practice the management of patients and resources within the hospital setting. In the recovery phase, the students study public health needs as a tabletop exercise. Our conclusion was that simulation training is very interesting and a valuable program that connects knowledge and practice.

Educational Lecture III

Dr. Stephanie Long of the Environmental Protection Agency, Ireland, introduced the national strategy for controlling radon exposure in Ireland. Approximately one third of the country has been categorized as a higher radon area predicted to have concentrations of more than 200 Bq/m^3, which is above than the reference level (RL) in Ireland[7, 8]. Such high levels are related to the contraction of lung cancer[9]. From the standpoint of radiation protection, the tracking of radon had been carried out since 2002 in the following categories: (i) state owned buildings, (ii) prevention in new buildings, (iii) testing and remediation of private homes and workplaces. In Ireland, the National Radon Control Strategy (NRCS)[10] was established as an inter-agency group to address 31 actions in six thematic areas, and a working group continues to identify knowledge gaps in four thematic areas: (a) establishing current baseline value for the NRCS, (b) better targeting of measures and resources, (c) improving the effectiveness of radon preventive measures and radon remedial work, and (d) developing better ways to communicate radon risk to raise awareness. The NRCS is also continuing to educate the public on the risk of radon and to recommend radioactivity checks in homes. These pioneering strategies and efforts could be helpful for further development of the radiation protection system in the northern part of Japan (3).

Educational Lecture IV

Radiation measurement in Mamuju and the surrounding area, indoor radon concentration in the Mamuju area, and the possibility of an Epidemiological study at Mamuju were introduced by Dr. Naofumi Akata of National Institute for Fusion Science, Japan. Dr. Akata talked about high background radiation areas around the world, with particular focus on Mamuju city in Indonesia. The Mamuju area has been known to have high radiation dose rates that come from Naturally Occurring Radioactive Materials (NORM) in rock and soil[11]. Absorbed dose rate in air were in the range 35-780 nGy/h in Mamuju area, and a low-dose radiation area existed north of Mamuju. Therefore, Dr. Akata proposed that the Mamuju area may be a prospective target area for elucidating radiation risk, because this residential area was classified as containing areas of low, moderate, and high natural radiation.

Dr. Niall Murphy of the Environmental Protection Agency, Ireland, presented the monitoring of both natural and artificial radionuclides in an array of samples with high purity germanium (HPGe) detectors, and the implementation of Monte Carlo methods for the correction of self-attenuation, by the Office of Radiological Protection and Environmental Monitoring (ORM). The commercially available software, GESPECOR, was used for simulation of self-attenuation corrections[12]; at ORM, it is used for the determination of self-attenuation correction factors for an array of samples. Dr. Murphy proposed three methods for the determination of self-attenuation correction factors.

Educational Lecture V

Dr. Mukh Syaifudin talked about the analysis of DNA damage in residents living in the high natural radiation area of Mamuju, West Sulawesi, Indonesia. This area has a background radiation around 13 times higher than normal areas, up to 2.8 mSv/h, because of natural uranium content (^{226}Radium and Radon gas) in rock and soil[13]. Since this area is close to a densely inhabited area, it provides a unique opportunity to study the health effects of chronic low-level radiation exposure directly on humans. His research team previously reported that DNA double strand break frequency in residents living in the high natural radiation area of Mamuju show a trend towards higher levels, but this difference is not significant compared to the normal area[14]. In this study, they collected blood samples from residents of Botteng village, which a high natural radiation area, and Keang village, which served as control area, and then performed analyses of DNA damage, such as chromosomal aberration, comet assay and γ-H2AX. As a result, there was no significant effect of natural radiation on unstable chromosomal aberrations (dicentric and ring chromosomes) or difference in the number of micronuclei between Botteng and Keang inhabitants. In addition, high background radiation does not effectively induce DNA double strand breakage in residents living in the Botteng village. These levels of radiation exposure were not adequate to induce significant DNA damage. This data does not reveal any significant negative impact of natural radiation exposure in inhabitants of high natural radiation areas. However, to further clarify the effect of chronic low-level radiation exposure, studies involving sampling of more time points and long-time evaluations are needed.

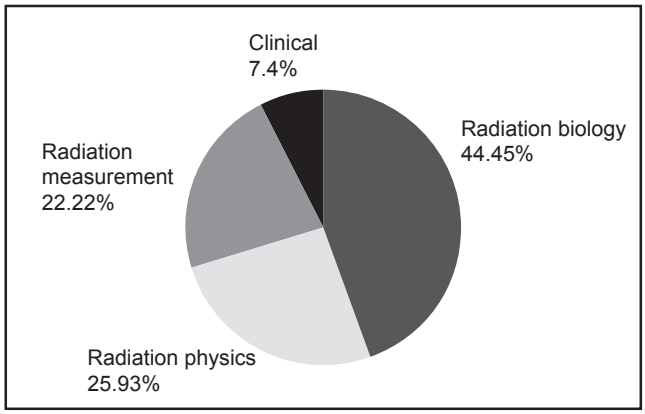

Fig. 1. Percentage of each category in the poster session for young scientists.

3. Poster Presentations by Young Scientists

Young scientists from five countries including Ireland, Hungary, Ukraine, Korea and Japan participated in this poster session. Not only graduate students and teachers but also undergraduate students actively participated. The number of accepted posters was twenty-nine. The fields from which the posters were drawn were radiation measurement, radiation biology, radiation physics, and clinical practice (Fig. 1). The field of radiation biology was the most popular subject. At the beginning of the session, the young scientists presented their poster contents for one minute. Next, they discussed each poster, and the judges, selected the award-winning posters on the basis of research originality and presentation, also asked them to explain and discuss their posters. Two of the young scientists, one of the overseas scientists, and one of the Japanese scientists, were chosen as the poster prize winners by ten judges. Both of the chosen posters were in radiation biology. The young scientists had lively discussions. For those young scientists who do not usually discuss science in English, it seemed that this poster session was a valuable experience. Therefore, we can say that the session was a place for meaningful exchanges of opinions and for the development of future research.

4. Summary and Future Prospects

In the fourth ESRAH2017, young researchers from fields such as biology, physics, environmental radiation, etc., gathered together. For the educational lectures, in addition to a report of the biological effects of the high back ground area, there was a lecture on disaster simulation at a radiation nursing department, and young researchers from the nursing department also participated. The young researchers had the opportunity to gain information and knowledge through interaction with their peers.

The next ESRAH will be held in Sapporo with Dr. Date as a president, Professor of Hokkaido University. We expect the participation of many researchers. Finally, we express our gratitude to the six scientists who accepted our offer to give the educational lectures.

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Conflict of Interest Disclosure

The authors declare that they have no conflict of interest.

References

1. Nakamura T, Yoshino H, Yamaguchi M, *et al*. Report on the 1st Educational Symposium on RADIATION AND HEALTH by Young Scientists (ESRAH2014). Radiat Emerg Med 2015;4:58 – 62.
2. Tsujiguchi T, Yamaguchi M, Nanashima N, *et al*. Report on the 2nd Educational Symposium on Radiation and Health by Young Scientists (ESRAH2015). Radiat Emerg Med 2016;5:65–71.
3. Matsuya Y, Tsujiguchi T, Ymaguchi M, *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;187:641–6.
4. Tryhorn FG, Widdowson EE. Identification of Objects by Radioactive Labelling. Police J: Theory, Practice and Principles. 1940;13(1):45–52.
5. Stather, JW. The polonium-210 poisoning in London. J Radiol Prot. 2007;27:1–3.
6. Harrison J. *et al*. The polonium-210 poisoning of Mr. Alexander Litvinenko. J Radiol Prot. 2017;37:266–78.
7. Radon in Dwellings. The Irish National Radon Survey. RPII. 2002.
8. Long S, Fenton D, Scivyer C, *et al*. Factors underlying persistently high radon levels in a house located in a karst limestone region of Ireland-lessons Ireland about remediation. Nukleonika. 2016;61(3):327–32.
9. Smyth R, Wilseman E, McPhillips D, *et al*. Household radon exposure in patients attending a rapid access lung cancer clinic. Am J Respir Crit Care Med. 2014;189:A3144.
10. Environmental Protection Agency. National Radon Control Strategy. [Internet]. Wexford, Ireland: Environmental Protection Agency; [cited 2017 October 21]. Available from: http://www.epa.ie/radon/
11. World Nuclear Association. Naturally-Occurring Radioactive Materials (NORM). [Internet]. London, UK; [cited 2017 November 7]. Available from: http://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/naturally-occurring-radioactive-materials-norm.aspx
12. Iurian AR, Millward GE, Sima O, *et al*. Self-attenuation corrections for Pb-210 in gamma-ray spectrometry using well and coaxial HPGe detectors. Appl Radiat Isot. 2017; in press. Available from: https://doi.org/10.1016/j.apradiso.2017.06.048.
13. Iskandar D. Bunawas Syarbaini. Mapping radiation and radioactivity in Sulawesi island. In: Kosako, Toshiso (Ed.), The Third Asian and Oceanic Congress on Radiation Protection (AOCRP-3) 2010.
14. Hasan Basri IK, Yusuf D, Rahardjo T, *et al*. Study of γ-H2AX as DNA double strand break biomarker in resident living in high natural radiation area of Mamuju, West Sulawesi. J Environ Radioact. 2017;171:212–16.