

2023 HICARE/IAEA Internship Report

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1. Overview

Period: April 1st, 2023 ~ June 30th, 2023

Dispatch source: Hiroshima International Council for Health Care of the Radiation-Exposed (HICARE)

Dispatch destination: International Atomic Energy Agency (IAEA)

Assigned department: Director's office, Division of Human Health,
Department of Nuclear Sciences and Applications

Purpose: To understand the significance and necessity of medical treatment for the victim of the atomic bomb from a global point of view. To develop human resources who will inherit the research results and results of medical treatment for the radiation-exposed in Hiroshima.

With the recommendation and support of HICARE, I did a three-month internship at the International Atomic Energy Agency (IAEA) in Vienna, Austria.

I applied for this internship because I was born and raised in Hiroshima, and I am interested in the peaceful use of nuclear energy and the effects of radiation on the human body as I have had many opportunities to hear stories about the atomic bomb since I was a child.

2. Activities during the Internship

The main activities I did during the internship were the following four things.

- (1) Writing a Review Paper on SBRT for Oligometastatic Prostate Cancer
- (2) Helping to Publish the Handbook
- (3) Attending Meetings

(4) Visiting the Sibersdorf Laboratory

Details are as follows.

(1) Writing a Review Paper on SBRT Treatment for Oligometastatic Prostate Cancer

I talked with Dr. May Abdel Wahab who is the director of the Division of Human Health, Department of Nuclear Science and Application (NAHU), and she told me to work on a review paper on SBRT (Stereotactic body radiotherapy) treatment for oligometastatic prostate cancer. Oligometastasis is a relatively new concept, referring to localized, small numbers of metastases (typically one to five) of cancer, but there is still no unified definition of the number and location of metastases.

In oligometastasis, treatment aimed at radical control of metastatic lesions, such as radiotherapy or surgery, can improve prognosis. SBRT is one of the most precise types of radiotherapy and is said to be highly effective in oligometastasis, but its effectiveness has not yet been well-researched, so I was assigned to review this topic. I worked on this paper throughout my internship. I conducted a search of the literature by setting keywords in PubMed, and then extracted and compared the results. It was my first time writing a paper and it was difficult, but thanks to Dr. May's careful guidance in her busy schedule, I was able to work on it little by little. I was impressed when Dr. May told me that "The internship experience itself does not remain in a visible form, but by writing a review paper, the experience can be preserved in a way that is tangible." The experience of writing the paper on my own was very good training in logical thinking based on medical findings.

After I returned to Japan, I prepared for the medical research presentation at Hiroshima University by making posters and PowerPoint presentations under the supervision of Dr. Yuji Murakami, a radiation oncologist at Hiroshima University.

(2) Helping to prepare for the publication of a handbook

I was involved in the preparation of a handbook under the guidance of Dr. Uwe Scholz. The handbook was about the guidance for medical practitioners communicating with

returning populations to former evacuation sites. It was a bit of a challenge at first, as some of the tools were new to me, but thanks to his careful guidance, I acquired new skills and gradually improved the speed of my work.

① Applying for Permission to Cite Figures and Tables

I asked UNSCEAR, Fukushima Prefecture, Japan's Ministry of the Environment, and others for permission to quote the figures and photos used in the handbook. Dr. Uwe had been working on the Fukushima nuclear accident for some time and has many Japanese acquaintances, so we sometimes contacted the relevant authorities through them.

② Correcting Grammar and Style of Writing

IAEA publications have a lot of regulations on format, such as font size and how to cite figures and tables, and so on. Many of the chapters in this handbook were written by people outside the IAEA, and some of them were not in line with the IAEA rules, so I corrected them. Also, some of the chapters had been written a little while ago, so I checked whether the references and links were correct. Some of the referenced figures and tables were not in the reference source or had incorrect links, so it was hard to find the correct ones. In addition, I corrected some grammatical errors.

③ Creating a revised version of the Reference section

I created a revised version of the References section, as some of them did not follow the IAEA's rules. If the referenced item was a paper, I searched for it using Web of Science and dropped it into an Endnote set in IAEA style, and used what was displayed. Some of the items were output incorrectly, so I checked everything myself afterward. If the referenced item was a book or report, I did an internet search, checked the necessary information such as title, year of publication, and so on again by myself, and revised the manuscript.

As the handbook was about the Fukushima nuclear accident, there were many Japanese publications in the references. Some of the Japanese publications had titles and names of

publishing organizations that had to be translated from Japanese into English, and some had publication years in the Japanese calendar, so I think I was able to contribute as a Japanese speaker, especially in this aspect.

(3) Attending Meetings

① Human Health Seminar

The Division of Human Health where I worked sometimes holds seminars on radiation and human health. During my three-month internship, two seminars were held.

The first one was entitled "Latest update on X-ray angiography technology and quality assurance" and was given by Prof. Kevin Wunderle, Diagnostic medical physicist at the Cleveland Clinic. Medical imaging technology is crucial for accurate diagnosis and improved patient care, and many types of X-ray equipment are used for a variety of clinical applications. In this presentation, he gave an update on the latest information and future perspectives on the technology of X-ray equipment specifically for interventional treatment under X-ray fluoroscopy.

The second one was entitled "Artificial Intelligence in Radiation Medicine; Opportunities and Challenges" and was given by Dr. Issam El Naqa, founding chair of the Machine Learning department. Artificial intelligence (AI) and machine learning (ML) have been proven to improve efficiency not only in diagnosis and treatment in radiology but also in treatment planning and assurance of treatment quality. However, especially in low- and middle-income countries, ethical concerns and financial resources have been a barrier, and have limited its application in healthcare. Therefore, in this presentation, he talked about current applications and real challenges in this context, as well as about new approaches to solve these issues. The first seminar was held face-to-face and the second was online, and there was a lively discussion after each presentation. Both seminars were very valuable opportunities to gain various insights from experts who are currently working extensively in the medical field.

② ARBR Section Meeting

Weekly ARBR (Applied Radiation Biology and Radiotherapy) section meetings were held under the chairmanship of Dr. May. They reported on the progress of their respective projects and confirmed plans.

③ Topical Session on Radiation Induced Second Primary Cancer Following Radiotherapy and Associated Imaging

I attended Day 3 of the Topical Session on Radiation Induced Second Primary Cancer Following Radiotherapy and Associated Imaging on 15 June 2023. Second primary cancer is a cancer that occurs in a person who has previously experienced malignancy and it is independent of the previous cancer. The main cause of second primary cancer has been considered to be radiotherapy, but in recent years it has become clear that a patient's genetic predisposition and lifestyle also have a significant impact on second primary cancer. According to the conference, the mechanisms of radiation induction of secondary primary cancers are still unclear in some areas, so further research is needed. It was impressive that some persons from the Nuclear Regulation Authority from Japan were also present and they asked some questions.

(4) Visiting the Sibersdorf Laboratory

Ms. Sumi, Laboratory Head of the Nuclear Material Laboratory (NML), Safeguard Department of the Sibersdorf Laboratory, guided me to visit the Environmental Sample Laboratory (ESL) and the NML in the laboratory. The Sibersdorf Laboratory is owned by the IAEA, and it has eight nuclear application laboratories. The ESL and NML are laboratories that aim to investigate whether nuclear material is used only for peaceful activities by analyzing samples collected by the IAEA inspectors at nuclear facilities around the world. The ESL verifies that no undeclared nuclear activities are taking place, while the NML verifies that the uranium and plutonium content in the samples matches what has been declared to the IAEA.

I was impressed to know that the samples collected are initially assembled at a specific location and are handed over to the experimenter after keeping the place and time of collection secret so that bias is eliminated and the verification is carried out from a neutral and impartial perspective. It was a valuable opportunity to get in touch with the scientific

aspects of nuclear security.

3. What I Learned from the Internship

I had many valuable experiences and learned a lot during this internship. Before coming to the IAEA, I thought that international organizations like the IAEA were a distant world that had nothing to do with me. However, I was able to see how the IAEA functions by working with many people there.

I was surprised because I was often asked what my expertise was when I introduced myself. Most of the IAEA staff members had Ph.Ds., which made me realize that a high level of expertise is required to work in the international organization.

In addition, through interaction with the staff members and interns, I realized that to understand foreign cultures, it is necessary to understand Japanese culture first as a comparison.

Furthermore, I found it important to be willing to take on challenges without being afraid of making mistakes. At first, I was so afraid of making mistakes that I sometimes slowed down my work speed by checking things one by one, and refrained from expressing my opinions, fearing that my ideas might not be conveyed properly.

However, my intern friends pointed out to me to stop doing this, and I started to shift my focus toward completion rather than perfection.

In this way, I learned a lot of things both from the internship at the IAEA and from the interaction with the staff members and interns from all over the world.

4. Acknowledgments

I would like to thank many people who helped me to do this internship.

I sincerely appreciate HICARE, Hiroshima Prefecture, and Hiroshima University for giving me this wonderful opportunity, and the staff members and interns I was able to work with at the IAEA.



With Dr. May Abdel Wahab, the director of NAHU



IAEA Buildings (Vienna, Austria)



With my intern friends