

## Biological Adaptations Report of HIMAC experiments granted by "Living in Space"

(A03-1) "Multidisciplinary Analysis of the Effect of Low Fluence Particle Radiation on Animals and Biological Adaptations"

Host researcher : Dr. Ryo Fujimori (National Institutes for Quantum and Radiological Science and Technology)

Place of visit : National Institutes for Quantum and Radiological Science and Technology

Name : Shaherah Alqahtani, Dylan Buglewicz, Takamitsu Kato (Colorado State University, U.S.A.)

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Beam time (date and heavy ions):

1) June 5<sup>th</sup>, 2019 (0:00 a.m. –3:00 a.m. on June 6<sup>th</sup>), Carbon C

2) June 11<sup>th</sup>, 2019 (0:00 a.m. – 04:00 a.m. on June 12<sup>th</sup>), Iron Fe

I, Shaherah Alqahtani, am currently pursuing a master's degree in Toxicology at Colorado State University. Myself along with my research colleague Mr. Dylan Buglewicz, currently pursuing a PhD in Toxicology, and my Supervisor Dr. Takamitsu Kato were invited to the National Institute of Radiological Sciences (NIRS) in Inage, Chiba, Japan on May 20, 2019 by Dr. Akira Fujimori and collaborated our research relevant to "Living in space." We also collaborated with Dr. Yoshikawa, from North Carolina University.

During our first week Dr. Takamitsu Kato and Mr. Buglewicz presented their prior results from their research at NIRS in the summer of 2018. This summer at NIRS we irradiated different cell lines with ionizing radiation beams including X-ray, carbon-ion and iron-ion beams. We addressed the differences between these beams on DNA damages utilizing assays such as: cell survival,  $\gamma$ -H2AX and flow cytometry. More specifically we observed the differences in DNA damage at varying carbon-ion beam depths and the role of different types of DNA repair mechanisms may influence the repair at different depths utilizing DNA repair deficient mutant cell lines.

During our stay, we enjoyed pleasant spring weather with rain, as well as, nutritious food comprising of green vegetables and fresh fish. Many of these foods, such as sushi, I experienced for the first time. My home country of Saudi Arabia nor Colorado possess many of the types of food available here and it has been a wonderful experience to try out all of the varieties that Japan has had to offer.

Dr. Fujimori also gave us a tour of the hospital facilities so we could see how people are treated with the carbon-ion radiotherapy first hand (Fig. 1). This was very meaning for to us, as it helped demonstrate the impact our research really has on saving lives. Being a research scientist, it becomes easy to lose sight of the bigger picture of what your research truly means and seeing the real world application of your work brings back into reality your potential to change the world.

I was very impressed with the hospitality and kindness of the Japanese towards us. I will remember this trip for the rest of my life, and it has been an amazing experience working with Dr. Akira Fujimori and his lab members.



Fig 1. At the treatment room with a newly installed gantry system for the heavy ion particle therapy facility in QST/NIRS (Chiba, Japan)