Prof Prakash Hande and Dr. Akira Fujimori collaborate on mouse studies using Fe ions

(A03-1) “Multidisciplinary Analysis of the Effect of Low Fluence Particle Radiation on Animals and BiologicalAdaptations”
Research Group Leader: Mitsuru Nenoi(National Institutes for Quantum and Radiological Science and Technology
Visit duration: September 11, 2019 to September 22, 2019

Dr. Manoor Prakash Hande is an Associate Professor at the National University of Singapore. Dr. Hande has been working in the fields of radiation biology, genome stability, telomere biology for the last 30 years. His seminar contribution is in the understanding the role of telomeres in the protection of genome stability and in ageing and cancer. Telomeres are the tips of chromosomes whose dysfunction drives the cells towards chromosome-genomic instability resulting in either ageing and/or cancer. Using mouse models, Dr. Hande and his collaborators have established that telomere-mediated chromosome-genome instability facilitates transformation of cells into cancer. These findings were instrumental in identifying the all-important role of DNA damage response or repair factors in telomere length maintenance to prevent genomic instability and cancer progression. Dr. Hande has developed a mouse model for retrospective biological dosimetry for ionising radiation exposure that has helped identification of a genomic signature in a human population occupationally exposed to plutonium. His laboratory has been working on the multiparametric approach to identify bioindicators of radiation exposures. Such biomarkers are useful in identifying the biological effects of radiation exposure in accidental scenario or occupational exposure to space radiation in astronauts or cosmonauts. In that direction, study of biological effects of heavy ions (such as Fe and C) would be very important.

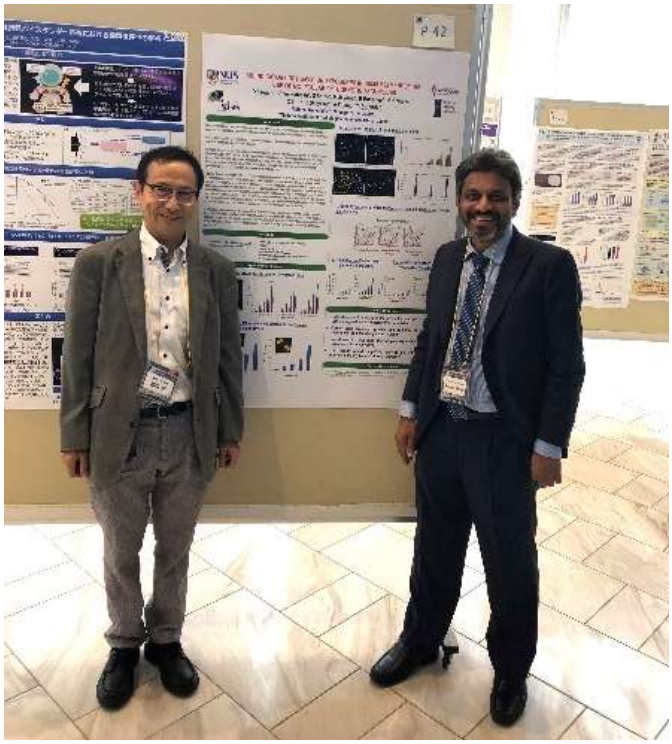
Dr. Hande visited and conducted collaborative experiments with Dr. Akira Fujimori at the Molecular and Cellular Radiation Biology Team Department of Basic Medical Sciences for Radiation Damages from September 18 to 28, 2018 (Visit 1) and March 07, 2019 to March 18, 2019 (Visit 2). The visit details were provided in the earlier reports.

(a) Dr. Hande during September 2019 visit to NIRS (b) Spenocytes being isolated from control and C-ion irradiated mice

As part of the third visit, Dr. Hande visited NIRS from September 11, 2019 to September 22, 2019. During this visit, mice from scid (severe combined immunodeficiency) backgrounds were exposed to 0.5 Gy of Carbon ions (2nd August 2019). The different backgrounds of scid mice used are: wt (wild type), Scid+/- and Scid+/+ - mice with scid mutation. Spleen lymphocytes were isolated approximately 5 weeks after irradiation and metaphase chromosomes were prepared to determine the persistent chromosome aberrations (dicentrics and translocations) in mice. Multicolour fluorescence in situ hybridissation (mFISH) will be performed to analyse the chromosomal changes (both structural and numerical) and telomere specific PNA-FISH will be conducted to determine the dicentrics and telomere dynamics. These studies will identify long term persistent chromosome aberrations in vivo in mice as well as highlight the genetic susceptibility of DNA repair deficiency in mice.

On September 21 - 22, 2019, Dr. Hande along with Dr. Fujimori attended the "33rd Annual meeting of the Japanese Society for Biological Sciences in Space, Chiba, Japan. Dr. Hande presented a poster and a two-minute presentation on "Bioindicators of heavy ion exposures in human lymphocytes: use of molecular cytogenetics techniques" on September 21, 2019 in association with the meeting of principal investigators KAKENHI project "Living in Space". In this poster presentation, data on C and Fe ion induced molecular and cellular changes including chromosome aberrations and differential gene expression were discussed. Preliminary data on the studies done in September 2018 visit were presented as well.

Annual Meeting of JSBSS



Dr. Akira Fujimori and Dr. Prakash Hande

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