

HU-ACE NEWS LETTER

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Activities of the Core

Aug. 28, 2024 The 1st Workshop of the Setouchi CN International Joint Research Center
(supported by HU-ACE)

Aug. 29, 2024 The 94th HU-ACE Steering Committee Meeting

HU-ACE Holds the “Kids Energy Symposium 2024”

On July 27, 2024, the “Kids Energy Symposium 2024” was held under the auspices of the Next-Generation Energy Project Research Center of Hiroshima University and the Chugoku-Shikoku Thermal Science and Engineering Research Association, co-sponsored by Higashihiroshima City and the Research Center for Super-Energy Utilization, and in cooperation with Mazda Motor Corporation. The event was targeted at third- to sixth-grade students, who enjoyed talking about energy and conducting experiments.

Despite the high outdoor temperature, three lecture rooms in the Faculty of Engineering at the Hiroshima University Higashihiroshima Campus were utilized for conducting experiments on three themes: "Let's heat with water," "Let's make batteries," and "Let's make a fountain" in air-conditioned rooms. Before the experiments, a Mazda representative gave a talk for children, and a quiz contest was also held.

About 40 elementary school students from Higashihiroshima City and their parents participated in the event. The day was organized by Yukihiro Matsumura (professor at Hiroshima University), chair of the executive committee, with support from Shuhei Inoue (professor at Kinki University) and Mengli Zhang (assistant professor at Hiroshima University), and part-time assistance from four students of Hiroshima University's environmental club "Burizado". The elementary school participants seemed to enjoy the event.



Related Events

The 9th International Symposium on Fuels and Energy (ISFE2025) is scheduled on June 30- July 1, 2025. Details will be announced later.

We have constructed a roadmap for the development of energy utilization technologies leading up to 2050 and an integration scenario called the “Hiroshima Scenario”. Please feel free to share your thoughts with us.

<https://hu-ace.hiroshima-u.ac.jp/wp/wp-content/uploads/2022/10/220921-brochure.pdf>



Research consultation and joint research are welcome.

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Research Topics

Assessment of exposure effects on wild Japanese macaques following the Fukushima nuclear power plant accident

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Research fields: Quantum Energy Applications, Radiation Biological Physics,

Keywords: Radiation measurements, Microdosimetry, Dose evaluations, Environmental radiations

Abstract

Background

In recent years, research and development of innovative light water reactors (LWRs) and small modular reactors (SMRs) have been conducted in the nuclear field to achieve carbon neutrality. Since the accident at the Fukushima nuclear power plant, the safety of these new reactors has been discussed everywhere. Analysis of the effects of the Fukushima NPP accident is considered important for the safe use of nuclear energy. As part of the evaluation of exposure effects due to radioactive contamination caused by the Fukushima nuclear power plant accident that occurred in 2011, a collaborative study is being conducted using Japanese macaques living in the Fukushima area. Hiroshima University is in charge of radiation dose assessment and is estimating the dose for each individual Japanese macaque that was sampled. In recent years, analysis of the oxidative stress status of individual organs of the sampled Japanese macaques has progressed to an analysis that examines the effects of long-term exposure to low-dose and low-dose-rate radiation on the oxidative stress status of individual organs.

Research theme

The purpose of this study is to clarify the effects of low-dose and low-dose-rate radiation or to advance the accumulation of data. First, in order to evaluate doses to individual organs, we will prepare voxel phantoms of Japanese macaques and estimate internal exposure organ dose rate conversion coefficients. We also aim to estimate organ-specific doses by using the measured values of radioactive Cs in organs of Japanese macaques sampled at Tohoku University and the conversion coefficients.

Results

CT images of an adult Japanese macaque (body weight 11 kg, sitting height 58 cm) were acquired using a CT system (Aquilion, Toshiba) at Tohoku University Graduate School of Medicine, and a three-dimensional model was created using the obtained CT images. A voxel phantom was created from the 3D model, and internal organ doses for $^{134,137}\text{Cs}$ and $^{129,131}\text{I}$ were estimated using the PHITS Monte Carlo code [1]. We are currently scaling the phantom of an adult Japanese macaque to estimate internal exposure organ dose rate conversion coefficients for macaques weighing 1-20 kg at arbitrary body weights. In the future, we will estimate the doses for each individual monkey and accumulate data on the correlation with the data on organ-specific adult responses conducted at Tohoku University.

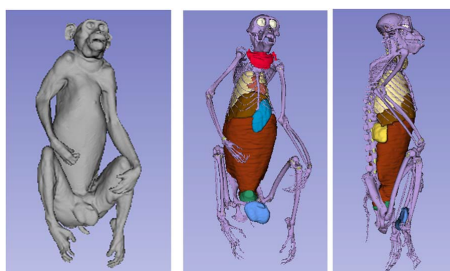


Fig.1 3D model of a Japanese macaque

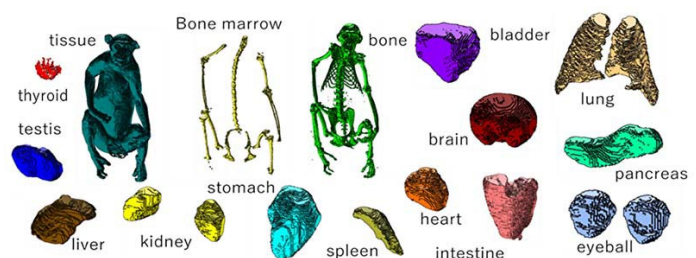


Fig.2 Voxel phantoms of organs

References

[1] Y. Takamura, et al., J. Radiat. Res. 64 (5), 804–810, 2023.