Radioisotope Research Facilities

Kunihiko Fukuda, *Professor and Director* Yukio Yoshizawa, *Assistant Professor*

General Summary

The Radioisotope Research Facilities was established to support medical and biological research with radioisotopes. The Facility also accepts research with nonradioactive isotopes. We have supported researchers by suggesting methods and practical techniques for experiments. Lectures and training courses are held for researchers, medical students, and graduate students. In 2014, 35 researchers from 12 departments and 13 students of 2 curriculums used the laboratory of this facility. Major nuclides used for experiments were ^{32}P, ^{51}Cr, ^{125}I, ^{35}S, and ^{3}H.

The Fukushima Dai-ichi Nuclear Power Plant was damaged by the Tohoku-Pacific Ocean Earthquake on March 11, 2011. Large amounts of fallout were released into the environment by the accident. We focus on the study of the behavior and distribution of the radioactive materials in the environment. Education related to radiation is also an interest.

Research Activities

Analysis of resistance mechanisms in radiation-resistant organisms

Tardigrades, which are called water bears, can tolerate extreme environments, including ionizing radiation and dryness. To clarify the radiation-resistant mechanism of the water bear, the sludge water bear *Isohypsibius* isolated from the activated sludge in Ariake Water Reclamation Center were irradiated with X-ray at 450 Gy, and DNA damage was analyzed with the comet assay method. The X-ray-irradiated cells show a longer tail than did the control nonirradiated cells. However, because the observed results were not quantified automatically, the cell preparation step may need to be improved by removing impurity with a cell strainer.

Measuring and tracing of radioactive fallout in the environment

Distribution and behavior of radioactive fallout released into the environment by the accident of the Nuclear Power Plant has been investigated. Recently, since the contaminated water was leaked into the ocean by the accident, we examined a safe, simple, and rapid method of analyzing radioactive strontium in seawater. Radioactive strontium was separated by a solid extraction column of Analig Sr-01 (IBC Advanced Technologies, Inc., American Fork, UT, USA) and was measured with a liquid scintillation counter. With this method the chemical separation of 2 days could be evaluated, compared with 2 weeks with a conventional technique. The detection limit in this procedure from 1 liter of seawater was 1Bq/l. This method might be able to be used to screen contaminated seawater.

Study of radon

Radon, which is a gaseous radioactive element, dissolves in groundwater and hot springs

and then reaches the surface of the ground. The radon concentration in the environment reflects the underground structure. Therefore, repeatedly measuring the radon concentration is useful. We measured radon concentration of 2 famous radon hot springs with a liquid scintillation counter. The radon concentration of Misasa Onsen Ishi-yu (Misasa, Tottori, Japan) was 1920 Bq/l (compare with 1470 Bq/l last year) and that of the Masutomi Onsen Furoukaku Reisen (Hokuto, Yamanashi, Japan) was 1470 Bq/l.

Publications

Minowa H. Image analysis of radiocesium distribution in coniferous trees two years after the Fukushima Daiichi Nuclear Power Plant accident. *J Radioanal Nuc Chem*. 2015; **303:** 1601-5.

Horiuchi K, Minowa H, Yoshizawa Y. 100 Years of radon research of Misasa Hot Springs (in Japanese). *Onsen Kagaku*. 2015; **64:** 409-21.