National Institutes for
Quantum and Radiological Science and Technology

PRESS RELEASE

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Successful visualization of the dynamics of cesium in a living animal using a newly developed positron-emitting ^{127}Cs tracer

Chiba, JAPAN - The National Institutes for Quantum and Radiological Science and Technology (QST), along with Tohoku University and the Japan Atomic Energy Agency (JAEA), succeeded in visualizing of the dynamics of cesium in a living animal using a newly developed positron-emitting ^{127}Cs tracer for the first time in the world. This research result was published online in *SCIENTIFIC REPORTS* today.

Highlights

- Production of the positron-emitting nuclide ^{127}Cs by irradiating sodium iodide with a $^{4}He^{2+}$ beam.
- Purification of ^{127}Cs tracer using the Cs adsorbent column that excludes sodium ions.
- Successful visualization of the dynamics of cesium (Cs) in a living animal by positron emission tomography (PET) imaging with ^{127}Cs tracer.

After the accident at Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station in March 2011, there has been a growing concern about radiocesium such as ^{134}Cs and ^{137}Cs released into the environment.

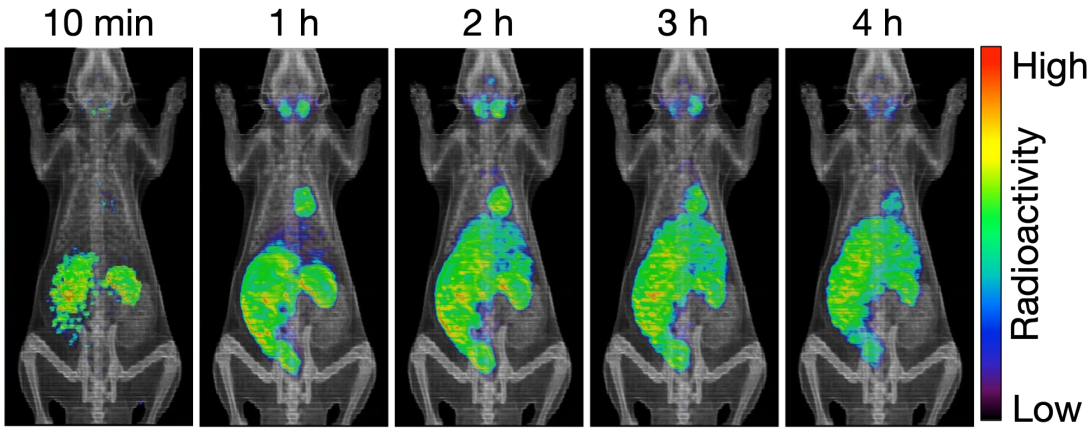
Visualizing the dynamics of cesium (Cs) is desirable to understand the impact of radiocesium when accidentally ingested or inhaled by humans. However, visualization of radiocesium in vivo is currently limited to plants. Herein, we describe a method for the production and purification of ^{127}Cs and its use in visualizing Cs dynamics in a living animal.

The positron-emitting nuclide ^{127}Cs was produced using the ^{127}I (α, 4n) ^{127}Cs reaction, which was induced by irradiation of sodium iodide with a $^{4}He^{2+}$ beam from a cyclotron. We excluded sodium ions by using a material that specifically adsorbs Cs as a purification

column and successfully eluted ^{127}Cs by flowing a solution of ammonium sulfate into the column.

We injected the purified ^{127}Cs tracer solution into living rats and the dynamics of Cs were visualized using positron emission tomography; the distributional images showed the same tendency as the results of previous studies using disruptive methods. Thus, this method is useful for the non-invasive investigation of radiocesium in a living animal.

^{127}Cs tracer will be useful in studies to evaluate internal doses due to radiocesium released into the environment. ^{127}Cs tracer can also be used in plant research to elucidate the mechanism of Cs transport in crops.



The distribution of Cs in a living animal visualized by PET imaging

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Paper

"Non-invasive imaging of radiocesium dynamics in a living animal using a positron-emitting ^{127}Cs tracer"

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About QST

The National Institutes for Quantum and Radiological Science and Technology (QST) was established in April 2016 to promote quantum science and technology in a comprehensive and integrated manner. The new organization was formed from the merger of the National Institute of Radiological Sciences (NIRS) with certain operations that were previously undertaken by the Japan Atomic Energy Agency (JAEA).

QST's mission is to raise the level of quantum and radiological sciences and technologies through its commitment to research and development into quantum science and technology, the effect of radiation on humans, radiation emergency medicine, and the medical use of radiation.

To ensure that research and development delivers significant academic, social and economic impacts, and to maximize benefits from global innovation, QST is striving to establish world-leading research and development platforms, explore new fields, and serve as a center for radiation protection and radiation emergency medicine.

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