U.S. DEPARTMENT of ENERGY | Office of Environment, Health, Safety and Security

Annual Report
April 2024-April 2025
EHSS Japan Program

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Purpose

The Department of Energy (DOE) Japan Program, managed by the Office of Environment, Health, Safety and Security (EHSS), comprises long-term health studies of atomic bomb survivors and their children conducted at the Radiation Effects Research Foundation (RERF) and related activities. EHSS directly funds RERF alongside its Japanese counterparts at the Ministries of Foreign Affairs and Health, Labour and Welfare (MHLW). EHSS also funds onsite U.S. labor and manages related fellowships, symposia, and human resource activities through a cooperative agreement with the National Academies of Science, Engineering, and Medicine. Research conducted through the Japan Program continues to set the standard for epidemiological analyses of external radiation exposures and forms the backbone of knowledge informing radiation protection limits to the general public and to radiation workers.

Fiscal Year (FY) 2024 Summary

RERF continues to perform state-of-the-art science; researchers have completed epidemiological cancer incidence analyses from 1958-2009 and are transitioning to cancer incidence and cancer and non-cancer mortality analyses with follow-up through 2019. RERF successfully completed a pilot for the Trio Genome Study, demonstrating the feasibility of using whole genome sequencing of parent-child trios to assess whether radiation-induced mutations are heritable in humans. RERF continues to develop novel techniques for assessing clinical and genomic data. Non-research highlights include a visit from a U.S. Congressional Staff Delegation that garnered interest from the Senate Appropriations Committee Energy and Water Development Subcommittee (Senator Patty Murray), a successful Quality Assurance Review of the RERF Human Subjects Protection Program, and engagement with local, national, and international stakeholders on ongoing research and its benefits to atomic bomb survivor health and human health more generally. RERF initiated a Research Resource Center to integrate data across disciplines and began construction of a new RERF laboratory building at Hiroshima University Kasumi Campus. The National Academies identified and interviewed multiple candidates and successfully recruited a new U.S. Chief Scientist whose start date is in Japanese FY2025. Planning for future fiscal years includes a more flexible work schedule for employees and cross-appointments to retain research staff and increase scientific expertise without substantially increasing costs.

Research Highlights

- Successful completion of the pilot Trio Study, which demonstrated the feasibility of using whole genome sequencing of parent-child trios to assess whether radiation-induced mutations may be heritable in human populations.
- Completion of epidemiological analyses summarizing radiation-related risks of solid cancer incidence in the follow-up period 1958-2009.
- Integration of clinical data with epigenetics, genetics, and genomics analyses to evaluate outcomes such as radiation-induced myelodysplastic syndrome, leukemia, clonal hematopoiesis, and individual sensitivity to radiation, in tandem with parallel animal studies[1,2].
- Clinical and epidemiological investigation of non-cancer outcomes of interest such as noncancerous thyroid disease, diabetes and atherosclerosis[3].
- Updates to the RERF dosimetry system using modern J45 computational phantoms.
- Validation of dosimetric methods using radiation biodosimetry[4].
- Publication of over 40 peer-reviewed scientific papers.
- Collaboration with 51 Japanese institutions and 16 institutions in North America, Europe, and Asia[5,6].

Other Highlights

- Visit from a high-level U.S. Congressional Staff Delegation garnered great interest in RERF's significance and activities amongst U.S. Congressional Staffers from the Senate Appropriations Committee Energy and Water Development Subcommittee (Senator Patty Murray).
- Engagement with research participants, local communities, and other stakeholders to explain and discuss the Trio Genome Study, resulting in 80-90% of participants in research explanatory sessions believing the project was necessary.
- Held international symposium in December 2024 to discuss the ELSI (Ethical, Legal, Social Issues) related to the return of genomic results for studies of atomic bomb survivors and their families. National and international experts, including the co-chair of the American College of Medical Genetics (ACMG) working group on secondary findings, participated and provided expert advice for RERF's work in this area.
- Initiation of the in-house Research Resource Center to enable integration of data across disciplines and departments.

- Contract accepted for construction of the new RERF building at the Hiroshima University Kasumi Campus; construction is now underway.
- Successful execution of the annual RERF Open House in August 2024 with over 600 visitors across the two labs.
- Hosted seminars and educational courses such as epidemiological training for radiation biologists, training for Hiroshima International Council for Health Care of Radiation-exposed (HICARE) and Nagasaki Association for Hibakushas' Medical Care (NASHIM) and hosted and provided lectures for International Atomic Energy Agency (IAEA)/HICARE training courses.
- Participation of scientific staff in high visibility international projects, such as World Health Organization BioDoseNet, the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) report series, and the International Commission on Radiological Protection (ICRP).
- Planned and executed informal Board of Councilors meeting held in Hiroshima, Japan January 2025 which included in-person participation of DOE/EHSS staff.
- Completed a DOE-led Quality Assurance consultation focused on the Human Subjects Protection Program at RERF, that received overwhelming positive feedback alongside directions for continued improvement.
- Planned and executed Scientific Advisory Committee meeting held in Hiroshima, Japan March 2025 which included in-person participation of DOE/EHSS staff.
- Planned RERF 50th Commemorative Ceremonies to be held in both Hiroshima and Nagasaki June 2025 in conjunction with the formal Board of Councilors meeting.
- National Academies identified and interviewed multiple candidates for the open U.S. Chief Scientist position at RERF.
- National Academies began recruiting Beebe Fellows to fill RERF knowledge gaps and diversify the scientific expertise involved in RERF research.
- National Academies successfully planned and executed the Beebe Symposium on AI and ML applications in radiation therapy, medical diagnostics, and radiation occupational health and safety.

Innovations

- Development of a novel multicombination system to amplify DNA from 10- to 50-year-old blood smears to produce acceptable call rates and precision in SNP array typing.
- Translational studies for outcomes such as clonal hematopoiesis and potential transgenerational effects of radiation.

Challenges and Solutions

- *Ethical use of genomic data:* To address this complex challenge, RERF has set up a committee on Ethical, Legal, and Social Issues (ELSI) to ensure the Trio Genome Study and other studies using genomic data are conducted per Japanese and U.S. regulations, policies, and relevant cultural norms, and that results are appropriately returned to participants.
- *Understaffing*: Introduce a discretionary working system to allow more flexible hours and increase collaborative availability; introduce cross-appointments with universities to increase expertise in areas of specific need.
- *Biological samples*: Use of stored biological samples from prior decades; work is underway to determine whether certain types of blood and formalin-fixed paraffin embedded samples are usable, and innovative technology is being tested to increase usability[7].

April 2025-April 2026 Outlook

- Execute RERF 50th Commemorative Ceremonies in both Hiroshima and Nagasaki to include participation from high-level Japanese government officials, Hibakusha, U.S. Embassy delegation, and DOE/EHSS staff (Note: successfully occurred June 2025).
- Plan scientific publications highlighting eight decades of research, marking RERF's 50th anniversary and the 80th anniversary of the atomic bombings (Note: successfully occurred August 2025. Ongoing).
- Participate in 80th atomic bomb anniversary commemorations[8] (Note: successfully occurred August 2025).
- Plan and host RERF 2025 Open House (Note: successfully occurred August 2025).
- Extend offer for open Chief Scientist position at RERF (Note: successfully hired Dr. Todd DeWees in June 2025).
- Epidemiologically evaluate cancer incidence from 1958-2019 and cancer and non-cancer mortality from 1950-2019, using state-of-the-art analytic techniques, modernized dosimetry, and other advancements[9,10].
- Genetic, genomic, and epigenetic analyses in families of survivors (including enrollment into the Trio Genome Study) and parallel studies in animal models.
- Clinical studies of cancer and non-cancer outcomes as well as radiation damage mechanisms in survivors; conduct parallel studies in animal models.
- Complete the newest dosimetry system revision using modern, sophisticated J45 phantoms.

- Expand educational and communication opportunities to engage scientists, future scientists, and the general public.
- Expand the Research Resource Center to allow integrated studies across RERF.
- Increase collaboration with external partners.
- Plan and execute informal Board of Councilors meeting to be held in Hiroshima, Japan January 2026.
- Plan and execute Scientific Advisory Committee to be held in Hiroshima, Japan March 2026.
- Plan formal Board of Councilors meeting to be held in Nagasaki, Japan June 2026.
- National Academies will plan a Beebe Symposium highlighting RERF accomplishments and contributions to commemorate the organization's 50th Anniversary to be held in Japanese FY26.

Important Dates

Activity	Dates
Dr. Todd DeWees begins position as Chief Scientist	June 2, 2025
Formal Board of Councilors Meeting	June 18-29, 2025
RERF 50th Anniversary Commemorative Ceremonies	Hiroshima: June 17, 2025 Nagasaki: June 20, 2025
80th Anniversary of the Atomic Bombings	Hiroshima: August 6, 2025 Nagasaki: August 9, 2025
DOE & MHLW Record of Discussion Renewal	November 15, 2025
Informal Board of Councilors Meeting	January 20-21, 2026
Scientific Advisory Committee Meeting	March 4-6, 2026

Relevant Publications (as cited in the report)

1. Yoshida, K. *et al.* Naive CD4 T Cells Highly Expressing the Inflammatory Chemokine Receptor CXCR3 Increase with Age and Radiation Exposure in Atomic Bomb Survivors. *Radiat Res* **201**, 71–76 (2024).

2. Yoshida, K. *et al.* High-dose radiation preferentially induces the clonal expansion of hematopoietic progenitor cells over mature T and B cells in mouse bone marrow. *Stem Cell Reports* **20**, 102423 (2025).

3. Tatsukawa, Y. *et al.* Relationship between radiation dose and markers of insulin resistance and inflammation in atomic bomb survivors. *J Clin Endocrinol Metab* Online ahead of print (2024) doi:10.1210/clinem/dgae621.

4. Kodama, Y. *et al.* Cytogenetic validation of DS02R1-estimated dose for atomic bomb survivors in Hiroshima and Nagasaki with FISH. *International Journal of Radiation Biology* **100**, 1155–1164 (2024).

5. Little, M. P. *et al.* A Historical Survey of Key Epidemiological Studies of Ionizing Radiation Exposure. *Radiation Research* (2024) doi:10.1667/RADE-24-00021.1.

6. Yamada, Y. *et al.* Establishment and activity of the planning and acting network for low dose radiation research in Japan (PLANET): 2016-2023. *J Radiat Res* **65**, 561–574 (2024).

7. Kobayashi, G. *et al.* Proteomic profiling of FFPE specimens: Discovery of HNRNPA2/B1 and STT3B as biomarkers for determining formalin fixation durations. *Journal of Proteomics* **301**, 105196 (2024).

8. Kamiya, K. & Rajaraman, P. From the hibakusha: 80 years of peace and scientific discovery. *The Lancet* **0**, (2025).

9. Sposto, R. & Cullings, H. M. The Use of Joint Models in Analysis of Aggregate Endpoints in RERF Cohort Studies. *Radiat Res* **201**, 304–309 (2024).

10. Sposto, R., Misumi, M. & Cologne, J. A note on potential gains in precision of radiation risk estimates from joint analysis. *Sci Rep* **14**, 26750 (2024).