

United States Transuranium and Uranium Registries
2021 Scientific Advisory Committee Meeting
Teleconference, Richland, WA, April 8 – 9, 2021



Research and Operation in FY2022

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“Learning from Plutonium and Uranium Workers”



College of
Pharmacy and
Pharmaceutical Sciences

WASHINGTON STATE UNIVERSITY



USTUR at Glance: *FY2022*

- Title: Manage and Operate United States Transuranium and Uranium Registries
- Agency/Office: DOE, Office of Domestic and International Health Studies (AU-13)
- Fiscal year 2022 (FY2022): April 1, 2021 – March 31, 2022 (5th year)
- FY2022 funding: \$1,200,000 (received year-to-date: \$925,000)
- Operated by: Washington State University, College of Pharmacy and Pharmaceutical Sciences (Award: DE-HS0000073)
- Operated under: Central DOE IRB #WASU-68-50181 (September 8, 2021)
- Supported full-time equivalent (FTE)
 - ✓ Faculty and staff: 6.5
 - ✓ Temporary appointment: 1.3





Organization Structure and Personnel



**WSU College of Pharmacy and
Pharmaceutical Sciences**
Prof. Kathryn E. Meier, PhD
Associate Dean

Scientific Advisory Committee
Thomas Rucker, *Radiochemistry, Chair*
Janet Benson, *Toxicology*
Luiz Bertelli, *Health Physics*
Heather Hoffman, *Epidemiology*
Timothy Ledbetter, *Ethics*
Arthur Stange, *Occupational Health*



Administration & Finances
Margo D. Bedell, AAS
Program Specialist II

USTUR Research Center
Sergei Y. Tolmachev, PhD
Director, Principal Investigator
Research Professor

Anthony E. Riddell, MPhil, MSRP* *Adjunct Faculty*
Daniel J. Strom, PhD, CHP* *Adjunct Faculty*

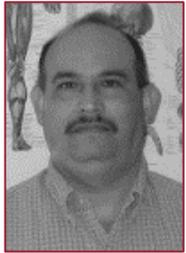
Operation/Research/Academics
Stacey L. McComish, MS
Associate in Research
Maia Avtandilashvili, PhD
Research Assistant Professor
Martin Šefl, PhD
Postdoctoral Research Associate

**National Human Radiobiological
Tissue Repository (NHRTR)**
Florencio T. Martinez, ASCP
* *Med. Tech., Prosector*
Eric L. Kiesel, MD, PhD
* *Consultant Forensic Pathologist*

Radiochemistry Laboratory
Sergei Y. Tolmachev, PhD
Principal Radiochemist
George Tabatadze, PhD
Research Assistant Professor
Elizabeth M. Thomas, BS
Laboratory Technician II

Alex Tabatadze, MS* *Programming*
Minh Pham, BS* *IT Support*
Mariya Tolmachova, MA* *Editor*

**Extramural Projects and
Collaborations**
USTUR/NHRTR 'Work for Others'
(Externally Funded)



† - Non-paid

‡ - Part-time/Contractor





Specific Aims

- Manage and operate the Registries
- Conduct scientific research
- Demonstrate and promote broader use and application of USTUR research, data, and materials
- Contribute to the education of a new generation of scientists



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Management and Operation

- Communicate with Registrants and next-of-kin
- Accept Registrant donations
- Operate the National Human Radiobiological Tissue Repository (NHRTR)
- Complete radiochemical analysis of tissues
- Develop and populate USTUR information systems





Radiochemistry Group 2021–2022 Tasks

- Install new plastic laboratory fume hoods and ventilation system†
- Maintain tissue analysis throughput of 350 – 400 samples
- Complete analysis of whole-body donation – Case 0846 (^{241}Am)
- Complete analyses of remaining (8) partial body cases
- Populate and harmonize Radiochemistry database with other USTUR databases

Drying &
Ashing

Digestion &
Dissolution

Actinide
separation

α -source
preparation

Actinide
measurement

USTUR tissue radiochemical analysis protocol

† - estimated budget \$87,727

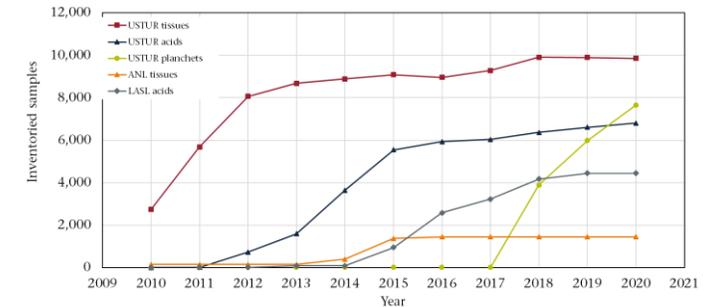
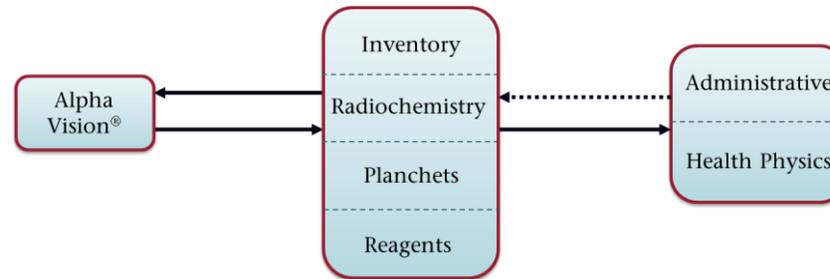
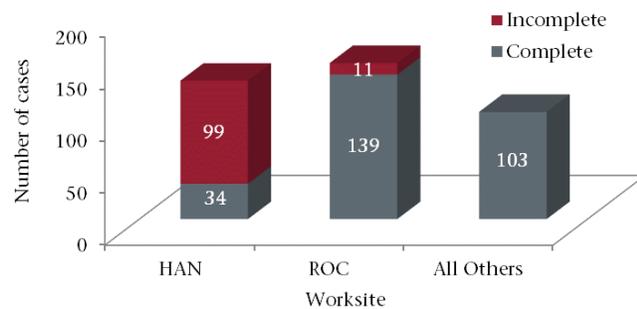




Database and Material Inventory 2021–2022 Tasks

Completion of:

- Health physics database: *All worksites except Hanford (2020 → 2022)*
- Database harmonization
- National Human Radiobiology Tissue Repository Inventory
 - ✓ Los Alamos National Laboratory acid solutions
 - ✓ Radium dial painter frozen tissues (2021–2024)





Internal Research Projects

- Evaluating bias and uncertainty in radiation dose assessment
- Misclassification of cause of death on death certificates
- Estimation of skeleton actinide concentration
 - Using $C_{\text{bone}}/C_{\text{skel}}$ scaling factor
 - Latent bone modeling approach
- Long-term retention, distribution, and biokinetics of enriched uranium in a female donor
- Beryllium retention, distribution, and biokinetics in human body





Collaborative Research Network



National Council on Radiation Protection and Measurements



Memorial Sloan Kettering Cancer Center



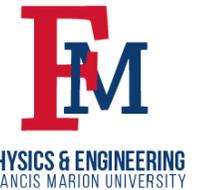
Pacific Northwest NATIONAL LABORATORY





Million Person Study's 'Umbrella'

- Validation of site-specific biokinetic models for plutonium
- Hanford dose reconstruction
- Uranium dosimetry at Fernald Feed Materials Production Center
- Application of mass-spectrometric techniques for plutonium, uranium, and radium measurements
- Radium Dial Worker epidemiology study
- NCRP Scientific Committee 6-13 on radium dosimetry





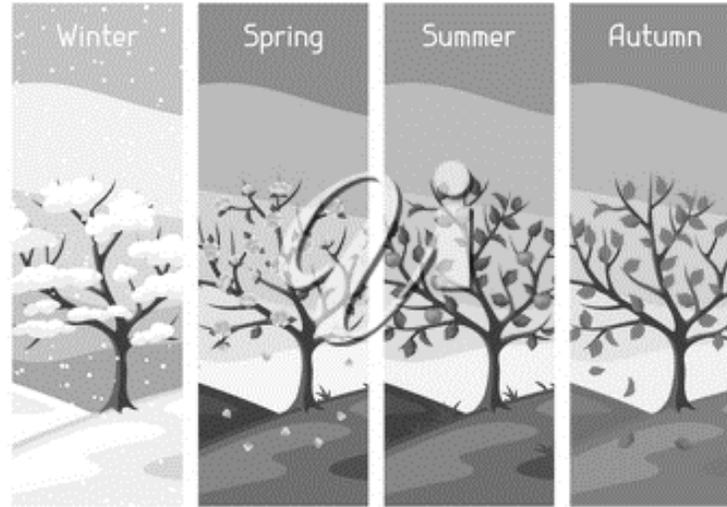
USTUR and Radium Studies



Re-planting: 1992



Ronald Kathren



Growing: 1992–2019



Ronald Kathren



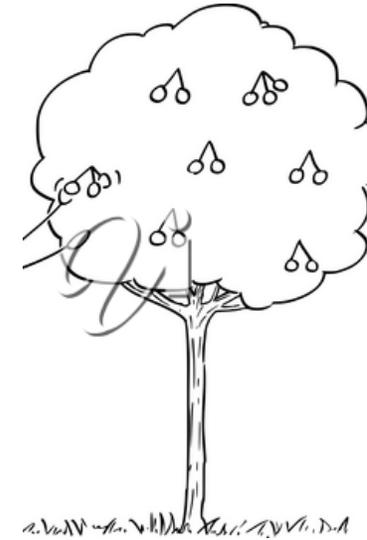
Ronald Filipy



Anthony James



Sergei Tolmachev



Ripening: 2019–2021



John Boice



Harvesting: 2021+
(not a cherry picking)



50th Anniversary: 1968–2020 eBook of Abstracts

USTUR-0551-20

United States Transuranium and Uranium Registries



1968–2020 USTUR Publication Abstracts
Volume I: Journals, Proceedings, and Books



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USTUR-0552-20

United States Transuranium and Uranium Registries



1968–2020 USTUR Publications
Volume 2: Conference Abstracts and Editorial Notes



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1968–2020 USTUR Publication Abstracts: Journals, Proceedings, and Books

JOURNAL ARTICLES

1972

Norcross JA, Newton CLJ. *U.S. Transuranium Registry: A progress report.* *Health Physics* 22 (6): 887–890; 1972.

During the summer of 1968, the Atomic Energy Commission authorized the establishment of the U.S. Transuranium Registry. The Registry is part of the organizational structure of the Hanford Environmental Health Foundation and is, in essence, a repository for all pertinent information available to identify any radiation hazard to the worker that may exist from exposure to transuranium elements. The major AFC contractors and a few of the licensees using plutonium and other transuranium elements have agreed to endorse and recommend that their affected employees support this program. Cooperation with the Registry is individually voluntary and includes release of medical and health physics data, and permission for postmortem analysis of certain organs.

<http://doi.org/10.1097/0004032-197206000-00054>

Norwood WD. *Plutonium (²³⁹Pu) toxicity diagnosis and therapy.* *Journal of Occupational Medicine* 14 (1): 37–44; 1972.

Based on animal studies, plutonium (²³⁹Pu) is considered to be one of the most toxic materials known to man. With the expanding use of plutonium for peaceful as well as defense purposes the opportunities for accidental deposition within the body are expected to increase. The hazard is due to alpha emissions from the internally deposited radioisotope which has a very long half-life and residence time in the body. Therapy to increase elimination of the element is most effective if administered soon after an accidental deposition. Assessment of the deposition and need for therapy is only possible if the metabolism of this metal within the body is understood. A diagnosis of delayed injury due to internal deposition of ²³⁹Pu may be made only by continuing in-depth medical and health physics studies during life of workers at risk, supplemented by autopsy and epidemiological studies involving a large number of such employees. The U. S. Transuranium Registry was established by the U. S. Atomic Energy Commission in 1968 for this purpose. Therapy, as used here, refers to treatment to hasten elimination of deposited ²³⁹Pu. Diagnosis refers not only to the evaluation of the internal deposition but also to the determination of a causal relationship, if any, between the deposition and the occurrence of injury many years after the deposition. Based upon animal studies the type of severe injury to be most carefully looked for, in humans, is malignancy of bone, liver, lungs, lymph nodes and tissue around a ²³⁹Pu contaminated wound.

While no serious injury has been reported due to deposition in workers, a limited number of biopsies and autopsies performed on deceased workers previously at risk and a larger number of autopsies of limited extent, on populations at large have indicated that the highest concentrations of ²³⁹Pu are in lymph nodes, with larger total amount but smaller concentrations in lung, bone and liver, where exposure is by chronic inhalation. Even with very high concentration, relatively few, instances of malignancy of the lymph nodes have been observed in laboratory animals.

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Professional Service

- National Council on Radiation Protection and Measurement (NCRP)
 - ✓ Program Area Committee 6: *Radiation Measurements and Dosimetry*
 - ✓ **Scientific Committee 6-13: *Radium Dosimetry***
 - ✓ Scientific Committee 6-12: *Brain Dosimetry for Internally Deposited Radionuclides*
 - ✓ Sub-committee of the Council Committee 2: *Radio- and Nuclear Chemistry*
- Health Physics Society: *International Collaboration Committee*
- Columbia Chapter of Health Physics Society: *Executive Council*
- Herbert M Parker Foundation: *Board of Trustees*
- Herbert M Parker Symposium: *Organizing Committee*
- Washington State University: *Radiation Safety Committee*
- Austin Biometrics and Biostatistics: *Editorial Board*
- Japanese Journal of Health Physics: *Editorial Board*





Education of Next Generation of Scientist

- Participating in Summer Undergraduate Research Fellowships (SURF) program (CPPS)
- Looking for a potential PhD candidate (CPPS)
- Teaching and laboratory practice for Radiation Protection Graduate Certificate Program (WSU Tri-Cities)
- Introducing USTUR research to Columbia Basin College, Bachelor of Applied Science Program in Health Physics
- Supporting and contributing to Herbert M. Parker Memorial Symposium 2022

CPPS – College of Pharmacy and Pharmaceutical Sciences

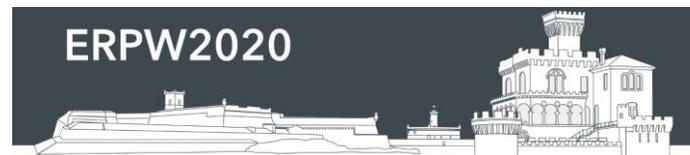
WSU – Washington State University





Upcoming 2021 Conferences

- 2021 Health Physics Society Midyear Workshop; Clemson University, NC, May 23–26, 2021
- 66th Annual Meeting of the Health Physics Society; Phoenix, AZ, July 25–29, 2021
- 5th European Radiation Protection Week 2020 (ERPW2020), Estoril, Portugal, September 28 – October 2, 2021
- 67th Annual Meeting of the Radiation Research Society, San Juan, Puerto Rico, October 3–6, 2021
- 2021 Annual Meeting & Expo of the American Public Health Association; Denver, CO, October 23–27, 2021
- 6th International Symposium on the System of Radiological Protection, Vancouver, Canada, November 1–4, 2021

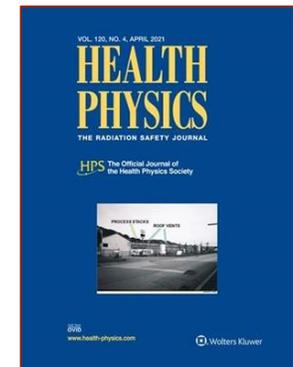
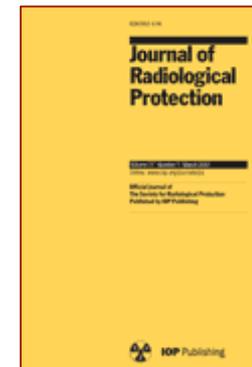
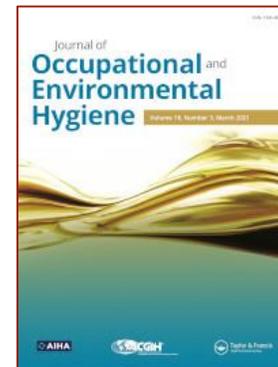
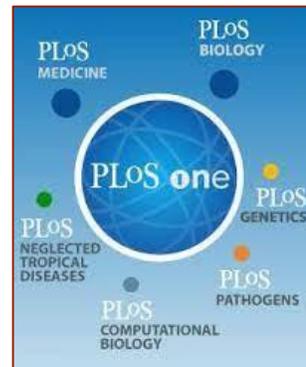
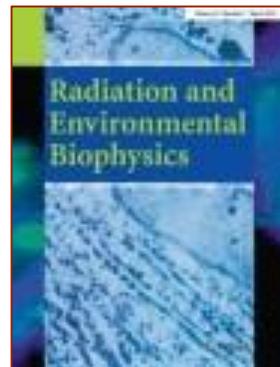




2021–2022 Publication in Preparation

Ten (10) papers are in preparation for publication

- Radiation Protection Dosimetry (0.773[†]): 3
- Radiation and Environmental Biophysics (1.321): 2
- Journal of Analytical Atomic Spectrometry (3.498): 1
- PLoS One (2.740): 1
- Journal of Occupational and Environmental Hygiene (1.653): 1
- Journal of Radiological Protection (1.261): 1
- Health Physics Journal (0.853): 1



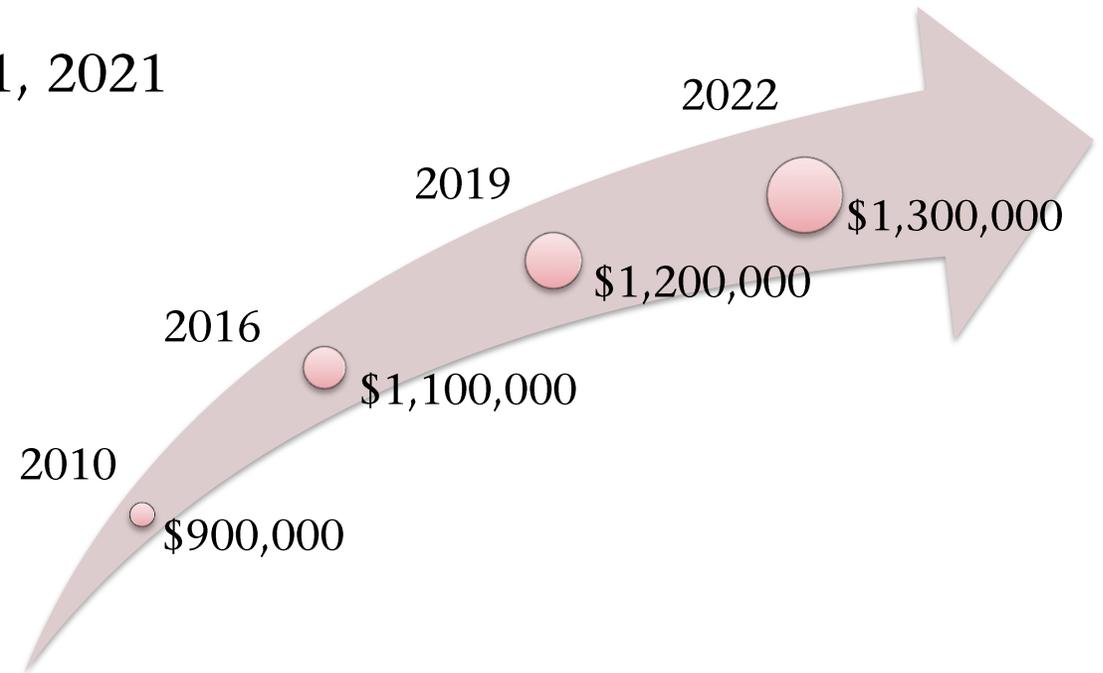
[†]- impact factor





Five-year Grant Renewal: 2022–2027

- Title: Manage and Operate United States Transuranium and Uranium Registries
- Agency/Office: DOE, Office of Domestic and International Health Studies (AU-13)
- Period: April 1, 2022 – March 31, 2027 (FY2023–FY2027)
- Request for annual budget increase: \$1,200,000 → \$1,300,000
- Budget justification submission: May 1, 2021
- Total requesting funding: \$6,500,000
- Proposal submission: July 30, 2021





Thank you!

