WASHINGTON STATE UNIVERSITY
College of Pharmacy and Pharmaceutical Sciences

2025 USTUR Scientific Advisory Committee Meeting
Hampton Inn, Richland, Washington; April 9–10, 2025

2024 Recommendations and 2025 Overview

Sergey Y. Tolmachev, *Research Professor and Director*

United States Transuranium and Uranium Registries

1845 Terminal Drive, Suite 201, Richland, WA 99354

ustur.wsu.edu | stolmachev@wsu.edu

"Learning from Plutonium and Uranium Workers"

2024 SAC Meeting

Following the 2024 Annual Meeting (April 25–26, 2024), the Scientific Advisory Committee (SAC) made:

- Eight comments
- Six observation
- Seven recommendations

https://ustur.wsu.edu/sac-meeting-2024-recommendations/

Comments on 2023 Recommendations

1. The graphing of data for consistency is good. The review of the entered data prior to use meets the recommendation and is recommended to be added to the QA plan
2. Check into *Autoscribe* by Informatics for a LIMS
3. See recommendations below for further application
4. Make sure that any method procedures that are revised are re-validated
5. Make sure that inconsistencies discovered in the PT program are investigated and resolved. Continuing involvement in PT programs is advised
6. Make sure logs are kept of eye wash, safety shower, and fire extinguisher checks
7. Productivity has been addressed, but not long-term continuity. We encourage continued planning and training for backup and replacement of staff to keep long term continuity
8. We appreciate the plan developed. We recommend including this in publicity material (see recommendation below)

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2024 SAC's Observations

1. We appreciate the installation of the new hoods and restart of the production of sample analysis. We are also pleased that funding for additional infrastructure and instrumentation has been obtained for the future
2. We recognize the significant number of publications and presentations that have been made in the past year and the ones scheduled to be published soon
3. USTUR is to be congratulated for the journal article accepted in (PLoS One) on misclassification of deaths among a small group of nuclear workers (McComish *et al*. 2024). The evaluation of misclassification rates based on the comparison of death certificates vs. autopsies is carefully considered and appropriate. (Note: work not presented but deserving of comment)
4. We agree that the impact of death certificate misclassifications on epidemiological risk models is an important topic, and Xirui Liu is to be congratulated for her clear presentation. The results Xirui presented demonstrate that misclassification of disease can affect the decision of a statistically significant association of dose to cause of death. However, issues of central concern were not addressed: whether under/over ascertainment of the correct cause of death (e.g., as evaluated by McComish *et al*.) would lead to a mischaracterization of the dose response. It is notable that other studies/reviews (see Linet et al, Sposto *et al*.) have concluded that – based on reasonable assumptions – it is unlikely that under/over ascertainment would result in substantial bias
5. We still support the effort to search for the status of inactive cases, including the Pension Benefit Information
6. We appreciate the continued research efforts that are using the USTUR data

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2024 SAC's Recommendations

1. We recommend developing a brochure for opportunities for research and use of the data and services of the USTUR. We recommend this include the vision for the USTUR and lab following completion of receipt and analysis of all registrant samples
2. We recommend USTUR perform an informal literature review on impacts of over/under-ascertainment on risk estimates. Notable references are attached. If feasible, arrange for collaborations (e.g., with NCI) for these types of analyses/reviews
3. We recommend USTUR plan on sending staff to next year's (2025) NCI course on Epidemiology and Dosimetry and to the 2024 RRMC
4. We recommend USTUR send staff (e.g. Xirui) for training to the REAC/TS internal dosimetry training courses and other ORAU or MJW professional training courses
5. We recommend Martin's research results be published
6. We recommend inserting the Python code in the DQO document for documentation
7. We recommend applying the DQO equations retroactively to some previous sample cases to explore the input to decisions

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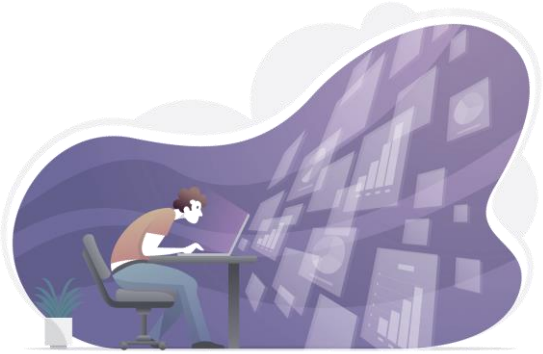
Recommendations on:

- Long-term ‘marketing’ plan
- Personnel professional training
- Publication of scientific results
- DQO document improvement



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Recommendation 1

Developing a brochure for opportunities for research and use of the data and services of the USTUR. We recommend this include the vision for the USTUR and laboratory following completion of receipt and analysis of all registrant samples

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What is the USTUR?

The United States Transuranium and Uranium Registries (USTUR) is a federal-grant program funded by the U.S. Department of Energy (DOE) Office of Domestic and International Health Studies.

Founded in **1968**

operated by Washington State University's College of Pharmacy and Pharmaceutical Sciences since **1992**

The USTUR was designed as a program to improve radiation protection of nuclear workers. The Registries studies the distribution, dose, and possible health effects of exposure to plutonium, americium, uranium, and thorium (actinides) in radiation workers and other individuals with known exposures.

Use of the Registries

The uniqueness of the USTUR's research lies in its ability to link exposure, work history, medical, and industrial hygiene data with post-mortem measurements of the distribution of radioactive elements in the human body. The USTUR is the only program worldwide that can combine such comprehensive workplace and exposure data with post-mortem results to study the behavior of actinide radionuclides in the human body, and the resulting doses.

Registries research has been documented in more than 300 scientific articles and reports, and continues to benefit future radiation workers by:

- Testing and improving the mathematical (biokinetic) models that are used to calculate workers' radiation doses and determine the distribution and clearance of radioactive elements from the human body.
- Studying the biological effects of radiation on tissues.
- Validating the effectiveness of US radiation safety standards.
- Contributing to national and international organizations that provide guidance and recommendations on radiation protection.

Furthermore, USTUR research can be used to protect the public following events such as the Chernobyl and

The NHRTR

The National Human Radiobiology Tissue Repository (NHRTR) is a tissue collection maintained by the Registries. It includes frozen and dried tissues, histological slides and blocks, and tissue solutions and other preparations obtained from volunteer donors with a known history of intake of radioactive elements such as radium, uranium, plutonium and americium. It is available to researchers who may be able to use materials from this unique collection of tissues and associated medical and radiation exposure histories in studies of cancer and other diseases, or other research.

Who is Eligible to Participate?

Individuals with a known history of intake of

How can researchers request the tissues and data?

The unique materials from the USTUR/NHRTR are available to reputable investigators for scientific research purposes. Scientific investigators may request, in writing, tissues or tissue samples from the NHRTR for legitimate research purposes.

Investigators must agree to maintain privacy of the registrants and to follow all ethical human subjects considerations and legal requirements as well as the published policies of the Registries. If available, the Registries will provide the most suitable tissue requested (e.g. frozen, formalin-fixed, or dried) for study. The only stipulations are that the Registries be acknowledged as the source of the samples, radiochemical analysis, or other data used in scientific proposals or manuscripts submitted for publication, and that a USTUR faculty member be included as a coauthor if previously unpublished data generated by the USTUR are included in a manuscript. Scientific collaboration with the USTUR is encouraged as appropriate.

Where are the NHRTR materials kept?

The NHRTR is located in a modern laboratory research facility in Richland, Washington. The facility includes an autopsy room and a radiochemistry laboratory for tissue preparation and analysis. Tissue samples are vacuum-packed and stored frozen at -30° or -70° C.

USTUR-0580-24

For more information

about the United States Transuranium and Uranium Registries please contact:

Sergey Y. Tolmachev, PhD
Professor and Director
US Transuranium and Uranium Registries
Washington State University
College of Pharmacy and Pharmaceutical Sciences
1845 Terminal Drive, Suite 201
Richland, WA 99354
Phone: 509-946-6870
or toll-free 1-800-375-9317
Email: stolmachev@wsu.edu
Web: ustur.wsu.edu

United States Transuranium and Uranium Registries & National Human Radiobiology Tissue Repository

Learning from plutonium and uranium workers

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ustur.wsu.edu

How are Tissues Obtained?

Registrants are volunteers who authorize the Registries to obtain their individual medical and radiation exposure records for research purposes, and to collect tissues/organs after death. These samples are obtained at an autopsy performed by an independent qualified pathologist.

Volunteer donors pre-plan the donation by granting the USTUR full consent to collect selected tissues after death; the entire body may also be donated. The consent can be withdrawn at any time by the donor. The donation program is similar to organ donations for medical purposes designated on a driver's license.

When a registrant dies, the Registries are notified by the hospital, legally-recognized next-of-kin, or other authorities. The Registries then verify with the next-of-kin that the previously-consented autopsy is still desired, and that valid written permissions are on file. If the next-of-kin choose not to provide tissue donations, the Registries comply with the wishes of the family.

If the family agrees to proceed with the pre-planned autopsy, the Registries will make all arrangements and pay for the autopsy. Except in the case of whole body donations, the body is returned to the family for burial or other disposition after autopsy. Autopsy results, research findings and any other information in the registrant's file are provided to next-of-kin upon written request.

For more information

about the United States Transuranium and Uranium Registries please contact:

Sergey Y. Tolmachev, PhD
Professor and Director
US Transuranium and Uranium Registries
Washington State University
College of Pharmacy and Pharmaceutical Sciences
1845 Terminal Drive, Suite 201
Richland, WA 99354
Phone: 509-946-6870
or toll-free 1-800-375-9317
Email: stolmachev@wsu.edu
Web: ustur.wsu.edu

Facts about the United States Transuranium and Uranium Registries

Learning from plutonium and uranium workers

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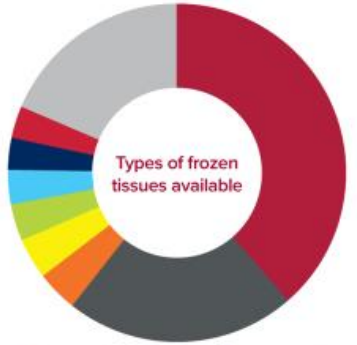
1968 and operated by the College of Pharmacy and Pharmaceutical Sciences at Washington State University since 1992, the USTUR was designed as a research program to improve radiation protection of nuclear workers. It studies the biokinetics and internal dosimetry of incorporated actinide elements such as plutonium, americium, and uranium in occupationally exposed workers and individuals medically exposed to Thorotrast. Tissues are obtained from voluntary donors (registrants) who have authorized the Registries to obtain their individual medical and radiation exposure records for research purposes and to collect tissue samples posthumously. More than 340 individuals have donated tissue to the program.

Is information available about the cases?

Information on each registrant such as radiation exposure history, work history, bioassay and measurement results, chemical exposures, smoking history, cause of death, and results of radiochemical tissue analysis is available. Exposure and medical histories are available for the majority of the cases from whom tissues or related materials have been obtained. However, the identity of all cases is strictly protected and confidentiality is maintained in accordance with legal and ethical requirements.

Samples are typically stored in a frozen state; however, the Registries also houses formalin-fixed tissues, paraffin embedded tissue blocks, and histopathology slides, as well as acid solutions from previously analyzed samples.

Currently, the NHRTR holds more than 10,000 frozen and formalin-fixed tissue samples from approximately 50 whole- and 120 partial-body USTUR donors (see figure below), and approximately 7,000 acid-digested tissue samples. A wide range of tissues is available including samples from the bone, lung, lymph node, liver, kidney, and brain.



autopsy from USTUR registrants; however, it also houses materials from the historical plutonium injection studies and as well as a large volume of materials from the radium studies, which were originally carried out by Argonne National Laboratory/Argonne Cancer Research Hospital, the Massachusetts Institute of Technology, and the New Jersey Radium Research Project. These materials include frozen, ashed, plastic-embedded, dried, and/or paraffin-embedded bone and tissue samples, as well as histopathological slides. These unique collections of tissues, records, and related materials are available to other researchers studying radiation effects, cancer, and other biological phenomena.

Registrant W

Ultra-low Actinide and Stable Element Analyses

90 Th Thorium 232.038	92 U Uranium 238.028	93 Np Neptunium 237.048	96 Cm Curium 247.070
94 Pu Plutonium 244.064	95 Am Americium 243.061	40 Zr Zirconium 91.22	4 Be Beryllium 9.012

11:20 – 11:40 *Analytical Capabilities at PNNL* by I. Arnquist

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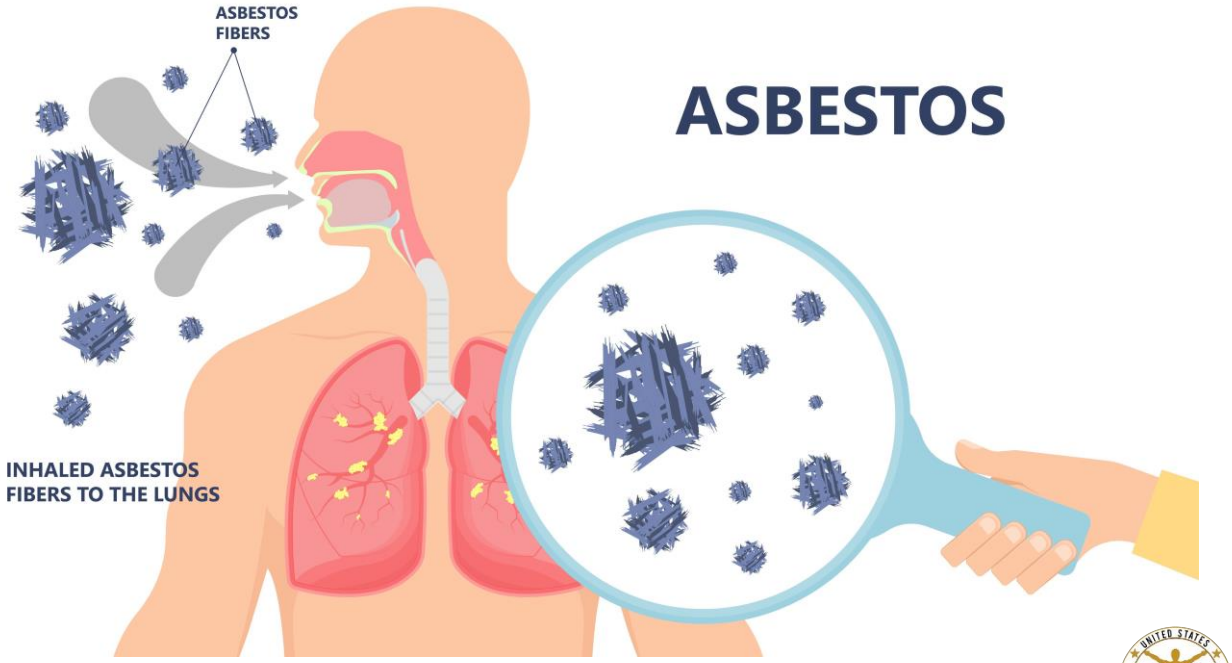
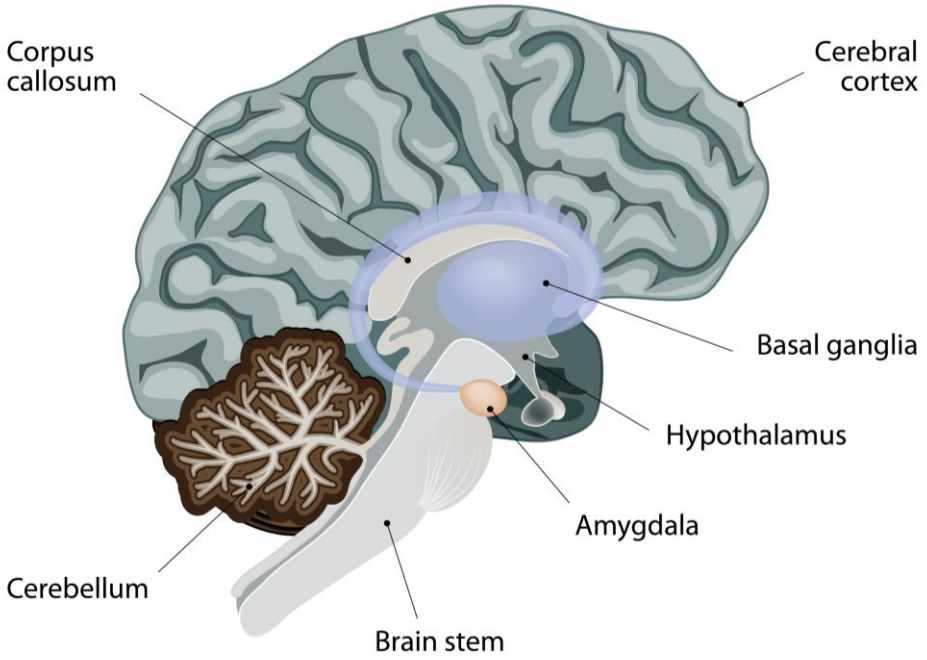
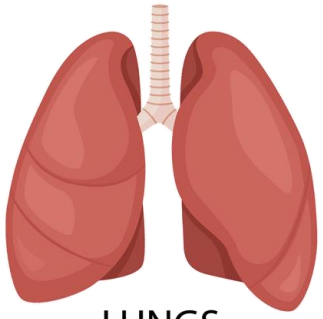
Asbestos Analysis in Lungs

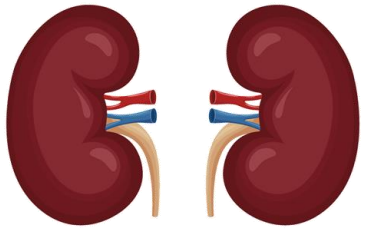
- 90 Registrants with self-reported exposure to **asbestos**
- 62 (left) lung tissue samples at the NHRTR including: **five lung cancers, three asbestoses, two mesotheliomas**; and **one berylliosis**

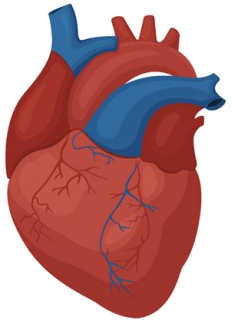


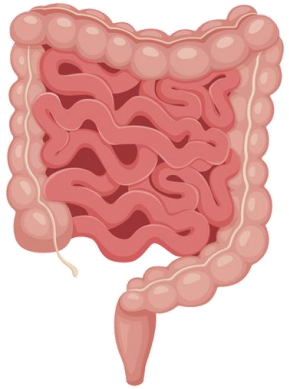
Individual Organ/Tissue Dosimetry

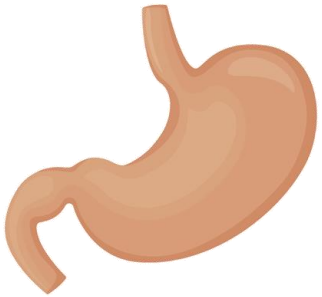


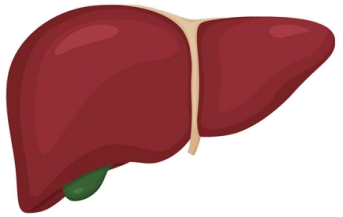

LUNGS


KIDNEYS


HEART


INTESTINES


STOMACH


LIVER

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Recommendation 2

Perform an informal literature review on impacts of over/under-ascertainment on risk estimates. Notable references are attached. If feasible, arrange for collaborations (e.g., with National Cancer Institute) for these types of analyses/reviews

Review and Future Publication

PLOS ONE

RESEARCH ARTICLE

Misclassification of causes of death among a small all-autopsied group of former nuclear workers: Death certificates vs. autopsy reports

Stacey L. McComish[1☯*], Xirui Liu[1☯], Florencio T. Martinez[1☯], Joey Y. Zhou[2☯], Sergey Y. Tolmachev[1☯]

1 United States Transuranium and Uranium Registries, College of Pharmacy and Pharmaceutical Sciences, Washington State University, Richland, Washington, United States of America, **2** Office of Domestic and International Health Studies, United States Department of Energy, Washington, District of Columbia, United States of America

☯ These authors contributed equally to this work.
* s.mccomish@wsu.edu

OPEN ACCESS

Citation: McComish SL, Liu X, Martinez FT, Zhou JY, Tolmachev SY (2024) Misclassification of causes of death among a small all-autopsied group of former nuclear workers: Death certificates vs. autopsy reports. PLoS ONE 19(5): e0302069. https://doi.org/10.1371/journal.pone.0302069

Editor: Jahanpour Alipour, Zahedan University of Medical Sciences, ISLAMIC REPUBLIC OF IRAN

Received: November 2, 2023

Accepted: March 27, 2024

Published: May 3, 2024

Data Availability Statement: It would be a breach of compliance with our research ethics board for us to publicly share the data. Due to privacy concerns, our institutional review board has not granted us permission to share data in this fashion; however, they do allow us to share data with individuals who request the data from us and sign appropriate confidentiality/permission forms. Data can be requested at: United States Transuranium and Uranium Registries 1845 Terminal Drive Suite 201 Richland, WA 99354 1(509)946-6870.

Abstract

The U.S. Transuranium and Uranium Registries performs autopsies on each of its deceased Registrants as a part of its mission to follow up occupationally-exposed individuals. This provides a unique opportunity to explore death certificate misclassification errors, and the factors that influence them, among this small population of former nuclear workers. Underlying causes of death from death certificates and autopsy reports were coded using the 10th revision of the International Classification of Diseases (ICD-10). These codes were then used to quantify misclassification rates among 268 individuals for whom both full autopsy reports and death certificates with legible underlying causes of death were available. When underlying causes of death were compared between death certificates and autopsy reports, death certificates correctly identified the underlying cause of death's ICD-10 disease chapter in 74.6% of cases. The remaining 25.4% of misclassified cases resulted in over-classification rates that ranged from 1.2% for external causes of mortality to 12.2% for circulatory disease, and under-classification rates that ranged from 7.7% for external causes of mortality to 47.4% for respiratory disease. Neoplasms had generally lower misclassification rates with 4.3% over-classification and 13.3% under-classification. A logistic regression revealed that the odds of a match were 2.8 times higher when clinical history was mentioned on the autopsy report than when it was not. Similarly, the odds of a match were 3.4 times higher when death certificates were completed using autopsy findings than when autopsy findings were not used. This analysis excluded cases where it could not be determined if autopsy findings were used to complete death certificates. The findings of this study are useful to investigate the impact of death certificate misclassification errors on radiation risk estimates and, therefore, improve the reliability of epidemiological studies.

OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

In preparation

- Liu X, McComish SL, Howard S, Zhou JY, Tolmachev SY. *Quantifying the impact of misclassification on health risk models: An analysis in radiation-exposed workers*. Scientific Reports; **2025**

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Recommendation 3

Plan on sending staff to next year's (2025) NCI course on Epidemiology and Dosimetry and to the 2024 Radiobioassay and Radiochemical Measurements Conference (RRMC)

2025 NCI and RRMC 2024

NIH NATIONAL CANCER INSTITUTE
Division of Cancer Epidemiology & Genetics

Presentation Videos from the 2019 Radiation Epidemiology & Dosimetry Course

Upcoming Course Dates

Sign up to be notified when the next Radiation Epidemiology & Dosimetry Course will be held.

Fundamentals of Radiation Epidemiology, Dosimetry, and Risk Modeling

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Recommendation 4

Send staff (Xirui) for training to the REAC/TS internal dosimetry training courses and other ORAU or MJW professional training courses

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Professional Training

Environmental Sciences 523
Internal Dosimetry

Introduction

Environmental Sciences 523
Internal Dosimetry

4. Dosimetry, Dosinference, and Doswaggery

Environmental Sciences 523
Internal Dosimetry

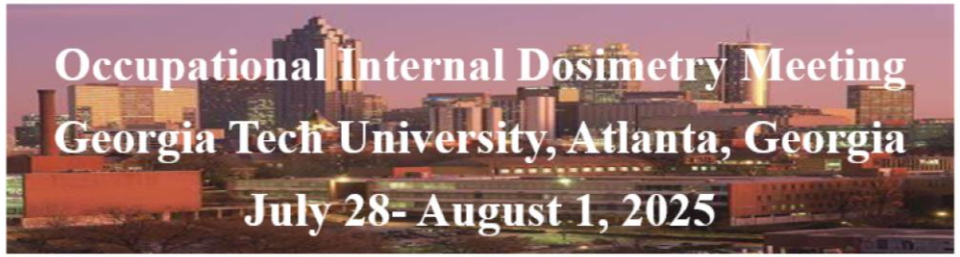
5. Kinetics, Physiology and Biokinetic Models

Daniel J. Strom, Ph.D., CHP
Strom@WSU.edu

ORAU Professional Training Programs

The Source for Professional Radiological Sciences Training

Occupational Internal Dosimetry (April 7–11, 2025)



This meeting will include an extended version of a very popular class provided at the 2023 annual meeting that gave a detailed introduction to occupational internal dosimetry. The class will focus on three areas of internal dosimetry, the first being on ICRP 30, 68, and 130 biokinetics models and dosimetry schema as they relate to deriving secondary occupational dose limits (for example, ALIs and DACs). The second being on the design and implementation of occupational internal dose programs in USNRC and USDOE regulated facilities. The third being on the heart of occupational internal dosimetry: the methods and philosophy of evaluating occupational intakes of radioactive materials. There will be example cases for the class to work through, but commercial software will not be provided, instead instruction will be provided on how to use spreadsheets (e.g., Excel, LibreOffice) to work example intake evaluations and occasionally use R (a freely available language for statistical computing) to tackle more challenging problems. The course concludes with a workshop session where the class will have the opportunity to work example problems. No previous experience is required, and only freely available software will be used. Instructors are Dr. Thomas LaBone and Dr. Charles "Gus" Potter. The week will conclude with a workshop session where attendees will present aspects of their programs or share lessons learned. The workshops will be breakout sessions for Internal Dosimetry, In Vivo Monitoring and External Dosimetry.

COST: FREE (includes tours and an evening social mixer)

HOW TO REGISTER: Georgia Tech is developing a web site for registration. Once completed a notice will be sent out.

AAHP has awarded 40 continuing education credits for this training.

Course Instructors: Thomas LaBone PhD, CHP and Charles "Gus" Potter PhD, CHP

Thomas LaBone PhD
Tom is an internal dosimetrist with over 40 years of operational experience in the radiopharmaceutical industry, USDOE facilities, and in the EEOICPA compensation program. He has been responsible for the design of internal dosimetry programs, the evaluation of intakes of fission products, tritium, uranium, and transuranics, and the mathematical modeling of biokinetic data. Tom completed a BS in Chemistry, an MS in Radiological Science, an MS in Industrial Statistics, and a PhD in Biostatistics. Tom lives in Aiken, South Carolina with his wife Joan and four Chihuahuas.

Dr. Charles "Gus" Potter PhD, CHP

Dr. Gus Potter is a Senior Scientist at Sandia National Laboratories where he designed and implemented their internal dosimetry program. Over his 32-year career he has published several papers on different aspects of internal dosimetry including a seminal work for his Ph.D. on the implementation of ICRP-68 models in intake and dose calculations. He has taught internal dosimetry at the University of New Mexico for over 30 years and continues to consult within the Sandia program and mentor internal dosimetrists. He participates in internal dosimetry standards working groups both with ISO and ANSI/HPS N13 working groups. Gus completed Physics, an M.S. in Radiological Science, and a Physics/Radiological Science. Gus lives in Albu NM with his wife Michelle.

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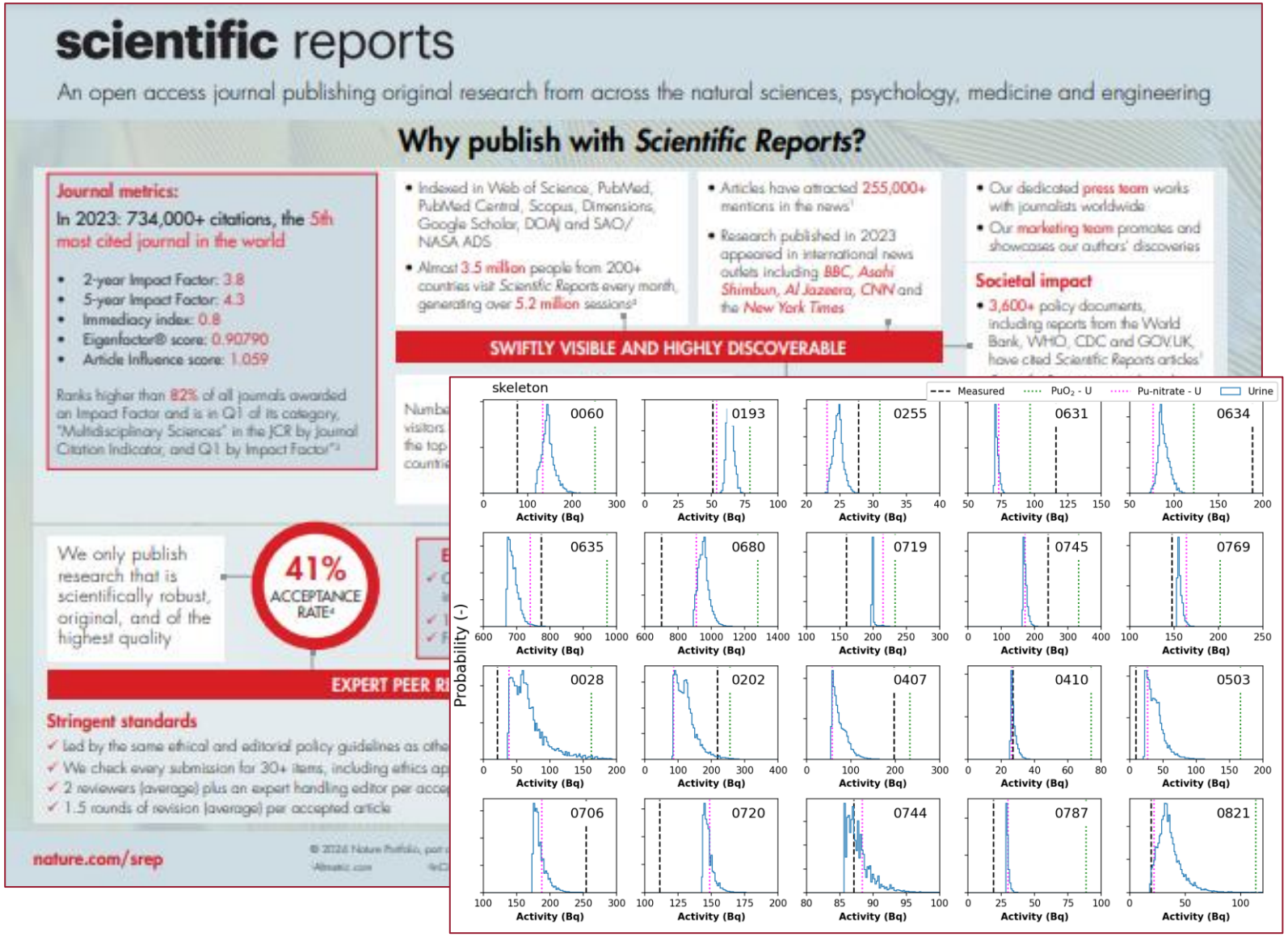
Recommendation 5

We recommend Martin's research results be published

Manuscript Submitted



Avtandilashvili M, Šefl M, Zhou JY, Tolmachev SY. *Evaluation of Bayesian modeling of uncertainty in plutonium organ doses using urine bioassay analyses and post-mortem tissue measurements*. **Scientific Reports**; 2025/3/10 **Submission ID** cb5b21d2-3a43-4729-b1d8-f5ba01976192

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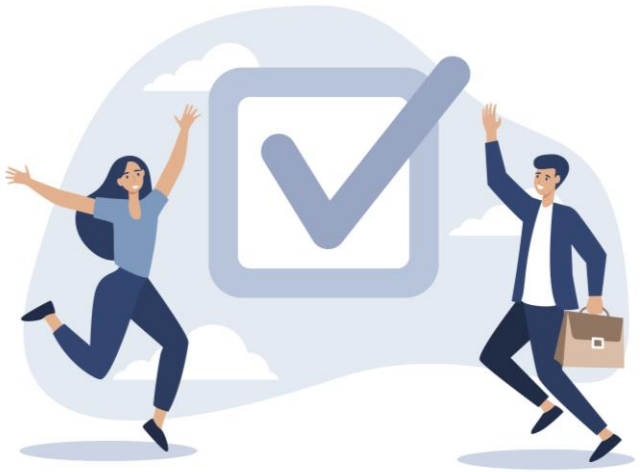
Recommendation 6

Inserting the Python code in the DQO document for documentation

Recommendation 7

Applying the DQO equations retroactively to some previous sample cases to explore the input to decisions

Implementation of URpy code



- Incorporated into the DQO document
- Tested on ten USTUR cases

```
# -*- coding: utf-8 -*-
import os
from argparse import ArgumentParser, ArgumentDefaultsHelpFormatter
import numpy as np
import pandas as pd
from datetime import datetime
from scipy.stats import norm
import re
from column_names import ColumnNames as cols
from column_names import sanitize_column_name, column_being_used_from_options
#from pandas import ColumnNames as cols
#from pandas import sanitize_column_name, column_being_used_from_options
import calcs  # The python code calcs.py must be in the same folder at URpy.

def get_author_info():
    author = "Strom@WSU.edu"
    employer = 'United States Transuranium and Uranium Registries'
    website = 'https://ustur.wsu.edu'
    AuthorInfo = 'Created by ' + author + ', Adjunct Professor at the ' + employer + ', online at ' + website
    return AuthorInfo
def print_program_info(infile:str):
    ProgName = os.path.basename(__file__)
    runtoday = 'run on '+ str(datetime.today())
    print(get_author_info())
    print('URpy is a python version 3.11.5 program based on Revision 4 the USTUR DQO Document.)
#Rev. 0 can be found at https://www.researchgate.net/publication/369818915_Data_Quality_Objectives_Supporting_
#               the_US_Transuranium_and_Uranium_Registries_Mission
    print(ProgName, runtoday, 'using', infile)
    print('2023 March 6: George Tabatadze and Daniel J Strom decided to limit this project to Am and Pu. U is done by ICP-MS; Th
and Cm are rare.')
    print()
    print('This python program imports the following Excel workbooks or worksheets as pandas DataFrames:')
    print('   Case 0359 Database Output Access Headers nodash.xlsx')
    print('   Tracer.Information.for.python.xlsx')
    print('   ICRP107.Isotope.Data.Pu.Am.xlsx')
    print('   Sheet "L & X" in QCSolns.xlsx')
    print('   Sheet "ListQCSoln" in QCSolns.xlsx')
    print()
    print('Columns are added to the right side of the DataFrame as calculations are conducted.')
    print('This 2025-03-27 version calculates count rates, tracer activities, decay corrections, activities, uncertainties, masse
and concentrations.')
    print('Tthe product of (epsilon)*(yRR) is taken directly from the tracer data and used to calculate the unknown activies of
A1, P8, and P90.')
    print('Values of ε (epsilon) for each (detector & tracer)-combination are adopted from AlphaVision.')
```

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Fiscal Year 2025 Overview

April 1, 2024 – March 31, 2025







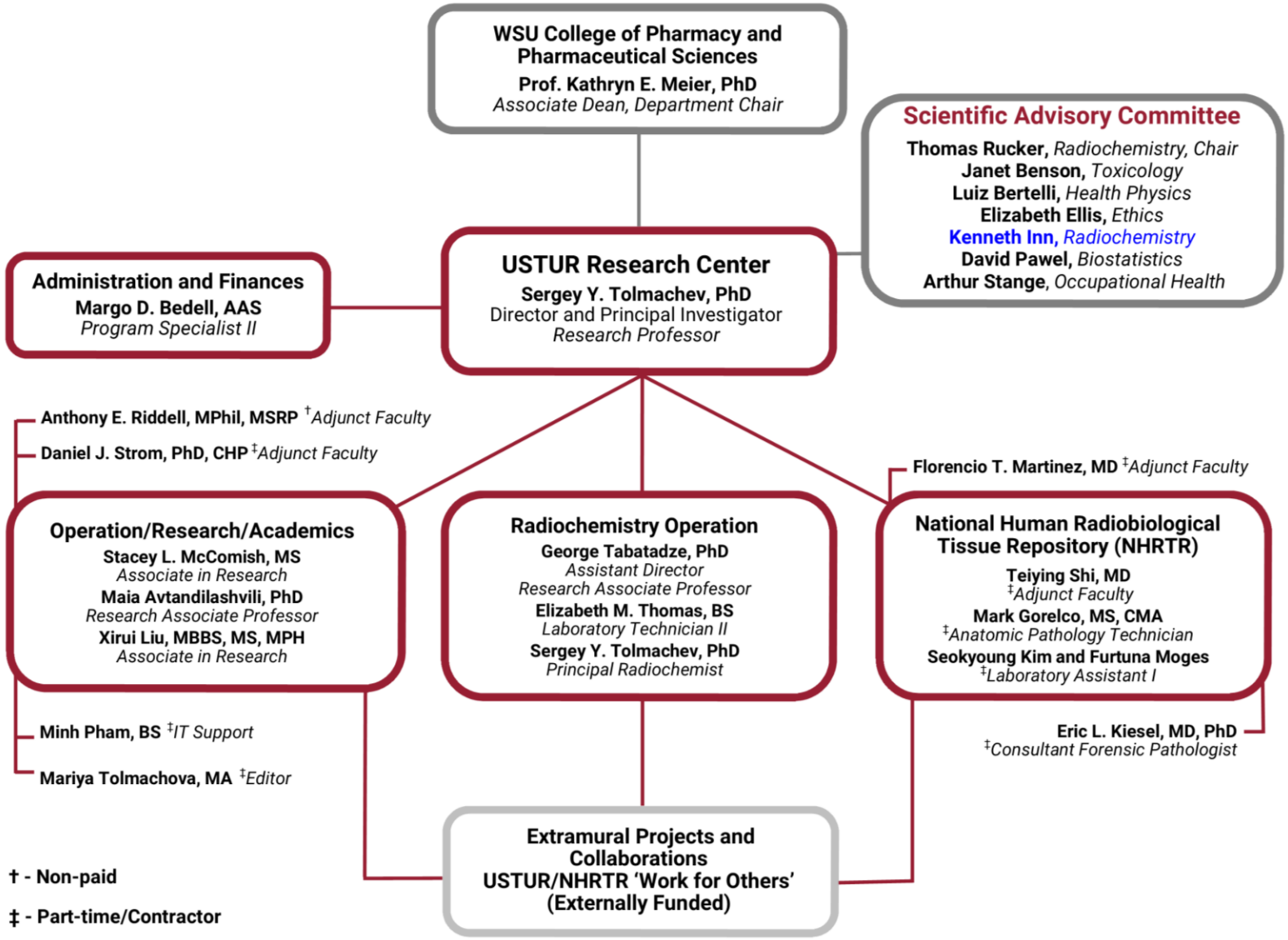








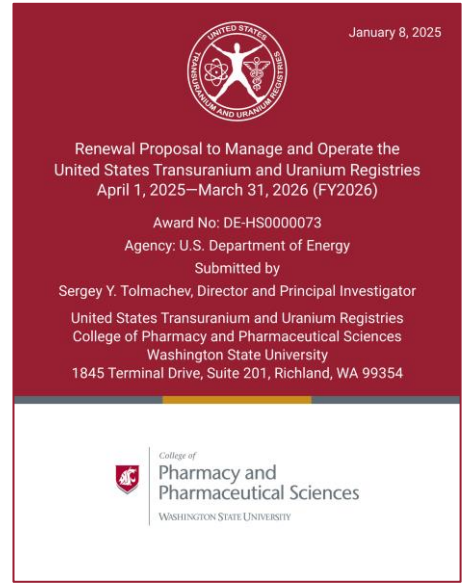
Organization and Personnel

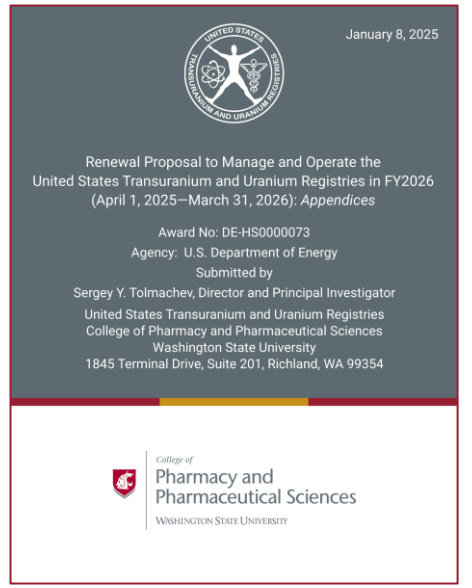


FY2026 U.S. DOE Funding

FY2026 single renewal

- Submitted: January 8, 2025
- Period: April 1, 2025 – March 31, 2026 (Year 4)
- Operational budget: $1,367,082





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Registrant Donations

- One whole- and one partial-body tissue donations (Rocky Flats)

10:00 – 10:20 *Registrant Statistics and LIMS* by S. L. McComish

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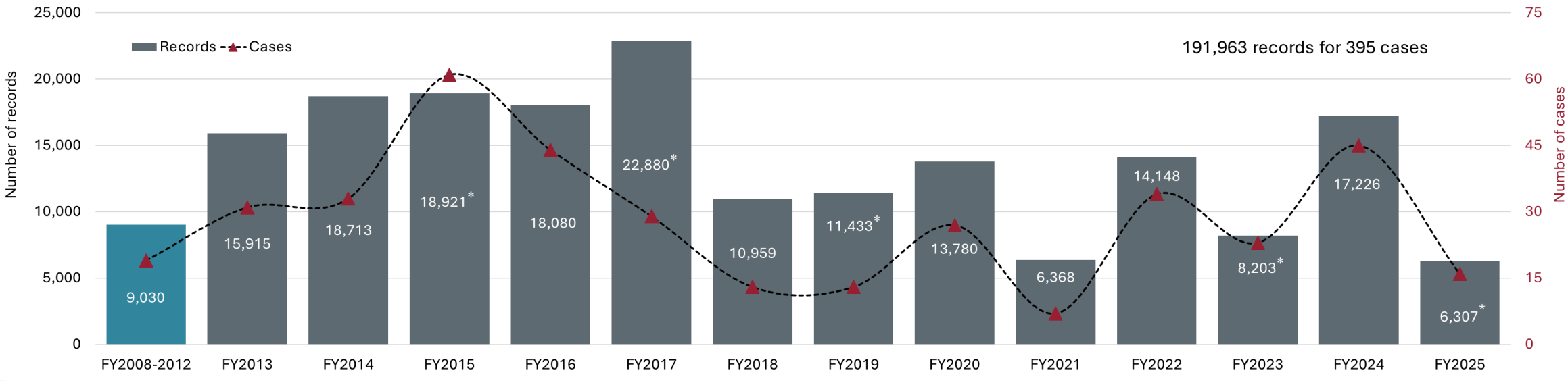
Health Physics Database – Completed!



Health Physics Database – User Manual




2025: Manual updated

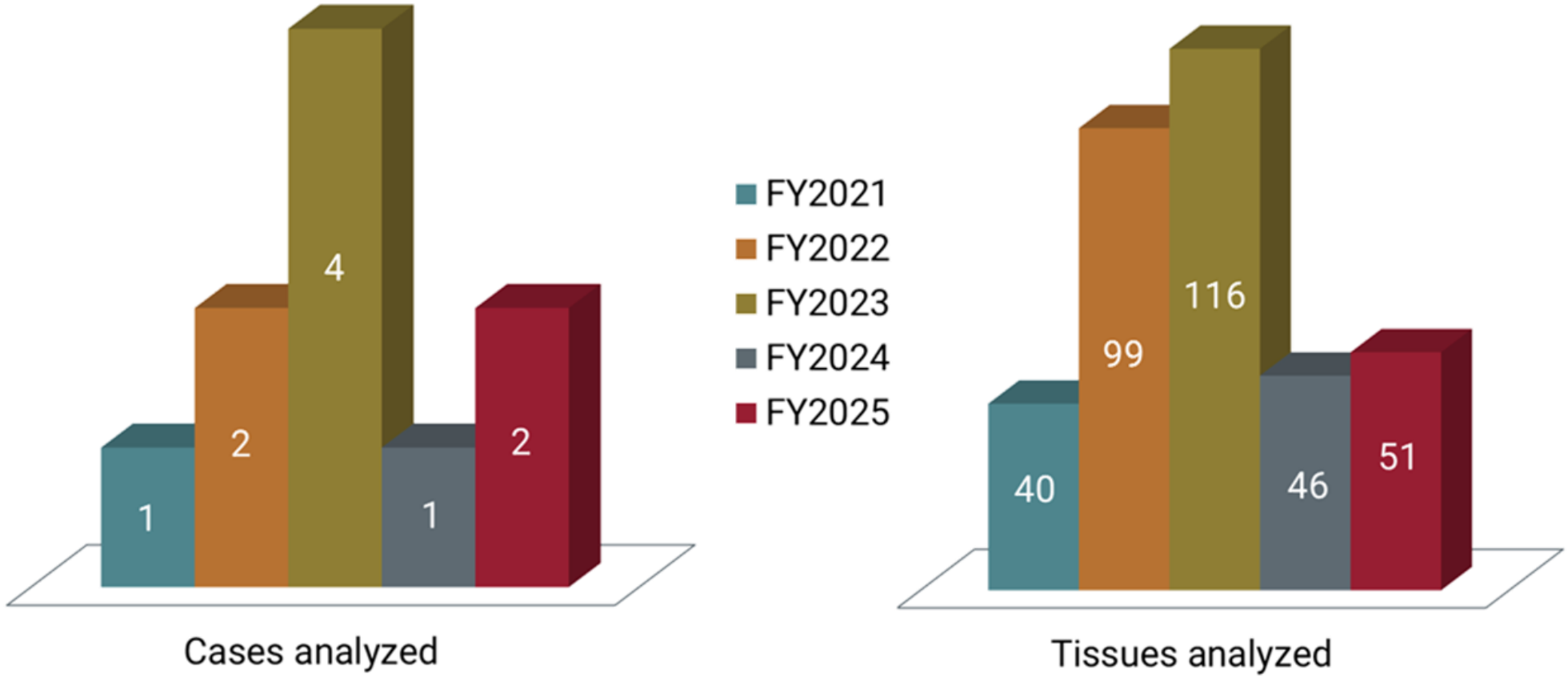
2022: New QA tools implemented

2008: Initially developed

User Manual

USTUR health physics database - Index

Radiochemistry: Tissue Analyses



10:20 – 10:40 *Radiochemistry Progress Report* by G. Tabatadze

CBRNResponder Network

- *"Is a product of collaboration sponsored by Federal Emergency Management Agency (FEMA), Department of Energy (DOE)/National Nuclear Security Administration (NNSA), NA-84 and the Office of Radiological Security (ORS), the Environmental Protection Agency (EPA), the Defense Threat Reduction Agency (DTRA), and the Department of Homeland Security's Science and Technology Directorate (DHS S&T), and is provided as a free service to all state, local, tribal, and territorial emergency response organizations".*
  https://www.cbrnresponder.net/app/index#home

Science and Technology

National Nuclear Security Administration

CBRN - chemical, biological, radiological, and nuclear

Urine Sample Analyses – Living Registrants

2022
- Initial sample collection
- **Fourteen** urine samples

2022
- Agreement for annual follow up
- **Ten** Registrants

2022 – 2024
- Radiochemical analyses
- **None**

2025
- Annual follow up alive
- **Seven** Registrants

GEL Laboratories LLC

a member of The GEL Group INC

RESL Radiological & Environmental Sciences Laboratory

Guy Backstrom
Director
Radiological & Environmental Sciences Laboratory
U.S. Department of Energy
Idaho Operations Office
backstlg@id.doe.gov
MOBILE 208.351.5586

Aurélie Soreefan, Technical Director
Radioanalytical Laboratory
Wright Patterson Air Force Base

U.S. AIR FORCE

UNITED STATES AIR FORCE SCHOOL OF AEROSPACE MEDICINE

April 2, 2025 – seven samples sent for the analyses

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On-going Research Projects

- Uncertainties in radiation epidemiology outcomes†
- Curium (^{244}Cm) distribution and biokinetics
- Beryllium distribution and biokinetics
- Radionuclides distribution and dosimetry using iQID
- Development and validation of site-specific biokinetic models (MPS/ORNL)‡, ¶
- Radium biokinetics and dosimetry (NCRP SC 6-13)
- Actinide and radium distribution in the human heart (MURR)

† 11:40 – 12:00 *Death Certificate Misclassification and Risk Models* by X. Liu

‡ 10:40 – 11:00 *MPS – USTUR Collaboration* by K. Higley and L. Dauer

¶ 11:00 – 11:20 *Internal Dosimetry for MPS* by C. Samuels

Broader Use of USTUR/NHRTR Data and Materials

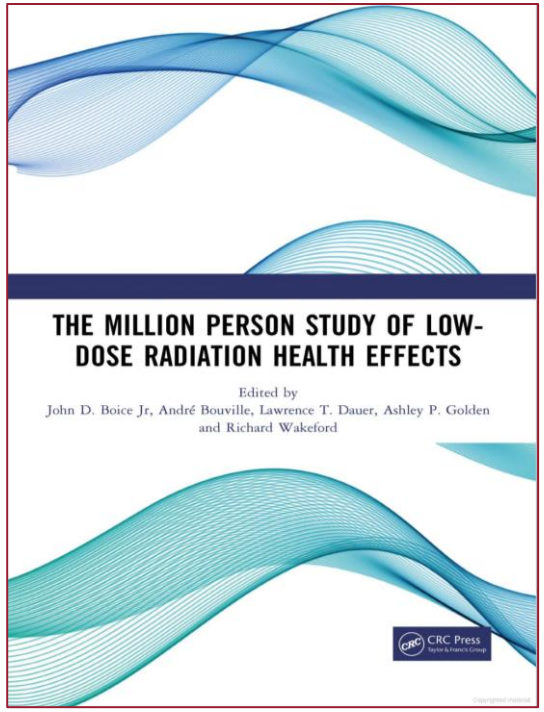
- Purdue University School of Health Sciences to the NIH/NIAD grant proposal *Sex-specific DNA Methylation Biomarkers for Radiation Exposure* – tissue specimens and exposure records (co-investigator) – not awarded
- RADIANT (bRain And raDIAtioN effecTs) group (kick-off meeting on 5/1/2024) – specific regions of the brain

Publications: Book Chapters

Published

1. Leggett RW, **Tolmachev SY**, Boice JD, Jr (**2024**) *Potential improvements in brain dose estimates for internal emitters*. In: Boice JD, Jr, Bouville A, Dauer LT, Golden AP, Wakeford R (eds). The Million Person Study of low-dose radiation health effects. London, United Kingdom: CRC Press; 125–138

2. Martinez NE, Jokisch DW, Dauer LT, Eckerman KF, Goans RE, Brockman JD, **Tolmachev SY**, **Avtandilashvili M**, Mumma MT, Boice JD, Jr., Leggett RW (**2024**) *Radium dial workers: back to the future*. In: Boice JD, Jr, Bouville A, Dauer LT, Golden AP, Wakeford R (eds). The Million Person Study of low-dose radiation health effects. London, United Kingdom: CRC Press; 280–298



3. Boice JD, Jr., Quinn B, Al-Nabulsi I, Ansari A, Blake PK, Blattnig SR, Caffrey EA, Cohen SS, Golden AP, Held KD, Jokisch DW, Leggett RW, Mumma MT, Samuels C, Till JE, **Tolmachev SY**, Yoder RC, Zhou JY, Dauer LT (**2024**) *A million persons, a million dreams: a vision for a national center of radiation epidemiology and biology*. In: Boice JD, Jr, Bouville A, Dauer LT, Golden AP, Wakeford R (eds). The Million Person Study of low-dose radiation health effects. London, United Kingdom: CRC Press; 327–355

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Publications: Journal Articles (I)

Published

1. **McComish SL**, **Liu X**, **Martinez FT**, Zhou JY, **Tolmachev SY** (**2024**) *Misclassification of causes of death among a small all-autopsied group of former nuclear workers: Death certificates vs. autopsy reports*. PLoS One 19(5):e0302069

2. Dauer LT, Mumma MT, Lima J, Cohen SS, Andresen D, Bahadori A, Bellamy M, Bierman D, Blattnig S, French B, Giunta E, Held K, Hertel N, Keohane L, Leggett R, Lipworth L, Miller K, Norman R, Samuels C, Thomas K, **Tolmachev S**, Walsh L, Boice Jr JD (**2024**) *A Million Person Study innovation: evaluating cognitive impairment and other morbidity outcomes from chronic radiation exposure through linkages with the centers for Medicaid and Medicare services big data*. Radiation Research 202(6):847–861

3. **Tolmachev SY**, **Martinez FT**, Linson JE, Brockman JD, **Thomas EM**, **Avtandilashvili M**, **Tabatadze G**, Leggett RW, Samuels C, Martinez NE, Jokisch DW, Boice Jr JD, Dauer LT (**2024**) *Distribution of plutonium and radium in the human heart*. Journal of Radiological Protection 44(4):041515

4. Goans RE, Dauer LT, Iddins CJ, Mumma M, **McComish SL**, **Tolmachev SY** (**2025**) *Chronic inflammation in a Radium Dial Painter cohort: elevated neutrophil to lymphocyte ratio and radiation-induced hearing loss*. Journal of Radiological Protection 45(1):013502

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Publications: Journal Articles (II)

Published Ahead of Print

1. Martinez NE, Jokisch DW, Mumma MT, **Tolmachev SY**, **Avtandilashvili M**, **Tabatadze G**, Leggett RW, Samuels C, Golden A, Howard S, Dauer LT, Boice Jr JD (**2024**) *Archived historical records housed at USTUR support radium dial worker dosimetry*. Journal of Radiological Protection. doi: 10.1088/1361-6498/ad8bcf

2. Dumit S, **Avtandilashvili M**, **McComish SL**, Miller G, Swanson J, **Tolmachev SY** (**2024**) *Modeling plutonium biokinetics of female nuclear worker treated with chelation therapy after inhalation intake*. Health Physics. doi: 10.1097/HP.0000000000001859

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Publications: Journal Articles (III)

Accepted

1. Lopez MA, Alves A, **Avtandilashvili M**, Bertelli L, Dumit S, Fojtik P, Franck D, Gadd M, Hetrick L, Klumpp J, Li C, Navarro JF, Osko J, Pérez López B, Petitot F, Poudel D, Riddell A, **Šefl M**, Sugarman S, **Tolmachev S**, Broggio D (**2025**) *EURADOS/REMPAN review on monitoring and dosimetry for radionuclide contaminated wounds*. Disaster Medicine and Public Health Preparedness

Submitted

1. Romanyukha A, Consani K, **Tolmachev SY** (**2025**) *Variability of radiation doses reconstructed by EPR in teeth of former United States nuclear workers*. Journal of Radiological Protection
2. Lopez MA, Alves A, **Avtandilashvili M**, Bertelli L, Dumit S, Fojtik P, Franck D, Gadd M, Hetrick L, Klumpp J, Li C, Navarro JF, Osko J, Pérez López B, Petitot F, Poudel D, Riddell A, **Šefl M**, Sugarman S, **Tolmachev S**, Broggio D (**2025**) *Clinical management of radionuclide intakes through wounds: a EURADOS/REMPAN review*. Disaster Medicine and Public Health Preparedness
3. **Avtandilashvili M**, **Šefl M**, Zhou JY, **Tolmachev SY** (**2025**) *Validation of Bayesian modeling approach of uncertainty in organ doses using post-mortem measurements*. Scientific Reports

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Invited Talks

1. 4th Public Meeting of the National Academies of Science, Engineering and Medicine's Committee on Feasibility of Assessing Veteran Health Effects of Manhattan Project. Richland, Washington, **July 18, 2024**
2. PNNL Radiochemistry Group's Colloquium. Richland, Washington, **December 12, 2024**
3. National Nuclear Security Administration Bi-Monthly Operations and Safety Call (virtual). **February 13, 2025**
4. 61st NCRP Annual Meeting "The Million Person Study: Current Results and Vision for Radiation Epidemiology and Protection". Bethesda, Maryland, **March 24–25, 2025**

NATIONAL ACADEMIES Sciences Engineering Medicine

National Nuclear Security Administration

Pacific Northwest NATIONAL LABORATORY

Podium Presentations

Presenters (6)

1. 43rd Annual Conference of the Canadian Radiation Protection Association. Edmonton, Alberta, Canada, **June 3–7, 2024**
2. International Conference on Radiation Applications. Granada, Spain, **June 10–12, 2024**
3. 16th International Congress of the International Radiation Protection Association – 69th Annual Meeting of the Health Physics Society. Orlando, Florida, **July 7–12, 2024**
4. WSU College of Pharmacy and Pharmaceutical Sciences Research Day. Spokane, Washington, **August 9, 2024**
5. 70th Annual Meeting of the Radiation Research Society. Tucson, Arizona, **September 15–18, 2024**

Co-authors (5)

1. 16th International Congress of the International Radiation Protection Association – 69th Annual Meeting of the Health Physics Society, Orlando, Florida, **July 7–12, 2024**
2. EPRBioDose 2024, Hirosaki, Japan, **September 25–28, 2024**
3. NASA Human Research Program Investigators' Workshop. Galveston, Texas, **January 28–31, 2025**
4. 2025 National Conference on Undergraduate Research. Pittsburg, Pennsylvania, **April 7–9, 2025**

Poster Presentations

Presenters (7)

1. 16th International Congress of the International Radiation Protection Association – 69th Annual Meeting of the Health Physics Society. Orlando, Florida, **July 7–12, 2024**
2. 70th Annual Meeting of the Radiation Research Society. Tucson, Arizona, **September 15–18, 2024**
3. 2024 Annual American Public Health Association Meeting. Minneapolis, Minnesota**, October 27–30, 2024**
4. 61st NCRP Annual Meeting "The Million Person Study: Current Results and Vision for Radiation Epidemiology and Protection". Bethesda, Maryland, **March 24–25, 2025**

Co-authors (4)

1. 16th International Congress of the International Radiation Protection Association – 69th Annual Meeting of the Health Physics Society, Orlando, Florida, **July 7–12, 2024**
2. 70th Annual Meeting of the Radiation Research Society. Tucson, Arizona, **September 15–18, 2024**
3. 61st NCRP Annual Meeting "The Million Person Study: Current Results and Vision for Radiation Epidemiology and Protection". Bethesda, Maryland, **March 24–25, 2025**




Teaching

WASHINGTON STATE UNIVERSITY
College of Pharmacy and Pharmaceutical Sciences

The United States Transuranium and Uranium Registries: digital autoradiography of alpha particle emitters in human tissue samples

George Tabatadze, PhD
Research Associate Professor
United States Transuranium and Uranium Registries
1845 Terminal Drive, Suite 201, Richland, WA 99354
george.tabatadze@wsu.edu

ustur.wsu.edu

Colorado State University
March 22, 2024

WASHINGTON STATE UNIVERSITY
College of Pharmacy and Pharmaceutical Sciences

Radioactive Materials, Radioactivity, and Radiation

George Tabatadze, Ph.D.
Fundamentals of toxicology
PharmSci 444/544
george.tabatadze@wsu.edu

November 18, 2024

WASHINGTON STATE UNIVERSITY
College of Pharmacy and Pharmaceutical Sciences

Toxic Effects of Radioactive Materials

George Tabatadze, Ph.D.
Fundamentals of toxicology
PharmSci 444/544
george.tabatadze@wsu.edu

November 21, 2024

WASHINGTON STATE UNIVERSITY
College of Pharmacy and Pharmaceutical Sciences

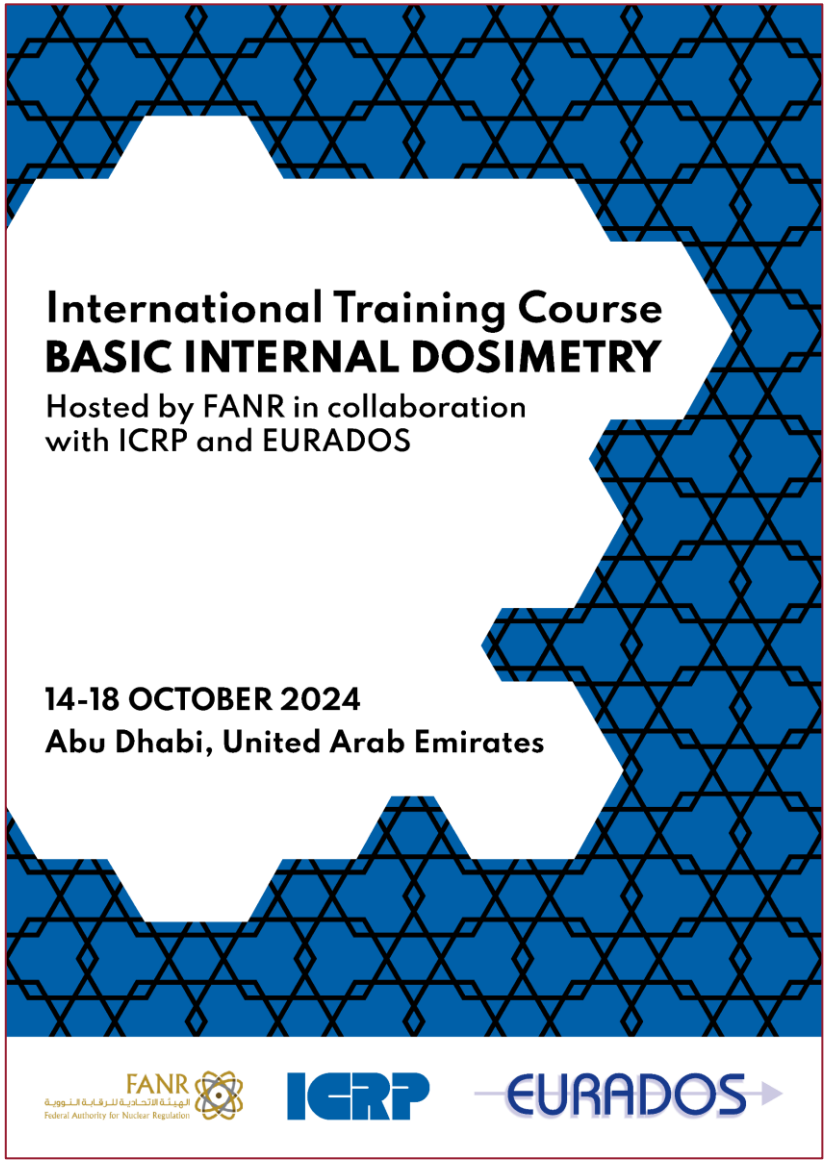
Honors 290.1
Science as a Way of Knowing: The Power of the Atom
Class 15: Learning from Plutonium and Uranium Workers

Sergey Y. Tolmachev, *Research Professor and Director*
United States Transuranium and Uranium Registries
1845 Terminal Drive, Suite 201, Richland, WA 99354
ustur.wsu.edu | stolmachev@wsu.edu

February 25, 2025

USTUR-706-25P

International Training



Detailed Agenda

MONDAY 14 OCTOBER 2024

BIOKINETICS AND DOSIMETRY

8:30 - 9:30	**Welcome and Course Purpose** Aayda Al Shehhi (FANR), Christopher Clement (ICRP), and Juan Francisco Navarro Amaro (EURADOS)
9:30 - 10:20	**Introduction to Internal Dosimetry** Daniele Giuffrida (FANR)
10:30 - 11:20	**Biokinetics: Inhalation, Ingestion and Systemic Models** Bernard Landry (EURADOS)
11:20 - 11:50	Coffee Break
11:50- 12:40	**Dosimetric Models and Statistical Methods for Internal Dose Assessment** Maia Avtandilashvili (ICRP)
12:40 - 14:00	Prayer and Lunch Break
14:00 - 14:30	**Introduction to the Afternoon Exercise Session: Scope and Purpose** FANR-ICRP-EURADOS
14:30 - 15:20	**First Exercise** FANR-ICRP-EURADOS and Participants in Groups
15:20 - 15:40	Coffee Break
15:40 - 16:30	**Second Exercise** FANR-ICRP-EURADOS and Participants in Groups
16:30 - 17:00	**Q&A and Discussion** FANR-ICRP-EURADOS

TUESDAY 15 OCTOBER 2024

IN-VIVO MONITORING AND WBC

8:30 - 9:00	**Welcome and Recap** Daniele Giuffrida (FANR)
9:00 - 10:00	**Whole Body Counter Facilities: Organization and Operation; Techniques and Methods for Direct Bioassay Measurements** Juan Francisco Navarro Amaro (EURADOS)
10:00 - 11:00	**Intake Assessment by Direct Bioassay Measurement in a Whole Bo Counter Facility** Juan Francisco Navarro Amaro (EURADOS)
11:00 - 11:30	Coffee Break
11:30- 12:30	**Accuracy Requirements and Uncertainty Analysis in Internal Dosin** Maia Avtandilashvili (ICRP) and George Tabadatze (ICRP)
12:30 - 14:00	Prayer and Lunch Break
14:00 - 14:30	**Introduction to the Afternoon Exercise Session: Scope and Purpose** FANR-ICRP-EURADOS

Basic Internal Dosimetry Training Course | 14-18 October 2024

THURSDAY 17 OCTOBER 2024 (CONT.)

ICRP JOURNEY, RADON, AND PHANTOMS

10:00 - 11:00	**Human Phantoms and Their Use in Internal Dosimetry** George Tabadatze (ICRP)
11:00 - 11:30	Coffee Break
11:30 - 12:00	**Decorporation Treatments** Bernard Landry (EURADOS)
12:00 - 12:30	**Codes and Software for Internal Dosimetry (II)** Maia Avtandilashvili (ICRP), George Tabadatze (ICRP), and Bernard Landry (EURADOS)
12:30 - 14:00	Prayer and Lunch Break
14:00 - 14:30	**Introduction to the Afternoon Exercise Session: Scope and Purpose** FANR-ICRP-EURADOS
14:30 - 15:20	**First Exercise** FANR-ICRP-EURADOS and Participants in Groups
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16:30 - 17:00	**Q&A and Discussion** FANR-ICRP-EURADOS

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WSU Service

- WSU Faculty Senate Graduate Studies Committee
- WSU Provost's Advisory Committee on Promotion and Tenure
- WSU Radiation Safety Committee
- CPPS Secretary
- CPPS Graduate Admissions Committee (!)
- CPPS Graduate Steering Committee

Health Physics Society

- Health Physics Society Fellow Award (Class 2024)
- ANSI/HPS N13 Committee, Working Group on “Internal Dosimetry for Mixed Fission and Activation Products” (2024–2027)
- Health Physics Society Board of Directors (2025–2028)

Professional and Academic Service

HEALTH PHYSICS SOCIETY
SINCE 1960 COLUMBIA CHAPTER

HEALTH PHYSICS SOCIETY
FOUNDED 1956

HPS Specialists in Radiation Protection

WASHINGTON STATE UNIVERSITY PULLMAN

HAB Hanford Advisory Board

EPA United States Environmental Protection Agency

WASHINGTON STATE UNIVERSITY SPOKANE

WASHINGTON STATE UNIVERSITY TRI-CITIES

SCIENTIFIC AUTHORITY SINCE 1929 · CONGRESSIONALLY CHARTERED · NCRP

National Council on Radiation Protection and Measurements

Physical Science & Biophysics Journal
ISSN: 2641-9165

健 物 jhps JAPANESE JOURNAL OF HEALTH PHYSICS 日本保健物理学会 JAPAN HEALTH PHYSICS SOCIETY

AUSTIN BIOMETRICS AND BIOSTATISTICS A

WASHINGTON STATE UNIVERSITY

Collaborative Research Network

The Million Person Study

Oak Ridge Institute for Science and Education

Oak Ridge National Laboratory

Vanderbilt University

NCRP Scientific Authority Since 1929 Congressionally Chartered

National Council on Radiation Protection and Measurements

MURR

Missouri

Los Alamos National Laboratory Est. 1943

Uniformed Services University of the Health Sciences 1972

UK Health Security Agency

NASA

U.S. Air Force

EURADOS

World Health Organization

Physics & Engineering Francis Marion University

United States Air Force School of Aerospace Medicine

CLEMSON UNIVERSITY

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Thank you for your attention!