2017 Scientific Advisory Committee Meeting
Red Lion Hanford House, Richland, WA
August 25-26, 2017

2016 SAC Recommendations & 2017 Overview

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"Learning from Plutonium and Uranium Workers"

2016 SAC's Comments/Recommendations

- Following the 2016 Annual Meeting, the SAC made 5 comments and 7 specific recommendations

2016 SAC's Comments

1. There has been good progress on populating the databases
2. The special session at the HPS annual meeting was excellent, and along with the booth greatly improved the visibility of the program
3. The Ph.D. student is an excellent example of collaboration with the College of Pharmacy
4. USTUR recognition of donors is a welcome cultural shift
5. A shift in emphasis from data collection to research is taking hold

2016 SAC's Recommendations

1. Promote the value of USTUR for research
2. Ph.D. staff should be classified as research associate professors; continue to build staff credentials
3. Formally document research goals and objectives; produce a modified set of data quality objectives to support research goals, as well as future missions and funding opportunities
4. Demonstrate the value of the program to current and future DOE needs
5. Offer practica for research students, continue practica for nursing students
6. Consider outreach to scientific collaborators outside traditional radiation-related disciplines
7. Consider outreach to workers, union representatives

Recommendation #1

Promote the value of USTUR for research

Promote the value of USTUR for research

- Consider possible current and future uses of data (hypotheses to be tested)
- Further research is likely to be collaborative; identify target organizations for outreach, e.g. Oak Ridge National Laboratory's Center for Radiation Protection Knowledge. Set a goal for external funding, e.g., $50,000
- Demonstrate the value of the program to the College of Pharmacy

Target Collaborations

- ORNL, Center for Radiation Protection Knowledge

Keith Eckerman, plutonium bound fraction (wound cases)

- REAC/TS, Cytogenetic Biodosimetry Laboratory

Adayabalam Balajee, DNA double-strand break induction

- NCRP/Northwestern University

John Boice & Gayle Woloschak, actinides in human brain

- Public Health England (UK)

Anthony Riddell, biokinetic modeling and IMBA support

Graduate Research Presentations at WSU

- Graduate Preliminary Examination

Sara Dumit, Ph.D. Candidate

- COP Research Day, August 12, 2016
- Graduate Research Seminars, November 18, 2016
- Graduate Research Seminars, September 29, 2017

CougaR$_x$ Newsletter: Student Achievement

Podium presentations

- 61st Annual Health Physics Society Meeting, Spokane, WA, July 19, 2016
- Graduate Research Seminar Series, Spokane, WA, November 18, 2016
- Columbia Chapter of the Health Physics Society, Richland, WA, January 26, 2017
- European Radiation Dosimetry Group Annual Meeting, Karlsruhe, Germany, February 27 - March 3, 2017

Poster presentation

- Brazilian Graduate Student Conference, University of Southern California, Los Angeles, CA, March 11-12, 2017

CougaR$_x$ Newsletter: Student Achievement

Publications

- Research paper in Radiation Protection Dosimetry journal
- Abstract in Health Physics journal

Travel grants received

- $500 from Associated Students of Washington State University Spokane
- $450 from Health Physics Society

WSU Partnership with KEEA

- Kyushu Environmental Evaluation Association (Fukuoka, Japan)

WASHINGTON STATE UNIVERSITY

WSU NEWS
Posts

WSU partnering with Japanese company in radiochemistry

PUBLISHED ON MAY 15, 2017

Tolmachev

By Maegan Murray, WSU Tri-Cities

RICHLAND, Wash. – The U.S. Transuranium and Uranium Registries, operated by Washington State University, will sign a memorandum of understanding with Kyushu Environmental Evaluation Association of Japan on Tuesday, May 16, at WSU Tri-Cities in Richland to partner for research opportunities, student experiences and the general sharing of knowledge.

KEEA's radioanalytical section has been involved with Japan's environmental monitoring following the 2011 accident at the Fukushima Daiichi nuclear power plants. The purpose of KEEA is to contribute to the conservation and maintenance of the environment in Japan, and protect the health and life of the local community.

In addition to signing of the memorandum of understanding, representatives from KEEA will tour the U.S. Transuranium and Uranium Registries (USTUR) facilities in Richland and discuss collaboration projects, in addition to current and future research efforts.

Sergei Tolmachev, director of the USTUR, said partnering with KEEA presents a great opportunity for the global sharing of knowledge and research. WSU's USTUR is a research program that studies actinide elements, such as plutonium, americium and uranium, that have been deposited within the human body – more specifically in persons with measurable, documented exposures to those radioactive elements.

"From an academic environment, it is a tremendous opportunity," Tolmachev said. "Through partnerships like these, there are great research possibilities, especially on a global scale. We will have the capability to share materials available at the registries and further our research reach."

Noriyuki Momoshima, president of KEEA, said his organization is excited about learning the techniques on radiochemical analysis of transuranium elements in humans from the USTUR.

Tolmachev, WSU Spokane pharmacy associate research professor, oversees the U.S. Transuranium and Uranium Registries

WSU News (May)

WSU partnering with Japanese company in radiochemistry

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Noriyuki Momoshima, president of KEEA, said his organization is excited about learning the techniques on radiochemical analysis of transuranium elements in humans from the USTUR.

"The technique is attractive because the KEEA has limited experience on biological sample analysis," he said. "The technique will improve our analytical skill and will expand our business."

Tolmachev said the USTUR will benefit from sharing testing materials that will allow them to broaden their scope of research, as well as provide them with additional testing capabilities for projects that have been put on hold due to larger-scope projects.

"It's a unique partnership for KEEA because there aren't a lot of academic environments that have a fully running radiochemistry lab," he said. "We both have a lot to learn and gain from one another."

COP Newsletter (June)

Recommendation #2

Ph.D. staff should be classified as research associate professors; continue to build staff credentials

Faculty Promotion

- Promoted to Assistant Research Professor
  - ✓ George Tabatadze – effective 4/1/2017
  - ✓ Maia Avtandilashvili – effective 7/1/2017
- Not promoted to Research Professor
  - ✓ Sergei Tolmachev

New Professional Services

- George Tabatadze: president-elect, Columbia Chapter of the Health Physics Society
- Sergei Tolmachev: writing team captain (Radiochemistry), NCRP Council Committees 2

The scope of this Committee is to continually assess, revise and renew the comprehensive plan initiated with Where Are the Radiation Professionals? (WARP) to meet the needs of the nation for radiation protection

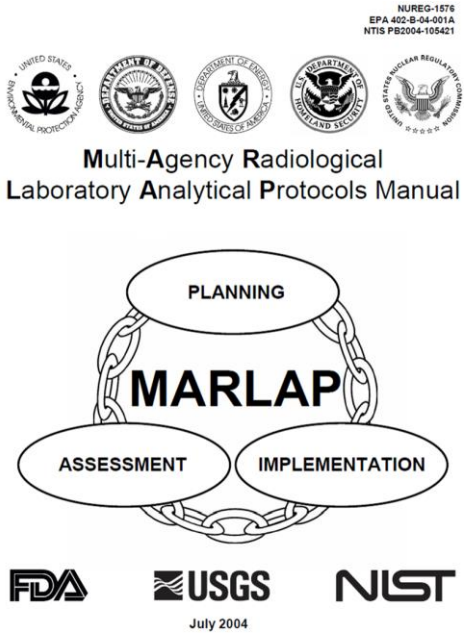
http://ncrponline.org/program-areas/cc-2/

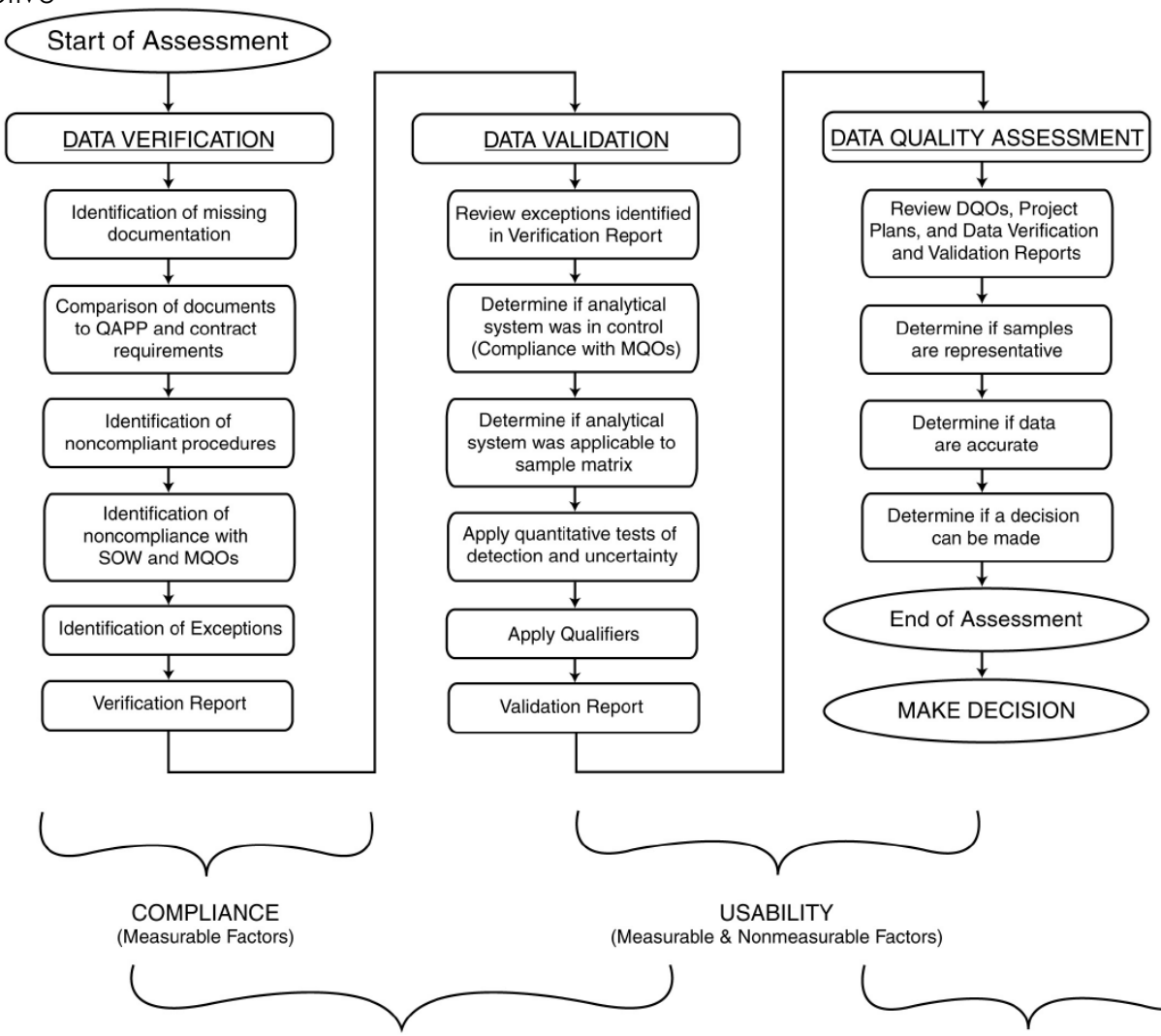
Recommendation #3

Formally document research goals and objectives and produce a modified set of data quality objectives to support research goals, as well as future missions and funding opportunities

MARLAP Data Assessment Process

QAPP quality assurance project plan
SOW statement of work
MQO measurement quality objective
DQO data quality objective





MARLAP (2004) Fig. 8.1

Recommendation #4

Demonstrate the value of the program to current and future DOE needs

Research Opportunities

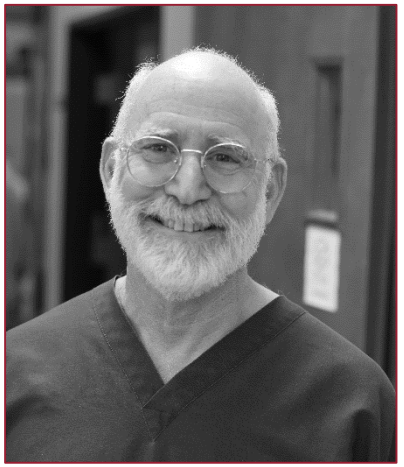
- Plutonium biokinetics
  - ✓ ^{239}Pu soluble material
  - ✓ ^{239}Pu refractory particles
  - ✓ ^{239}Pu contaminated wound
  - ✓ ^{238}Pu exposure
- Uranium biokinetics
- Decorporation modeling
- Minor actinides: ^{237}Np and ^{244}Cm
- Non-radioactive materials: Be and Zr

M. Avtandilashvili, S. McComish, G. Tabatadze, S. Tolmachev. *USTUR Research: Land of Opportunity* @ EURADOS 2017 Annual Meeting

Recommendation #5

Offer practica for research students, continue practica for nursing students

Autopsy: Case 0674



WSU Nursing Students:

- Carolina Ayala-Torres
- Christina Babcock
- Joshua Mensonides

Recommendation #6

Consider outreach to scientific collaborators outside traditional radiation-related disciplines, such as toxicology, biokinetics, cellular biology, *etc*

DNA Double-strand Break Study

- Adayabalam Balajee, PhD

Director of the Cytogenetic Biodosimetry Laboratory at REACT/TS

- USTUR Case 0785

Paraffin-embedded tissue: brain, kidney, liver, and tumor

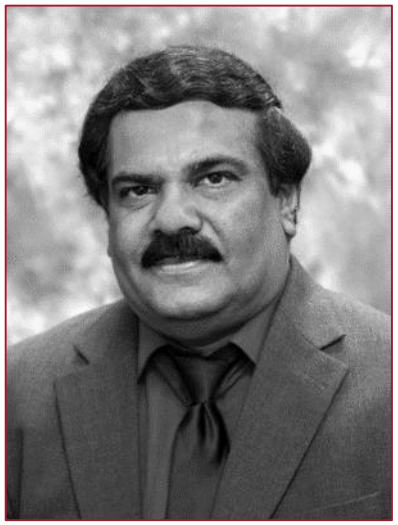
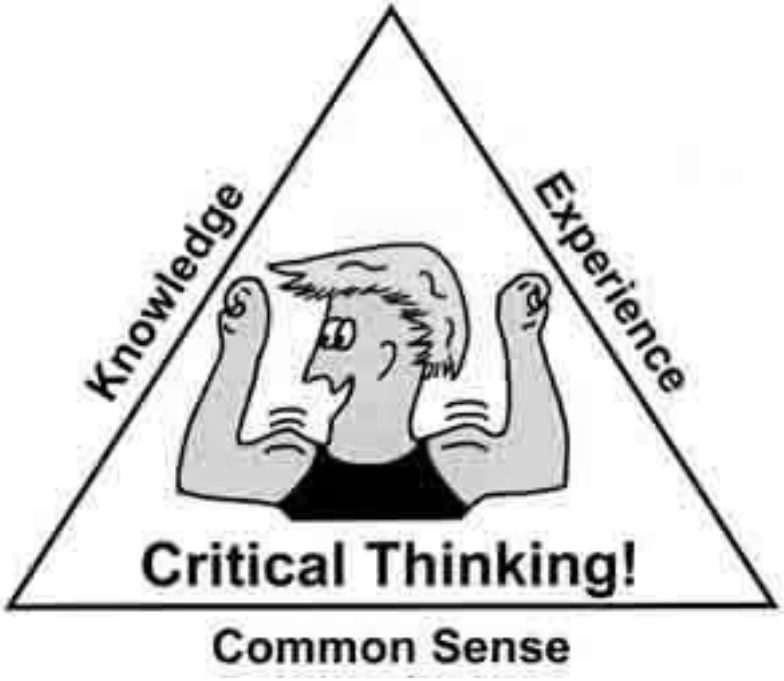


Photo from https://orise.orau.gov/about/media-center/news-features/2015/balajee-named-director-of-cytogenetic-biodosimetry-lab.html

Recommendation #7

Consider outreach to workers, union representatives

‘New’ SAC Member: Worker Representative

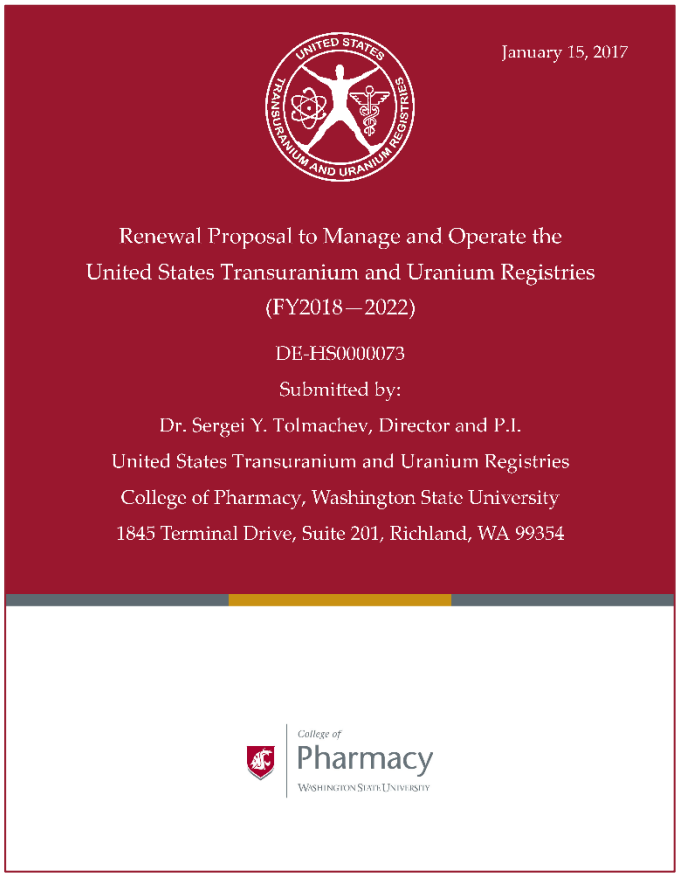


Recommendation #4: Demonstrate the value of the program to current and future DOE needs

2016 Activities Brief Overview

- Operation and Management
- Activities and Research

FY2018 – 2022 Grant Renewal



January 15, 2017

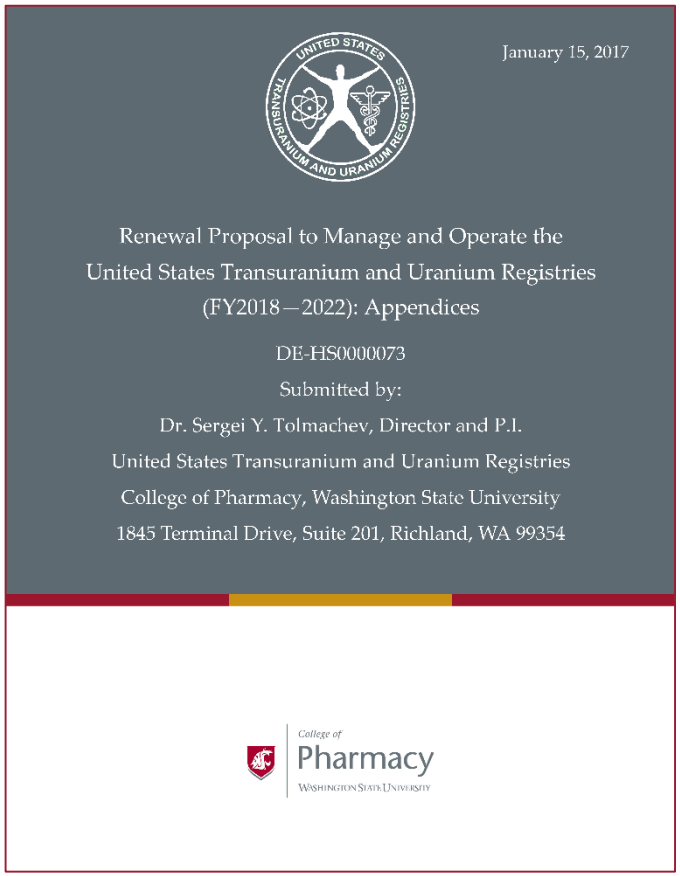
Renewal Proposal to Manage and Operate the
United States Transuranium and Uranium Registries
(FY2018—2022)

DE-HS0000073

Submitted by:

Dr. Sergei Y. Tolmachev, Director and P.I.
United States Transuranium and Uranium Registries
College of Pharmacy, Washington State University
1845 Terminal Drive, Suite 201, Richland, WA 99354

College of Pharmacy
Washington State University



January 15, 2017

Renewal Proposal to Manage and Operate the
United States Transuranium and Uranium Registries
(FY2018—2022): Appendices

DE-HS0000073

Submitted by:

Dr. Sergei Y. Tolmachev, Director and P.I.
United States Transuranium and Uranium Registries
College of Pharmacy, Washington State University
1845 Terminal Drive, Suite 201, Richland, WA 99354

College of Pharmacy
Washington State University

Awarded budget – $5,500,000

Institutional Review Board Changes

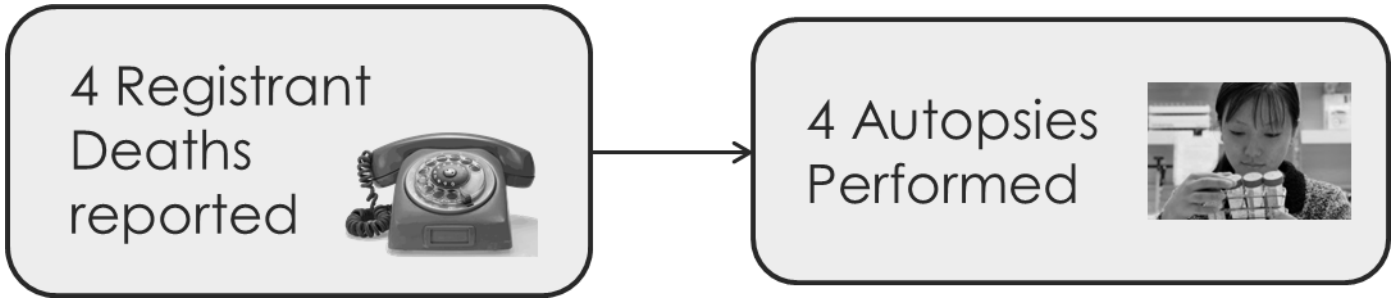
- Since 1992 USTUR operated under WSU Institutional Review Board (IRB) approval #11573
- 7/7/2017: WSU signed IRB Authorization Agreement with DOE
- 7/27/2017: USTUR submitted IRB renewal to Central DOE Institutional Review Board (CDOEIRB)
- 8/10/2017: USTUR research was approved by CDOEIRB (DOE000211) for "*an additional period of 3 months*"

Accepting Registrant Donations

Stacey L. McComish & Margo D. Bedell

S. McComish. Registrant Statistics and IRB Changes

Registrant Donations



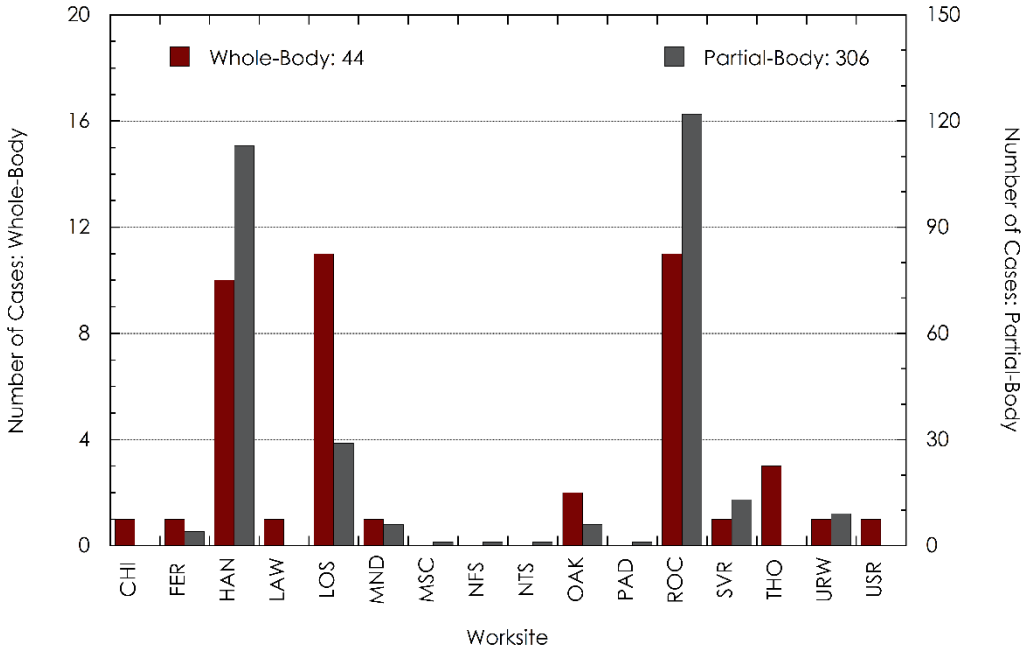
- Whole-body Case 0674 (2017)
- Partial-body case 0421 (2016), 0688 (2017), 0287(2017)

Registrant Statistics

- Living Registrants: 41
  - *Whole-body donors: 7*
  - *Partial-body donors: 34*
- Deceased Registrants: 350
  - *Whole-body donors: 44*
  - *Partial-body donors: 306*
- Total:

13

379

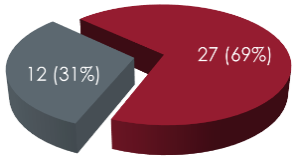
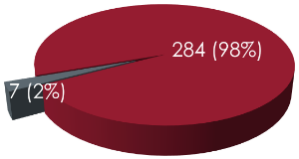
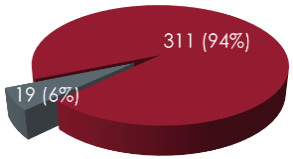
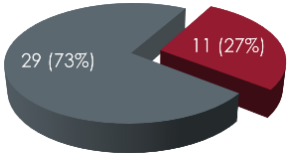
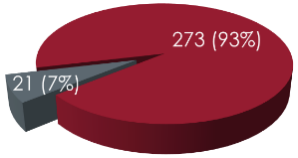
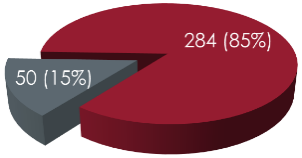
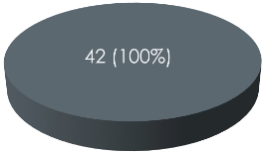
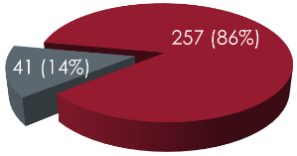
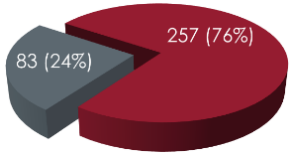
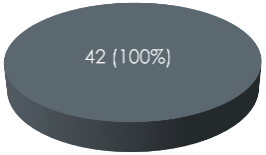
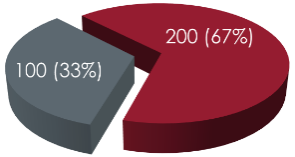
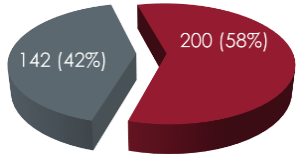
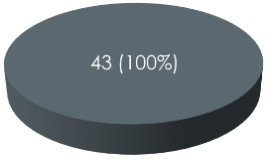
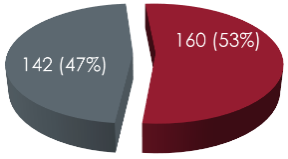
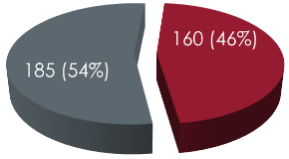
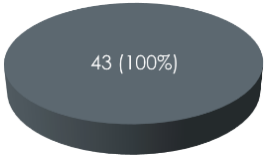
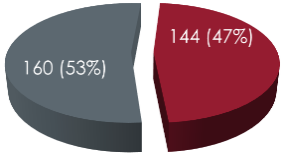
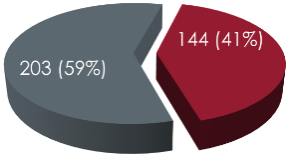


Health Physics Database

M. Avtandilashvili

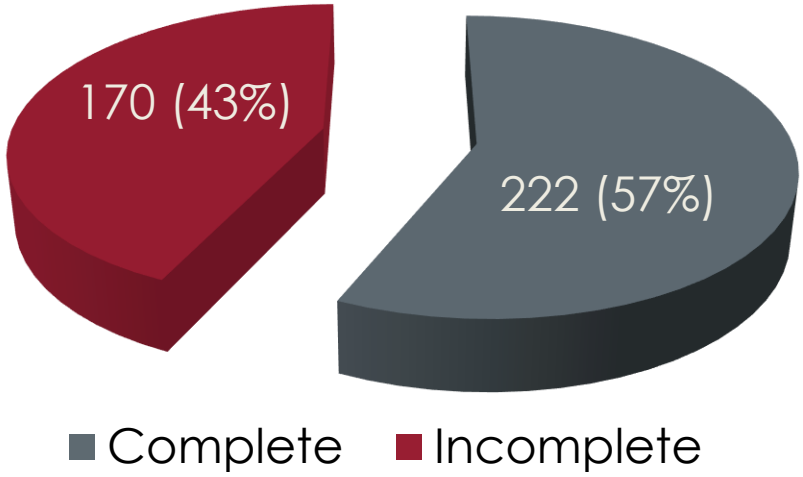
M. Avtandilashvili. Health Physics Database Progress Report

2012 – 2016 Case Completion Progress

	Whole-Body	Partial-Body	Total
April 1, 2012			
April 1, 2013			
April 1, 2014			
April 1, 2015			
April 1, 2016			
December 31, 2016			

Health Physics Database 2017

As of August 18, 2017, 222 of 392 Registrant cases completed



Deceased: 59%

- 44 whole-body (100%)
- 161 partial-body (53%)

Living: 41%

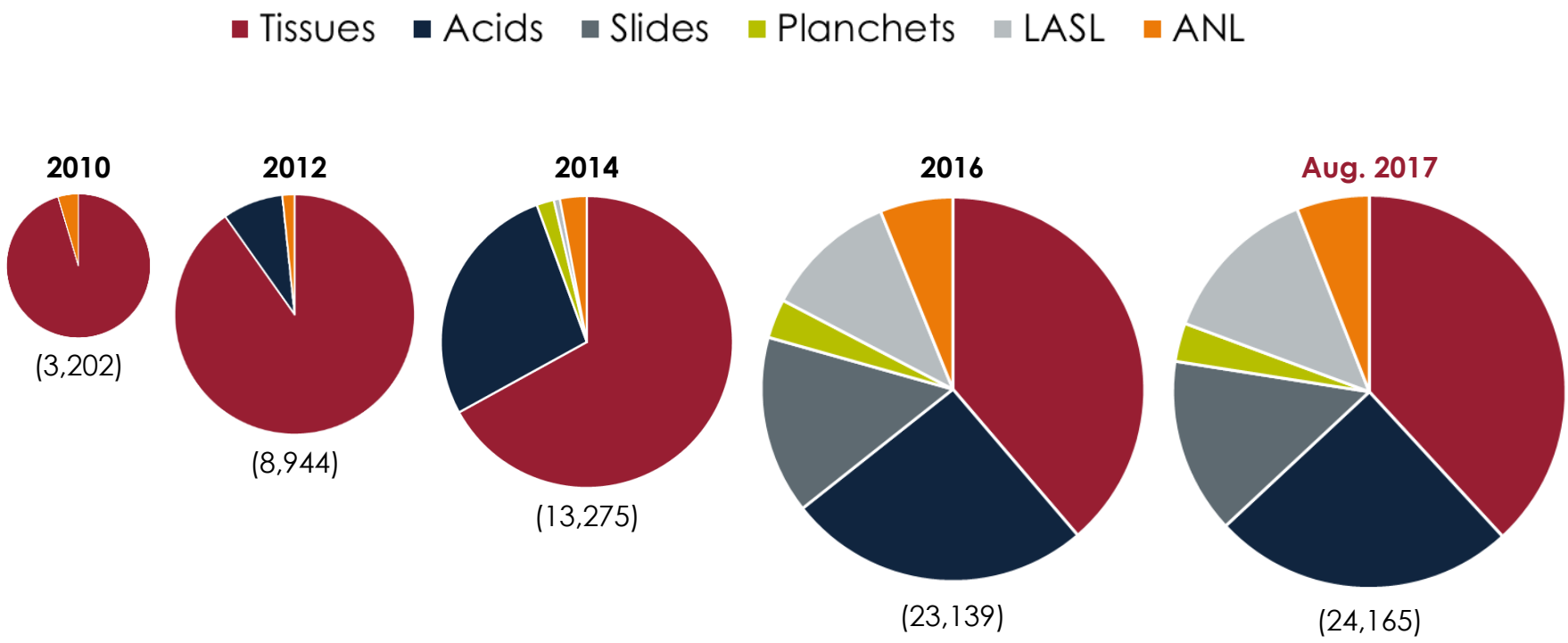
- 7 whole-body (100%)
- 10 partial-body (29%)

National Human Radiobiological Tissue Repository (NHRTR)

Florencio Martinez, Warnick Kernan, Stacey McComish

S.L. McComish. National Human Radiobiological Tissue Repository

2010 – 2017 Material Inventory



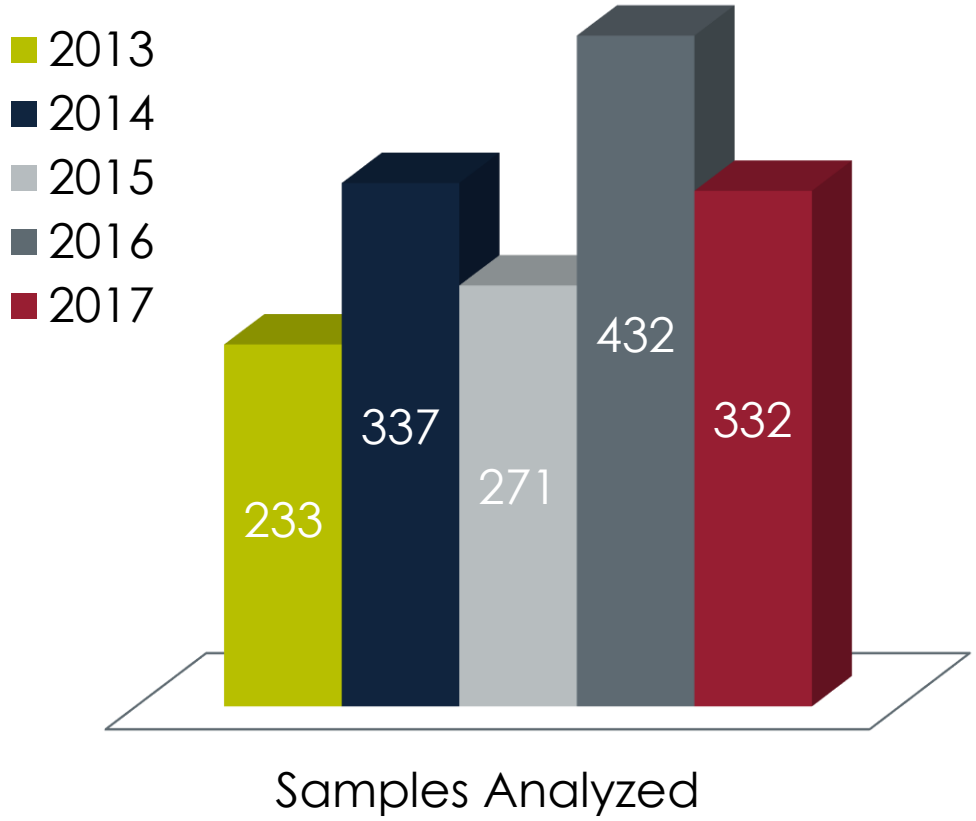
* Number of samples excludes miscellaneous sample types
** Area of each circle is proportional to the number of samples

In-house Radiochemistry

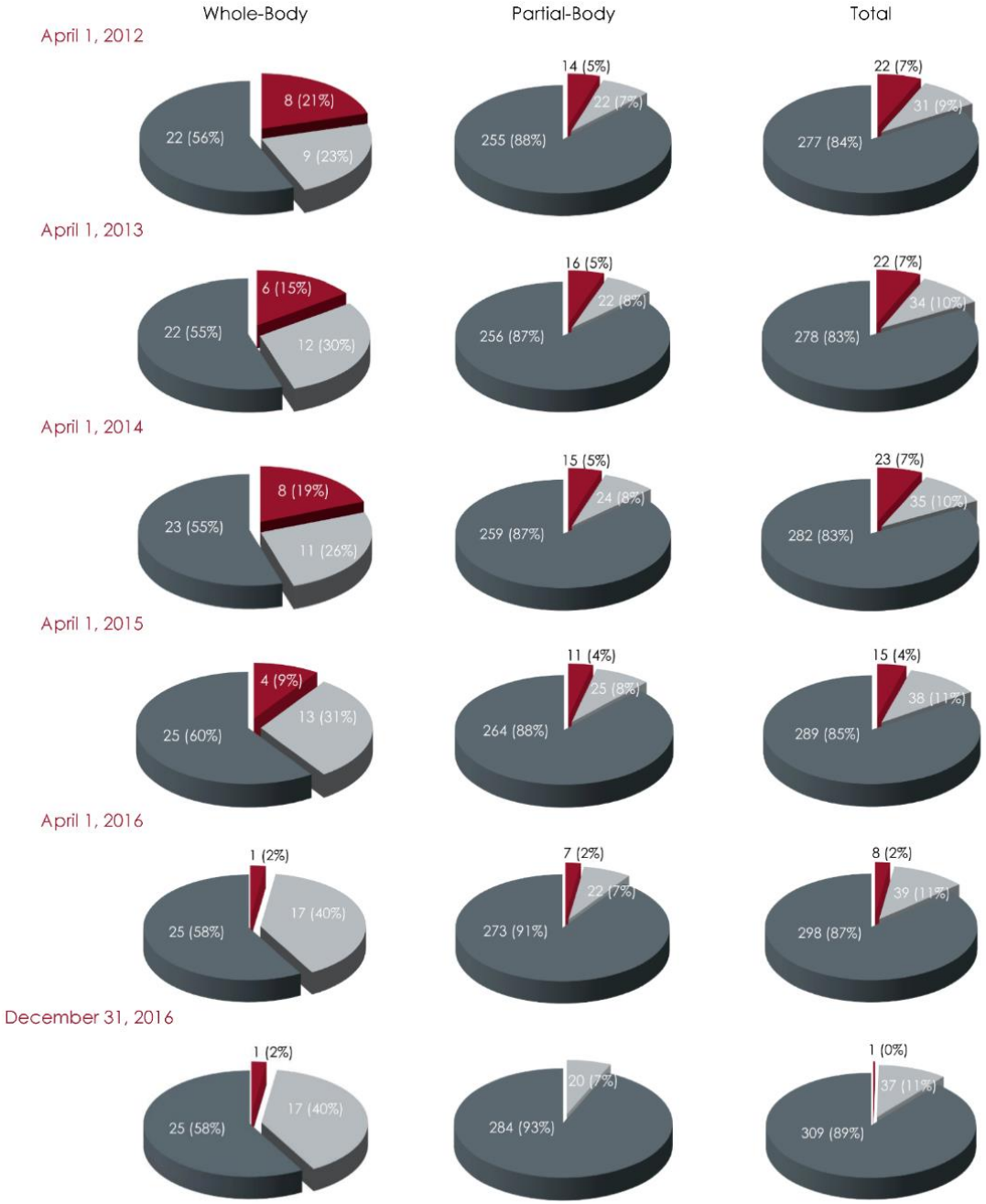
Elizabeth M. Thomas and George Tabatadze

G. Tabatadze. 2017 Radiochemistry Progress Report

2013 – 2017 Radiochemical Analysis of Tissues

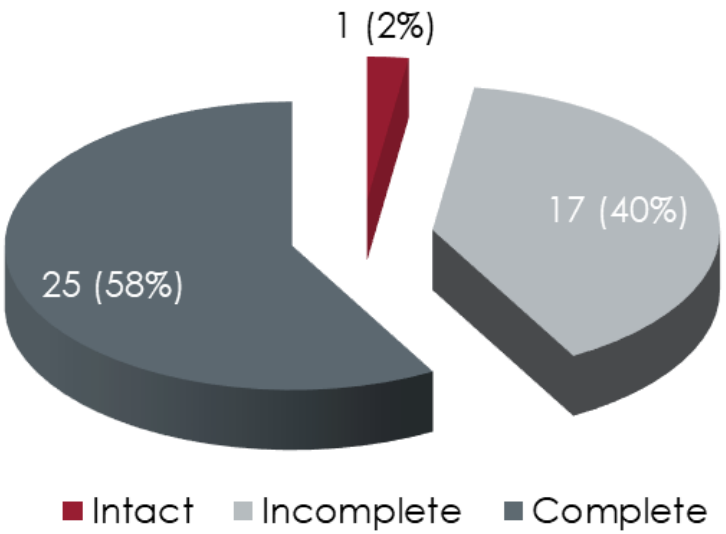


2012 – 2016 Donation Analysis Progress

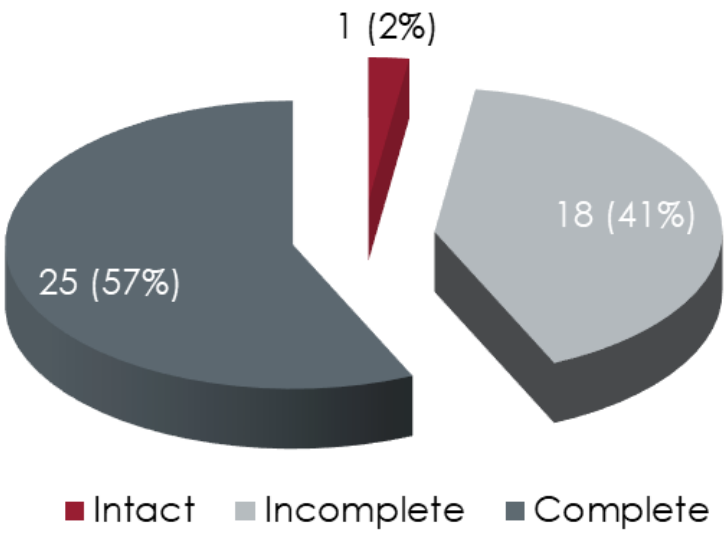


2017 Donation Analysis Progress: Whole Body

7/1/2016: 43



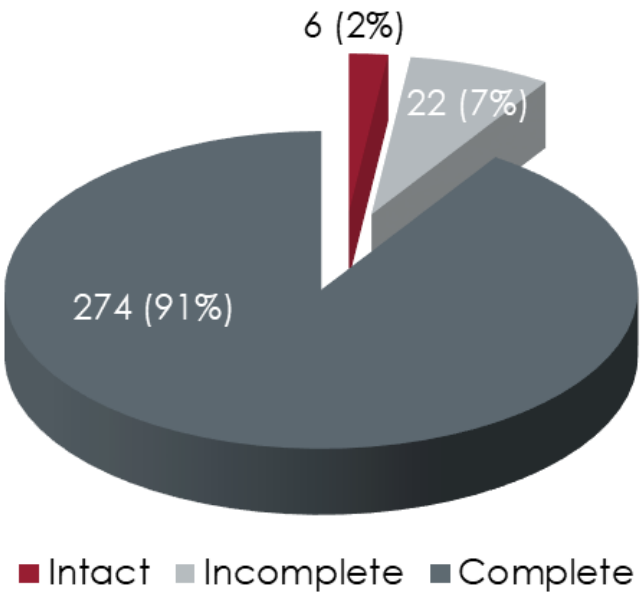
8/1/2017: 44



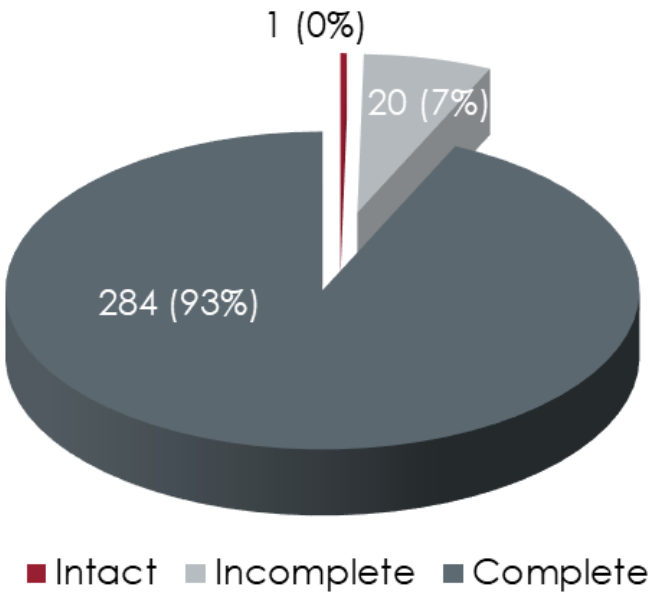
- Survey analysis of one donation was completed

2017 Donation Analysis Progress: Partial Body

7/1/2016: 302

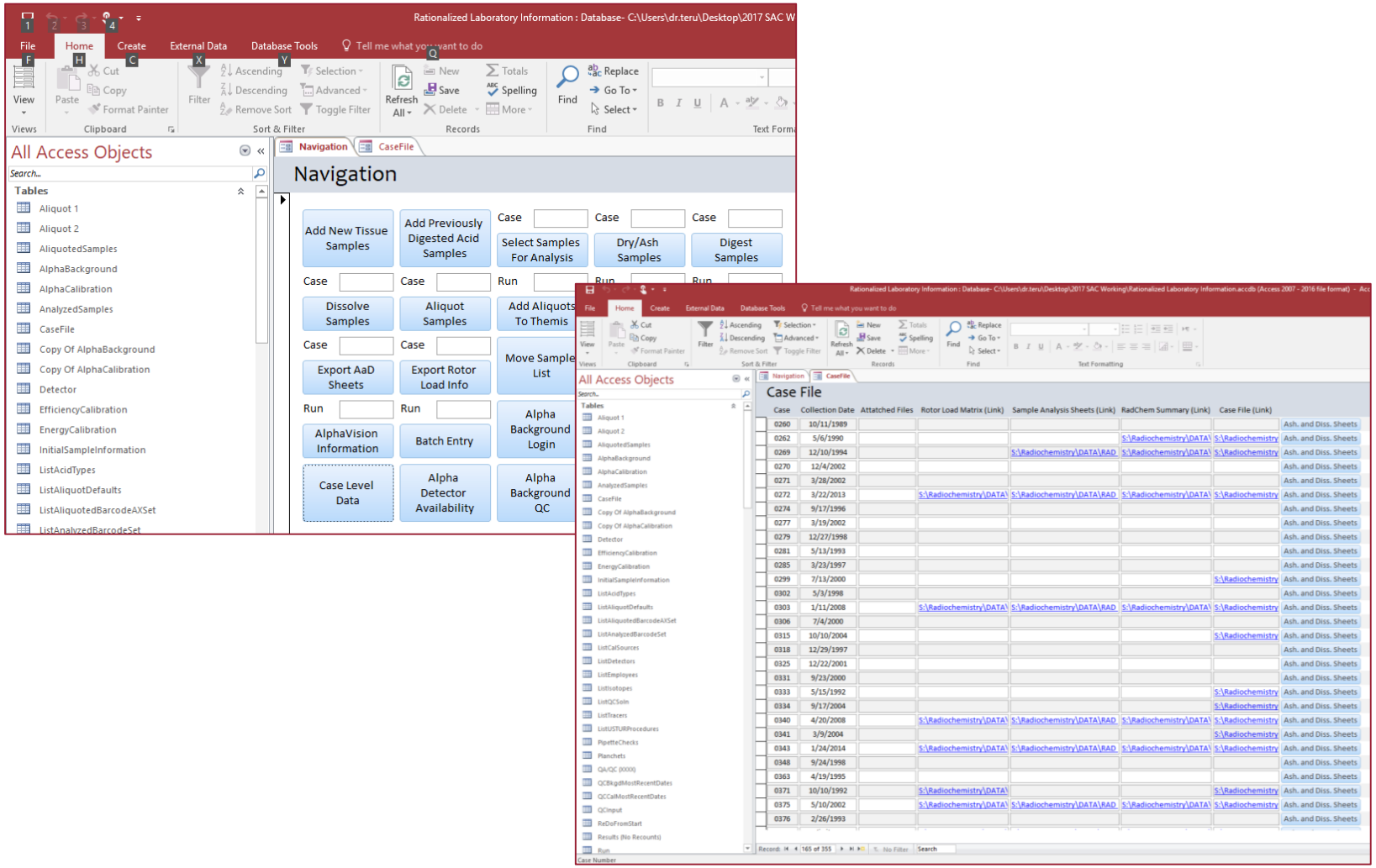


8/1/2017: 305



- Analysis of 10 donations was completed
- Backlog of intact cases was significantly reduced

Radiochemistry Database



Academic Activities

WSU Pharmaceutical Sciences (Spokane)

- Graduate Committee Members: Dan Strom, Sergei Tolmachev (major advisor)

WSU Graduate Certificate Program in Radiological Protection (Tri-Cities)

- Advisory Board Members: Dan Strom, George Tabatadze, Sergei Tolmachev
- Professor: Dan Strom, Internal and Environmental Dosimetry Class (ENVR_SCI 520) and Introduction to Radiological Science (ENVR_SCI 406)
- Guest Lecturer: Maia Avtandilashvili, *Introduction to IMBA Professional Plus®*, Internal and Environmental Dosimetry Class (ENVR_SCI 520)

Professional Services

- President-elect: Columbia Chapter of the Health Physics Society
- Board of Trustees: Herbert M. Parker Foundation
- Technical Board: Kyushu Environmental Evaluation Association
- Editorial Board
  - ✓ Austin Biometrics and Biostatistics
  - ✓ Japanese Journal of Health Physics
- Professional Committee: Health Physics Society International Collaboration
- Writing Team Captain: NCRP Council Committees 2
- Professional Society
  - ✓ Health Physics Society
  - ✓ Radiation Research Society
  - ✓ European Radiation Dosimetry (EURADOS) WG-7 on Internal Dosimetry
- *Ad-hoc* Review: Journal of Hazardous Materials (6.065)

USTUR/WSU - KEEA Partnership

- Signed on May 15, 2017 memorandum of understanding between WSU through the USTUR and Kyushu Environmental Evaluation Association (Fukuoka, Japan)
- Efforts: "*conduct program and activities of basic and applied research education and training, technology and information transfer, and economic development*"

Sergei Tolmachev (USTUR Director) and Noriyuki Momoshima (KEEA President)

2016 – 2017 Scientific Meeting Presentations

Podium (invited)

- Georgian National Academy of Sciences Meeting 1
- Columbia Chapter Health Physics Society Meeting 1
- 62nd Annual Meeting of the Health Physics Society 1

Podium

- WSU/COP Graduate Research Seminar 1
- EURADOS 2017 Annual Meeting 2
- 62nd Annual Meeting of the Health Physics Society 3

Podium (upcoming)

- 2017 Asian Pacific Symposium on Radiochemistry 2

Poster

- Brazilian Graduate Student Conference (BRASCON) 1

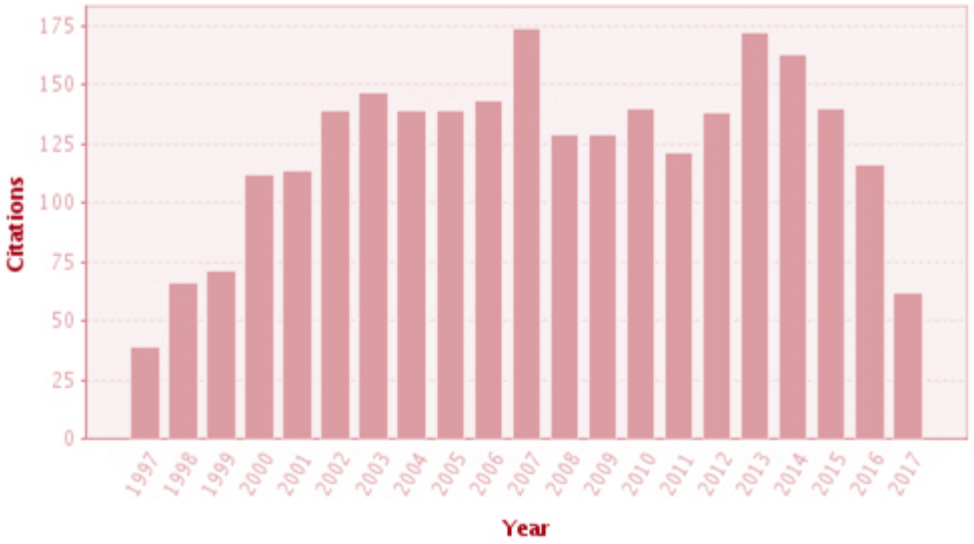
Publications 2017

- Full-Paper
  - ✓ Radiation Protection Dosimetry (0.917) 11†
  - ✓ PlosOne (2.806) 1
  - ✓ Epidemiology (6.075) 1
- Abstract
  - ✓ Health Physics (1.193) 4

† - including 10 by Alan Birchall from special issue on Mayak Worker Dosimetry System – 2013

Citations 1980 – 2017

- ResearcherID: I-1056-2013
- Platform: Web of Science
- Peer-reviewed publications: 293
- Cited articles: 199
- Times cited: 2,853
- Average citations: 14.3
- h-index: 28



USTUR Website: New Look

https://ustur.wsu.edu

50th Anniversary Events

- HPS special session on USTUR's research (2016)
- USTUR booth at the HPS (2016)
- Special issue of Health Physics journal (2017)
- Book of USTUR publications 1994 – 2017 (2018)

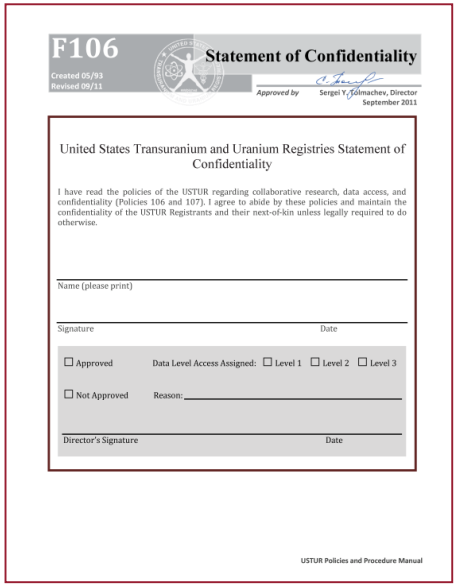
Fifth Special Issue

Worthington P. *Preface*

1. Kathren RL. *The United States Transuranium and Uranium Registries: Five decade follow-up of plutonium and uranium workers*
2. Cargaugh E. *The Atomic Man: Case study of the largest recorded ^{241}Am deposition in a human*
3. Avtandilashvili M. *Improving ICRP skeleton weight vs. body height equation*
4. Birchall A. *The importance and quantification of plutonium binding in human lungs*
5. Breustedt B. *USTUR Case 0846: Modeling ^{241}Am biokinetics following intensive decorporation therapy*
6. Dumit S. *Evaluating plutonium intake and radiation dose following extensive chelation treatment*
7. Goans RE. The pseudo Pelger-Huet cell as a retrospective dosimeter: Analysis of a radium dial painter cohort
8. Lopez MA. *Measurements of ^{241}Am and Monte Carlo simulations in three skull phantoms*
9. Tabatadze G. *Mapping ^{241}Am spatial distribution within anatomical bone structures using digital autoradiography*
10. Tolmachev SY. *Estimation of actinide skeletal content from patella bone analysis*
11. Zhou JY. *A novel approach to evaluate mesothelioma and radiation in the U.S. Transuranium and Uranium Registries*

Data Request: Idaho State University

- Graduate Project: development of ^{241}Am chelation model (Mr. Mason Jaussi)
- USTUR Case 0846 data: information on incidents, bioassay data, information on DTPA treatment, and post mortem tissue radiochemistry analysis results



F106

Statement of Confidentiality

Created 05/93
Revised 09/11

Approved by Sergei Y. Tolmachev, Director
September 2011

United States Transuranium and Uranium Registries Statement of Confidentiality

I have read the policies of the USTUR regarding collaborative research, data access, and confidentiality (Policies 106 and 107). I agree to abide by these policies and maintain the confidentiality of the USTUR Registrants and their next-of-kin unless legally required to do otherwise.

Name (please print)

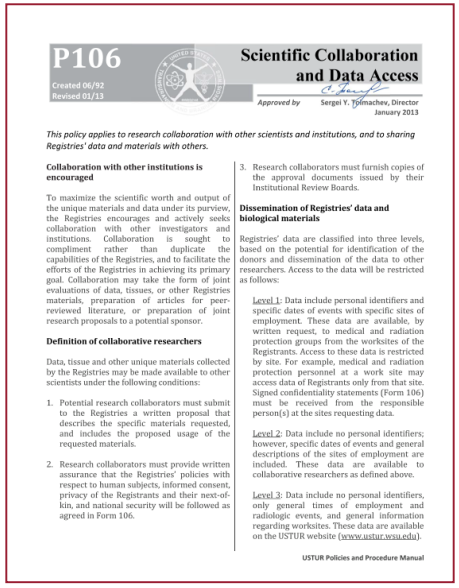
Signature Date

☐ Approved Data Level Access Assigned: ☐ Level 1 ☐ Level 2 ☐ Level 3

☐ Not Approved Reason:

Director's Signature Date

USTUR Policies and Procedure Manual



P106

Scientific Collaboration and Data Access

Created 06/92
Revised 01/13

Approved by Sergei Y. Tolmachev, Director
January 2013

This policy applies to research collaboration with other scientists and institutions, and to sharing Registries' data and materials with others.

Collaboration with other institutions is encouraged

To maximize the scientific worth and output of the unique materials and data under its purview, the Registries encourages and actively seeks collaboration with other investigators and institutions. Collaboration is sought to compliment rather than duplicate the capabilities of the Registries, and to facilitate the efforts of the Registries in achieving its primary goal. Collaboration may take the form of joint evaluations of data, tissues, or other Registries materials, preparation of articles for peer-reviewed literature, or preparation of joint research proposals to a potential sponsor.

Definition of collaborative researchers

Data, tissue and other unique materials collected by the Registries may be made available to other scientists under the following conditions:

1. Potential research collaborators must submit to the Registries a written proposal that describes the specific materials requested, and includes the proposed usage of the requested materials.
2. Research collaborators must provide written assurance that the Registries' policies with respect to human subjects, informed consent, privacy of the Registrants and their next-of-kin, and national security will be followed as agreed in Form 106.
3. Research collaborators must furnish copies of the approval documents issued by their Institutional Review Boards.

Dissemination of Registries' data and biological materials

Registries' data are classified into three levels, based on the potential for identification of the donors and dissemination of the data to other researchers. Access to the data will be restricted as follows:

Level 1: Data include personal identifiers and specific dates of events with specific sites of employment. These data are available, by written request, to medical and radiation protection groups from the worksites of the Registrants. Access to these data is restricted by site. For example, medical and radiation protection personnel at a work site may access data of Registrants only from that site. Signed confidentiality statements (Form 106) must be received from the responsible person(s) at the sites requesting data.

Level 2: Data include no personal identifiers; however, specific dates of events and general descriptions of the sites of employment are included. These data are available to collaborative researchers as defined above.

Level 3: Data include no personal identifiers, only general times of employment and radiologic events, and general information regarding worksites. These data are available on the USTUR website (www.ustur.wsu.edu).

USTUR Policies and Procedure Manual

P107

Publications

Created 06/92
Revised 09/11

Approved by Sergei Y. Tolmachev, Director
September 2011

This policy applies to all publications of the United States Transuranium and Uranium Registries. All collaborative researchers are subject to this policy.

Peer-reviewed publication of scientific findings is encouraged

It is the policy of the Registries to encourage publication of scientific findings and the associated data upon which these findings are based as expeditiously as practicable. Peer-reviewed scientific literature is the preferred vehicle for this purpose. To expedite publication further, preliminary results may be published in Registries Annual Reports, or in special topical reports.

Publication in peer-reviewed literature includes the following: articles; notes; abstracts; letters to the editor; other technical communications; or oral presentations of findings that have undergone independent review for scientific content and merit, given at scientific and technical meetings. Publication by the Registries scientific staff is encouraged, and, in keeping with the true spirit of academic freedom, does not require external or internal prior approval. The author(s) is(are) responsible for the scientific content of the publication, and for ensuring that there is no breach or violation of confidentiality, or other legal and ethical requirements.

Privacy of Rgistrants must be maintained

The USTUR has pledged confidentiality to the Registrants and their next-of-kin, and that pledge will pertain to all publications. No publicly available or open-literature publication shall be made in which Registrants are identified by name or other personal identifiers without the prior consent of the Registrant, or the legally responsible next-of-kin, unless legally required by law, regulation, or court order.

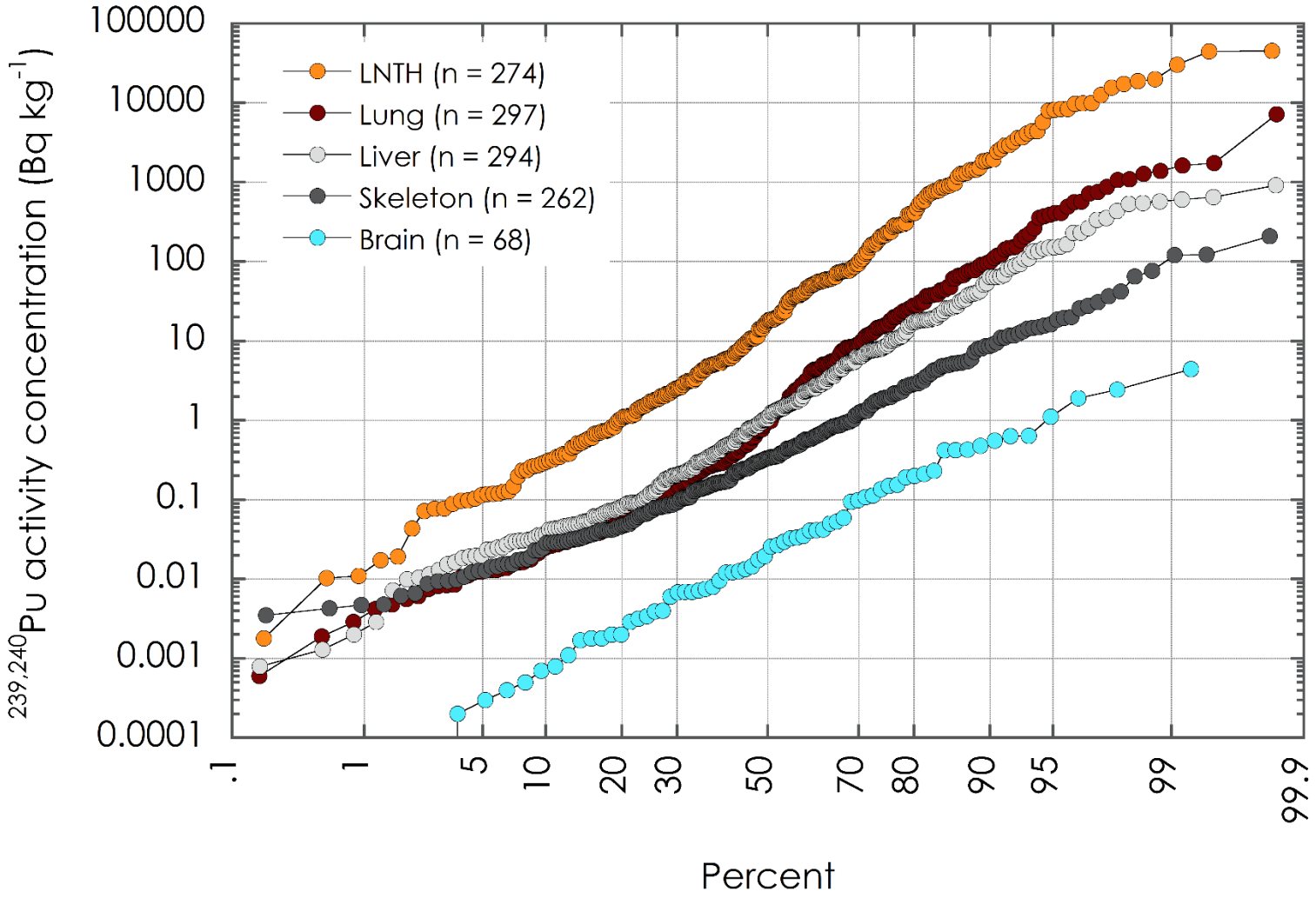
Specific dates of radiological or medical incidents, specific dates of employment, or the exact place of employment shall not be used in publications. Also, the use of specific descriptions of radiological incidents, health conditions, or causes of death should be avoided if they might assist a reader in the identification of a subject. Such information will be presented in general terms so that an individual reading the publication would be forced to perform additional research in order to identify the research subject. For example, times of events shall be stated as time (days, months, years) before or after the beginning of work, the end of work, or death. An individual might be classified as working at Rocky Flats, Hanford, or other sites, but no specific work location or employer will be identified.

Approval may be required for non-peer-reviewed publications

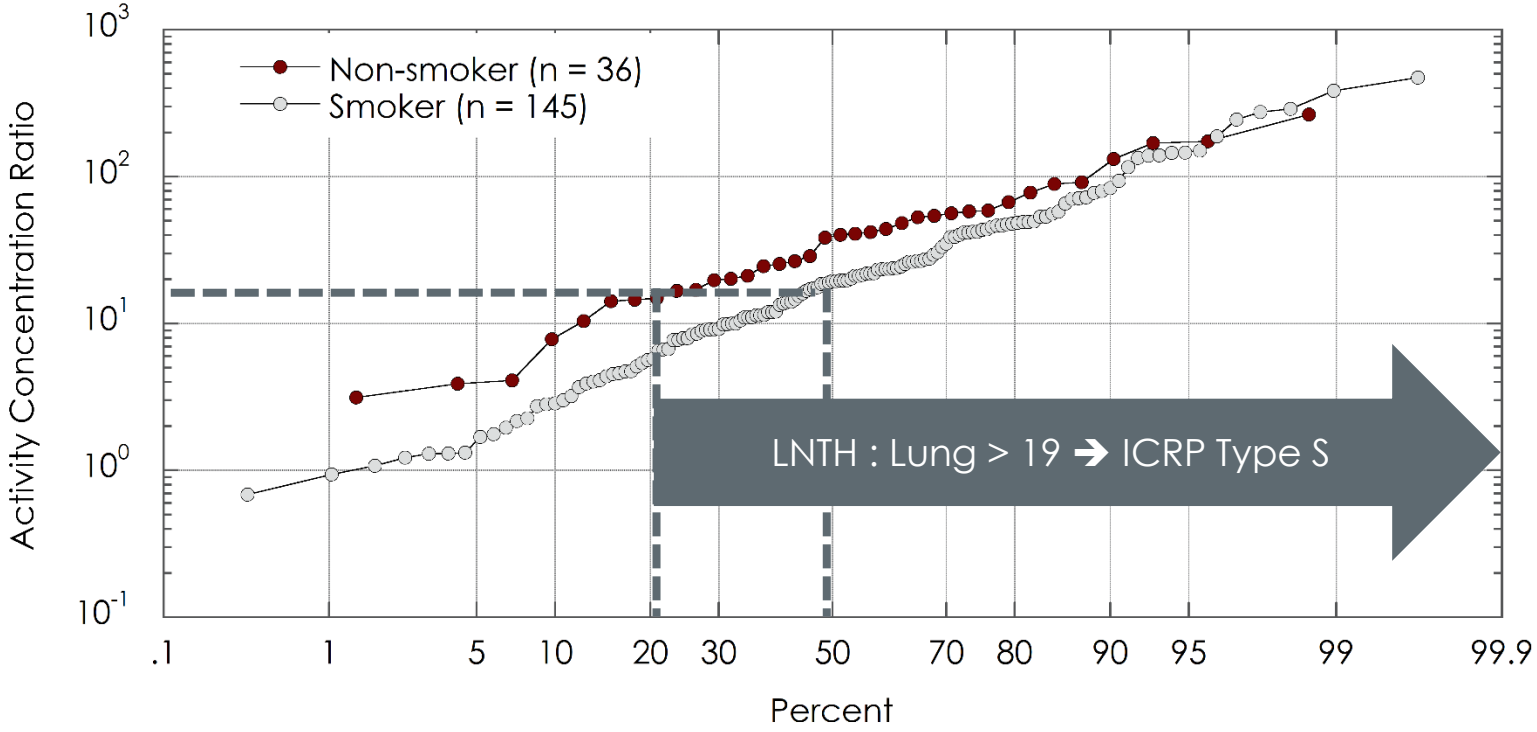
The author(s) is(are) responsible for obtaining the Registries' approval of press releases and publications that do not undergo external scientific peer review prior to release or distribution. Customarily, it is the responsibility of the senior author to obtain the approval. This should not be construed to impose any constraints on formal or informal communications between Registries staff and external persons on technical or scientific matters, and applies only to 1) documents specifying Registries policy or administrative practice, or making commitments of Registries

USTUR Policies and Procedure Manual

Plutonium in Tissues of USTUR Donors



Distribution of Pu in Lungs and Lymph Nodes and Relationship to Smoking Status: Update



Smoker	Yes	No
Range	0.68 – 473	3.15 – 265
Geometric Mean	17.4	32.3
95% CI for Mean	14.0 – 21.6	22.6 – 46.0

S. Tolmachev, SAC2017: 2016 Recommendations & 2017 Progress Report

Thank you