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

Research Plan and Operation in FY2018

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"Learning from Plutonium and Uranium Workers"

Funding

- Agency: U.S. Department of Energy, Domestic and International Health Studies (AU-13)
- Project: Management and Operation of the United States Transuranium and Uranium Registries
- Total budget: $5,500,000
- Period: 4/1/2017 – 3/31/2022
- FY2017 budget: $1,063,400

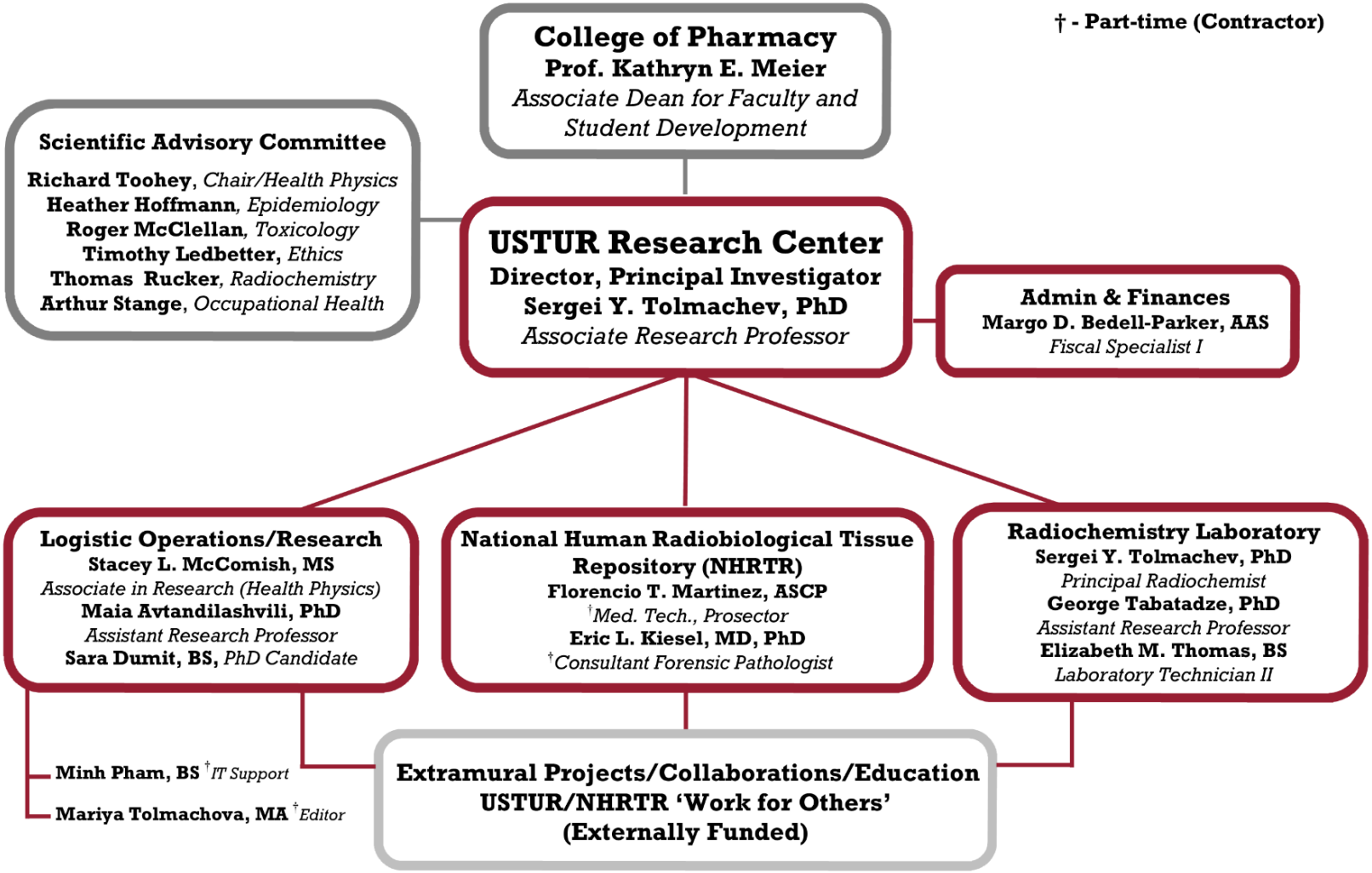
Personnel

FY2017 total FTE: 5.8

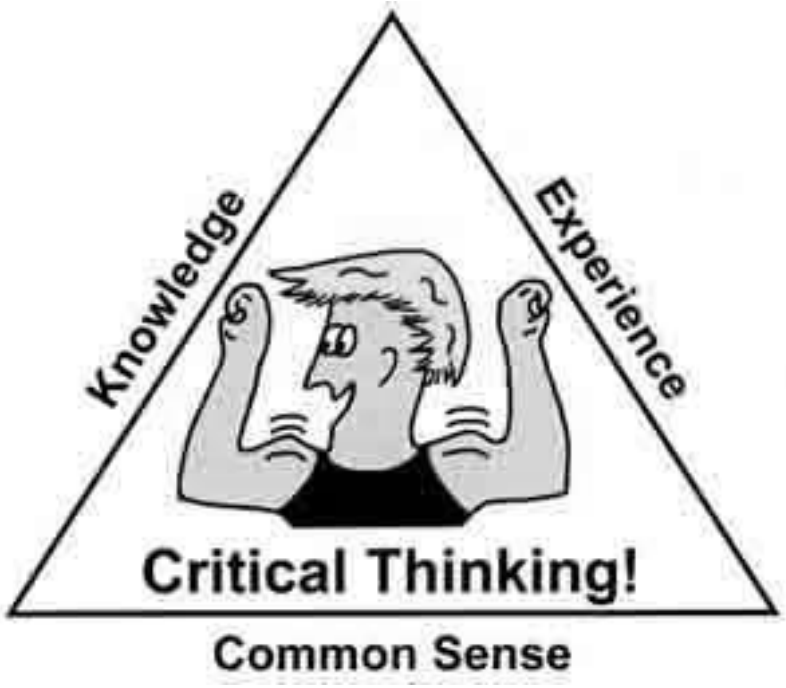
- PI, Director: 1.0
- Research faculty: 2.8
- Technical personnel: 1.0
- Administrative personnel: 1.0

Adjunct faculty: Daniel J Strom (WSU)
(4/1/2017 – 3/31/2020)

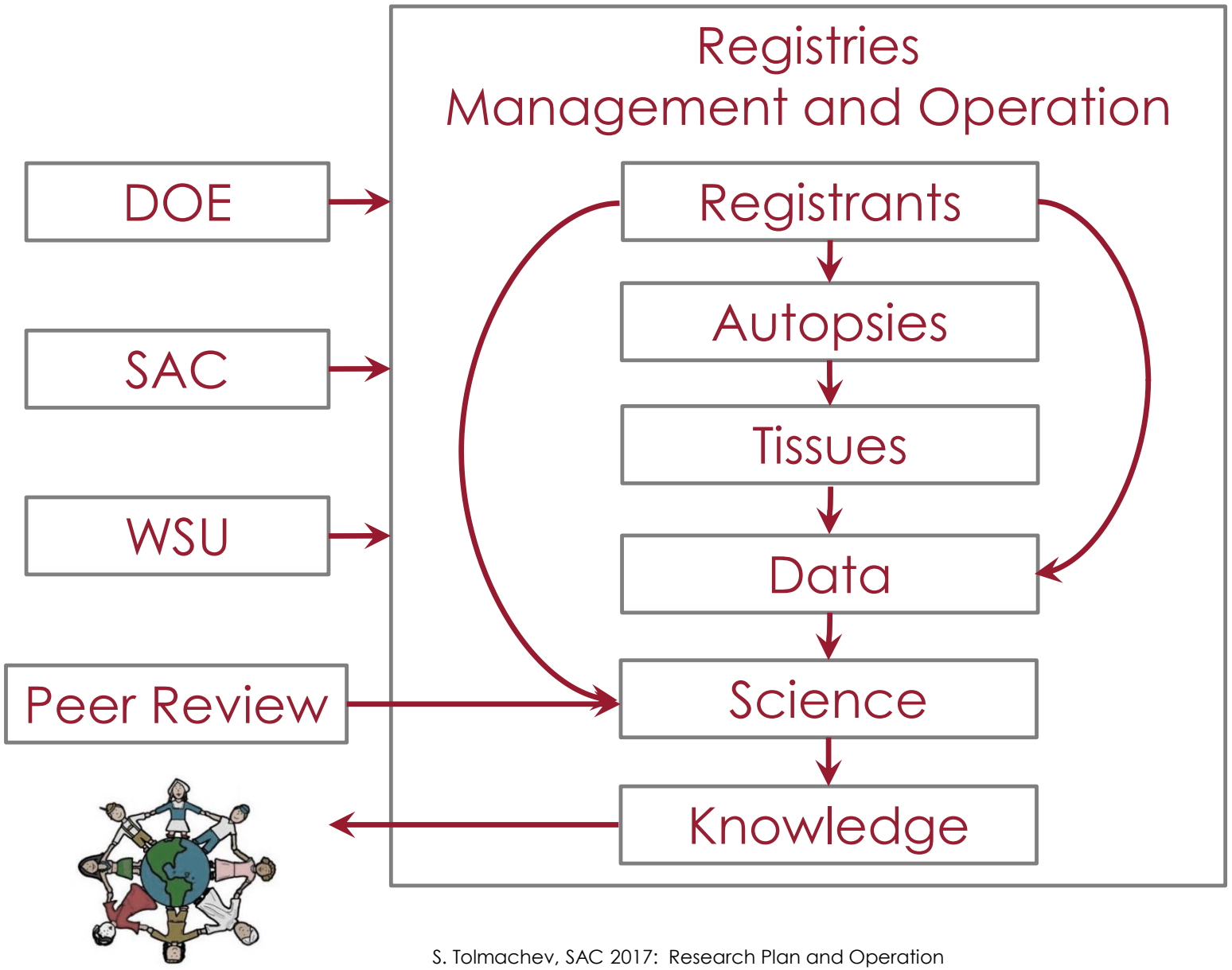
Organization Structure



‘New’ SAC Member: Worker Representative?



High Level View of USTUR as a System



Specific Aims

- Manage and operate the Registries
- Conduct scientific research
- Demonstrate and promote broader use and application of USTUR research, data, and materials

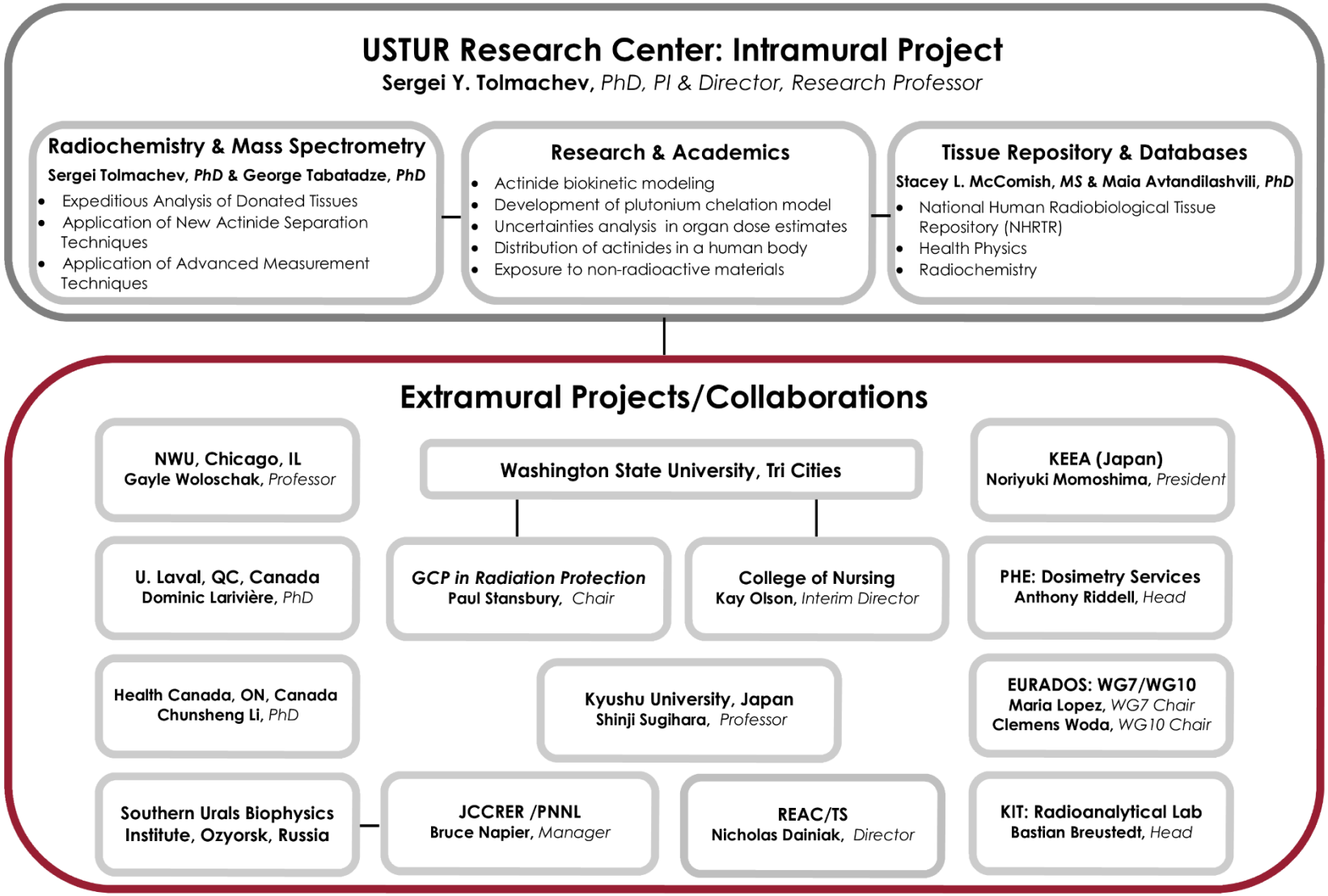
Management and Operation

- 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

Primary Research Focus

- Actinide biokinetic modeling and dosimetry
- Development of plutonium chelation model
- Analysis of uncertainties in organ dose estimates
- Explore opportunities to study occupational exposure to non-radioactive materials

Research and Collaboration Network



EURADOS

一般財団法人
九州環境管理協会

Health Canada

reac/ts

ЮУрИБФ

National Council on Radiation Protection and Measurements

Pacific Northwest NATIONAL LABORATORY

KIT Karlsruhe Institute of Technology

Public Health England

UNIVERSITÉ LAVAL

New Opportunities

- Washington State University, Institute of Nuclear Science and Technology (INST)

https://nuclearscience.wsu.edu/

- Colorado State University, Department of Environmental and Radiological Health Sciences

http://csu-cvmbs.colostate.edu/academics/erhs/

Department of
ENVIRONMENTAL &
RADIOLOGICAL HEALTH SCIENCES
COLLEGE OF VETERINARY MEDICINE & BIOMEDICAL SCIENCES

Broader Use of USTUR

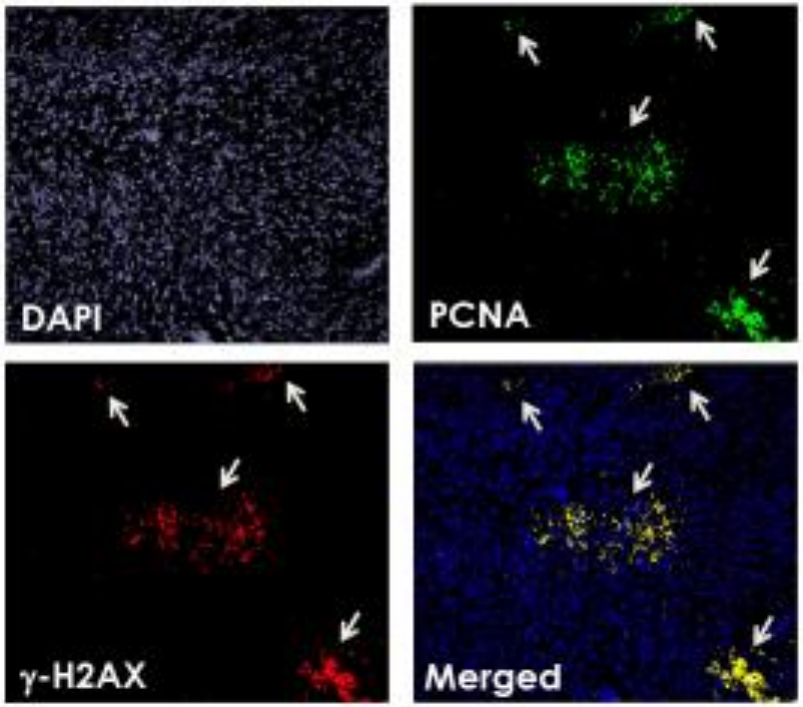
Materials:

- Actinides in brain (NCRP-NWU)
- Radiation biomarkers and DBS markers (REACT/TS, Health Canada)
- Nuclear forensics (LANL)
- Beryllium determination (KEEA)

Data:

- Plutonium bound fraction (ORNL, JCCRR)
- Development of chelation model for actinides (EURADOS, LANL, ISU)

REACT/TS: Immunostaining Case 0785 Tumor



- Green: proliferating cell nuclear antigen (PCNA) - specific for proliferating cells
- Red: phosphorylated H2AX (Ser139/Tyr142) - surrogate DSB marker

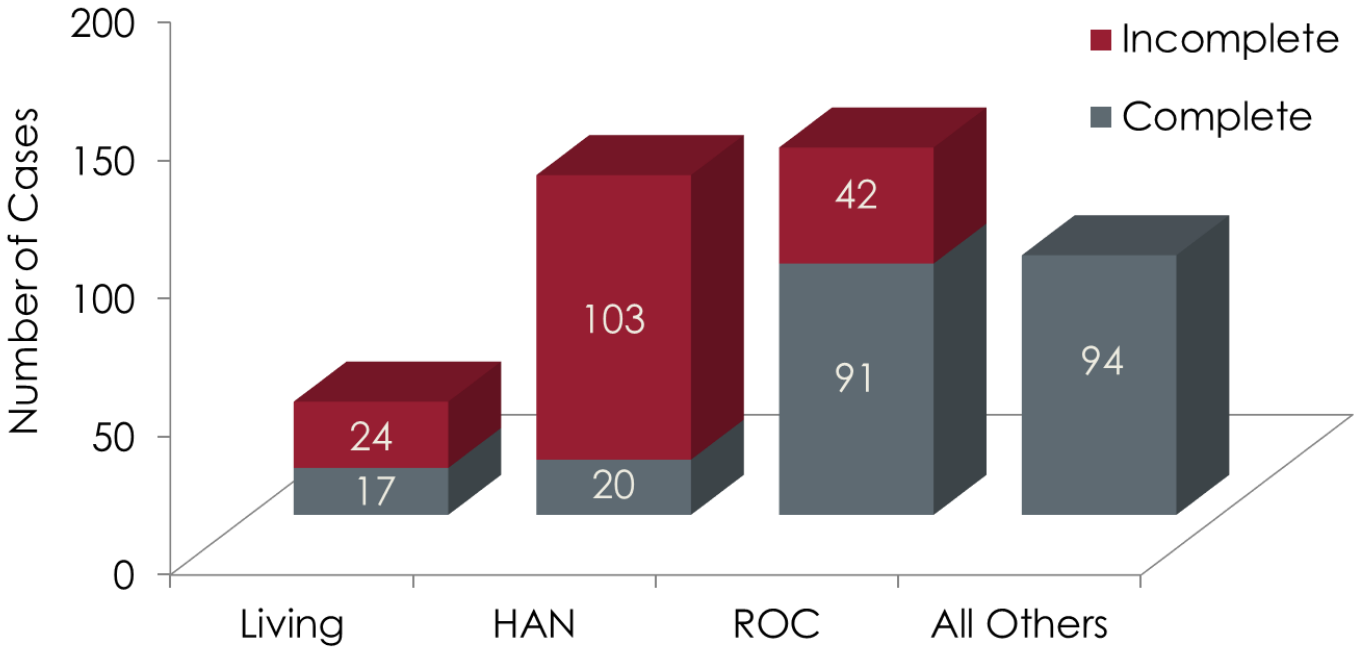
- Arrows indicate regions of poorly differentiated tumor cells positive for PCNA and γ-H2AX

National Human Radiobiological Tissue Repository (NHRTR)

- Expeditiously dissect and inventory tissues from new donations
- Inventory remaining USTUR materials
- Inventory tissue samples from non-USTUR collections
- Inventory of acid-digested tissue samples from non-USTUR collections

Health Physics Database Tasks

- Complete data standardization for all living Registrants in 2018
- Complete database population in 2022

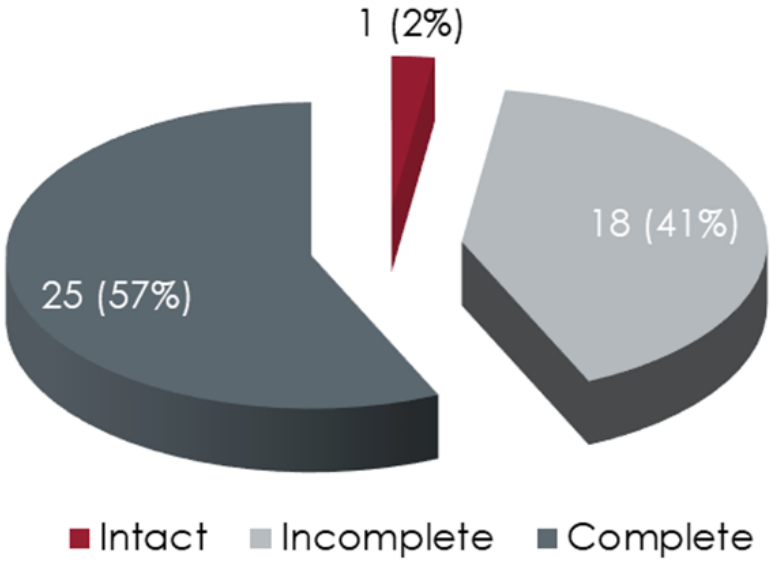


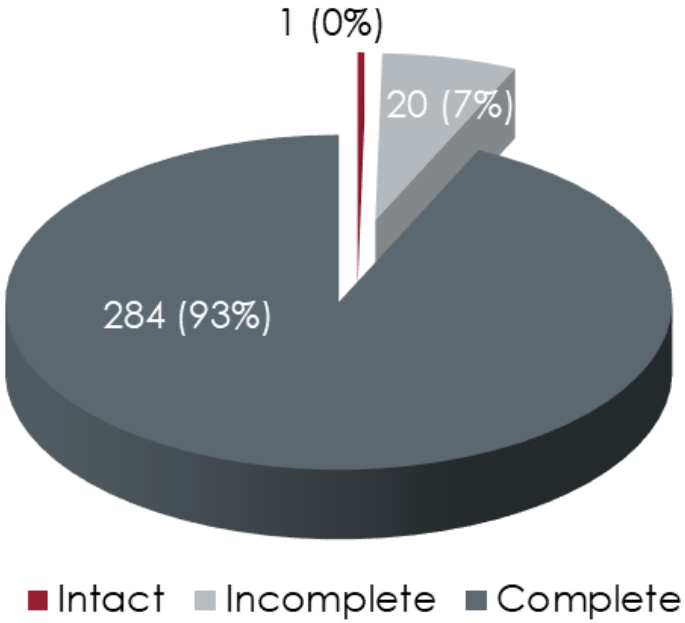
Radiochemistry Group Tasks

- Analyze new donations as received
- Complete analysis of all partial-body donations
- Complete DQO
- Populate Radiochemistry database

Radiochemical Analysis Status 2017

- Whole-body: 44
- Partial-body: 305

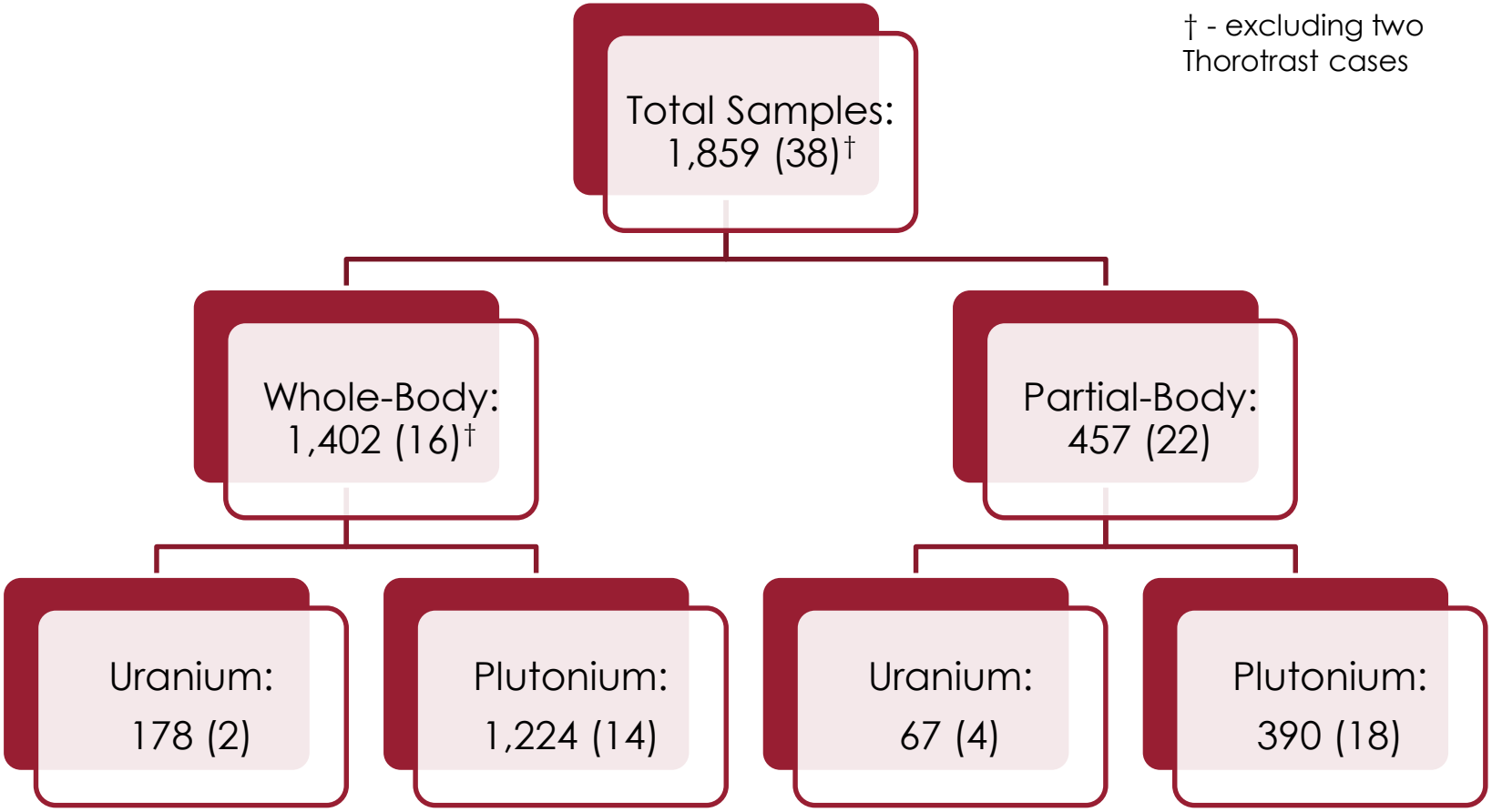




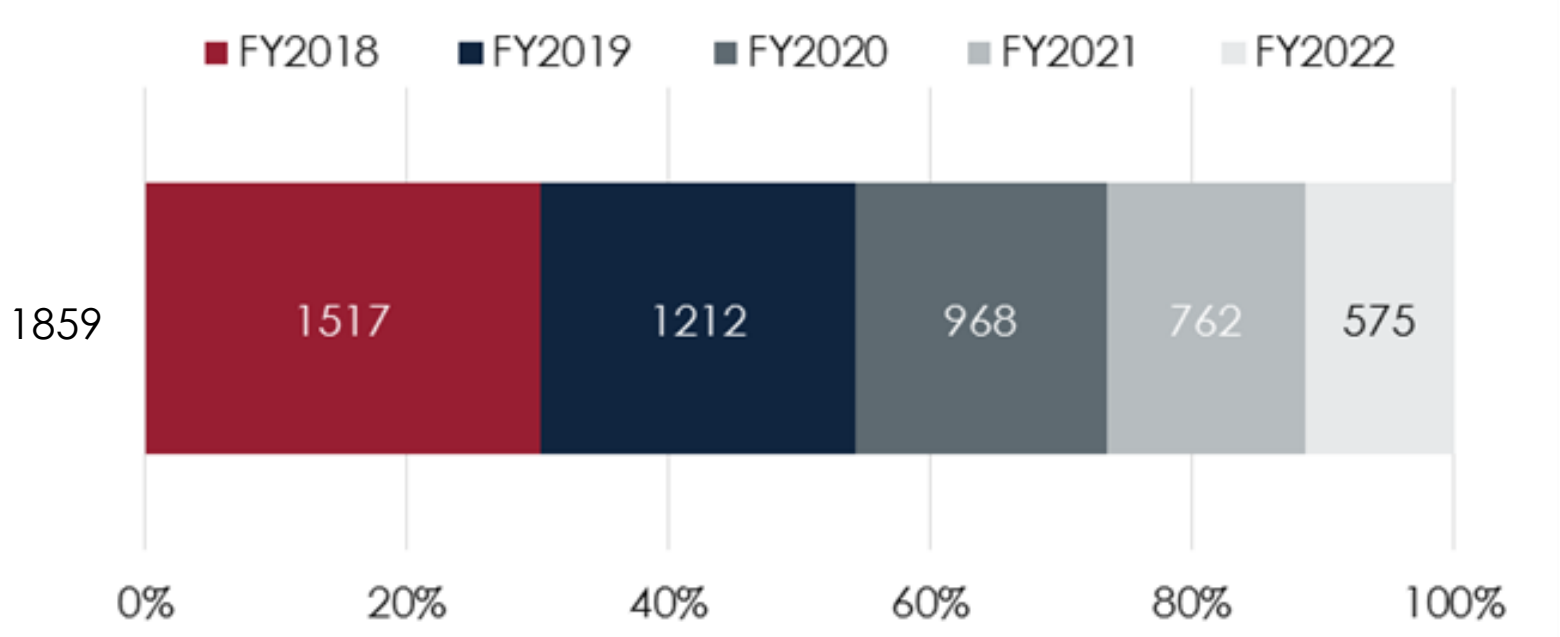
1. Intact – no tissue samples were analyzed
2. Incomplete – limited samples were analyzed; 'survey' analysis completed
3. Complete – no samples need to be analyzed

Tissue Sample Backlog

† - excluding two Thorotrast cases



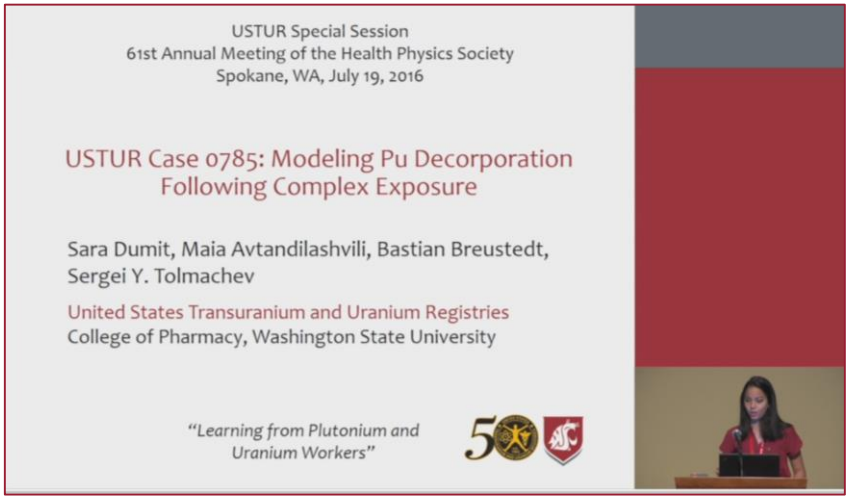
Estimation of Tissue Sample Backlog



S. Tolmachev, SAC 2017: Research Plan and Operation

50th Anniversary Activities

- Publishing video presentation from USTUR special session



- Publishing special issue of Health Physics journal
- Publishing book of USTUR publications 1994 – 2017

Improving Worker Safety

Radiation Dose Assessment

Worksite

- Chest and urine measurements (bioassay)
- Estimation of intake and radiation dose using biokinetic and dosimetric models

USTUR

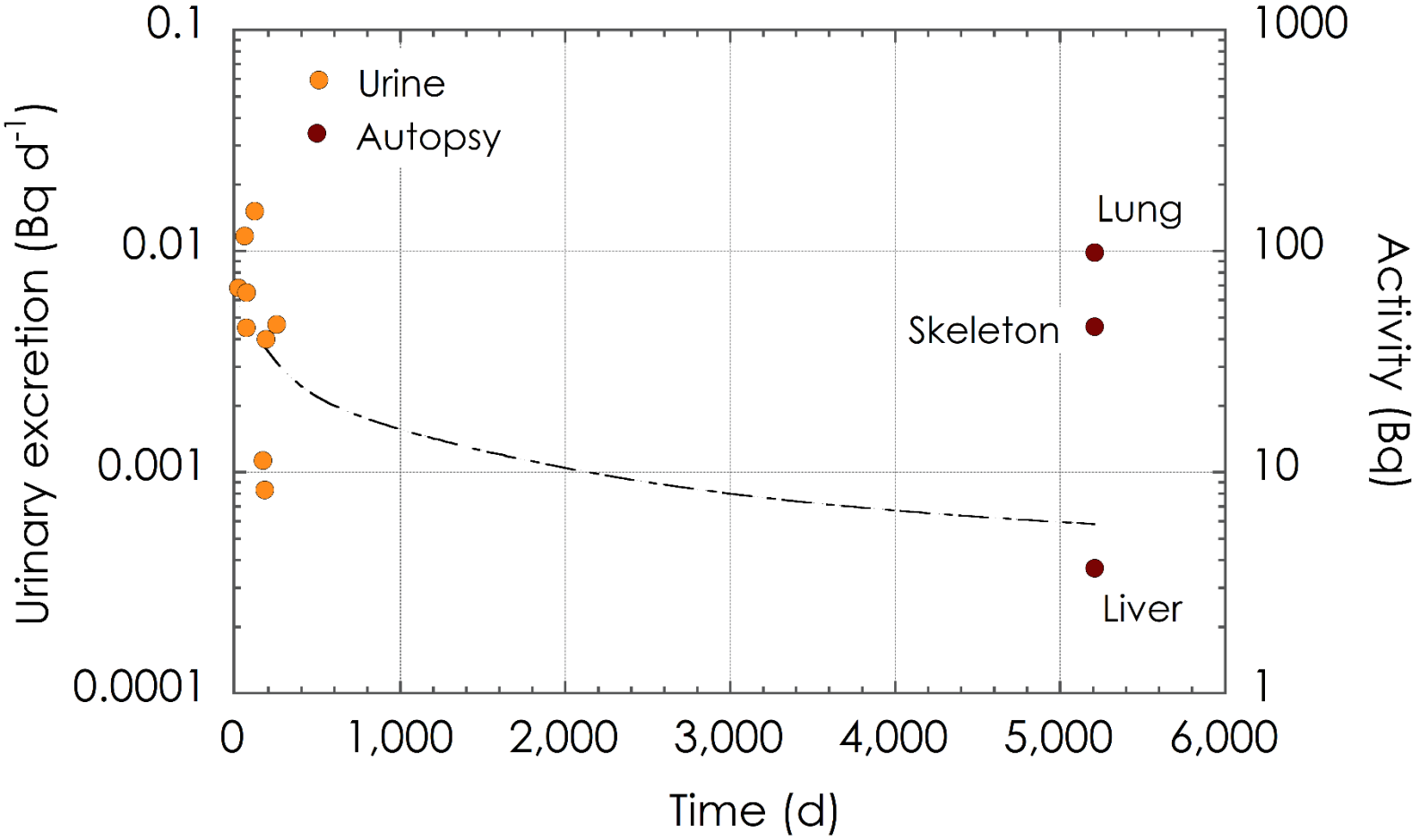
- Using autopsy data to improve models and predictions of committed dose
- Improving worker protection

Dose Estimation: Bioassay vs Autopsy

Case	Lung Dose, mSv		Ratio
	Urine Only	Bioassay + Autopsy	
Nitrate			
0224	395(2.5)	230(1.5)	0.58
0631	525(2.2)	190(2.0)	0.37
0795	130(2.5)	48(1.5)	0.37
Average			0.4±0.1
Oxide			
0028	3,410(2.2)	9,830(1.3)	2.88
0036	3,350(2.5)	5,050(1.2)	1.51
0407	8,800(3.1)	20,920(1.2)	2.38
0821	5,110(2.7)	7,000(1.3)	1.37
Average			2.0±0.7

Data Gap: Post-employment Bioassay

- Extensive urine sampling immediately after intake, but less or none later on



Late Bioassay Benefits

- Better quality data
- Improving dose estimate

Case 0785	Early	+ Late	+ Autopsy
Eff. Dose, Sv	1.3	1.4	1.5

- 41 living Registrants
- Post-nuclear employment: 33.6±14.9 y

➢ Urine sample collection from living Registrants

Thank you