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Overview

The U.S. Transuranium and Uranium Registries (USTUR), and the associated National Human Radiobiology Tissue Repository (NHRTR), is a federally-funded human tissue research program. It provides long-term follow-up of plutonium, americium, and uranium (actinides) biokinetics, and potential health effects in nuclear workers (volunteer registrants) with accidental internal depositions of these elements. Since its establishment in 1968, the USTUR has received tissues from 39 whole-body and 292 partial-body donations. An additional 12 whole-body and 59 partial-body potential donors are currently registered with the USTUR.

National Human Radiobiological Tissue Repository (NHRTR)

The NHRTR houses several tissue sample collections, including:

- **USTUR Registrants:** the primary focus of this poster. Thousands of frozen, formalin fixed, ashed, and acid-dissolved bone and soft tissue samples are available for analysis.



Frozen USTUR tissues

- **Radium Dial Painters:** women who ingested radium in the early 1900s while painting watch dials and military instruments with radium paint. The radium dial painter collection consists of dried bones, plastic embedded bones, frozen tissues, and data from the women who worked in the radium industry.



Ra dial painter bone

The Registries

- Studies actinide elements in the human body – in persons with documented, occupational exposures to those elements.
- Voluntary Human Tissue Program.
- Funded through the U.S. Department of Energy.
- Operated by Washington State University, College of Pharmacy.
- Administrative offices and laboratory facilities in Richland, WA.

39 Whole-body donations.

292 Partial-body donations.

12 whole- and 59 partial-body potential donors are still living.

8,000+ frozen or formalin fixed tissues.

~10,000 acid-digested tissues, previously analyzed for actinides and available as acid solutions for future research.



Goals

- Evaluate and improve biokinetic models.
- Model the effects of chelating agents (e.g. DTPA, EDTA) on long-term tissue retention and urinary excretion of actinides.
- Establish national data bank.
- Compare pre-mortem estimates with tissue analysis.
- Assess radiation protection standards.

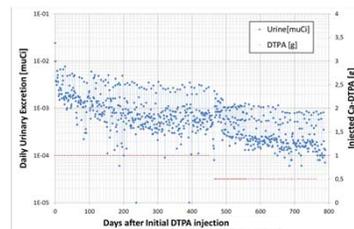
Results

- Improved understanding of human actinide metabolism.
- Enhanced occupational and public radiation safety.

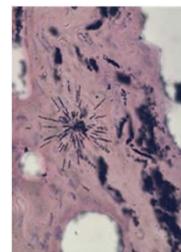
Current USTUR Research

Current research topics at the USTUR include:

- Coupling the plutonium dosimetric and DTPA pharmacokinetic models to test and further develop the European Radiation Dosimetry Group (EURADOS) chelation therapy model.



- Characterization of the distribution of plutonium in the lungs of a USTUR registrant are under revision for publication in Cancer Research.



Plutonium encapsulated within sub-pleural connective scar tissue emits a particles in a "star" pattern, seen when the autoradiography film was developed. Black cigarette residues can also be seen in the surrounding tissue.

- Validation of proposed revisions to the International Commission on Radiation Protection's (ICRP) human respiratory tract model by modelling the translocation of highly insoluble PuO₂ in two Registrants that were exposed during a fire.
- Elemental bio-imaging of actinides in human tissues using Laser Ablation Inductively Coupled Mass Spectrometry (LA-ICPMS) and Synchrotron Radiation Micro X-ray Fluorescence (SR Micro-XRF) spectrometry.

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