

## The U.S. Transuranium and Uranium Registries Resources for Radiation Dosimetry and Biological Effects

**A unique collection of hundreds of tissue samples available for research and education**

### The Purpose of This Brochure

The purpose of this brochure is to inform researchers and educators about the National Human Radiobiological Tissue Repository (NHRTR) sample collection and to solicit utilization of the samples for studies of localized tissue doses, studies of micro-distribution of the actinide elements, and molecular biological or biomarker studies. Without such utilization, the samples may have to be discarded because storage is expensive and prolonged storage of the samples (even at  $-70^{\circ}\text{C}$ ) may eventually diminish their potential usefulness for such studies.

### The National Human Radiobiological Tissue Repository

The NHRTR is one component of the United States Transuranium and Uranium Registries (USTUR). It contains frozen tissues, tissue solutions, microscope slides, and paraffin blocks that were collected by the USTUR at autopsy of workers with documented intakes of plutonium, americium, uranium, and thorium.

### The NHRTR is a Great Resource

The samples in the NHRTR are available to qualified scientists who are interested in

conducting studies of localized tissue doses, studies of micro-distribution of the actinide elements, or studies of radiation induced molecular changes.

### The NHRTR Collection is Unique and Well Documented

*Samples Containing Plutonium, Americium, and Uranium*

The USTUR receives tissues donated at autopsy or whole-body donations from workers who had documented intakes of the actinide elements from employment at U.S. weapons plants. Upon receipt of the tissues, the USTUR divided them, radiochemically analyzed one portion of them, and retained the other portion in a frozen ( $-70^{\circ}\text{C}$ ) state. Table 1 contains a partial list of the NHRTR tissue collection and Table 2 is a list of microscope slides and paraffin blocks.

*Samples Containing Thorium*

The USTUR has received and analyzed tissues from two whole-body donations that had been injected with Thorotrast during medical procedures. Approximately one-half of each body was analyzed and the other half is preserved in a frozen state in the NHRTR.

*Samples Containing Radium*

A unique collection of tissues from the Radium Dial Painter program were received from the Center for Human Radiobiology at the Argonne National Laboratory. Many of these materials have been stored in a frozen state in the NHRTR. These materials were derived from a unique population of workers in the Radium Dial Painter industry, beginning in the 1910's and 1920's in the United States.

## Figure 1—Database Structure

### Information About the NHRTR Samples

An inventory of NHRTR samples containing plutonium, uranium, and americium is included in the USTUR database, which is made up of seven tables linked by USTUR Case number (Figure). Information about thorotrast-injected donors includes amount injected, age at injection, autopsy reports, and radiochemical analytical results.

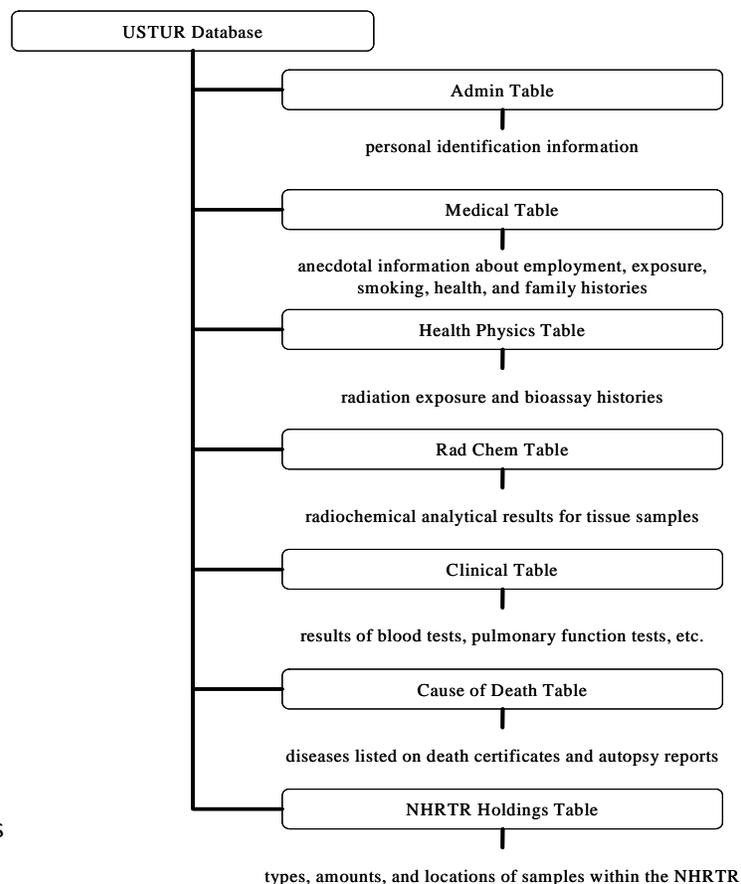
The radiation doses to the radium dial painters before death and autopsy were determined by whole body counting and radon exhalation measurements. Detailed information about each measured dial painter is available through publications that contain tables with estimated skeletal radiation doses, exposure time periods, ages at exposure (and death), and much other pertinent information. This information can be supplied with frozen tissue samples and an electronic form of the files are available in DOE's Comprehensive Epidemiologic Database (CEDR) at <http://cedr.lbl.gov>.

### Availability of NHRTR Samples

To qualify for receipt of NHRTR samples, researchers must:

- Provide a brief summary of the intended use of the samples
- Sign a confidentiality statement agreeing to protect the identities of subjects
- Provide a copy of IRB approvals, if appropriate

USTUR authorship on published reports is not a condition of collaboration; however, acknowledgement of the source of the materials would be appropriate.



*This large collection of well-preserved and inventoried tissues, records, and related materials is available to other researchers or laboratory institutions for study of radiation effects, cancer, and other molecular changes.*

Samples Available	Am/Pu	Uranium	Thorotrast
Abdominal Fat	28	9	1
Abdominal Muscle	23	8	-
Aorta Arch	9	-	-
Blood from Heart	18	6	-
Brain	25	6	-
Calvarium	10	4	-
Clavicle	24	6	-
Esophagus	17	6	-
Femur	15	5	-
Heart	28	4	-
Hilar Lymph Nodes	28	4	-
Kidney	73	20	-
Liver	50	8	1
Lower Extremity Bone	56	11	5
Lung	49	11	1
Lymph Nodes Other	18	-	-
Muscle Samples	27	9	3
Patella	14	2	-
Pelvis Left Half	12	3	1
Pituitary	11	3	-
Prostate	18	6	-
Rib Left Side (1-12)	12	3	1
Ribs	28	4	-
Skin	25	8	-
Skin Samples	21	9	3
Skull Left Half	9	2	1
Small Intestine	8	1	-
Spleen	38	10	-
Sternum	27	7	-
Stomach	21	5	-
Testes	55	13	1
Thyroid	30	9	-
Tumor, Lung	11	2	-
Upper Extremity Bone	47	6	5
Urinary Bladder	6	1	-
Vertebra	144	36	12

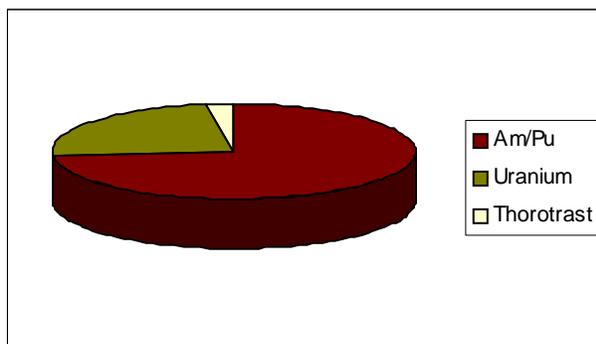
Table 1—Frozen Tissue Samples

Table 1—other tissues: There are additional tissues available for which a limited number of Am, Pu and/or Uranium samples exist, e.g. less than five. These are: blood; gall bladder; large intestine, larynx; pancreas; trachea; bone tumor; breast tumor; kidney tumor; liver tumor; mediastinal tumor; pancreatic tumor; rib tumor; wound site; wound site muscle; and wound site skin.

Slides/Blocks Available	Am/Pu	Uranium
Adrenal	53	8
Aorta	9	-
Bladder	12	1
Bone Marrow	13	1
Brain	27	8
Central Nervous System	8	-
Endocrine	5	1
Esophagus	6	1
Gastrointestinal Tract	19	-
Heart	59	11
Intestine	6	2
Kidney	64	13
Liver	65	12
Lung	70	13
Lymphatic	35	5
Pancreas	49	11
Peritoneal Tissue	14	-
Prostate	22	6
Respiratory Tract	29	-
Spleen	29	11
Stomach	17	1
Testes	19	2
Thyroid	26	10

Table 2—Microscope Slides

Table 2—other tissues: There are additional slides and blocks available for which a limited number of Am, Pu and/or Uranium samples exist, e.g. less than five. These are: appendix; biliary system; cerebellum; cerebrum; colon; diaphragm; duodenum; ileum; jejunum; larynx; myocardium; medulla; pituitary; soft tissue; spinal cord; thymus; tongue; trachea; lung tumor; and vertebrae.



**Hundreds of USTUR tissue samples are available for scientific utilization**

## The United States Transuranium and Uranium Registries

The United States Transuranium and Uranium Registries (USTUR) are human tissue research programs. The Registries study the organ distributions, radiation doses, and possible health effects of radioactive elements such as plutonium, americium, uranium, and thorium in the human body. Figure 1 shows the extensive set of documentation associated with each USTUR case and sample.

### Origins of NHRTR Samples—USTUR Operations

Persons with a known history of intake of radioactive materials are suitable candidates for participation in the research of the USTUR. Registrants are all volunteers who authorize the Registries to obtain their individual medical and radiation exposure records for research purposes, and to collect tissue samples after death. USTUR autopsies are performed by independent pathologists near the site of a Registrant death.

Volunteer donors pre-plan the donation by granting the USTUR full consent to collect tissues after death. In some cases, the whole body may be donated to the USTUR. The consent can be withdrawn at any time by the donor and, after death, by the donor's family. The donation program is similar to organ donations for medical purposes, designated on a drivers license.

The research is federally funded through a grant from

the U. S. Department of Energy (DOE) to Washington State University (WSU). The Registries are administratively part of the WSU College of Pharmacy, with offices and research laboratories located on both the Tri-Cities and Pullman, WA campuses. The radiochemical analyses on autopsy samples are performed in special laboratories on the WSU main campus in Pullman; the chemists are members of the USTUR staff and funded by the USTUR.

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

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