

**The Russian Radiobiology Human Tissue  
Repository in Southern Ural Biophysics Institute  
FMBA, Russian Federation: results of work and  
development prospects**

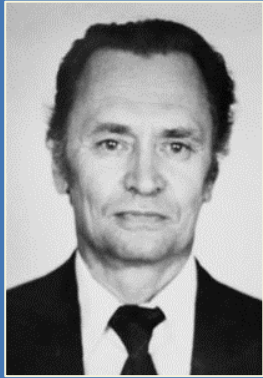
Oslina D.S., Makeeva V.S., Silantyev I.V., Azizova T.V.



Ozersk, 2024



## Repository from 1960 to 2000



Lemberg V.K.



Guskova A.K.



Baisogolov G.D.



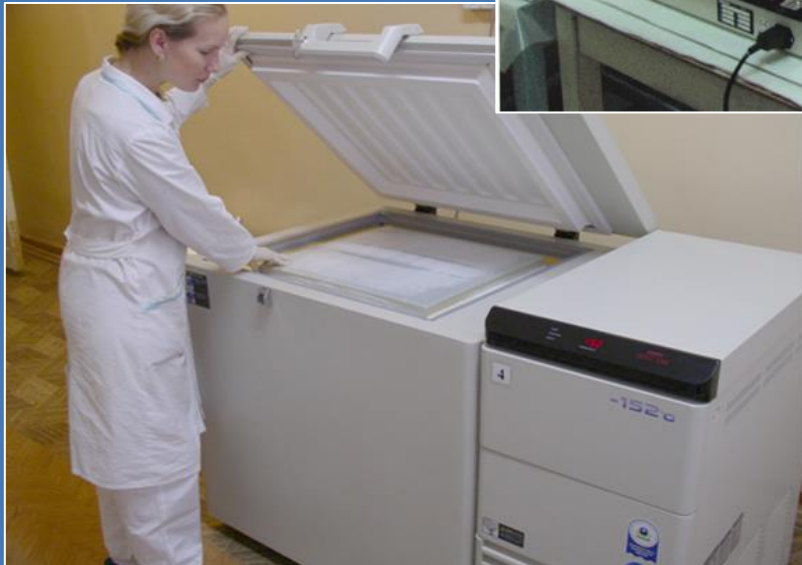


# International cooperation on research of radiation health effects for the purpose of minimizing the consequences of radioactive exposures





## The increase in the repository collection since 2001





## **The purpose of the RHTR:**

Collection and storage of biological material to study the effects of ionizing radiation at the organ, tissue, cellular and molecular levels.

## **RHTR tasks:**

- ✓ Obtaining, processing and storage of biological samples;
- ✓ Monitoring of storage conditions and assessment of the quality of stored biological samples;
- ✓ Obtaining and clarifying demographic, professional, dosimetric and medical information about registrants;
- ✓ Providing researchers with high-quality annotated biological material for scientific research;
- ✓ Informing the scientific community about the results of the repository's work.



## THE SAMPLES COLLECTED BY THE RHTR

### FIXED TISSUES

- ✓ Autopsy organs and tissues;
- ✓ Surgical/biopsy tissues.

### FROZEN SPECIMENS

- ✓ Blood and Blood Components;
- ✓ DNA;
- ✓ Induced sputum;
- ✓ Saliva and buccal cells;
- ✓ Frozen autopsy and biopsy tissues.

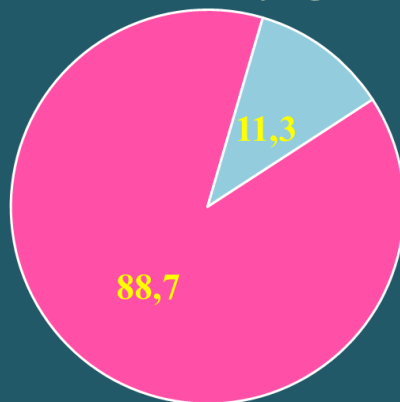
### PARAFFIN BLOCKS AND SLIDES

- ✓ Autopsy and biopsy tissues;
- ✓ Blood and bone marrow smears;
- ✓ Cytogenetic preparations.



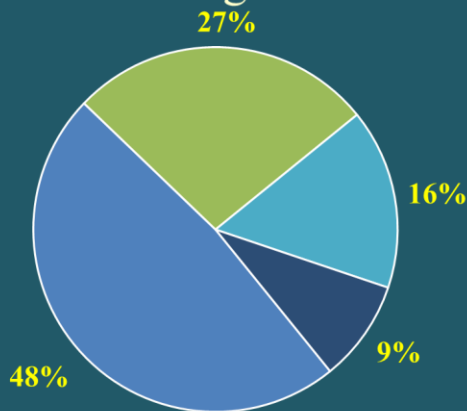
## Characteristics of the cohort of RHTR registrants (n=13723)

### Distribution by groups



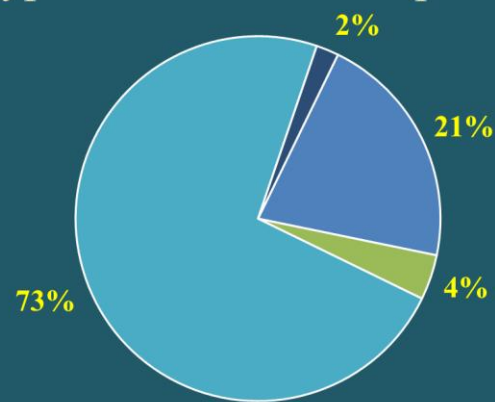
■ NRHF workers, % ■ Residents of Ozersk, %

### Years of starting work at NRHF



■ 1948-1953 ■ 1954-1958 ■ 1959-1963 ■ >1963

### Types of Radiation Exposure

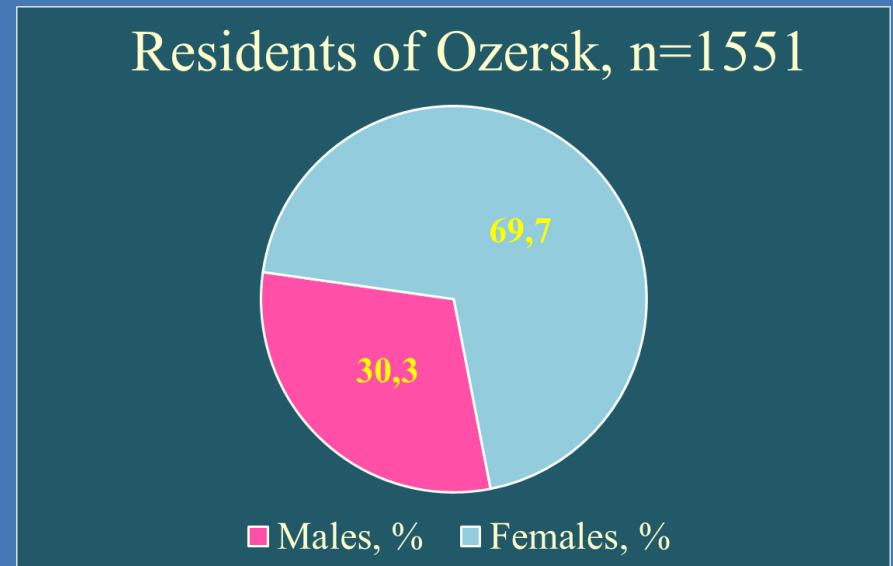
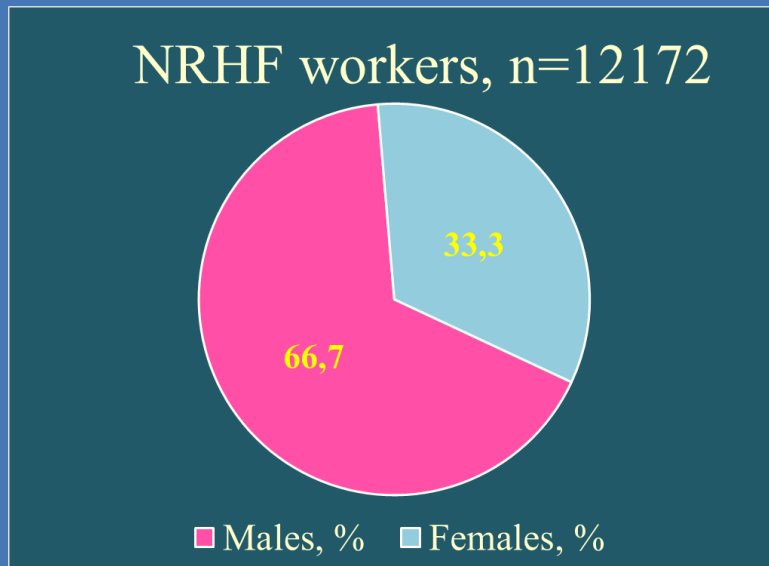
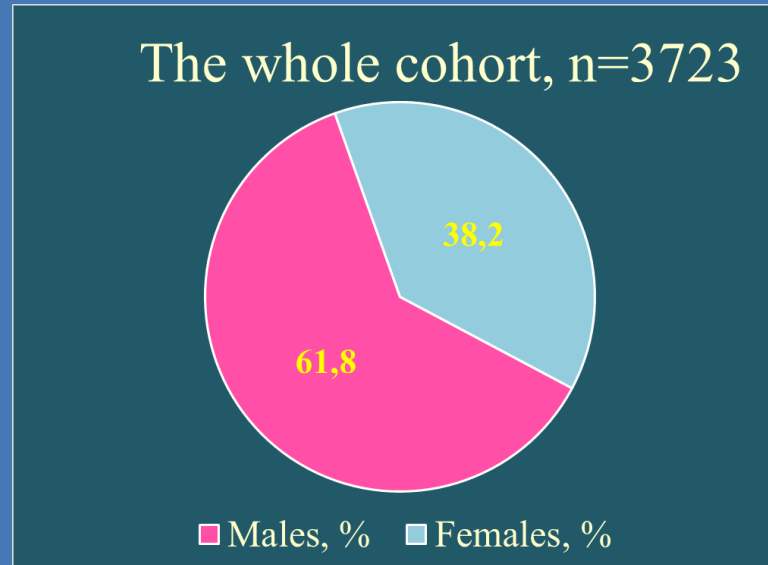


■ Gamma rays ■ Alpha particles ■ Gamma+Alpha ■ Unmonitored





## Distribution of registrants by gender

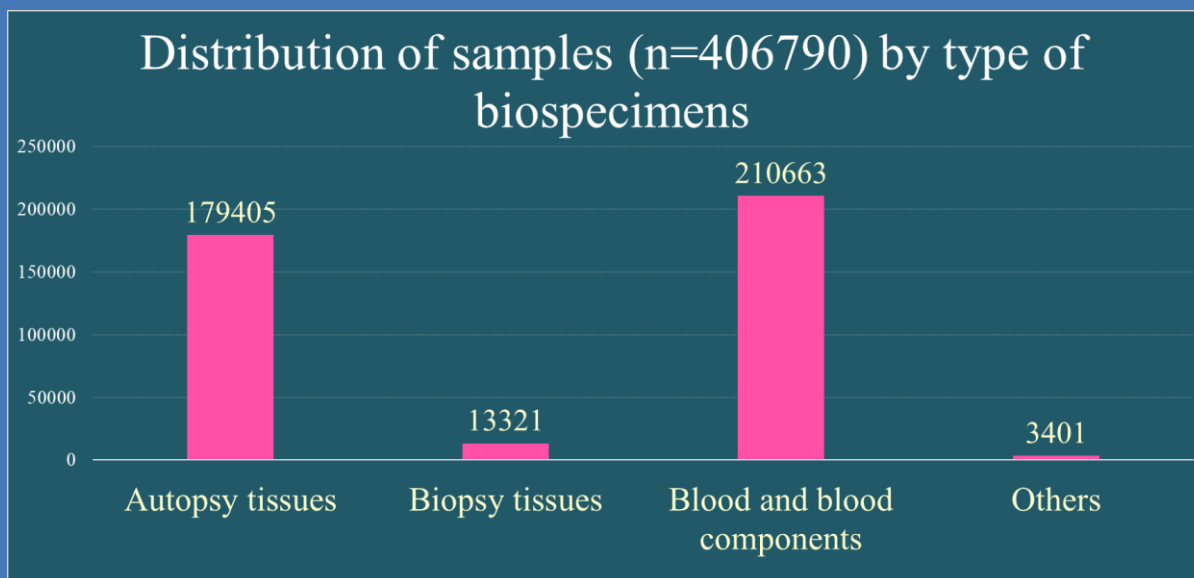
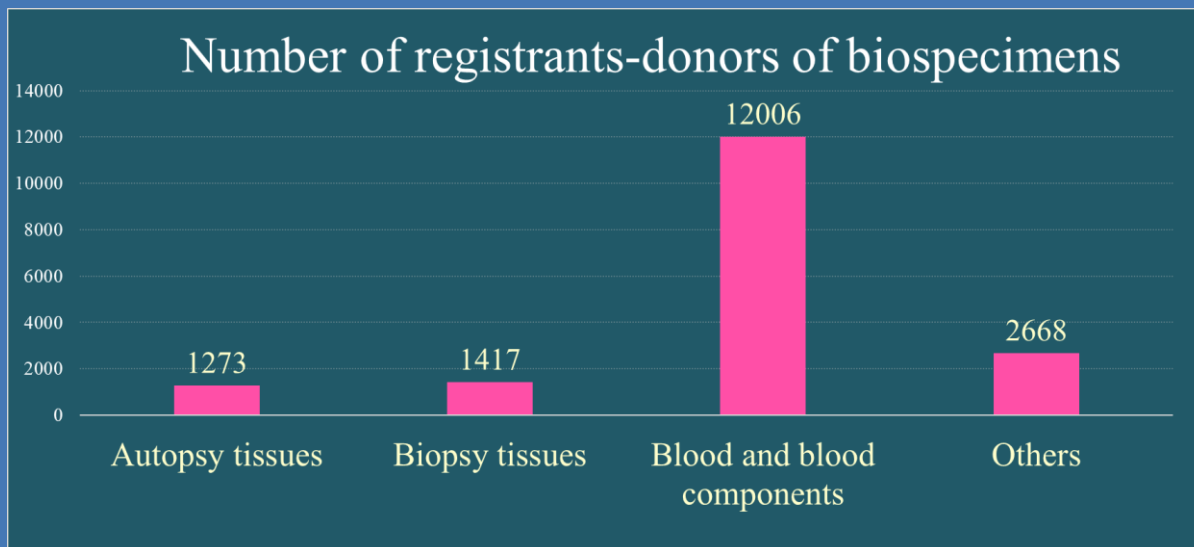


## Occupational diseases registered in registrants of biomaterial

- Acute radiation diseases
- Chronic radiation disease
- Occupational pneumosclerosis
- Occupational combustiton
- Occupational dermatitis
- Occupational wound
- Occupational cataract



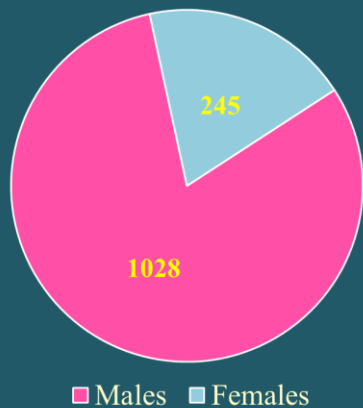
## Characteristics of the cohort of RHTR registrants (n=13723)



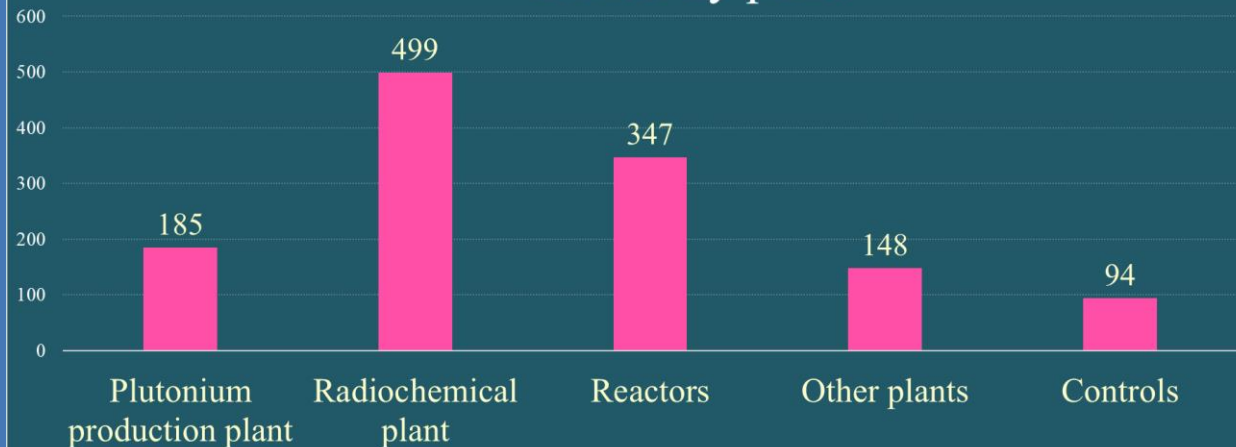
## Registrants-donors of autopsy tissues (n=1273)

|   | Numbers | M     | SE     | Min   | Max     |
|---|---------|-------|--------|-------|---------|
| Age of registrants at the time of taking biomaterial, years |         | 63,1  | 0,4    | 18    | 95      |
| <b>DOSIMETRY INFORMATION:</b>                               |         |       |        |       |         |
| Total external gamma radiation dose, Gy                     |         | 1,26  | 0,033  | 0     | 5,71    |
| Plutonium body burden, kBq                                  |         | 7,954 | 1,0048 | 0,043 | 335,722 |

Distribution of registrants-donors of autopsy tissues by gender

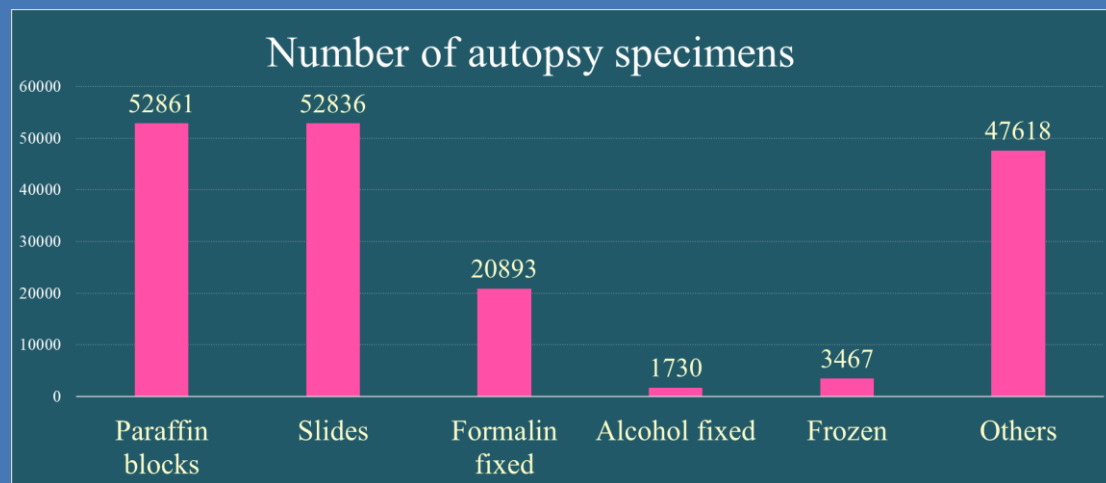
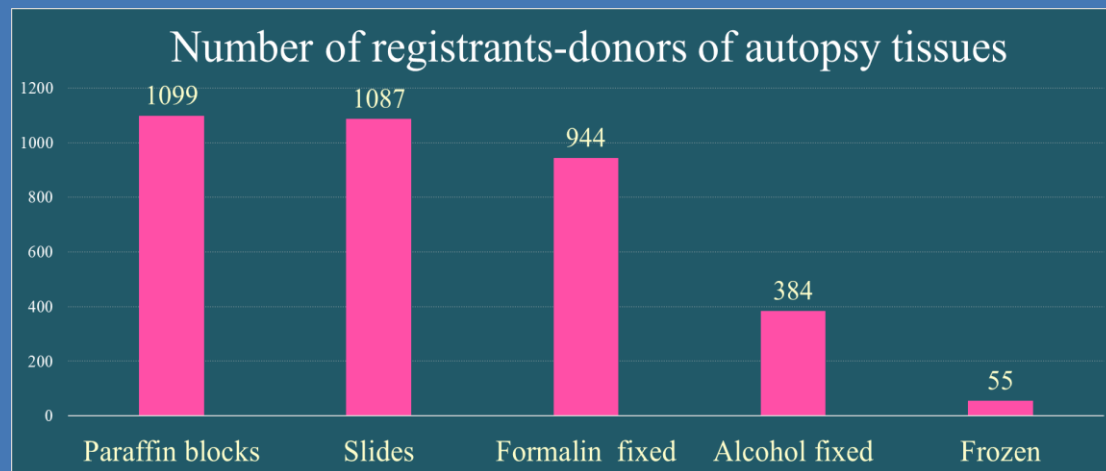


Distribution of registrants-donors of autopsy tissues by plant



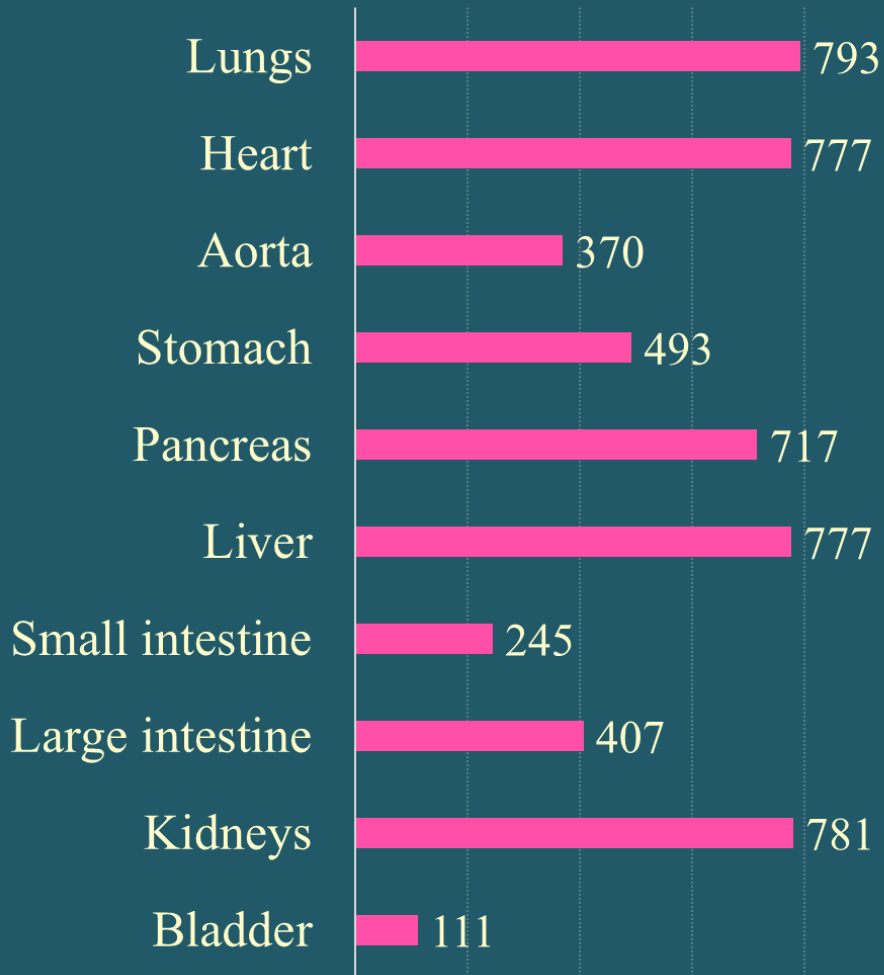


## Registrants-donors of autopsy tissues (n=1273)



## Types of tissues and organs

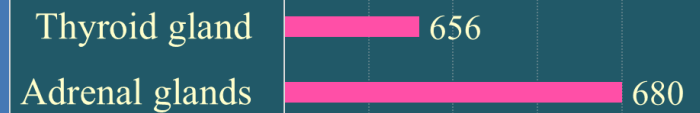
### Internal organs



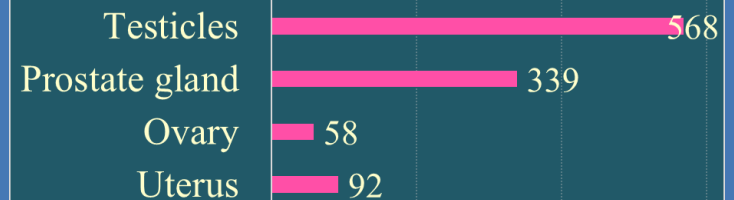
### Cerebrum



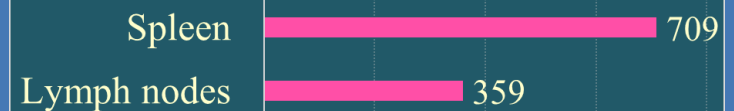
### Glands



### Reproductive organs



### Lymphoid tissue



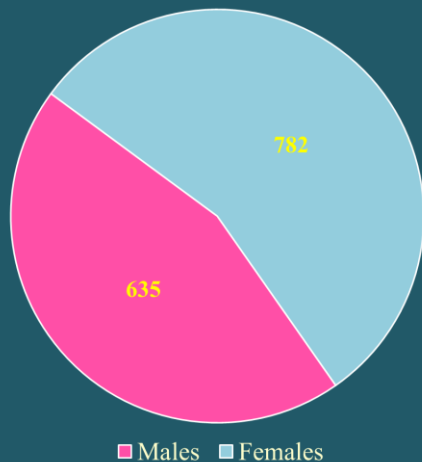
## **Malignant neoplasms autopsy samples**

|                                       | <b>Number of cases</b> |
|---------------------------------------|------------------------|
| <b>Respiratory system</b>             | <b>&gt;271</b>         |
| <b>Digestive system</b>               | <b>&gt;217</b>         |
| <b>Hematopoietic /Lymphoid tissue</b> | <b>&gt;49</b>          |
| <b>Reproductive organs</b>            | <b>&gt;43</b>          |
| <b>Urinary system</b>                 | <b>&gt;47</b>          |
| <b>Other</b>                          | <b>&gt;70</b>          |

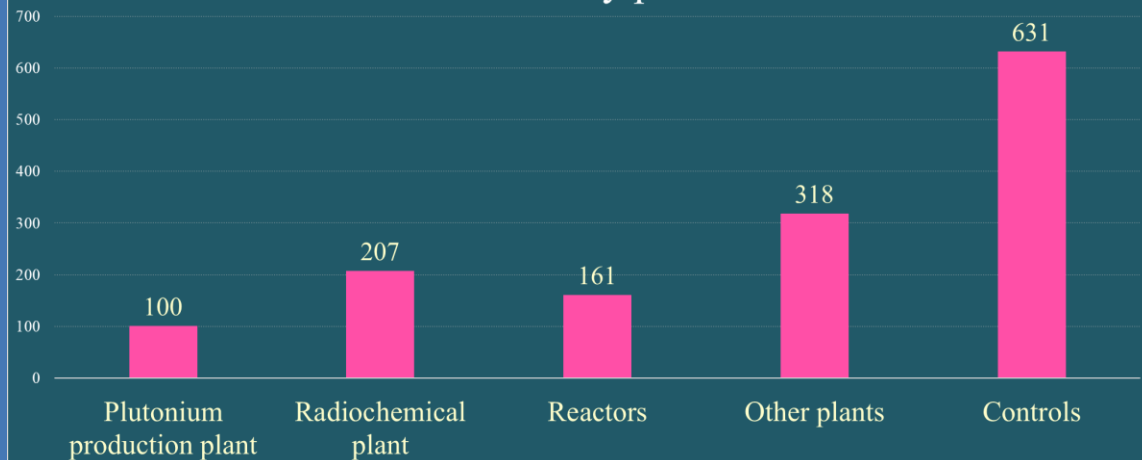
## Registrants-donors of surgical/biopsy tissues (n=1417)

|   | Numbers | M     | SE    | Min   | Max     |
|---|---------|-------|-------|-------|---------|
| Age of registrants at the time of taking biomaterial, years |         | 65,4  | 0,3   | 18    | 90      |
| <b>DOSIMETRY INFORMATION:</b>                               |         |       |       |       |         |
| Total external gamma radiation dose, Gy                     |         | 0,47  | 0,028 | 0     | 4,421   |
| Plutonium body burden, kBq                                  |         | 2,639 | 0,806 | 0,012 | 133,281 |

Distribution of registrants-donors of surgical/biopsy tissues by gender

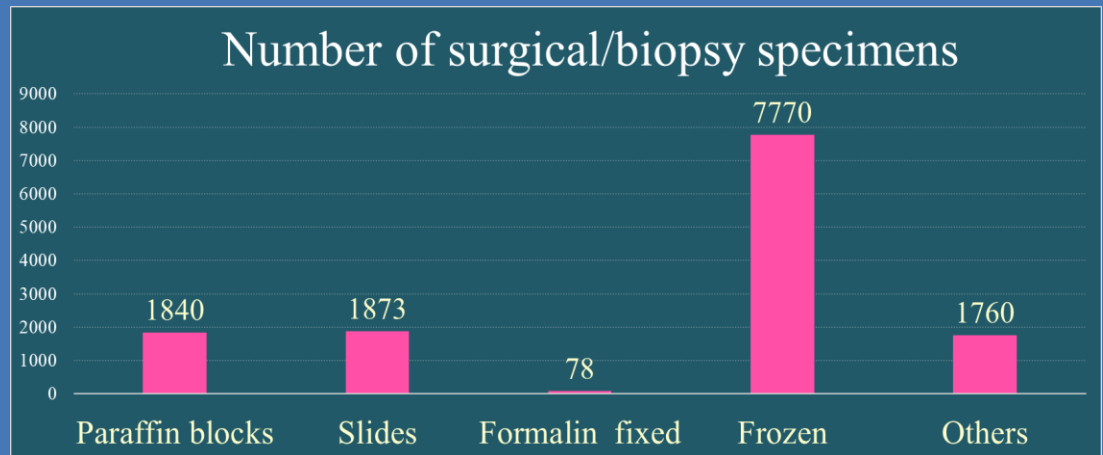
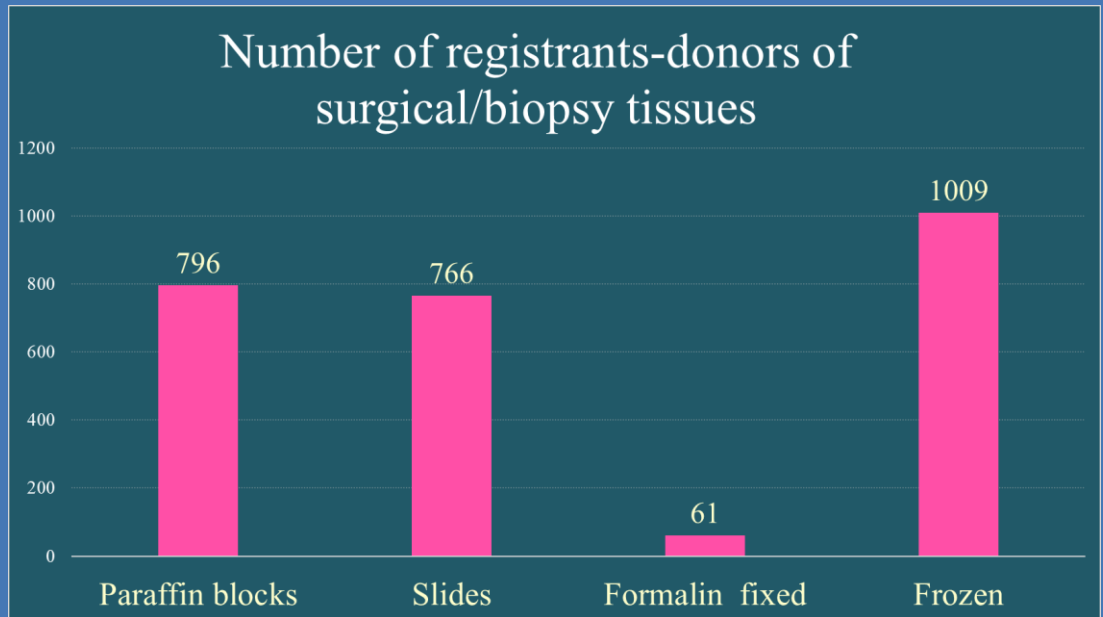


Distribution of registrants-donors of surgical/biopsy tissues by plant





## Registrants-donors of surgical/biopsy tissues (n=1417)



## Tumor and non-tumor surgical/biopsy tissues

### a) Malignant neoplasms

|                            | Number of cases |
|----------------------------|-----------------|
| <b>Lungs</b>               | <b>2</b>        |
| <b>Stomach</b>             | <b>58</b>       |
| <b>Jejunum</b>             | <b>1</b>        |
| <b>Colon</b>               | <b>121</b>      |
| <b>Rectum</b>              | <b>65</b>       |
| <b>Other</b>               | <b>2</b>        |
| <b>Reproductive organs</b> | <b>26</b>       |
| <b>Kidneys</b>             | <b>48</b>       |
| <b>Bladder</b>             | <b>13</b>       |
| <b>Melanoma</b>            | <b>46</b>       |
| <b>Other</b>               | <b>45</b>       |
| <b>Mammary gland</b>       | <b>189</b>      |

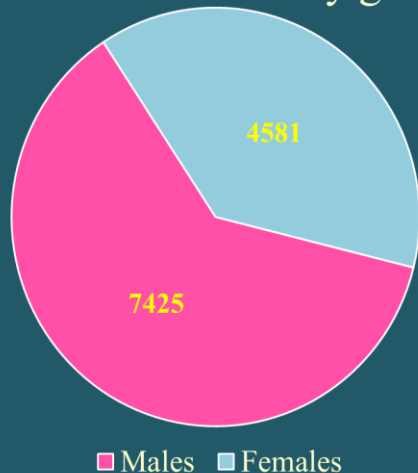
### b) Benign tumors

|                                | Number of cases |
|--------------------------------|-----------------|
| <b>Digestive organs</b>        | <b>12</b>       |
| <b>Reproductive organs</b>     | <b>182</b>      |
| <b>Mammary gland</b>           | <b>46</b>       |
| <b>Skin, connective tissue</b> | <b>22</b>       |
| <b>Urinary organs</b>          | <b>10</b>       |

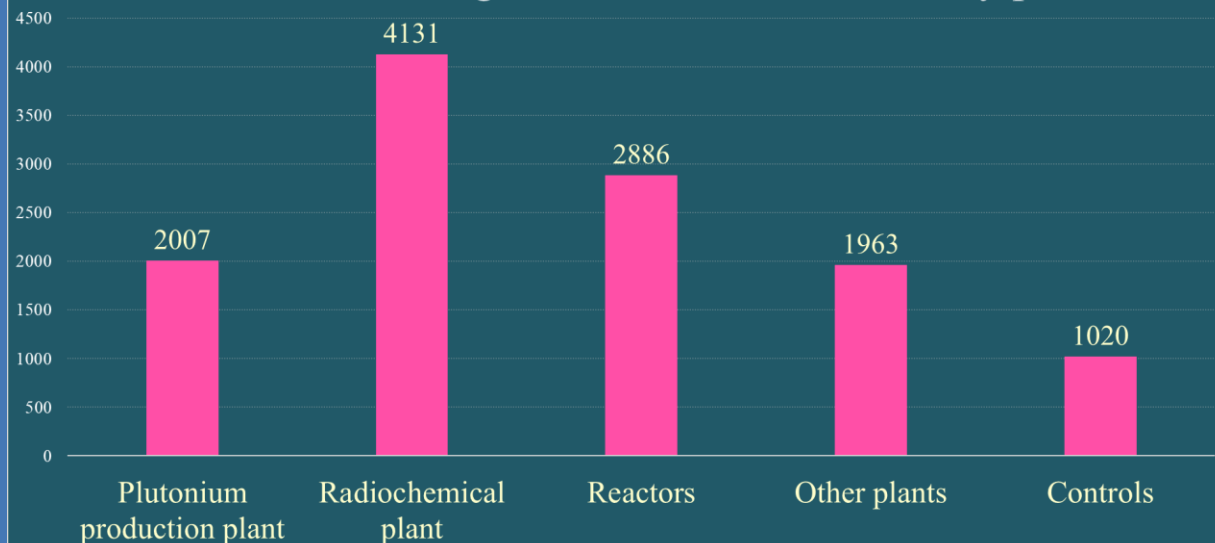
## Registrants-donors of of blood and its components (n=12006)

|   | Numbers | M     | SE    | Min   | Max      |
|---|---------|-------|-------|-------|----------|
| Age of registrants at the time of taking biomaterial, years |         | 62,7  | 0,1   | 18    | 98       |
| <b>DOSIMETRY INFORMATION:</b>                               |         |       |       |       |          |
| Total external gamma radiation dose, Gy                     |         | 0,59  | 0,007 | 0     | 5,24     |
| Plutonium body burden, kBq                                  |         | 2,024 | 0,408 | 0,004 | 1259,182 |

Distribution of registrants-donors of blood by gender



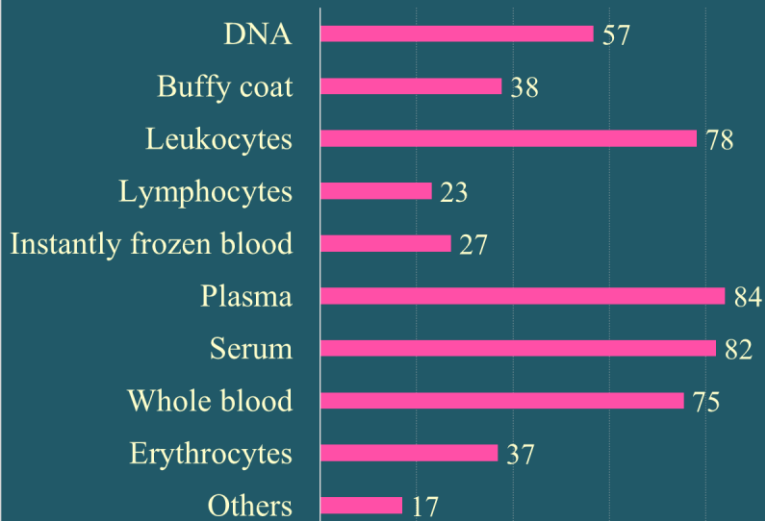
Distribution of registrants-donors of blood by plant



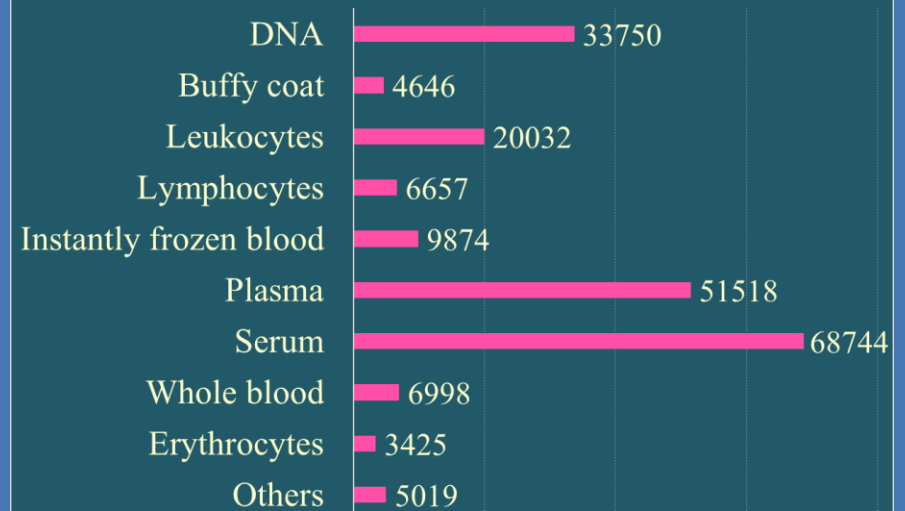
## Registrants-donors of of blood and its components(n=12006)



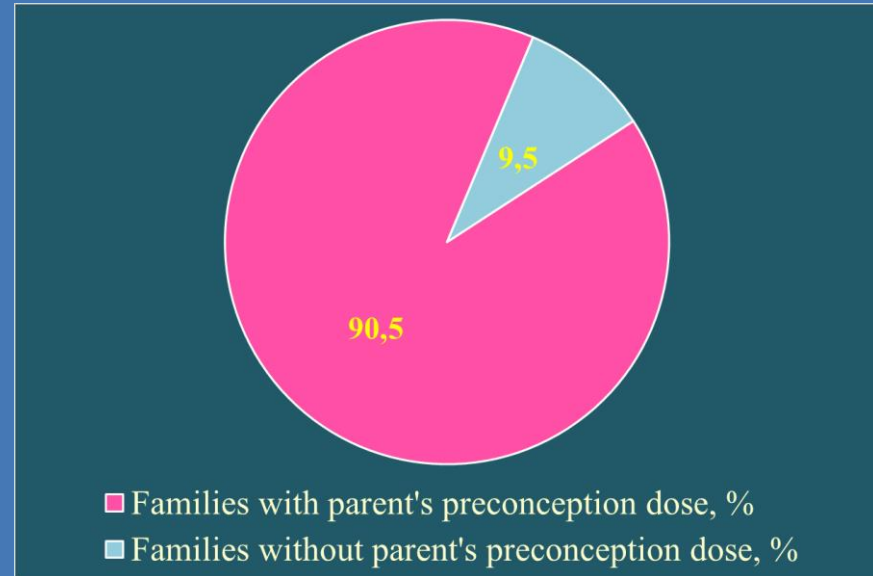
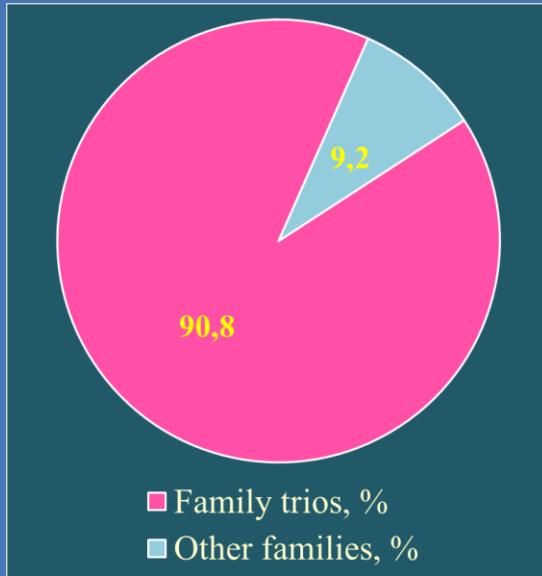
### Distribution of blood donors by type of biomaterial, %



### Number of aliquotes stored at ultra-low temperatures



## Biospecimens of families (1715 registrants, 555 trios)



## Biospecimens of the offsprings with parents' preconception doses (260 family trios)

|                            | Exposed mothers and fathers | Exposed fathers | Exposed mothers | Parents were not occupationally exposed |
|----------------------------|-----------------------------|-----------------|-----------------|---|
| <b>Number of sons</b>      | <b>40</b>                   | <b>115</b>      | <b>15</b>       | <b>45</b>                               |
| <b>Number of daughters</b> | <b>19</b>                   | <b>54</b>       | <b>24</b>       | <b>16</b>                               |
| <b>Total:</b>              | <b>59</b>                   | <b>169</b>      | <b>39</b>       | <b>61</b>                               |

## Requests for RHTR specimens

- **LRRI, NM, USA;**
- **UofU, USA;**
- **TU, Dublin, Ireland;**
- **The University of Durham, Ireland;**
- **TUM, Germany;**
- **University of Tübingen, Germany;**
- **Helmholtz Association, Germany;**
- **Georgetown University, USA;**
- **The Institute of internal and preventive medicine, Russia;**
- **Federal state budget institution of science INSTITUTE OF THEORETICAL AND EXPERIMENTAL BIOPHYSICS, Russian Academy of Sciences, Russia**
- **ChelSMA, Russia;**
- **SUBI FMBA, Russia.**



**Спасибо за внимание!**



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