**Contract 77329 (Internal SUBI number for reference purposes)**

**«Experimental therapy at Pu intake in animals and levels of its accumulation in humans»**

Performance period: 1977-1981

**Publications**

Scientific research report (final). Principal investigator. E.R. Lubchansky, principal executor Т.I. Levdik et al. – FIB-1, 1981. – Inv.no 1571s (label removed). – 1vol. – 141p. – 2vol. – 102p., 29 tables, 27 fig., 125 references, 20 appendices. Contract materials were sources for 56 papers, 28 of them are published.

**Background**

The information was gathered from 2225 male Wistar rats that were used in SUBI’s experiment no. 777329. The collection and collation of the information was done as part of Task 2.3 (“Evaluation of the SUBI tissue archive and database as a potential part of the European archive”) of the previous EURATOM-funded project STORE (Sustaining access to Tissues and data frOm Radiobiological Experiments; contract number 23228), which was coordinated by BfS, Germany (see <http://cordis.europa.eu/project/rcn/89386_en.html>) .

The information given here is based upon SUBI’s 18 months and 42 months reports.

It has been shown in the STORE project, that the biological material from the experiments conducted by SUBI can still be used. The respective Standard Operating Procedures are available on the STORE website (<http://www.storedb.org/store_v3/documents.jsp> ).

**The study**

The aim was to study biological effects caused by 239Pu, chemicals (HNO3 solution, hexachlorobutadiene), pharmacopeia (CaNa3DTPA, ZnNa3DTPA) and new compounds, and the effectiveness of complex therapies. This was done in an experiments with 2,225 Vistar rats. 2,091 were used to study late effects, while 134 were used for other purposes.

The effectiveness of the therapies were estimated by biological effect criteria:

* effectiveness of treatment with Ca- and ZnDTPA after inhalation of optimally blastomogenic amount of 239Pu nitrate is identical and characterized by decrease of absorbed doses in lung, skeleton and other organs, increase of average lifetime (AL), decrease of III degree pneumosclerosis incidence, lung hemangiosarcomas and osteosarcomas;
* at cutaneous covering traumas (scratches, punctured wounds) accompanied by 239Pu intake in amounts causing AL decrease (punctured wounds), treatment using СаDTPA results in decrease of absorbed doses in skeleton, increase of AL, decrease of osteosarcomas incidence (citrate-polymer, nitrate). incidence of malignant tumors in wound site (fibrosarcomas), is not affected by complexonotherapy but by Pu chemical form (polymer>nitrate-monomer), trauma type (punctured wounds> scratches) and level of activity applied to scratch. Treatment with СаDTPA did not influence osteosarcomas incidence in experiments where 239Pu was administrated combined with tributyl phosphate and hexachlorobutadiene.

Inhalations of one of uracyle derivatives increase a number of alveolar macrophages and accelerate lung excretion of plutonium dioxide particles in rats and dogs.

**Results**

It was previously established:

- After inhalation of 239Pu nitrate, IV, рН 1.0 in optimal blastomogenic amounts (0.06-0. 08 μCi/lung) early (in 30 minutes and 3 hours of DTPA salts inhalation) and prolonged (5 days /week, 8 weeks at a row, since day 1, intra peritoneal, 25 μМ/kg/day) Са- or ZnDTPA treatment led to reduction of accumulated doses to the lung by a factor of 2, and to a dose reduction in skeleton by a factor of 10 when compared to untreated rats. In parallel, the lifespan increased by 15% on average, and the occurrence of severe diseases (III level) decreased: pneumosclerosis of lung tissue, frequency of lung hemangiosarcomas, osteogenic sarcomas;

- Incorporation of 239Pu through wounds (punctured wounds, scratches) led to lifespan skeleton doses of 10.2 Gy (punctures) and 2.1 Gy (scratches) in rats. Treatment with CaDTPA by standard scheme showed a 5 times higher lifespan, a reduction of absorbed doses in skeleton by a factor of 2 for punctured wounds and by a factor of 4 for scratches. The osteosarcoma yield for punctured wounds and for scratches was reduced by a factor of 2 and 5-6, respectively. At the same time an increase in sclerosis processes and of fibrosarcomas in wounds was registered with an increase of absorbed dose from 1.4 -9.1 Gy to 25-36 Gy (scratches), while in treated animals (punctured wounds) the frequency of hypoderm fibrosarcomas in wounds (punctures) was related to the dose.

**Biological material**

From total number of tested animals (2,225 rats) 43,906 samples of paraffin-fixed biomaterial is available from 2,025 rats. Table 1 gives detailed characteristics for the individual experiments and a quantitative assessment of the biomaterial as well as its location. Table 2 gives information about the location of the biomaterial in the storage facility, which might be important for reanalyses.

To analyze late effects only 1,312 rats were used under contract 77329 (tests with 239Pu inhalation and wound intake). The other biomaterial from tests with intra peritoneal administration of 239Pu (15,593 samples from 779 rats) was analyzed in contract 81329.

**Further relevant information**

This study is in close relation to the SUBI study 81329 (not in STORE), analyzing the biomaterial from tests with intra peritoneal administration of 239Pu. This study is not listed here, but the biomaterial used there came from this experiment 77329.

**Contact information**

If you want to use the material or have any detailed questions regarding the study you should contact SUBI through [inter\_dep@subi.su](mailto:inter_dep@subi.su). If you have any questions regarding this short summary report, please contact Dr. Bernd Grosche ([bgrosche@t-online.de](mailto:bgrosche@t-online.de)).