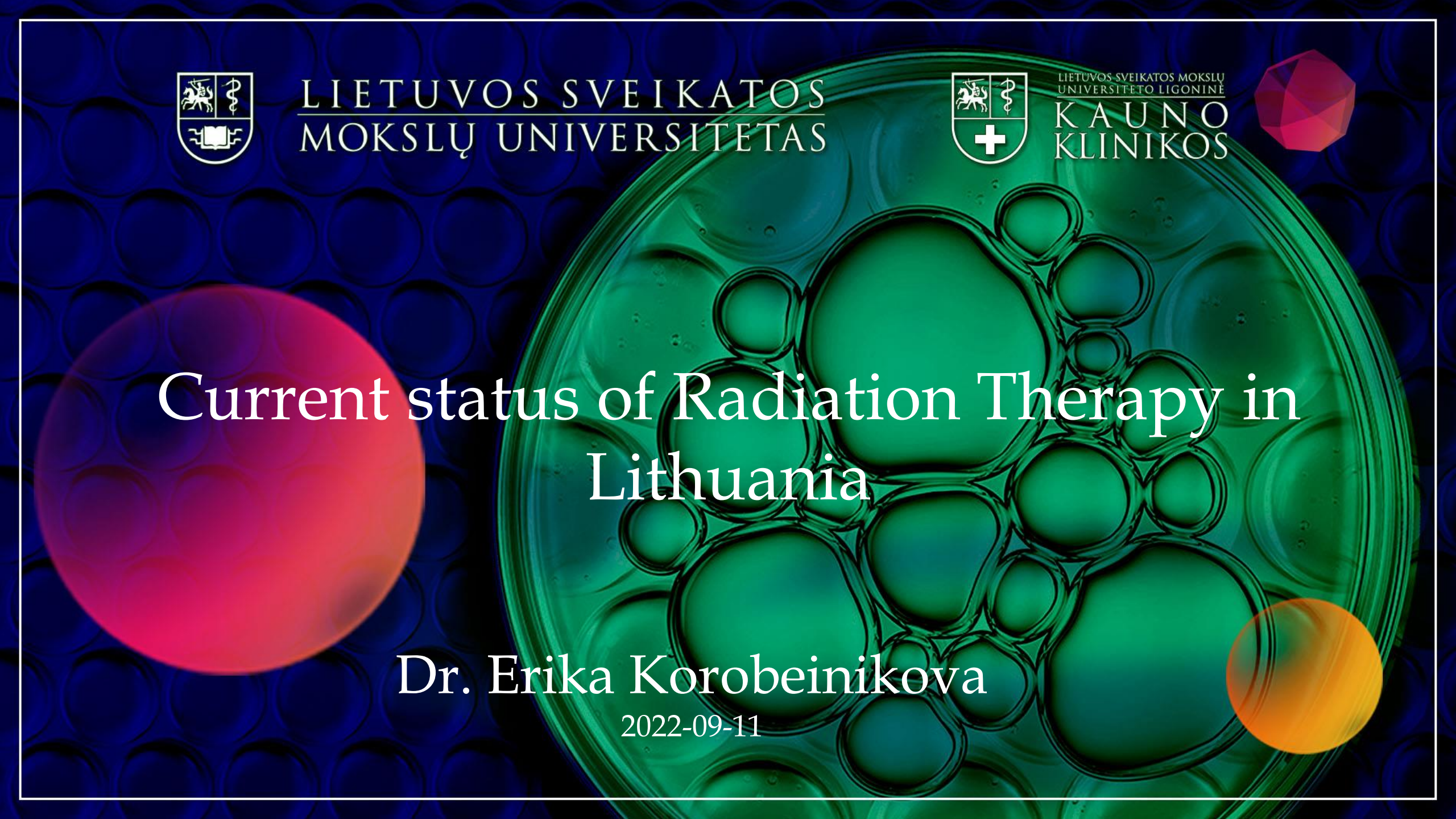


Current status of Radiation Therapy in Lithuania

Dr. Erika Korobeinikova

2022-09-11

Current status of Radiation Therapy in Lithuania

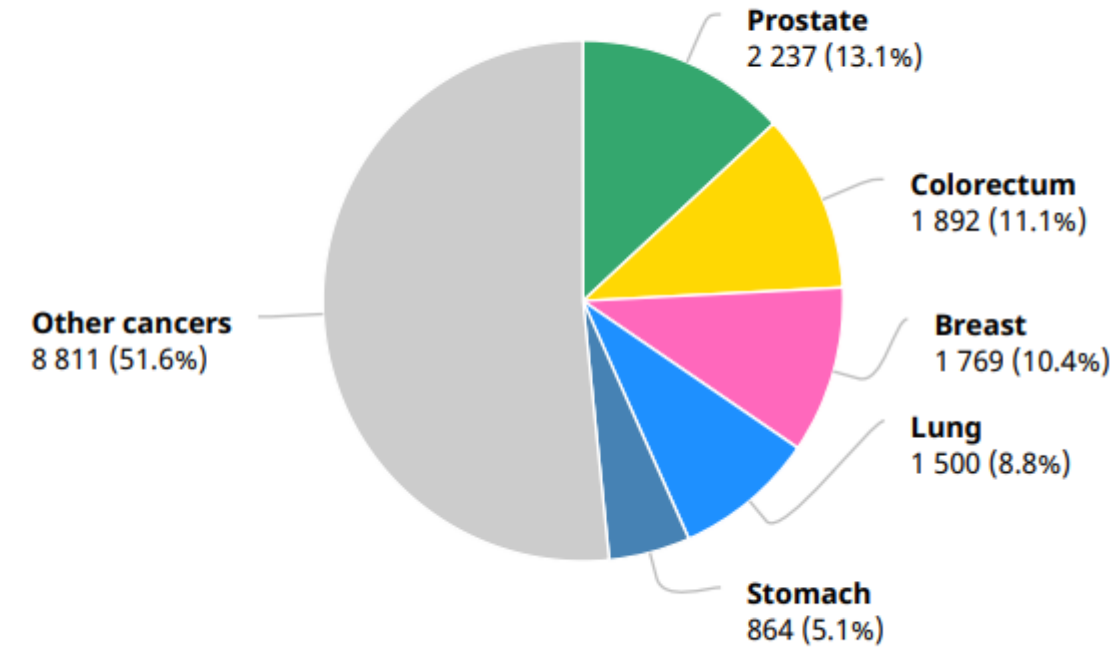
Dr. Erika Korobeinikova

Burden of cancer in Lithuania

International Agency for Research on Cancer

World Health Organization

Number of new cases in 2020, both sexes, all ages



Total: 17 073

Numbers at a glance

Total population

2 722 291

Number of new cases

17 073

Number of deaths

8 168

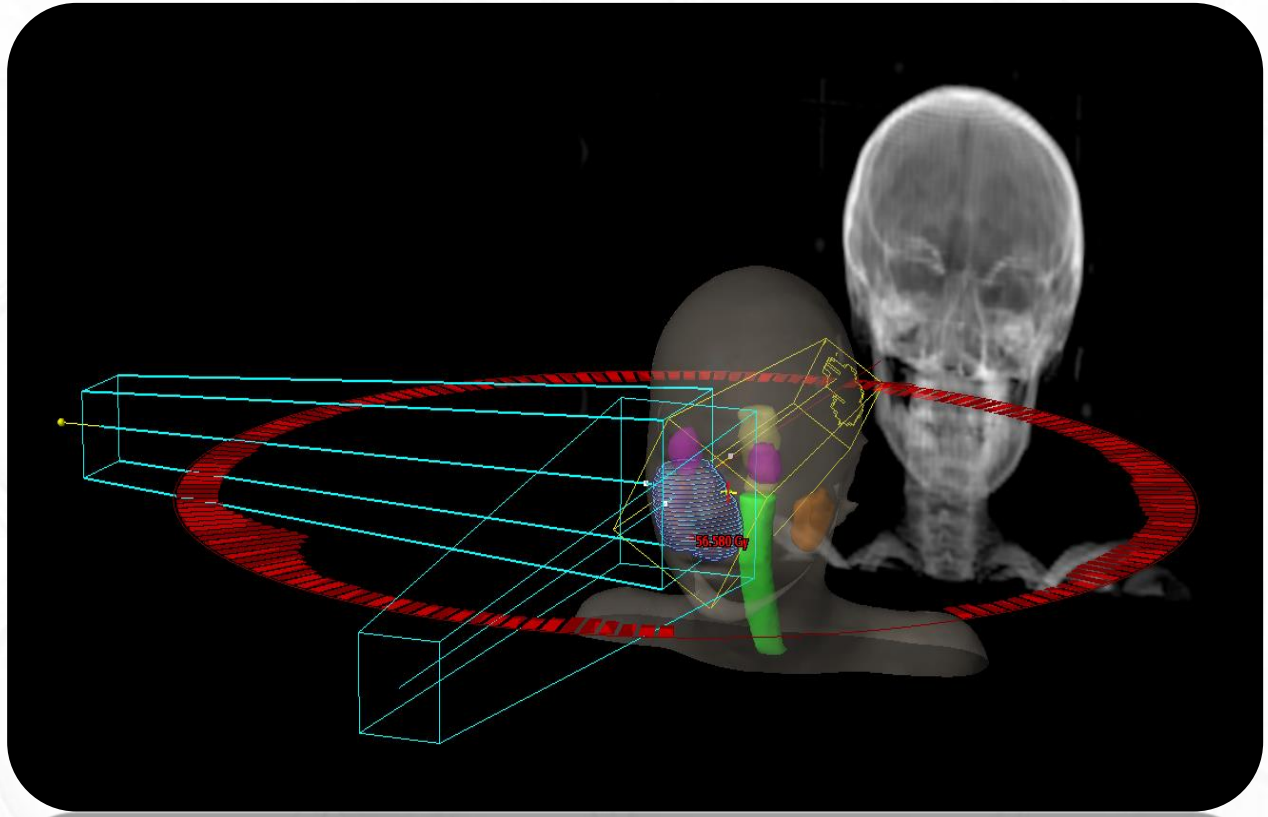
Number of prevalent cases (5-year)

48 728

Source: Globocan 2020

Radiotherapy in cancer treatment

- Cured patients: 40% with RT (49% - surgery, 11% - chemotherapy);
- Indication to cure or improve survival – 85% of the cases;
- Overall 50% of new cancer patients would benefit from RT;
- Radiotherapy is one of the most cost-effective cancer treatment.



Ahmad AS et al. Br J Cancer 2015; Price P. Et al 2008; Jacobs S et al. 2009; Delaney et al. 2005

Radiation therapy centers in Lithuania

Hospital of Lithuanian University of health Sciences

National Cancer Institute

Klaipeda University hospital

Republican Siauliai Hospital

Human capacity for treating of cancer patients	
Total number of radio-oncology specialists	45
Total number of radiotherapy technologists	57
Total number of radiotherapy medical physicists	31

Cancer centers and Radiotherapy facilities

City	Center	Type of Cancer Treatment Modality:		Number of Patients Treated Annually (2020 Number)
		Radiation Therapy (Yes/No)	Brachytherapy (Yes/No)	
Vilnius	NCI	Yes	Yes	2228
Kaunas	HLUHS	Yes	Yes	2638
Klaipeda	KUH	Yes	Yes	1086
Siauliai	RSH	Yes	Yes	391

Current RT machines in Lithuania

10 dual energy Linacs + electron beams (2005 – 2020)

1 Gamma knife with cobalt sources (2020)

1 Halcyon: single energy. 1/ninth the time for Tomotherapy (2021)

4 Brachytherapy machines (1 cobalt, 3 iridium sources) (2010-2019)

Under installation

ACCELERATOR – Electa ”Unity”: an exciting new paradigm in cancer treatment

Radiotherapy guided by real - time MR imaging.

Will start working in early 2023

Available diagnostic and treatment modalities in Lithuania

- Diagnostics:
  - SPECT/CT (8 machines)
  - CT (53 machines)
  - MRI (35 machines)
  - PET/CT (FDG) (2 machines)
  - US (numerous machines)
- Treatment modalities: IMRT, VMAT, IGRT, 4D RT, SBRT, SRS, Brachytherapy (HDR, LDR), TBI, Gamma knife (SRS);
- Coming soon…

  Cyclotron for PET/CT tracers (under construction in Kaunas Clinics);

About Lithuanian University of Health Sciences

- The largest institution of higher education for biomedical sciences in Lithuania;
- Integration of studies, research and clinical practice.
- Consists of two main academies: Medical Academy and Veterinary Academy.
- Includes 7 faculties, 6 research institutes, two animal clinics and the Hospital of LUHS.
- Has more than 7,000 students enrolled.

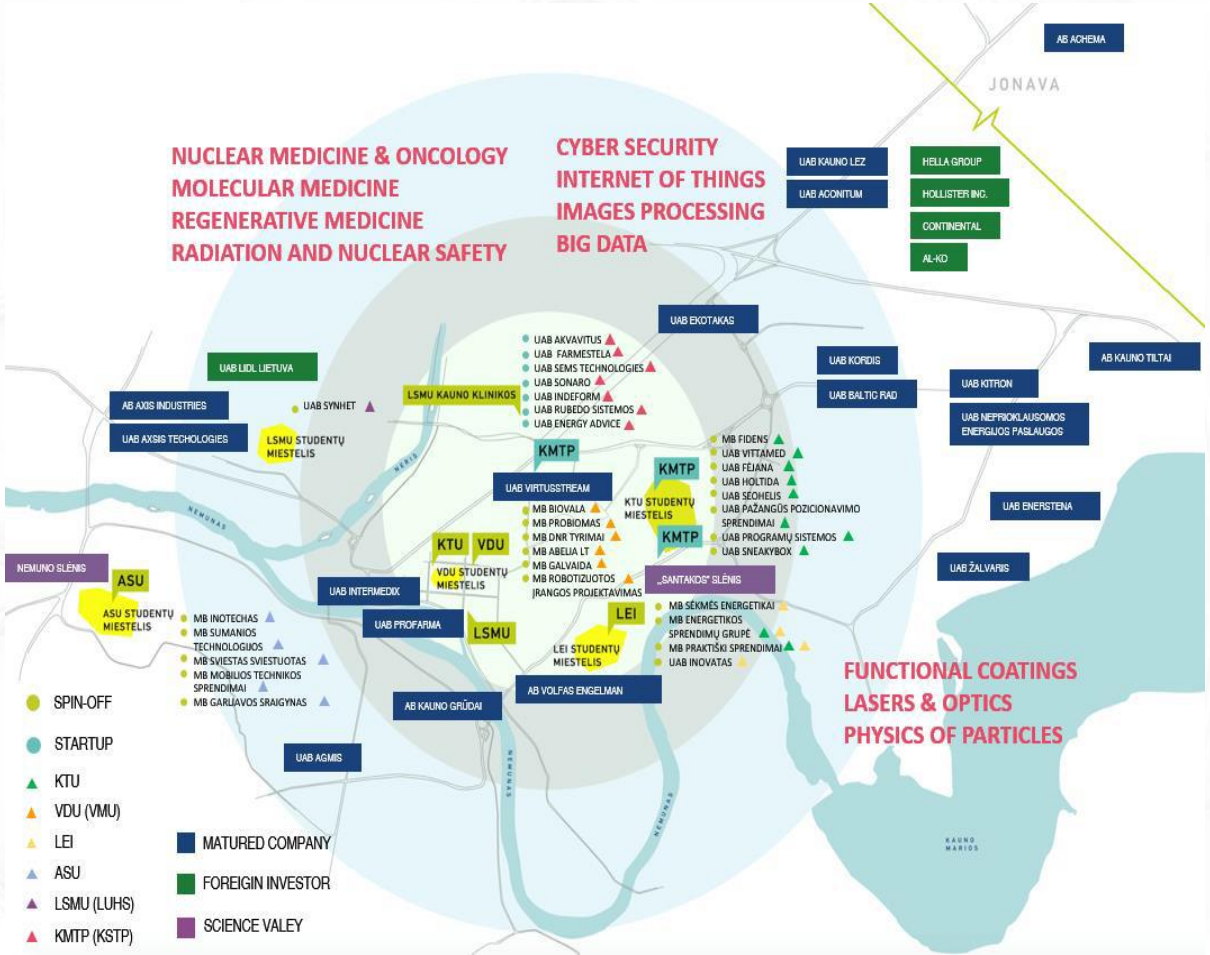
Collaboration with CERN

During the last years training of medical physicists and radiation oncologists was organized in collaboration with CERN.

Development of nuclear medicine is closely related to the deplopment of cyclotron at LUHS University Hospital.

Oncology institute: CERN- activities related 6 projects in Radiobiology.

We have implemented five radiobiology research projects related to CERN activities. We are currently continuing this research with another CERN related project. These projects funded by the Lithuanian Science Council.



INSPIRE project

- €5M (Coordinated by Manchester)
- Integrating proton research across Europe
- 17 partners
- Networking, Transnational Access, Joint Research Activities
- 13 TNA providers
- 11 PBT centres; national hubs
- Varian and IBA

InspireProject

"……the aim of INSPIRE is to integrate national infrastructures in proton beam therapy (PBT) research and make them available to researchers from academia, hospitals and industry to ensure that excellent multi-disciplinary research is undertaken and best practice shared…."

Grant Agreement Number 730983

www.protonsinspire.eu

LUHS activities in INSPIRE project

- **WP7 – Radiobiology.** We investigated molecular mechanisms of sensitivity and resistance to radiotherapy in breast cancer cell lines.

- Cell exposure to different chemical agents and the assessment of their possible radio-sensitising activities is our innovation task in this project.

- One of our team member had the opportunity to join the **Clinical Radiobiology group at GSI** and was contributing to the developments of the protocols for 3D cell culture phantoms. Additionally, she was involved in the *in vitro* FLASH experiments assessing the cell survival after irradiation with 12C ion beams at ultra-high dose rates.

InspireProject

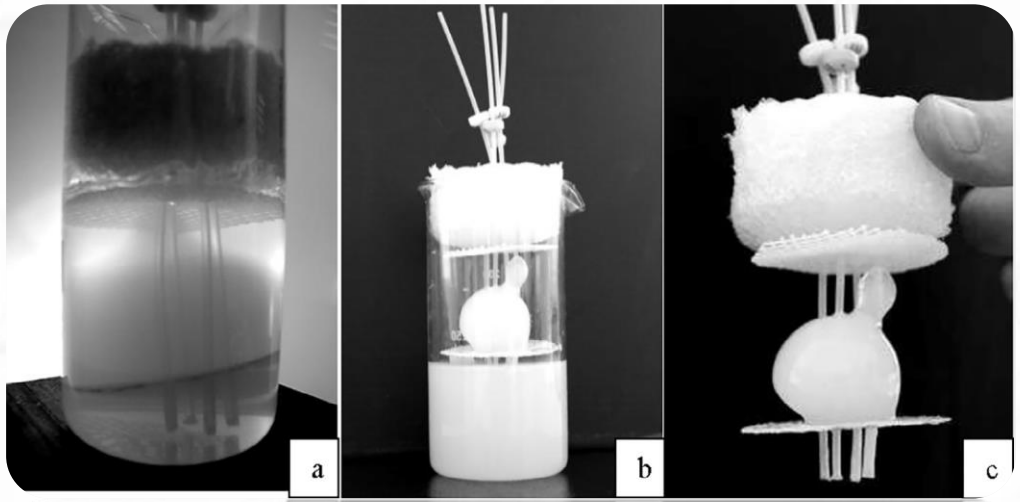
Funded from the European Union's Horizon 2020 Research and InnovationProgramme under Grant Agreement No: 730983
https://protonsinspire.eu/knowledge-hub

Educational activities

- Oncology Institute participated in the training course related to proton beam therapy „The Christie Proton Therapy E-School at The Christie School of Oncology“.

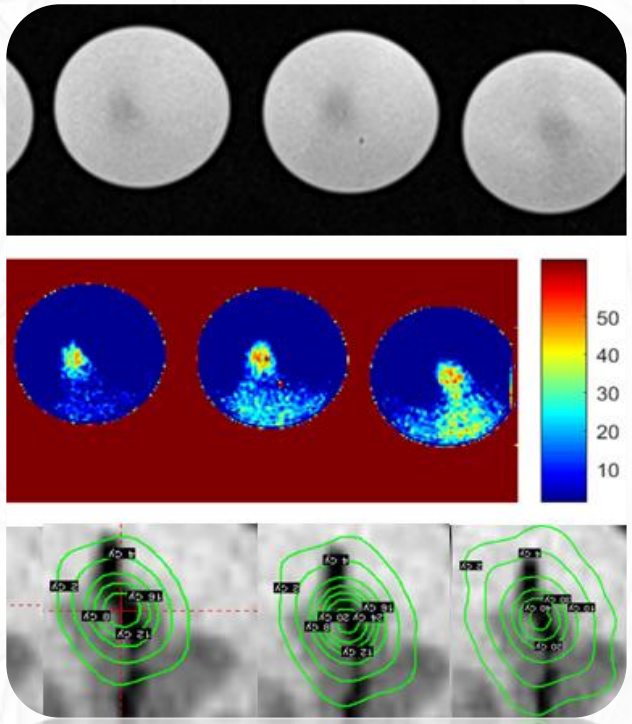
- Attended the 1st FLASH Radiotherapy and Particle Therapy Conference where we also had the opportunity to present the abstract and e-poster from the part of our research activities in INSPIRE project.

Dosimetry research in collaboration with Kaunas University of Technology



Dosimetry with gels forming a stable free standing polymerized shapes upon irradiation

Individual patient 3D printed phantoms



MRI-scanning based dose maps

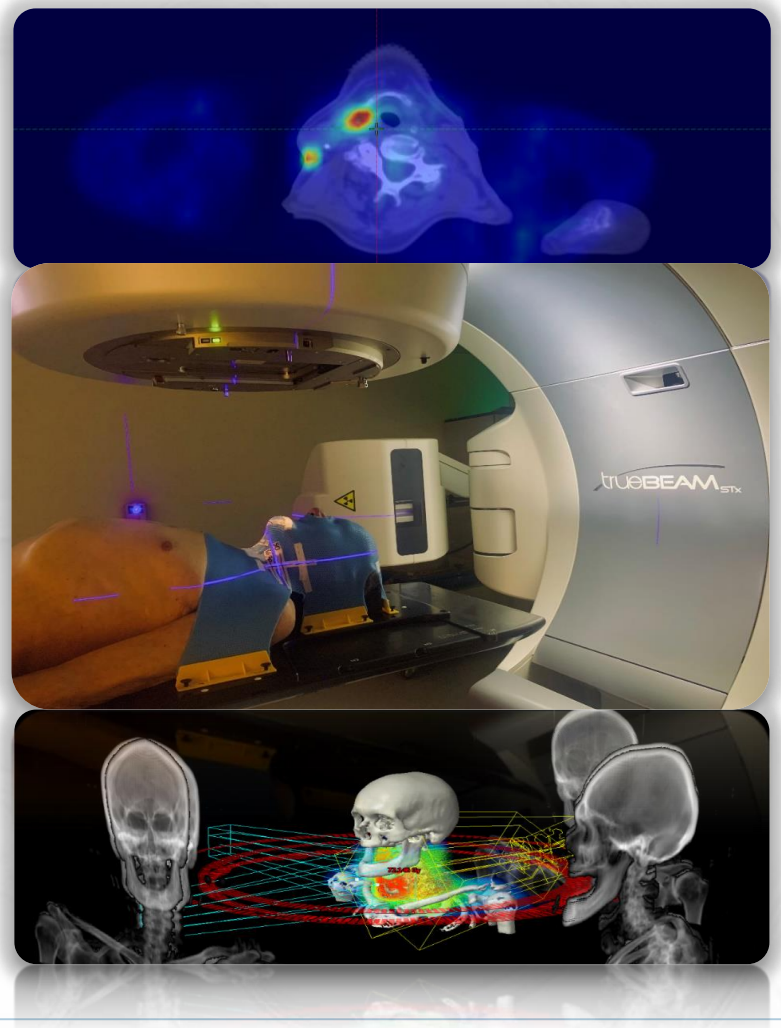
LUHS Resaerch areas in radiotherapy, radiobiology and dosimetry

- Prognostic and predictive molecular markers of solid tumors;
- Radiobiology research;
- Radiotherapy optimisation using ^{18}F-FDG-PET/CT images;
- Molecular mechanisms of sensitivity and resistance to radiotherapy in breast cancer or other cell lines;
- Association between common genetic variations with individual patient variability in normal tissue late radiation toxicities;
- Linac-based fractionated stereotactic radiotherapy vs. intensity modulated radiotherapy;
- Polymer gel dosimetry;
- New brachytherapy techniques.

Conclusion

Infrastructure of radiation therapy in Lithuania is a great platform for research and radiotherapy development, since there are:

- Well equipped diagnostic and treatment facilities
- Large flow of patients suffering from cancer
- Experience in implementation of R&D activities
- Open and ready for cooperation with researchers and business sector.



THANK YOU FOR
YOUR KIND ATTENTION

LET'S COLLABORATE!

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