

# Basic Clinical Radiobiology

To learn the fundamental radiobiology principles related to patient treatment. This knowledge provides rationale for daily decisions in clinical practice.

# Target groups

- Students of Medical physics, Radiobiology and related fields
- Students of MUNI who can benefit from understanding basics of radiobiology (e.g., radiation protection officers) and clinical practice (e.g., physicians and radiographers)

# Course Aim

- Provide an introduction to radiobiology and radiation oncology
- Cover basic mechanisms of cell death and general radiation response of cancerous and non-cancerous cells to radiation
- Describe the current approaches to various radiotherapy modalities and discuss possible future approaches (e.g., FLASH RT)

# Teachers

1. **A.Kurzyukova** „Cancer cell biology & radiation-induced molecular effects“
2. **A.Kurzyukova** „Radiation effects on tumor cells and microenvironment & radioresistance“
3. **A.Odložilíková** „Introduction to Radiobiological Modelling in Radiation Therapy “
4. **B.Odložilík** „Basic radiobiology and introduction to FLASH“
5. **B.Odložilík** „Laser-based particle acceleration and experiments“
6. **S.Bazhukov** „Radiopharmaceuticals production“
7. **I.Bazhukova** „Radionuclide therapy with radiopharmaceuticals“
8. **I.Bazhukova** „Radiomodifiers in radiation therapy“

## Anastasia Kurzyukova

### Topics of interest:

- ❖ Cancer cell biology and gene regulation
- ❖ Tumor microenvironment
- ❖ Cancer metastasis
- ❖ Radiobiology

### Education:

- ❖ PhD student, University of Copenhagen
- ❖ MSc Molecular Bioengineering, TU Dresden
- ❖ MSc and BSc Bioengineering Systems & Technologies, Ural Federal University

### Affiliations:

- ❖ DanStem, University of Copenhagen (Research assistant & CPH Bioscience PhD student)
- ❖ Center for Regenerative Therapies Dresden, Medical Faculty Carl Gustav Carus (Research assistant)



## Ing. Anna Odložilíková Ph.D.

### Topics of interest:

- ❖ Clinical radiobiology, Radiobiological Modelling in Radiation Oncology
- ❖ BRT (3D conformal BRT with CT and MR)
- ❖ Total Body Irradiation and Total Skin Electron Irradiation.

### Education:

- ❖ Ural Polytechnical Institute, Sverdlovsk, Russia, Physical-Technical Faculty
- ❖ Czech Technical University (Faculty of Nuclear Sciences and Physical Engineering)

### Affiliations:

- ❖ Masaryk University
  - Assistant professor for Radiological Physics
- ❖ Masaryk Memorial Cancer Institute, medical physicist
  - International expert IAEA (external)
  - External auditor for quality assurance in Radiotherapy for Czech Republic
  - The member of committee for quality assurance in Radiotherapy



## Boris Odložilík

### Topics of interest:

- ❖ Ultra-high dose rate radiobiology
- ❖ Laser-based particle acceleration and advanced targetry
- ❖ Radiation protection

### Education:

- ❖ Czech Technical University (Faculty of Nuclear Sciences and Physical Engineering)
- ❖ Queen's University Belfast (School of Mathematics and Physics)

### Affiliations:

- ❖ Queen's University Belfast (Marie Skłodowska-Curie PhD fellow )
  - School of Mathematics and Physics
  - Patrick G. Johnston Centre for Cancer Research
- ❖ ELI Beamlines (Junior Researcher)
  - ELI Multidisciplinary Applications of Laser-Ion Acceleration (ELIMAIA) group



## Sergei Bazhukov, Ph.D.

### Topics of interest:

- ❖ Radiation technologies
- ❖ Modifying polymer materials with high dose irradiation
- ❖ Nuclear medicine and radiopharmaceutical's production
- ❖ Application of charged particle accelerators in scientific and applied issues

### Education:

- ❖ Ural Polytechnic Institute (now – Ural Federal University, Yekaterinburg, Russia)  
(Physical and Technical Faculty)

### Affiliations:

- ❖ Ural Federal University (Director of Radiation Sterilization Center)
  - Radiation Sterilization Center, Institute of Physics and Technology





## Irina Bazhukova, Ph.D.

### Topics of interest:

- ❖ Biophysics
- ❖ Nuclear medicine and radiopharmaceutical's production
- ❖ Inorganic nanoparticles as prospective modifiers in radiation therapy

### Education:

- ❖ Ural State Technical University (now – Ural Federal University, Yekaterinburg, Russia)  
(Physical and Technical Faculty)

### Affiliations:

- ❖ Ural Federal University (Associate Professor)
  - Experimental Physics Department, Institute of Physics and Technology



# Teaching Methods

- 8 hours of lectures
- 8 tests after each of lectures

## Learning Outcomes:

By the end of this course participants should be able to have the basic knowledge of radiobiology necessary for working in the field of Radiation Oncology.