Virtual course of lectures for Ukrainian radiation oncologists, clinical oncologists, and medical physicists "Radiobiology through the eyes of radiation oncologists"

February 24th – May 12th 2026
Timing: scheduled weekly on Tuesdays, 7 pm (CET)
Each lecture lasts for 1 h 15 min (talk) + 15 min (questions)

Course directors:

- Natalka Suchowerska, Radiobiologist, University of Sydney, Australia
- Anna Dubrovska, Radiobiologist, Helmholtz-Zentrum Dresden - Rossendorf, Germany

Speakers (tentative):

- Leoni Kunz-Schughart, Radiobiologist, Faculty of Medicine, TU Dresden, Germany
- Mechthild Krause, Radiation Oncologist, Faculty of Medicine, TU Dresden, Germany
- Ielizaveta Gorodetska, Radiobiologist, Helmholtz-Zentrum Dresden - Rossendorf, Germany
- Rob Coppes, Radiobiologist, University Medical Center Groningen, The Netherlands
- Martin Pruschy, Radiobiologist, University Hospital Zurich, Switzerland
- Stephen McMahon, Physicist, Queen's University Belfast, UK
- Nicolas Magné, Clinical Oncologist, Université de Lyon, France
- Kristina Viktorsson, Molecular Biologist / Radiobiologist, Karolinska Institutet, Sweden
- Bartlomiej Tomasik, Radiation Oncologist, Medical University of Gdańsk, Poland
- Ananya Choudhury, Clinical Oncologist, Cancer Research UK Manchester Centre, UK

Programme

Date	Title	Speaker
February 24th	Basics of tumor cell (cell cycle, DNA damage response, signal transduction, tumor microenvironment, hallmarks of cancer)	L. Kunz-Schughart (DE)
March 3rd	History of radiation biology and its clinical translation	M. Krause (DE)
March 10th	How does radiotherapy kill tumor cells? 7Rs; cancer stem cells; direct and indirect effect of ionizing irradiation on cellular and tissue levels	I. Gorodetska (DE)
March 17th	Normal tissue reaction to radiotherapy: biological explanation	R. Coppes (NL)
March 24th	Biological basis of the fractionation, modeling of radiobiological response in radiotherapy, linear-quadratic model in clinical practice, radiobiology of SBRT	S. McMahon (UK)
March 31st	Definition of dose and dose rates (incl. FLASH); the quality of irradiation (photon/particles), linear energy transfer and relative biological effectiveness	M. Pruschy (CH)

April 7th	Systemic and delayed effect of radiotherapy on normal and tumor tissues (e.g. abscopal, bystander, clastogenic effects; genomic instability and secondary tumor development)	N. Magné (FR)
April 14th	Systemic effect of radiotherapy combination therapies (radioimmuno-; radiochemo-; radiohormonal, radiothermal therapy)	K. Viktorsson (SE)
April 21st	The radiobiology of re-irradiation and tumor recurrence	B. Tomasik (PL)
April 28th	Radiation therapy personalization: biomarkers, chronobiology, patient-derived models	A. Dubrovska (DE)
May 5th	Biological imaging for individualized radiation therapy (PET for target volume delineation, dose painting, image-guided radiotherapy)	A. Choudhury (UK)
May 12th	Panel discussion: the future of translational radiation biology	Moderator: N. Suchowerska (AU)

Course Aim

This course aims to provide training for radiation oncologists, clinical oncologists, and medical physicists in Ukraine during the war, equipping participants with a basic understanding of the molecular basis of radiation effects on tumors and normal tissues through the lens of clinical practice. We will discuss the systemic and delayed effects of radiotherapy on tumor and normal tissue biology, the biological basis of radiotherapy fractionation, and the modeling of radiobiological response.

The course will provide an up-to-date overview of the distinct biological effects resulting from the radiotherapy of different qualities (photon vs. particle irradiation) and different dose rates (FLASH vs. conventional radiotherapy), and the insights into the therapeutic potential of combining radiotherapy with other types of conventional and innovative treatments, including chemotherapy, immunotherapy, hormone therapy, and thermotherapy.

We will review recent updates on the biology of tumor re-irradiation and recurrence, as well as the effect of circadian rhythms on treatment effectiveness and normal tissue toxicity.

By the end of the course, participants will have acquired a basic understanding of how the analysis of tumor biology can be leveraged to personalize radiation therapy and enhance treatment outcomes.

Course Target Audience

The target audience includes radiation oncologists, clinical oncologists, and medical physicists seeking to deepen their understanding of the radiobiological basis of radiotherapy and potentially apply radiobiological principles in their clinical practice. Additionally, PhD candidates and postdoctoral researchers from various biological fields aiming to integrate radiobiological insights into their research work.

Course Learning Objectives

- The main biological capabilities (hallmarks) of cancer and their clinical relevance;
- 7Rs of radiation biology and their clinical translation;
- Biological basis of the fractionation and modeling of tumor response;
- Biological effects of the different types of radiation therapy (photon vs. particle irradiation) and different dose rates (FLASH vs. conventional radiotherapy);
- Systemic and delayed effects of radiotherapy and its combination with other treatments on normal and tumor tissues;
- Radiation therapy personalization based on patient biology.