

# RADIATION RESEARCH IN ONCOLOGY

## HIRO and OncoRay Lecture Series 2020/2021, part 2

From October 2020 until June 2021 we will continue with the second part of our lecture series.

Everyone welcome! PhD students please register online via the Training Portal. **Until further notice, the lecture series will take place online only.**

### TOPICS AND DATES

#### 1. Particle Radiotherapy (Prof. Dr. Oliver Jäkel)

*Thursday, 22.10.2020, 5:00 – 6:30pm, online only*

The seminar introduces the rationale and concepts for proton and ion beam radiotherapy. Some historical notes as well as an overview on the existing centers are briefly given. Furthermore, some examples for clinical applications and clinical evidence are presented.

#### 2. Fundamentals of Radiologic Imaging (Prof. Dr. Nasreddin Abolmaali)

*Thursday, 26.11.2020, 5:15 – 6:45pm, online only*

This lecture reviews basic techniques of imaging and image interpretation in radiology including radiography, fluoroscopy, ultrasound, computed tomography and magnetic resonance imaging. Additionally combined imaging techniques, namely PET/CT and MR/PET, as well as imaging analysis tools (e.g. semi-automated image analysis and computer aided diagnostics) are presented.

#### 3. Imaging Technology I (Prof. Dr. Marc Kachelrieß)

*Thursday, 10.12.2020, 5:00 – 6:30pm, online only*

Macroscopic imaging in medicine is based on several physical principles ranging from ultrasound to ionizing radiation coming from sources outside or inside the patient. Accordingly, the questions to be answered by the different methods and the content of information of the resulting images are quite different. In Imaging Technology I, the physical and technical principles of *computed tomography (CT)* and *position emission tomography (PET)* will be presented.

#### 4. Imaging Technology II (Prof. Dr. Mark Ladd)

*Thursday, 21.01.2021, 5:00 – 6:30pm, online only*

Macroscopic imaging in medicine is based on several physical principles ranging from ultrasound to ionizing radiation coming from sources outside or inside the patient. Accordingly, the questions to be answered by the different methods and the content of information of the resulting images are quite different. In Imaging Technology II, the physical and technical principles of *ultrasound (US)* and *magnetic resonance imaging (MRI)* will be presented.

## **5. Fundamentals of Nuclear Medicine (Prof. Dr. Jörg Kotzerke)**

*Thursday, 25.02.2021, 5:00 – 6:30pm, online only*

Tracer principle is the basis of radionuclide application which includes molecular imaging and therapy. This lecture explains the application of specific radiotracers for visualization of physiology and specific changes in blood flow, metabolism as well as transporter or receptor state depending on disease and its genesis. Clinical applications of FDG-PET are explained in tumor, inflammation and degeneration. The lecture gives an overview on cancer therapy with special focus on thyroid carcinoma.

## **6. Cyclotrons and Synchrotrons (Prof. Dr. Oliver Jäkel)**

*Thursday, 25.03.2021, 5:00 – 6:30pm, online only*

Radiation research in oncology requires the use of high quality sources of x-ray, electron- and ion-beams, as well as their precise control and characterization. This lecture reviews the current state-of-art in radiation sources, and discusses new advances based on both radio-frequency-accelerator and laser technologies, which promise performance improvements for fundamental research and a prospective for future clinical application.

## **7. Radiation response of normal tissue (Prof. Dr. Christian Karger)**

*Thursday, 22.04.2021, 5:00 – 6:30pm, online only*

Normal tissues are inevitably included in the high dose volume of radiotherapy, predominantly within the tumor and surrounding normal tissue, thus bearing a certain risk of early and/or late complications. The radiation response of normal tissues and its dependence on treatment parameters and biological factors, e.g. dose, fractionation protocol, overall treatment time as well as the impact of the irradiated tissue volume will be discussed. Current strategies to model and to ameliorate radiation effects in normal tissues will be presented.

## **8. Tumor Radiobiology (Prof. Dr. Mechthild Krause)**

*Thursday, 20.05.2021, 5:00 – 6:30pm, online only*

This lecture gives an overview on the biological effects of ionizing irradiation in tumors. Tumor response parameters to radiotherapy and biological factors of radiation resistance of tumors are presented.

## **9. Cancer stem cells and radiotherapy (Prof. Dr. Anna Dubrovskaja)**

*Thursday, 24.06.2021, 5:00 – 6:30pm, online only*

This lecture will review the clinical perspectives of cancer stem cell research in radiation oncology including (i) the 5R's of radiotherapy in the light of cancer stem cell biology, (ii) cancer stem cells as predictive and prognostic biomarkers, (iii) cancer stem cell heterogeneity and plasticity of cancer stem cell state and (iv) development of anti-cancer stem cell therapies for tumor radiosensitization.

**End of the lecture series!**