# ESTRO 2024 - Physics Pre-Meeting Course

## *Clinical Translation of CT Innovations in Radiotherapy*

Friday, 3 May 2024, from 08:30 to 17:00

**Course directors:**

- Vicki Trier Taasti, Department of Radiation Oncology (Maastro), Maastricht (NL)
- Patrick Wohlfahrt, Siemens Healthineers – Cancer Therapy Imaging, Forchheim (DE)

**Faculty:**

- Christian Richter, Medical Physicist, OncoRay – National Center for Radiation Research in Oncology, Dresden (DE)
- Jochen Cammin, Medical Physicist, University of Maryland School of Medicine, Baltimore, MD (US)
- Hillary Kelly, Radiologist, Harvard Medical School/Massachusetts General Hospital/Massachusetts Eye and Ear, Boston, MA (US)
- Antje Knopf, Medical Physicist, University of Applied Sciences and Arts Northwestern Switzerland (FHNW), Muttenz (CH)
- René Werner, Physicist, University Medical Center Hamburg-Eppendorf, Hamburg (DE)
- Paul Keall, Medical Physicist, Image X Institute, University of Sydney, Sydney, NSW (AU)
- Esther Bär, Medical Physicist, University College London Hospital, London (UK)
- Jessica Miller, Medical Physicist, University of Wisconsin, Madison, WI (US)
- Evelien Bogaert, Medical Physicist, Ghent University Hospital, Ghent (BE)
- Elisabeth Steiner, Medical Physicist, Landesklinikum Wiener Neustadt, Wiener Neustadt, (AT)
- Stephanie Tanadini-Lang, Medical Physicist, University Hospital Zurich, Zurich (CH)

**Programme**

| Time slot | Title | Teacher |
|---|---|---|
| 08:30 - 08:40 | Welcome & Get-together | |
| 08:40 - 08:50 | Introduction | |
| | **Session 1:**<br>**Current status of CT in radiotherapy** | |
| 08:50 - 09:10 | Overview of current CT applications in radiotherapy<br>• Introduction of CT technology and its importance for RT<br>• RT-relevant CT scan and reconstruction parameters<br>• Current use of CT imaging for dose calculation and delineation | C. Richter (DE) |

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| 09:10 - 09:30 | Commissioning & quality assurance and its impact on treatment planning<br>• Current recommendations for commissioning and quality assurance of CT simulation in RT<br>• Consequences and impact of deviations outside acceptance criteria<br>• Discussion of missing recommendations | J. Cammin (US) |
| 09:30 - 09:50 | Learning from diagnostic imaging: CT workflows and optimal contrast administration<br>• Diagnostic CT workflows for oncological patients<br>• Necessity of multiple image datasets for diagnostic readings<br>• Optimal contrast protocols for cancer diagnosis and follow-up | H. Kelly (US) |
| 09:50 - 10:10 | Panel discussion with questions & answers | |
| 10:10 - 10:30 | Interactive corner | |
| 10:30 - 11:00 | *COFFEE BREAK* | |
| | **Session 2:**<br>**CT motion management in image-guided radiotherapy** | |
| 11:00 - 11:20 | Overview of clinical CT motion management techniques in image-guided radiotherapy<br>• Introduction of CT motion management techniques<br>• Pros & cons of CT acquisition techniques, respiratory gating devices & motion management strategies<br>• Respiratory 4DCT motion artefacts and mitigation strategies | A. Knopf (CH) |
| 11:20 - 11:40 | Respiratory 4DCT: clinical workflows and innovations<br>• Innovations in respiratory 4DCT<br>• End-to-end clinical workflows for moving targets<br>• Quality assurance of respiratory 4DCT innovations | R. Werner (DE) |
| 11:40 - 12:00 | Image guidance of moving targets in radiotherapy today and in the future<br>• Low-dose CT/CBCT in adaptive RT with repeated imaging vs. treatment precision<br>• Requirements on image quality for specific clinical task at hand<br>• Effective imaging timeline for repetition of CT simulation in adaptive RT | P. Keall (AU) |
| 12:00 - 12:30 | Panel discussion with questions & answers | |
| 12:30 - 14:00 | *LUNCH BREAK* | |

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| | **Session 3:**<br>**Clinical use of dual-energy CT in radiotherapy** | |
| 14:00 - 14:20 | Overview of dual-energy CT for delineation and photon/proton dose calculation<br>• Introduction to dual-energy CT and its use in RT<br>• Dual-energy CT-derived image types and their usability in RT<br>• Benefits of dual-energy CT for delineation and proton/photon dose calculation | E. Bär (UK) |
| 14:20 - 14:40 | Clinical use cases of dual-energy CT in radiotherapy and requirements for quality assurance<br>• Specific requirements on dual-energy CT in radiotherapy<br>• Recommendations for quality assurance of dual-energy CT<br>• Expectation of the clinical use of dual-energy CT in RT in 5-10 years | J. Miller (US) |
| 14:40 - 15:00 | Clinical introduction of dual-energy CT workflows in radiotherapy departments<br>• Dual-energy CT workflow in routine practice<br>• Differences in clinical workflows based on single-energy CT and dual-energy CT<br>• Clinical commissioning strategy of dual-energy CT | E. Bogaert (BE)<br>&<br>E. Steiner (AT) |
| 15:00 - 15:30 | Panel discussion with questions & answers | |
| 15:30 - 16:00 | *COFFEE BREAK* | |
| | **Session 4:**<br>**The future of CT in radiotherapy** | |
| 16:00 - 16:20 | Photon-counting CT to advance radiotherapy<br>• Introduction to photon-counting CT and its technological advantages compared to energy-integrating CT<br>• Possible applications of photon counting CT in oncology<br>• Change in clinical practice and impact on radiotherapy | S. Tanadini-Lang (CH) |
| 16:20 - 16:50 | Panel discussion with questions & answers | |
| 16:50 - 17:00 | Wrap up & closing | |