

## 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 (Maastricht), 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, Landeskrankenhaus 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	
	<b>Session 1: Current status of CT in radiotherapy</b>	
08:50 - 09:10	Overview of current CT applications in radiotherapy <ul style="list-style-type: none"> <li>• Introduction of CT technology and its importance for RT</li> <li>• RT-relevant CT scan and reconstruction parameters</li> <li>• Current use of CT imaging for dose calculation and delineation</li> </ul>	C. Richter (DE)

09:10 - 09:30	<p>Commissioning &amp; quality assurance and its impact on treatment planning</p> <ul style="list-style-type: none"> <li>• Current recommendations for commissioning and quality assurance of CT simulation in RT</li> <li>• Consequences and impact of deviations outside acceptance criteria</li> <li>• Discussion of missing recommendations</li> </ul>	J. Cammin (US)
09:30 - 09:50	<p>Learning from diagnostic imaging: CT workflows and optimal contrast administration</p> <ul style="list-style-type: none"> <li>• Diagnostic CT workflows for oncological patients</li> <li>• Necessity of multiple image datasets for diagnostic readings</li> <li>• Optimal contrast protocols for cancer diagnosis and follow-up</li> </ul>	H. Kelly (US)
09:50 - 10:10	Panel discussion with questions & answers	
10:10 - 10:30	Interactive corner	
10:30 - 11:00	<i>COFFEE BREAK</i>	
	<b>Session 2: CT motion management in image-guided radiotherapy</b>	
11:00 - 11:20	<p>Overview of clinical CT motion management techniques in image-guided radiotherapy</p> <ul style="list-style-type: none"> <li>• Introduction of CT motion management techniques</li> <li>• Pros &amp; cons of CT acquisition techniques, respiratory gating devices &amp; motion management strategies</li> <li>• Respiratory 4DCT motion artefacts and mitigation strategies</li> </ul>	A. Knopf (CH)
11:20 - 11:40	<p>Respiratory 4DCT: clinical workflows and innovations</p> <ul style="list-style-type: none"> <li>• Innovations in respiratory 4DCT</li> <li>• End-to-end clinical workflows for moving targets</li> <li>• Quality assurance of respiratory 4DCT innovations</li> </ul>	R. Werner (DE)
11:40 - 12:00	<p>Image guidance of moving targets in radiotherapy today and in the future</p> <ul style="list-style-type: none"> <li>• Low-dose CT/CBCT in adaptive RT with repeated imaging vs. treatment precision</li> <li>• Requirements on image quality for specific clinical task at hand</li> <li>• Effective imaging timeline for repetition of CT simulation in adaptive RT</li> </ul>	P. Keall (AU)
12:00 - 12:30	Panel discussion with questions & answers	
12:30 - 14:00	<i>LUNCH BREAK</i>	

	<b>Session 3:</b> <b>Clinical use of dual-energy CT in radiotherapy</b>	
14:00 - 14:20	Overview of dual-energy CT for delineation and photon/proton dose calculation <ul style="list-style-type: none"> <li>• Introduction to dual-energy CT and its use in RT</li> <li>• Dual-energy CT-derived image types and their usability in RT</li> <li>• Benefits of dual-energy CT for delineation and proton/photon dose calculation</li> </ul>	E. Bär (UK)
14:20 - 14:40	Clinical use cases of dual-energy CT in radiotherapy and requirements for quality assurance <ul style="list-style-type: none"> <li>• Specific requirements on dual-energy CT in radiotherapy</li> <li>• Recommendations for quality assurance of dual-energy CT</li> <li>• Expectation of the clinical use of dual-energy CT in RT in 5-10 years</li> </ul>	J. Miller (US)
14:40 - 15:00	Clinical introduction of dual-energy CT workflows in radiotherapy departments <ul style="list-style-type: none"> <li>• Dual-energy CT workflow in routine practice</li> <li>• Differences in clinical workflows based on single-energy CT and dual-energy CT</li> <li>• Clinical commissioning strategy of dual-energy CT</li> </ul>	E. Bogaert (BE) & E. Steiner (AT)
15:00 - 15:30	Panel discussion with questions & answers	
15:30 - 16:00	<i>COFFEE BREAK</i>	
	<b>Session 4:</b> <b>The future of CT in radiotherapy</b>	
16:00 - 16:20	Photon-counting CT to advance radiotherapy <ul style="list-style-type: none"> <li>• Introduction to photon-counting CT and its technological advantages compared to energy-integrating CT</li> <li>• Possible applications of photon counting CT in oncology</li> <li>• Change in clinical practice and impact on radiotherapy</li> </ul>	S. Tanadini-Lang (CH)
16:20 - 16:50	Panel discussion with questions & answers	
16:50 - 17:00	Wrap up & closing	