Press release

Please fill in this form and return it to graduateschoolhealth@au.dk in Word format no later than three weeks prior to your defence.

Basic information

Name: Casper Gammelmark Muurholm Email: casmuu@oncology.au.dk Phone: +45 50599924

Department of: Clinical Medicine

Main supervisor: Per Rugaard Poulsen

Title of dissertation: Real-time dose reconstruction and dose guidance during radiotherapy delivery

Date for defence: 26-11-2021 at (time of day): 15:00 Place: Aarhus University Hospital, Palle Juul-Jensens Boulevard 99, entrance C, level 1, Auditorium C114-101, DK-8200 Aarhus N

Press release (Danish)

Dosisrekonstruktion og dosisoptimering foretaget i sand tid under strålebehandling af kræft

De fleste tumorer kan bevæge sig under en strålebehandling f.eks. pga vejrtrækning. Det kan forringe præcisionen af strålebehandlingen og dermed den faktisk afleverede dosis sammenlignet med den tilsigtede dosis. De dosismæssige konsekvenser af bevægelse er generelt ukendte for den enkelte behandling, men med udregninger af den faktisk afleverede dosis i sand tid kan de dosismæssige konsekvenser bestemmes under selve behandlingen. I dette ph.d.-projekt bliver dosis-rekonstruktionerne udført med et computerprogram ved navn DoseTracker, som er udviklet på Aarhus Universitetshospital. Første del af projektet omhandlede udvidelsen af DoseTracker til at håndtere rotationer af tumoren, hvilket ofte ses under strålebehandling af fx prostatakræft. Udvidelsen blev testet eksperimentelt i en forsøgsopstilling der imiterer en faktisk patientbehandling. Kvaliteten af udregningerne blev sammenlignet med målinger af dosis foretaget under forsøgene. Anden del af ph.d.-projektet omhandlede udviklingen af en metode til løbende evaluering af en igangværende strålebehandling. Dette blev gjort via de førnævnte beregninger af den faktisk afleverede dosis samt en forudsigelse af den fremtidige bestråling i resten af behandlingen baseret på tumorens nuværende bevægelsesmønstre. Denne evalueringsmetode blev undersøgt i simuleringer og anvendt i en optimeringsstrategi, hvor patientens position justeres under behandling for at forbedre præcisionen af strålingsdosis. Projektet er gennemført af Casper Gammelmark Muurholm, der forsvarer det d. 26/11.

Forsvaret af ph.d.-projektet er offentligt og finder sted den 26/11 kl. 15 i Auditorium C114-101, Aarhus Universitetshospital, Palle Juul-jensens Boulevard 99, indgang C, level 1, DK-8200 Aarhus N. Titlen på projektet er ”Real-time dose reconstruction and dose guidance during radiotherapy delivery”. Yderligere oplysninger samt Zoom-link: Ph.d.-studerende Casper Gammelmark Muurholm, e-mail: casmuu@rm.dk.

Bedømmelsesudvalg:

Associate Professor Azza Ahmed Khalil (chairman and moderator of the defence)
Department of Oncology, Aarhus University Hospital, Aarhus, Denmark

Professor Bas W. Raaymakers
Department of Radiotherapy, University Medical Center Utrecht, The Netherlands

Professor Ivan Richter Vogelius
Department of Oncology, Rigshospitalet, Copenhagen, Denmark

Press release (English)

Real-time dose reconstruction and dose guidance during radiotherapy delivery

In radiotherapy, tumor motion can deteriorate the intended dose distribution. The dosimetric consequences are usually unknown for each individual fraction, but with real-time motion-including dose reconstruction these consequences can be investigated during patient treatments. In this Ph.D.-project the dose reconstruction is done using a computer program called DoseTracker, which has been developed at Aarhus University Hospital. In the first part of the project, DoseTracker was expanded to include rotational motion which can happen during radiation of e.g. the prostate. The program was tested experimentally in a manner which mimics actual patient treatments. The reconstructed doses were compared with dosimetric measurements performed simultaneously. The second part of the project was about the development of a novel method for evaluation of the radiation delivery using the aforementioned real-time dose reconstructions as well as a prediction of the yet to be delivered dose based on the motion patterns of the target. The method was tested in simulations as an evaluation tool and used as a part of a novel dose-based patient position optimization strategy. The project was carried out by Casper Gammelmark Muurholm, who is defending his dissertation on 26/11.

The defence is public and takes place on 26/11 at 15:00 in Auditorium C114-101, Aarhus University Hospital, Palle Juul-jensens Boulevard 99, Entrace C, level 1, DK-8200 Aarhus N. The title of the project is ”Real-time dose reconstruction and dose guidance during radiotherapy delivery”. For more information and Zoom-link, please contact Ph.d.-student Casper Gammelmark Muurholm, e-mail: casmuu@rm.dk.

Assessment committee:

Associate Professor Azza Ahmed Khalil (chairman and moderator of the defence)
Department of Oncology, Aarhus University Hospital, Aarhus, Denmark

Professor Bas W. Raaymakers
Department of Radiotherapy, University Medical Center Utrecht, The Netherlands

Professor Ivan Richter Vogelius
Department of Oncology, Rigshospitalet, Copenhagen, Denmark

Permission

By sending in this form:

- I hereby grant permission to publish the above Danish and English press releases.
- I confirm that I have been informed that any applicable inventions shall be treated confidentially and shall under no circumstances whatsoever be published, presented or mentioned prior to submission of a patent application, and that I have an obligation to inform my head of department and the university’s Patents Committee if I believe I have made an invention in connection with my work. I also confirm that I am not aware that publication violates any other possible holders of a copyright.