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Press release

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Basic information

Name: Vicki Trier Taasti Email: victaa@rm.dk Phone: +45-23267945

Department of: Clinical Medicine

Main supervisor: Ludvig Paul Muren

Title of dissertation: Improving proton range determination using new x-ray computed tomography principles

Date for defence: 19.3.2018 at (time of day): 14.00 Place: Patologisk Auditiorium, Bygn. 18, Nørrebrogade 44, 8000 Aarhus C

Press release (Danish)

Forbedring af proton rækkeviddebestemmelse ved brug af nye røntgen computer tomografi principper

Protonterapi er fordelagtig ved behandling af kræft, da det kan ramme kræftsvulsten meget præcis, mens det omkringliggende raske væv skånes for skadelig stråling. En kendt problemstilling ved protonterapi er dog, at rækkevidden af protonerne i væv er svær at bestemme med høj præcision, hvorved man risikerer at afsætte uhensigtsmæssig stråledosis udenfor kræftsvulsten. Formålet med dette ph.d.-projekt var derfor at undersøge, hvordan præcisionen af rækkeviddebestemmelsen kan øges med henblik på at yde en mere skånsom behandling med færre bivirkninger.
Traditionelt optages et CT billede af patienter, der bruges til at bestemme protonernes rækkevidde og fordelingen af stråledosis i vævet. Men da der ikke er en direkte sammenhæng mellem, hvordan røntgenstråling i en CT skanner og protoner nedbremses i væv, vil disse CT billeder ikke kunne give en præcis bestemmelse af rækkevidden.
I dette projekt blev det undersøgt om teknologisk nye CT teknikker kunne udnyttes ved behandlingsplanlægningen i protonterapi. Blandt disse nye CT teknikker var dual energy CT, hvor der optages to forskellige CT billeder af patienten, hvilket giver ekstra information om patientens væv. Ved at udnytte denne ekstra information kan præcisionen af rækkeviddebestemmelsen øges. I dette ph.d.-projekt blev der blandt andet foreslået en ny beregningsmetode for proton rækkeviddebestemmelse, der var baseret på dual energy CT. Denne nye metode blev blandt andet evalueret på hoved-hals kræftpatienter. “Forbedring af proton rækkeviddebestemmelse ved brug af nye røntgen computer tomografi principper” er et nyt ph.d.-projekt fra Aarhus Universitet, Health. Projektet er gennemført af Vicki Trier Taasti, der forsvarer sin afhandling d. 19.03.2018.

Forsvaret af ph.d.-projektet er offentligt og finder sted den 19.03.2018 kl. 14.00 i Patologisk Auditorium, Bygning 18, Aarhus Universitet, Nørrebrogade 44, 8000 Aarhus C. Titlen på projektet er “Forbedring af proton rækkeviddebestemmelse ved brug af nye røntgen computer tomografi principper”. Yderligere oplysninger: Ph.d.-studerende Vicki Trier Taasti, e-mail: victaa@rm.dk, tlf. +45-23267945.

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Press release (English)

Improving proton range determination using new x-ray computed tomography principles

Proton therapy is an efficient treatment of cancer and at the same time the healthy tissue surrounding the tumor can be spared for harmful irradiation. A known problem in proton therapy is the range uncertainty. The range of the protons in the tissue is difficult to determine with a high precision and for this reason an increased dose outside the tumor region can be risked. The aim of this PhD project was to investigate how the accuracy of proton range determination can be increased to improve the proton therapy treatment and reduce the side effects.
Traditionally, a CT scan of the patient is acquired and used for determination of the proton range and the distribution of the irradiation dose inside the patient. However, as x-ray photons and protons interact differently with matter, the CT number in a CT scan cannot give an accurate estimate of the proton range.
During this project, technological advanced CT techniques were investigated to evaluate their potential for improving the precision of the proton treatment planning. Among these new CT techniques was dual energy CT. In a dual energy CT scan two different CT images of the patient are acquired whereby additional information is gained on the patient's tissues. This can be used to estimate the range more accurately. In this PhD project, a new computation method based on dual energy CT was suggested for proton range determination and this new method was evaluated on head and neck cancer patients. The project was carried out by Vicki Trier Taasti, who is defending her dissertation on 19.03.2018.

The defence is public and takes place on 19.03.2018 at 14.00 in Pathological Auditorium, Building 18, Aarhus University, Noerrebrogade 44, 8000 Aarhus C. The title of the project is "Improving proton range determination using new x-ray computed tomography principles". For more information, please contact PhD student Vicki Trier Taasti, email: victaa@rm.dk, Phone +45 2326 7945.

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