Board of examiners

Prof. dr. Anne Catrine Trægde Martinsen
Department of Diagnostic Physics, Oslo University Hospital
Det Kongelige Frederiks Universitet, Norway

Prof. dr. Tim Leiner
Department or Radiology, UMC Utrecht
Universiteit Utrecht, Netherlands

Prof. dr. Emmanuel Coche
Department of Radiology, Cliniques Universitaires Saint-Luc
Université catholique de Louvain, Belgium

Prof. dr. Guy Nagels
Department of Neurology, UZ Brussel
Vrije Universiteit Brussel, Belgium

Prof. dr. Frederik Vandenbroucke
Department of Radiology, UZ Brussel
Vrije Universiteit Brussel, Belgium

Prof. dr. Gert Van Gompel
Department of Radiology, UZ Brussel
Vrije Universiteit Brussel, Belgium

Prof. dr. Mark De Ridder, Chair
Department of Radiotherapy, UZ Brussel
Vrije Universiteit Brussel, Belgium

Prof. dr. Nico Buls, Promotor
Department of Radiology, UZ Brussel
Vrije Universiteit Brussel, Belgium

Prof dr. Johan de Mey, Promotor
Department of Radiology, UZ Brussel
Vrije Universiteit Brussel, Belgium

VRIJE UNIVERSITEIT BRUSSEL

PhD in Medical Sciences
2018-2019

INVITATION to the Public defence of

Steven VAN HEDENT

To obtain the academic degree of **'DOCTOR IN MEDICAL SCIENCES'**

INCREMENTAL CLINICAL VALUE AND QUANTITATIVE PERFORMANCE OF DUAL-LAYER DETECTOR DUAL-ENERGY CT.

Monday 20 May 2019
Auditorium Piet Brouwer, 17:00
Faculty of Medicine and Pharmacy, Laarbeeklaan 103, 1090 Brussel

How to reach the campus Jette:
http://www.vub.ac.be/english/infoabout/campuses

Summary of the dissertation

Dual-energy CT (DECT) is an innovative imaging technology which has been clinically available for about a decade. The goal of this thesis is to inform the readers of the basic physical principles of DECT, provide an overview of its current applications, present the findings of our research from investigating the spectral performance of one of the most recently introduced DECT systems (Dual-Layer or Spectral Detector CT), and present investigated potential applications of this technology.

Dual-Layer Detector DECT (dlDECT) is an approach that acquired dual-energy data at the level of the detector, by employing a dual-layer detector that acquired high- and low-energy photons at the bottom and top layer of the detector, respectively. Therefore, dual-energy imaging data is available with every scan. This makes dlDECT lend itself to improving characterization of incidental findings or opportunistic screening; a reasoning found in all the potential applications of dlDECT we investigated.

First, the advantages and limitations of DECT in general and dlDECT are investigated and discussed, to facilitate interpretation of the dual-energy reconstructions and help interpretation when faced with varying scan parameters and patients. Second, clinical applications are investigated. The focus is on clinically relevant applications that can solve diagnostic obstacles (metal or calcium blooming artifact reduction), and decrease patient mortality and morbidity (differentiate hemorrhage from iodine; bone mineral density assessment).

It is our hope that this information may provide practicing physicians/radiologists and researchers with new insights using this technology, and help make the most of this technology.

Curriculum Vitae

Steven Van Hedent was born May 13th 1985 in Aalst, where he spent most of his time growing up. After graduating high school at Koninklijk Atheneum Aalst, and some detours, he started medical school at the Vrije Universiteit Brussel in 2006. He graduated in 2013 with honors. It was following a radiology observership in 2011 in Cleveland, he decided to follow in his father's footsteps, and apply for a radiology residency position at UZ Brussels. His residency consisted of working in the Radiology Department at Algemeen Stedelijk Ziekenhuis in Aalst, University Hospital Brussels, and completing a research fellowship at University Hospitals Cleveland Medical Center/Case Western Reserve University. During this research fellowship, under the supervision of Prof. Dr. Pablo Ros, the foundation for his PhD was built. He got the opportunity to work with the IQon dual-energy CT prototype, and clinical scanner, from Philips Healthcare. After graduating as a radiologist in 2018, he started working as a fellow at the Imeldaziekenhuis in Bonheiden.

What comes next is still unknown…