

2021 SFfR CPD/ST Course Proposal

“ANALYSIS AND SIMULATION TOOLS FOR THE EVALUATION AND OPTIMIZATION OF MEDICAL IMAGING SYSTEMS”

COURSE DIRECTORS: PREDRAG BAKIC (UNIVERSITY OF PENNSYLVANIA / LUND UNIV) AND ANGELICA SVALKVIST (UNIVERSITY OF GOTHENBURG)

Proposed duration: 7 hours (Tue, 16 Nov 16:00-19:00 & Wed, 17 Nov 08:00-12:00)

Proposed lecturers: P. Bakic (potentially +1), Lund Univ; A. Svalkvist (potentially +1), Univ Goth

Short Course Description

Evaluation and optimization of image quality is of critical importance in development of medical imaging systems and their appropriate use in clinical practice. In case of radiographic imaging image quality is directly related to diagnostic accuracy of medical imaging systems, and the radiation dose used.

The course will review various approaches for the assessment of image quality, with the main focus on two free software tools aimed to design and perform (i) virtual clinical trials (OpenVCT, University of Pennsylvania) and (ii) image evaluation studies with human readers (ViewDEX, University of Gothenburg).

OpenVCT is an open-source free software package to design and run virtual clinical trials (VCTs) – for preclinical evaluation and optimization of medical imaging systems. Clinical imaging trials are limited by cost, duration, available patients, and the risk (in case of e.g., ionizing radiation). For example, it took 4 years, 50,000 women, USD 26 million to run DMIST trial assessing the advantages of digital mammography. VCTs represent an affordable preclinical alternative, based upon the computer simulation of anatomy, imaging modalities and image interpretation (by observer models). University of Pennsylvania has developed **OpenVCT** software to design and run VCTs with very large number of simulated patients, offering full control of anatomic and pathological properties. To that end, novel standards have been developed for VCT data format and results transfer/storing.

ViewDEX is a free DICOM-compatible software, designed to facilitate image evaluation studies in medical imaging. The software is developed in joint collaboration between the Department of Medical Physics and Biomedical engineering at Sahlgrenska University Hospital and the University of Gothenburg. The first version of the software was presented in 2004 and since then a continuous development has been ongoing. Today ViewDEX is frequently used both for research studies and for clinical optimization studies all over the world. The latest version of the software, ViewDEX 3.0, is a more modern version of the software. ViewDEX 3.0 enables the possibility to review multiple images/image stacks simultaneously which makes the software better adapted for image quality assessments in modern medical imaging.

The course will include didactic lectures about theoretical bases and challenges of OpenVCT and ViewDEX (Tuesday, 16 Nov 2021, 16:00-19:00 tentatively), followed by practical demonstration of sample applications of software tools in observer and virtual studies (Wednesday, 17 Nov 2021, 08:00-12:00 tentatively).

Detailed course syllabus and recommended computer configuration for (optional) interactive demonstration will be provided before the course. Vi ses snart i november!