



Czech Association
of
Medical Physicists



EFOMP



European School for Medical Physics Expert (ESMPE)

Prague 2016

Computed Tomography Imaging: Dosimetry, Optimization and Advanced Clinical applications

January 28 – 30, 2016
Prague, Czech Republic

The EFOMP in collaboration with the Czech Association of Medical Physicists and the Department of Dosimetry and Application of Ionizing Radiation of Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague would like to invite you to the next **ESMPE 2016**. The school will cover the main physics aspects of Computed Tomography with a focus on Image quality and patient dose evaluation and optimization, putting them in a clinical context. It is addressed to medical physicists who are already Medical Physics Experts (MPEs) or are working to become MPEs in Diagnostic Radiology. This two-and-half day event will be accredited by EFOMP. As in previous schools, there will be an optional final exam for those seeking a higher level of certification beyond the school attendance.

Contents

Computed Tomography Overview – General overview on current clinical challenges in CT: physics and technology of state of the art CT scanners, advances in image reconstruction.

Image Quality and Quality Control – Image quality with phantoms compared to clinical image quality. Assessing image quality by phantoms, and optimization strategies. Acceptance/commissioning, Quality controls and reproducibility tests.

Dosimetry in CT. Standard and advanced metrics to quantify CT dose. Patient-specific and scanner-specific Monte Carlo simulation. Radiation Dose Index monitoring (RDIM) and DRLs. Cancer risk estimation. CT in pediatric and pregnant patients

Practical Sessions – How to assess image quality experiment to illustrate difference between image quality human- and computer-based. QC protocols (X-ray source, dosimetry, automatic exposure control, detector tests and site planning)

New applications of computed tomography - State of the art and clinical challenges in dual energy CT, perfusion CT.



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Radioprotection. Site Planning. Shielding requirements

Organizers

Jaroslav Ptacek, Tereza Hanusova (Czech Republic)

Alberto Torresin (Scientific Chair) , Marco Brambilla (Chair of the School).

Teachers

Marco Brambilla	Head Department of Medical Physics - University Hospital of Novara – Italy
John Damilakis	President of EFOMP; Head - Department of Medical Physics, Faculty of Medicine, University of Crete - Greece
Sue Edyvean	Head of Medical (Radiation) Dosimetry Group - Centre for Radiation, Chemical and Environmental Hazards (CRCE) – Chilton - UK
Koos Geleijns	Head Department of Medical Physics - Leiden University Medical Center - The Netherlands
Isabelle Hernandez-Giron	Researcher - Radiology Department-Leiden University Medical Center – The Netherlands
Mika Kortensniemi	Adjunct Professor, Chief Physicist, HUS Medical Imaging Center, University of Helsinki
Colin J. Martin	Honorary Senior Clinical Lecturer - University of Glasgow - UK
Francesco Pisana	Researcher - Medical Physics in Radiology - German Cancer Research Center (DKFZ) – Heidelberg -Germany
Alberto Torresin	Head Department of Medical Physics - Hospital Niguarda – Milan – Italy



School schedule

Jan 28th Thursday	Session	Title	Description	Lecturer
8:00-9:00	Registration/Welcome			
9:00-10:00	Advances in CT	The state of the art of CT scanner	An overview of state of the art CT scanners: X-ray tubes, Gantry, Detectors	K.Geleijns
10:00-10:30	coffee break			
10:30-11:00	Advances in CT	Tube current modulation	How it is implemented in different makes and model of state of the art scanners. How to configure the relevant parameters during acquisition	C.J. Martin
11:30-12:30		Iterative Reconstructions	Iterative reconstructions in the image space or in the sinogram space. To understand differences in the different makes and model of state of the art scanners. Modeling the physics in the iterative reconstruction for transmission computed tomography	M. Kortesiemi
12:30-14:00	Lunch			
14:00-15:00	Image quality	Image quality definition	Standard and advanced metrics to quantify Image quality: sharpness, contrast, Noise, SNR, CNR, NEQ, DQE and how these metrics behave as a function of the dose	M. Kortesiemi
15:00-16:00		How to assess Image quality I	Human image quality assessment	K.Geleijns
16:00-16:30	coffee break			
16:30-17:30	Image quality	How to assess Image quality I	Model observers	Hernandez-Giron I



17:30-18:30	Image quality	<i>How to assess Image quality II</i>	Practical demonstration	Hernandez-Giron I
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20:00-23:00	Social dinner - participants + lecturers			
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Jan 29th Friday	Session	Title	Description	Lecturer
9:00-10:00	CT dosimetry	CT dosimetry	Standard and advanced metrics to quantify CT dose (CTDI, DLP, SSDE). Patient-specific and scanner-specific Monte Carlo simulation How to measure and evaluate CT dosimetric metrics	S.Edyvean
10:00-10:30	coffee break			
10:30-11:30	CT dosimetry	Radiation Dose Index monitoring (RDIM) systems and establishment of local DRLs	DICOM Dose Structured Report, Overview of RDIM systems, Use of RDIM systems to establish local DRLs, optimization and organ dose evaluation	A.Torresin
11:30-12:30		Radiation Dose of CT Examinations and the associated LAR of Cancer	Review of radiation dose associated with the most common types of diagnostic CT and methods to estimate the associated risk of cancer	M.Brambilla
12:30-14:00	lunch			
14:00-15:00	Quality controls – Practical session	<i>Acceptance testing and QC of CT scanners</i>	Acceptance/commissioning testing: purpose, types, examples. Suspensions levels in CT	S.Edyvean
15:00-16:00	Quality controls – Practical session	<i>CT Dose evaluation</i>	How to use SW for CT patient dose evaluation	S.Edyvean
16:00-16:30	coffee break			
16:30-17:30	Advanced CT applications	<i>Dynamic Contrast Enhanced CT</i>	How to implement protocol optimization in brain, liver, lung, tumour	F. Pisana/ M. Kachelriess



17:30-18:30		Dual energy CT	How to implement protocol optimization	F.Pisana/ M. Kachelriess
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Jan 30th Saturday	Session	Title	Description	Lecturer
8:00-9:00	CT in pediatrics and pregnant patients	CT dose management in pediatric patients	Patient specific dosimetry methods associated with radiological examinations for children and adolescents	J. Damilakis
9:00-10:00		CT Dose management of pregnant patients	How to apply patient specific dosimetry in pregnant patients	J. Damilakis
10:00-10:30	coffee break			
10:30-11:30	Radioprotection	Site planning	Installation and Room design for CT scanners	C.J. Martin
11.30-12.30		Shielding	Exercitation on shielding	C.J. Martin
13.00-15.00	Final exam			

Further information

Course language	English
Level	MP to MPE
Registration fee	300 € 2 main meals, 5 coffee breaks included, 1 social dinner
Reduced registration fee - subsidized by EFOMP - first-come, first-served policy	150 € - for the first 15 attendees (max. 3 from one country) coming from the following European countries: Albania, Belarus, Bosnia Herzegovina, Bulgaria, Cyprus, Estonia, Greece, Hungary, Kosovo, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia,



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	Turkey, Ukraine.
Late registration fee registration after 31 Dec 2015	350 €
Maximum number of participants	50
Duration	28 Jan 2016 – 30 Jan 2016
Study load	18 hours of lectures and demonstrations
Venue	Department of Dosimetry and Application of Ionizing Radiation, Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Břehová 7, 115 19 Prague 1, CZECH REPUBLIC
GPS coordinates	50°5'27.737"N, 14°24'58.713"E
Accommodation	Individual (possible via accommodation agency)
Information, program, etc.	www.csfm.cz/winter2016.html
Registration	Electronic registration via www.csfm.cz/winter2016.html
Registration period	October 1st, 2015– Jan 21st, 2016

For all practical information, including accommodation and public transport in Prague, please contact Czech part of organizing committee: winter2016@csfm.cz. You will be informed about accommodation possibilities, transportation etc. in registration confirmation e-mail.

Electronic registration and e-mail address will be functional from 1 October 2015.