ESMPE European School for Medical Physics Experts

Advances in PET imaging and quantification

September 11, 2024

Munich, Deutchland

The course provides participants with a thorough understanding of positron emission tomography – computed tomography (PET/CT) instrumentation and its diverse applications in the field of medical imaging and oncology in research and practice.

The course explores the cutting-edge advancements in PET technology, including the design and functionality of advanced clinical PET systems. Beyond hardware novelty (e.g. long axial field-of-view scanners, crystal/detector coupling), the course concentrates on image reconstruction considering both conventional iterative methods including detector and noise modelling to the new-developed deep learning techniques.

Moreover, the course explores the essential aspects of quality assurance protocols with a particular attention to ensure the reliability and reproducibility of quantitative measurements both in a single site environment both promoting harmonization of PET/CT scanners across different sites, emphasizing the importance of standardizing imaging protocols to maintain consistency and facilitate inter-institutional collaboration.

Quantitative PET analysis techniques, including semi-quantification and dynamic imaging with kinetic modeling, are also introduced and emphasis is placed on the pivotal role of PET imaging biomarkers in oncology, offering insights into their application in the diagnosis, treatment planning, and response assessment.

This one-day event will be accredited by EBAMP (European Board of Accreditation for Medical Physics) as CPD event for Medical Physicists at EQF Level 8.

Faculty

Stephane Chauvie	Santa Croce e Carle Hospital, Italy
Jörg Peter	Deutsches Krebsforschungszentrum, Germany
Dimitris Visvikis	National Institute of Health and Medical. Research (INSERM), France

Timetable

11th September Wednesday	Title	Description	Lecturer
8:00-9:00	Registration		
9:00-9:15	Welcome and Introduction		Chauvie
9:15-9:45	PET principles	PET system design: scintillation detector time resolution, SiPM-based	*Peter*
9:45-10:15	Advanced clinical PET systems	ToF-PET/CT, LAFOV, PET-MRI, BGO	*Peter*
10:15-10.30	Coffee Break	Available at participants cost in the Congress venue	
10:30-11:00	Image reconstruction	Iterative, Kernels ToF specific	*Peter*
11:00-11:40	Image corrections	Attenuation, random and scatter, noise modelling	*Peter*
11:40-12:00	Motion management	Respiratory motion, gating corrections	*Visvikis*
12:00-13:00	Lunch break Available at participants cost in the Congress venue		
13:00-13:30	Segmentation, Image derived biomarkers	Use of quantitative imaging bio-markers: from segmentation to practice	*Visvikis*
13:30-14:00	Harmonization of PET/CT scanners	QC to ehnance quantitative analysis in a multi-center contest	*Chauvie*
14:00-14.15	Coffee Break	Available at participants cost in the Congress venue	
14:15-14:45	Dynamic imaging and kinetic modelling	Principle and applications of kinetic analysis for cardiac and onoclogy studies	*Chauvie*
14:45-15:15	Dosimetry and quantification	Semi-quantification principles and dosimetry application of PET	*Chauvie*
15:15-16:00	AI in PET imaging	The use of AI from reconstruction to segmentation and beyond	*Visvikis*

Further information

Course language	English
Level	MPE – Level 8
Maximum number of participants	80
Date	11th of September 2024
Study load	6 hours of lectures and demonstrations
CPD	Points to be confirmed (EBAMP Accreditation)