Methods. The Master offers a study program in line with the best international practices that provides both knowledge and practical skills to graduate students. It is a two-years program: one academic year of theoretical classes followed by one year of supervised clinical training in radiotherapy or medical imaging. The clinical training is organized according to the IAEA, AFRA and IOMP guidelines.

It is jointly organized by the Physics Department of the local university, and by an international scientific institution located in the same area. The university hospital actively supports the program. Most fellowships are provided by an international agency, and are supplemented by others from local or international institutions.

Results. The 5th cycle of the Master was opened in 2018. Up to now 86 students have been enrolled in the Master from all the continents: 39 from Africa, 21 from Asia, 19 from Latin America, 1 from Oceania and 6 from Europe (25 women and 61 men).

The cooperation between university and the international scientific institution is a recognized example of effective synergy: the university has experience in high-level education and organization of courses while the international institution has an efficient network for the international enrolment of students and a large experience in international mobility. The generous collaboration of a large number of hospitals with medical physics departments guarantees a one-year-long supervised clinical training per each student.

Conclusions. The Master programme requires an extensive effort from both students and the organizing institutions, but the results are very satisfactory as the graduates are highly appreciated in the hospitals in their home countries.

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[OA116] Education and training for leadership in medical physics: An EFOMP-EUTEMPE collaboration

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Purpose. Good leadership, managerial and strategic planning skills have become crucial in today's rapidly changing and highly competitive world. Leadership is of concern to all professions and essential for small professions such as Medical Physics. EFOMP and EUTEMPE-NET are collaborating to produce what are perhaps the most comprehensive modules for Medical Physics leadership worldwide.

Methods. A SWOT analysis for the Medical Physics profession was carried out. This was followed by a comprehensive review of the literature regarding leadership in the medical and healthcare professions. Themes relevant to the profession were identified and guide the content of the modules.

Results. Teaching leadership should be done in two ways: first by direct interaction with successful leaders who would share their experiences (role modeling) and secondly through formal learning. The modules provides examples of both. European leaders present their own experiences of leadership and present practical 'to do' lists for successful leadership. The formal learning is delivered using a combination of online and face-to-face phases. The online component consists of a series of sets of compulsory readings, followed by online discussions involving real-world case studies. The online phase is asynchronous so that participants would not need to take time off their clinical duties and there will not be a problem with time zones. This is followed by an onsite phase which includes discussions in which participants can discuss challenges they are facing

in their own country with a panel of established leaders. Total learning time (readings, presentations, online fora etc) is 80 h. The modules can be described as 'Mini MBAs for Medical Physicists'.

Conclusions. The first module 'Leadership in Medical Physics - Development of the profession and the challenges for the Medical Physics Expert in Diagnostic and Interventional Radiology' (<http://eutempe-net.eu/modules/>) has already been run successfully twice. The next run of the module starts online November 2018 whilst the onsite phase will be in Prague February 2019. Applications close September 30th 2018. Similar modules are projected for Radiation Oncology and Nuclear Medicine.

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[OA117] Improvements and challenges in postgraduate radiation protection training for dental staff

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Purpose. Dental practitioners and other registered dental care professionals in the UK undergo regular update training on radiation protection matters as part of their CPD requirement. If assessments are not made as part of the update training session, it is difficult to demonstrate that real learning has taken place. It is also difficult to know whether there are areas of the training that prove difficult for participants to understand. The purpose of the study is to see whether this situation can be improved by the use of both pre-and post- training session testing.

Methods. Training sessions for dental practitioners and other registered dental care professionals were provided by the author as a series of 5, 1-h lectures designed to cover a defined syllabus.

Prior to the start of the training session, participants completed a short 10-question multiple-choice questionnaire (MCQ). At the end of the session, participants then completed a longer 30-question MCQ. The questions on the pre-session test were a sub-set of the post-session test. Many questions on both tests were designed to have more than one correct answer, and participants were informed of this beforehand, both on the test sheets and by verbal reminder. No fixed time limit was given for the completion of the questionnaires. The pre- and post-training session MCQs have been used at eight training sessions with a total of approximately two hundred participants.

Results. >85% of participants demonstrated an increase in their percentage test scores, with a mean increase in percentage score of 18%. Differences between pre- and post- course test scores were significant at $p < 0.01$, assessed using the Wilcoxon Rank-sum test. Individual question scores were also analysed and demonstrated that certain questions generated more incorrect answers than others.

Conclusions. The use of both pre- and post-course testing for dental radiation training courses can demonstrate that learning has been effective. The analysis of individual question scores can shine a light on those areas where learning has not been as effective and thus help with the delivery of future courses.

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[I118] Active motion management strategies: Breath hold, gating, tracking

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In this lecture, we will review active motion management strategies such as breath hold and gating. We will discuss patient selection and compliance, appropriate verification strategies and impact on dose distribution and planning target margins in various sites such as breast, lung or liver cancer and pediatrics. The solutions presented will range from equipment-free, pragmatic solutions to advanced technologies (tracking, MR linac).

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[I119]

Abstract not available

[I120] Image quality in CT: From physical measurements to model observers

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The presentation will focus on the description and implementation of the assessment of image quality in CT. At first the standard methods of image quality measurements, based on signal theory, will be briefly presented together with their strengths and weaknesses. Then, the concept of task based image quality assessments will be presented with an introduction in psychophysics and the theory of model observers. Ideal and anthropomorphic model observers will be discussed together with their potential uses. Finally practical examples will be given to show how model observers could be used in the framework of the patient dose optimization in CT.

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[I121] Model observers applied to quality control in computed tomography

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Model observers are mathematical algorithms that can include different aspects of the human visual system and aim to reproduce human performance for simple detection tasks. Their use has extended in different medical imaging modalities, such as mammography, computed tomography (CT) and nuclear medicine among others, in the past few years. Several model observers have shown good correlation with human observers for simple detection and discrimination tasks in image quality phantoms with uniform backgrounds. Some model observers have been used by CT manufacturers to obtain clearance for their image quality claims, in particular for low contrast detectability (LCD), in the USA. LCD is frequently assessed in CT by human observers scoring the visibility of simple objects (such as disks) of different contrast and size in phantom images. These studies might be biased as, in general, the observer knows the distribution of the objects in the phantom beforehand. A great inter- and intra-observer variability might also appear.

The models that will be studied in the course are: the non-prewhitening matched filter with an eye filter (NPWE) and the channelized Hotelling observer (CHO). The NPWE model includes a mathematical implementation of the contrast sensitivity function (CSF) of the human eye. There exist different published functions for the CSF based on human observer studies. The CHO model includes channels

that can have different shapes (Gabor, Laguerre-Gauss, difference of gaussians...) depending on the target object; the channels aim to mimic the neurons triggering in the human visual cortex.

Different aspects the implementation of model observers in image quality assessment, in particular in CT will be explored in this refresher course. Among them, how to choose the task, how to implement a model observer and its limitations, and also a short introduction on how to validate the model results with human observer studies. Practical examples about the use of these models in routine quality control, for example for low contrast detectability assessment, will be shown. Tips about how to start implementing model observers, in particular with freeware (imageJ), will be shared.

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[I122] Quantitative molecular imaging: Can we trust the SUV?

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Metabolic activity can be measured using FDG PET/CT. Quantification of FDG PET/CT studies is often based on so-called standardised uptake values (SUV). SUVs or other metabolic parameters, such as metabolic volume and total lesion glycolysis can be used for metabolic phenotyping of the tumor. These quantitative metrics are affected by various sources of bias [1]. Factor influencing tracer uptake can be described as technical, imaging physics related or biological uncertainties. Effects of the above mentioned factors on SUV should be mitigated and/or harmonized as much as possible [2]. Harmonization of PET/CT examinations aims at making SUV reads as exchangeable (comparable) and reproducible as possible by harmonizing imaging procedures, image quality and quantitation and harmonizing data analysis methods and interpretation. The main challenge of harmonisation arises from differences in PET/CT imaging procedures and in technology across multiple sites and users. To this end the European Association of Nuclear Medicine published FDG PET/CT imaging guidelines [2] and started a multicentre accreditation program. Moreover, continuous monitoring of the FDG PET/CT data quality is warranted [3]. In this lecture the principles of metabolic imaging with PET, the mechanism of FDG uptake, various factors affecting FDG PET/CT tracer uptake and its quantification by SUV will be discussed. Moreover, the need for validation of simplified uptake metrics, such as SUV, against full kinetic analysis and use of FDG PET as quantitative metabolic imaging biomarker will be addressed. Finally, it will be shown that by standardisation of imaging procedures and by ongoing quality control of the PET/CT systems, FDG uptake can be reliably quantified.

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