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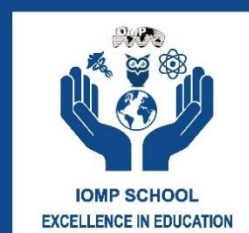
Medical Physics World
SPECIAL ISSUE

IOMP

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IOMP School Webinars

Topic	Speaker(s)	Link to recorded version
CT scan parameters and radiation dose	Mahadevappa Mahesh	https://youtu.be/Z3qOKVP564A
Monte Carlo simulation of dosimetry problems in proton therapy	Lorenzo Brualla	https://youtu.be/a2SLeiGhQIA
A comprehensive approach to the management of radiotherapy patients with implanted cardiac devices	Dimitris Mihailidis	https://youtu.be/MnRoG7fDnXU
Smaller! Faster! More! Advanced X-Ray Breast Imaging and its Role Beyond Cancer Diagnosis	Ioannis Sechopoulos	https://youtu.be/FsqEJOnEmwU
Radionuclide therapy patients in public: The original social distancing	Nicholas Forwood	https://youtu.be/XbNKlFo3Mqo
Physics Aspect of Clinical Implementation of MR-Linac	K. Y. Cheung	https://youtu.be/rxmis9F8U5w
Artificial Intelligence in Medical Physics and Medicine: Challenges and Opportunities	Steve Jiang	https://youtu.be/x373_3g7I9s
What is radiomics? What is its relationship to machine learning and deep learning? Potential value and pitfalls of machine learning for radiomics applications	Arman Rahmin Mathieu Hatt	https://youtu.be/Y1wwerL5j7U
Understanding the limitations of current CT dosimetry and the way forward	John Damilakis	https://youtu.be/ecTv9uGQNKU
Engaging medical professionals, physicists, engineers, and biologists in	Johan Verjans Price Jackson Lois Holloway	https://youtu.be/6bb2scwM4Ro

medical machine learning projects: experience from the Australian Institute for Machine Learning Expanding Quantitative Medicine through AI and Automation AI in clinical trials Panel discussion	Jonathan Sykes	
The importance of certification and accreditation in medical physics	Colin G. Orton	https://youtu.be/K9U9nC8iXZ0
From radiobiological challenges to imaging biomarkers in personalised radiotherapy	Iuliana Toma-Dasu Loredana G. Marcu	https://youtu.be/xdhVMQ0xP-o
Proton Facility Shielding: Regulatory and Design Aspects	Katja Maria Langen Nisy Elizabeth Ipe	https://youtu.be/PH0WqCiPLKA
Colin Martin: Effective dose in Medicine Effective dose: Is it poor man's cake? Panel discussion: "Is Effective dose thriving or dying?"	Colin Martin Madan Rehani	https://youtu.be/BQcTG4ybYCE
e-Learning in Medical Physics Education – How much, When and How – A Reflection After 20 Years Experience	Slavik Tabakov	https://youtu.be/4v3F4N-j4JY
IOMP-IDMP Webinar: Medical physicist as a health professional	Ola Holmberg Giorgia Loretti Madan Rehani Ibrahim Duhaini Ad Maas Brenda Byrne Hassan Kharita Sandra Guzman Taofeeq Ige	https://youtu.be/2L4Ive6zm-Y

	Arun Chougule Freddy Haryanto	
Publishing in medical physics journals	Paolo Russo Iuliana Toma-Dasu	https://youtu.be/u2fzJcQ8KlM
Personalized dosimetry for CT and interventional procedures	Hilde Bosmans	https://youtu.be/_kkNgvTZSbk
IOMP webinar jointly with WHO, IRPA and IAEA on Radiation Safety Culture	Dr. Debbie Gilley, IAEA Dr. Madan Rehani, IOMP Dr. Bernard le Guen, IRPA Dr. Maria Perez, WHO	https://youtu.be/BTm3kC8ft8I
Joint IAEA–IOMP–CIRSE webinar: What's new in understanding radiation risks for patients in interventional procedures	Dr. Madan Rehani, IOMP Werner Jaschke (CIRSE)	https://youtu.be/xdxsedOHsSA
IOMP-ALFIM webinars in Spanish language: Seguridad y Protección en salas de Resonamcia Magnética: Actualización / Safety and Protection procedures in the MRI Suite	Dr. Manuel Arreola	https://youtu.be/IfqJaoqciTc
Joint IAEA–IOMP webinar: Patients Undergoing Recurrent CT Imaging: Managing Cumulative Doses	Dr. Madan Rehani, IOMP	https://youtu.be/hKsfmAhR4Fg
Radioterapia de Pulmón utilizando IMRT/VMAT y SBRT / Lung IMRT/VMAT and SBRT	Cesar Della-Biancia	https://youtu.be/v4SMZ0Ikk1U
Monochromatic X-rays: A new source with potential to replace century-old technology	Madan Rehani Eric Silver	https://youtu.be/3YKCyQNbDQU

Artificial Intelligence and medical physics: The initial experience of the SINFONIA Horizon project	John Damilakis Habib Zaidi	https://youtu.be/UYohMIrpAIY
Patient radiation protection: How IAEA and WHO are contributing?	Ola Holmberg Maria Perez	https://youtu.be/-vzduiPsCus
Does contact shielding improve patient safety?	Paddy Gilligan	https://youtu.be/tJF1KH5BSgI
The management of unintended and accidental exposures	Colin Martin	https://youtu.be/hUZuHfYiRU0
Publishing in medical physics	Katia Parodi John Boone	https://youtu.be/RkGuBCN8TRg
I tested this x-ray system: Is it acceptable for clinical use?	Stephen Balter	https://youtu.be/a6rqAh1loPY
CTV-PTV Margins in Stereotactic Radiosurgery: Do we need them?	John Shakeshaft	https://youtu.be/b0DBzK6qq9c
Cardiac radioablation: An introduction, an overview, and how medical physicists could help shape its future	Suzy Lydiard	https://youtu.be/xDw4le-C8dk
New Tools of Phantoms, Monte Carlo Calculations, and AI for Medical Physics Applications	Xie George Xu	https://youtu.be/_MC1HuPw1-k
IOMP webinar on IDMP 2021: Communicating the Role of Medical Physicists to the Public	Joan Leach Jeanne Erdmann Peter Rickwood	https://youtu.be/ODgdY-PEFvE
Modelling the invasiveness of high-grade gliomas using computational tools – from imaging to radiotherapy target definition	Wille Häger	https://youtu.be/S8NzZjPrsxM
Re-igniting the role of physics in medicine	Robert Jeraj	https://youtu.be/O00na0IEnTs

Image quality monitoring, Medical Physics 3.0, and patient-centered care	Ehsan Samei	https://youtu.be/Z2MukCk5XlA
Biologically Targeted Radiotherapy: utilising imaging biomarkers to characterise tumour heterogeneity for precision radiation therapy	Annette Haworth	https://youtu.be/on3jK7zTePw
IOMP-ICRP Webinar: Are radiation risks below 100 mGy for example through recurrent CT procedures of real concern for radiological protection?	Werner Ruehm Dominique Laurier Richard Wakeford	https://youtu.be/IAbcnB5Satk
Non-cancer effects associated with low to moderate doses radiation exposure: what we know so far from epidemiological studies	Marie-Odile Bernier Sophie Jacob	https://youtu.be/XIS7eGNz2C8
Computational challenges in patient dose	Choonsik Lee Manuel Bardiès	https://youtu.be/AkLoCGVgcRU
GEANT4 for medical physics applications: an overview and latest updates & Overview of the Geant4-DNA project	Susanna Guatelli Sebastien Incerti	https://youtu.be/uQEUZ5-Sl18
Virtual imaging trials in breast imaging	Hilde Bosmans	https://youtu.be/4kMpBinuaLE
Relative biological effectiveness of protons – time for a change?	Iuliana Toma-Dasu	https://youtu.be/wbjFvKzw8aQ

Non-cancer effects associated with low to moderate doses radiation exposure: what we know so far from epidemiological studies

9 May 2022

Organizer: John Damilakis, IOMP
Moderator: John Damilakis, IOMP
Speakers: Marie-Odile Bernier, Sophie Jacob

Marie-Odile Bernier, MD, PhD, works as researcher in the Epidemiology Department of the French Institute for radiation Protection and Nuclear safety (IRSN) since 2005. She is coordinating epidemiological studies on low dose exposure in the field of medical exposure at IRSN. She launched a large cohort specifically designed to study cancer risk in 100 000 children exposed to CT scans in France. She has also more than 25 years of experience as endocrinologist, specialized in the treatment of thyroid cancer.

Sophie Jacob, PhD, is a radiation epidemiologist at IRSN since December 2007. She is specialized in non-cancer effects of ionizing radiation in the context of medical exposure. She coordinated the French O'CLOC study on radiation cataract and lens opacities and was then involved in the OPERRA – EURALOC study (2013-2017), a European multicentric study. In 2013, she initiated research on radiation-induced cardiovascular effects after breast cancer radiation therapy with the French BACCARAT study, further developed in the frame of European MEDIRAD EARLY-HEART study (2017-2022). Dr. Jacob received a PhD in epidemiology (2007) and a master degree in mathematics and biostatistics for biology (2004) from the University of Paris, France.

Abstract:

The use of ionising radiation in medicine is steadily increasing, with clear benefits for population health through improved diagnostic and therapeutic technologies, but it also raises issues in the radiation protection of patients and medical workers.

There is accumulating evidence from epidemiological studies for increased risk of some non-cancer effects following exposure to ionising radiation at low to moderate doses, in particular for circulatory diseases, lens opacities or neurological effects, that may take decades to manifest and present clinically. But there are still uncertainties related to the risks of late-developing non-cancer diseases and effects of radiation exposure.

This webinar will provide an overview of recent epidemiological results and ongoing research in the era of non-cancer diseases related to ionising radiation exposure, with a special emphasis on medical application of radiation.

IOMP Webinar: Computational challenges in patient dose

10 May 2022

Organizers: Madan Rehani and Pedro Vaz

Moderator: Pedro Vaz, Portugal, Centro de Ciências e Tecnologias Nucleares of IST (University of Lisbon), Portugal.

Speakers: Choonsik Lee, PhD; NCI, NIH, USA & Manuel Bardiès, INSERM (National Institute of Health and Medical Research), France

Pedro Vaz, Portugal, Centro de Ciências e Tecnologias Nucleares of IST (University of Lisbon), Portugal.

Pedro Vaz, Ph.D. in Physics, is Coordinator Researcher at **I**nstituto **S**uperior **T**écnico, University of Lisbon. His areas of research include Radiation Protection and Dosimetry. He was the President of the Center for Nuclear Sciences and Technologies of IST (2017-2020).

He is/has been Portuguese Representative in several Committees of the European Union (Group of Experts in Radiological Protection of the EURATOM Treaty and Consultative Committee on Energy Fission of the European Union) and the OECD/NEA (namely the Committee on Radiological Protection and Public Health). He is the institutional representative in European Union research platforms such as MELODI and EURADOS. He served as the National Liaison Officer (NLO) of Portugal for the International Atomic Energy Agency (IAEA). Is member of the Editorial Board of the journal "European Journal of Radiology" and Associated Editor of the journal "Radiation Physics and Chemistry". Pedro Vaz teaches Radiation Protection and Dosimetry topics in different Portuguese Universities.

Choonsik Lee, PhD; NCI, NIH, USA

Topic: Current status and challenges in organ dose estimation for patients undergoing diagnostic radiology procedures

Dr. Lee is a senior investigator and Dosimetry Unit head at the United States National Cancer Institute. He has more than 20 years of expertise on computational and experimental radiation dosimetry for patients undergoing medical radiation procedures. His research team develops methods and tools to estimate radiation dose from medical exposures, including treatment and diagnostic tests, in order to generate reliable dosimetry data for use in epidemiological studies of ionizing radiation and cancer risk. Dr. Lee has involved in several task groups in the International Commission on Radiological Protection in the past years and was appointed to the ICRP Committee 2 (Doses from Radiation Exposure).

Abstract

Diagnostic medical radiation sources have substantial contributions to effective dose per capita worldwide. Although radiology procedures provide indisputable benefits to patients, there are still concerns about potential risks from radiation doses, especially in pediatric patients who are more sensitive to radiation than adults. The investigators at the United States National Cancer Institute are developing methods and tools including National Cancer Institute dosimetry system for Computed Tomography (NCICT), nuclear medicine (NCINM), and radiography and fluoroscopy (NCIRF) to estimate individualized organ doses. The tools have been actively used for epidemiological and clinical research. The major outcomes from the research and remaining challenges will be presented at this seminar.

Manuel Bardiès, INSERM (National Institute of Health and Medical Research), France.

Topic: Clinical dosimetry in diagnostics and therapy: recent developments and new perspectives

Manuel Bardiès obtained his Doctorate from Toulouse University, France, in 1991. He developed his research in *radiopharmaceutical dosimetry* within INSERM (National Institute of Health and Medical Research) since 1992 in Nantes, then in Toulouse, and currently in Montpellier (2021-). He was member of the EANM Dosimetry Committee (2001-2013, chair 2009-2011). He chaired EFOMP Science Committee (2014-2016), and is currently chairing the EFOMP Special Interest Group for radionuclide internal dosimetry. He has been involved in education in various European structures (ESMIT, ESMPE). He's members of the Board of the medical physics resident programme in France. The group led by Manuel Bardiès is primarily involved in radiopharmaceutical dosimetry, at various scales (cell, tissue, organ). This requires the ability to assess radiopharmaceutical pharmacokinetics, through quantitative imaging. An important part of the research activity involves Monte Carlo modelling of radiation transport. The objective is to improve molecular radiotherapy by allowing patient-specific treatments.

Abstract

Targeted and Selective internal radiotherapy have boosted the development of clinical internal dosimetry. The recent developments include a better appraisal of activity uptake in different compartments of the body, more accurate pharmacokinetics and absorbed dose determination. In addition, there is a growing awareness of the real challenges, both methodological and technological, raised by therapeutic nuclear medicine dosimetry. It is now clear that conventional clinical dosimetry workflows developed for reference dosimetry in diagnostics are not relevant in a context of therapy. More work is needed to better identify the relevant dosimetric indices that will contribute effectively to therapeutic optimisation. On the bright side, the increasing development and dissemination of clinical dosimetry, associated with the advent of commercial treatment planning software participates to both quantitative and qualitative improvements of our professional practice. Now come the time to develop quality assurance in clinical dosimetry.

IOMP Webinar: GEANT4 for medical physics applications: an overview and latest updates & Overview of the Geant4-DNA project

11 May 2022

Organizer: Eva Bezak, IOMP

Moderator: Eva Bezak, IOMP

Speakers: Associate Professor Guatelli (University of Wollongong) & Prof Sebastien Incerti (University of Bordeaux)

Associate Professor Susanna Guatelli, Centre For Medical and Radiation Physics, University of Wollongong, Australia, is an international leading expert of the Geant4 Monte Carlo code for medical physics applications, working in the field since 2002. Since 2018, S. Guatelli is member of the Steering Board of the Geant4 International Collaboration in her role of Coordinator of the Geant4 Advanced Examples Working Group. Since 2018, she leads the Geant4 Medical Simulation Benchmarking Group dedicated to the systematic testing of Geant4 for medical applications. S. Guatelli has extensive expertise in teaching Geant4 at various levels and organised many Geant4 short courses addressed to the use of this Monte Carlo code in medical physics. S. Guatelli has been chair/co-chair of several international workshops and conference sessions dedicated to Monte Carlo codes applied to medical physics. She is Associate Editor of Physica Medica and of Applied Radiation and Isotopes. In 2021, she was awarded with the prestigious Women in Physics Lecturer award, of the Australian Institute of Physics, for her significant contribution to research at the international level. In 2022, she became a member of the College of Experts of the Australian Research Council (ARC).

Abstract

Topic: GEANT4 for medical physics applications: an overview and latest updates

Geant4, which is a Monte Carlo toolkit describing particle transport and interactions in matter, is widely used in medical physics in critical applications such as verification of radiotherapy

treatment planning systems, and the design of equipment for radiotherapy and nuclear medicine. It is also used in medical imaging for dosimetry, to improve detectors and reconstruction algorithms, and for radiation protection assessments. In this seminar, an overview will be given of the capability of Geant4 for medical physics applications, focusing on the latest updates concerning Geant4 11.0. In addition, she will present the project G4-Med, which has been developed by a large international collaboration, the Geant4 Medical Simulation Benchmarking Group, including both Geant4 developers and users. The goal of the project is to perform a systematic benchmarking of the accuracy of the Geant4 physics models in a set of application scenarios of interest for medical applications. Information will be provided on how to start to use Geant4 for medical applications. The seminar will finish by describing briefly the Geant4 development processes and Geant4 user support, which are in place to continue to develop this simulation code for and in synergy with the medical physics community.

Professor Sébastien Incerti is director of research at the National Center for Scientific Research (CNRS) and the National Institute of Nuclear and Particle Physics (IN2P3), in France. He is involved in the development of the open source Geant4 Monte Carlo toolkit (http://geant4.org) for the simulation of particle-matter interactions. His research activities focus on the study of the biological effects of ionizing radiation in several application areas, including medical physics and space sciences, in particular for the Geant4-DNA project (http://geant4-dna.org) for which he has been the spokesperson since 2008. Since 2019, he is the scientific director of CNRS-IN2P3 for interdisciplinary science.

Abstract

Topic: Overview of the Geant4-DNA project

In this webinar, we will present an overview of the Geant4-DNA extension (http://geant4-dna.org) of the general-purpose Geant4 Monte Carlo simulation toolkit (http://geant4.org). Initially proposed by the European Space Agency, Geant4-DNA aims at simulating in a mechanistic way the biological effects of ionizing radiation on living organisms at the sub-cellular level. In particular, it allows to simulate the physical, physico-chemical and chemical stages that

take place in the biological environment after irradiation, allowing in particular the prediction of early DNA damage from simplified geometries of biological targets. Geant4-DNA is fully included in Geant4 and is freely available to the scientific community. It contains examples of various applications in physics, chemistry and radiobiology, which can be used to learn Geant4-DNA. Its development continues in the framework of an international collaboration.

IOMP Webinar: Virtual imaging trials in breast imaging

12 May 2022

Organizer: John Damilakis, IOMP

Moderator: John Damilakis, IOMP

Speaker: Hilde Bosmans

Hilde Bosmans is professor in medical physics in the University of Leuven (Belgium), she is expert in medical physics in the radiology department of the University Hospital Leuven and steers the physico-medical quality control procedures in 103 mammography units in the Belgian breast cancer screening. She has 261 peer reviewed papers and works currently with 12 PhD students at different themes in medical physics. Research in Virtual Clinical Trials was worked out in the frame of PhD theses by Ann-Katherine Carton, Federica Zanca, Elena Salvagnini, Lesley Cockmartin, Eman Shaheen and Liesbeth Van Coillie. Ongoing projects in VCTs in breast imaging focus on the creation of synthetic data for AI training, the optimization of contrast enhanced mammography and expansion to other modalities such as chest x-ray imaging (with the PhD project of Sunay Rodriguez) and cone beam dental applications.

Abstract

Quality requirements in breast imaging are high, especially in breast cancer screening where the ultimate results are also measured and compared to (European) Guidelines. This has triggered many optimization projects and models for detailed breast dosimetry. The parameter space for optimization is however big, many new techniques are being introduced and clinical trials in breast cancer screening require a huge amount of images and take a lot of time. From the early days on, effort has therefore been put in developing breast models and virtual clinical trial (VCT) frameworks.

We will report on the typical components in VCT studies, on their validation and their limitations. The lecture will conclude with illustrating unique results that could be obtained with virtual imaging trials.

IOMP Webinar: Relative biological effectiveness of protons – time for a change?

13 May 2022

Organizer: Madan Rehani, IOMP
Moderator: Eva Bezak, IOMP
Speaker: Iuliana Toma-Dasu

Iuliana Toma-Dasu is Professor in Medical Radiation Physics and the Head of the Medical Radiation Physics division at the Department of Physics, Stockholm University, affiliated to the Department of Oncology and Pathology at Karolinska Institutet in Stockholm, Sweden, and the Editor in Chief of Physica Medica – European Journal of Medical Physics. Iuliana Toma-Dasu studied Medical Physics at Umeå University, Sweden, where she also became a certified medical physicist and received a Ph.D. degree. In parallel with her involvement in the educational program for the medical physicists run at Stockholm University, her main research interests focus on biologically optimised adaptive radiation therapy, including particle therapy, modelling the tumour microenvironment and the risks from radiotherapy.

Abstract

Current practice in proton radiotherapy planning is based on the assumption that the relative biological effectiveness (RBE) of protons has a constant value of 1.1 as recommended by the ICRU report 78. Nevertheless, increasing evidence is pointing nowadays towards to fact that the RBE of protons is not constant but it varies with the endpoint, the dose per fraction, the actual beam quality described by the linear energy transfer (LET) or other metrics and, of course, the tissue type. This presentation will give a brief overview of the clinical evidence for variable proton RBE and will introduce the frame of the mathematical models for variable RBE based on in vitro cell survival data and the application of these models on proton treatment evaluation and optimisation. A critical discussion on the change from a constant 1.1 proton RBE to a variable value will also be presented.

IOMP-ICRP Webinar: Are radiation risks below 100 mGy for example through recurrent CT procedures of real concern for radiological protection?

20 April 2022

Organizer: Madan Rehani, IOMP

Moderator: Christoper Clement, ICRP

Speakers: Werner Ruehm, Dominique Laurier, and Richard Wakeford

Christopher Clement is the Scientific Secretary & CEO of the International Commission on Radiological Protection (ICRP), overseeing the daily business of ICRP and representing the organisation in many international fora since 2008. He has presented well over 300 invited lectures in more than 40 countries and overseen the production of more than 70 issues of Annals of the ICRP as Editor-in-Chief. Since 2012 he has been a member of the International Radiation Protection Association (IRPA) Executive Council, and Vice-President of IRPA since 2021. He has more than 30 years of experience in radiological protection, including environmental monitoring and remediation, radiological counterterrorism, and as Director of Radiation Protection at the Canadian Nuclear Safety Commission. In 2019, he received the Ambassador's Award from the Ambassador of Japan to Canada for his work in recovery after the Fukushima Daiichi accident and the promotion of mutual understanding and friendly relations between Japan and Canada.

Werner Rühm leads the Medical and Environmental Dosimetry Group at the Helmholtz Center Munich, Institute of Radiation Medicine, Germany. In addition, he is professor at the Medical Faculty of the University of Munich. He has been a member of Committee 1 "Radiation Effects" (C1) of the International Commission on Radiological Protection (ICRP) since 2005, serving as C1 Secretary from 2012 to 2016, and as C1 Chair from 2016 to 2021. Currently he is currently chairing ICRP TG91 on Dose and Dose-Rate Effectiveness Factor. From 2014 – 2020 he was Chair of the European Radiation Dosimetry Group (EURADOS), and in 2020 he was elected

Chair of the German Radiation Protection Commission (SSK). In 2020 Werner Rühm was elected by the German Federal Parliament and the Federal Council of Germany as a member of the National Civil Society Board, and in 2021 he was elected Chair of ICRP. He is a member of the German delegation to UNSCEAR.

Dominique Laurier has 25 years of experience in the field of radiation epidemiology. He works at the French Institute for Radiation Protection and Nuclear Safety (IRSN) as Deputy Head of the Health Division. He has been a member of the main commission of the International Commission on Radiological Protection (ICRP) since 2017 and chairman of ICRP committee 1 since 2021. He is the French representative to UNSCEAR, and the chair of the Nuclear Energy Agency (NEA) High Level Group on Low Dose Research (HLG-LDR).

Richard Wakeford is Honorary Professor in Epidemiology in the Centre for Occupational and Environmental Health at The University of Manchester, UK. He worked in the nuclear industry for nearly 30 years advising on radiation risks before taking early retirement in 2006, then joining the academic staff of The University of Manchester as Professor before retiring at the end of 2019. Richard has been a member of ICRP Committee 1 since 2009 and has also been a member of a number of expert groups including as a member of the UK delegation to UNSCEAR, the EU Article 31 Group, the UK Committee on Medical Effects of Radiation in the Environment (COMARE), the UK Scientific Advisory Group for Emergencies (SAGE) at the time of the Fukushima Dai-ichi accident, and various technical groups for WHO, IAEA, NEA/OECD and US NCRP. He has been Editor-in-Chief of Journal of Radiological Protection since 1997.

Abstract:

Recent studies suggest that every year worldwide about a million patients might be exposed to doses of the order of 100 mGy of low-LET radiation, due to recurrent application of radioimaging procedures. This webinar provides a synthesis of recent epidemiological evidence on radiation-related cancer risks from low-LET radiation doses of this magnitude. Specifically, reviews of recent results are given with respect to a) the atomic bomb survivors (by W. Rühm), b) low dose-rate exposures during adulthood (by D. Laurier), and c) in utero and childhood exposures. (by R. Wakeford). Taken together, substantial evidence was found that ionizing radiation causes cancer

at acute and protracted doses above 100 mGy, and growing evidence for doses below 100 mGy. It is concluded that doses of the order of 100 mGy from recurrent application of medical imaging procedures involving ionizing radiation are of concern, from the viewpoint of radiological protection.

Literature:

W. Rühm, D. Laurier, R. Wakeford, Cancer risk following low doses of ionising radiation – current epidemiological evidence and implications for radiological protection, Mut. Res. – Genetic Toxicol. Environ. Mutagenesis 873 (2022) 503436

M.P. Little, R. Wakeford, S.D. Bouffler, K. Abalo, M. Hauptmann, N. Hamada, G.M. Kendall, Review of the risk of cancer following low and moderate doses of sparsely ionising radiation received in early life in groups with individually estimated doses, Environ. Internat. 159 (2022) 106983

R. Wakeford, J.F. Bithell, A review of the types of childhood cancer associated with a medical X-ray examination of the pregnant mother, Int. J. Radiat. Biol. 97 (2021) 571-92.

IOMP Webinar: Biologically Targeted Radiotherapy: utilising imaging biomarkers to characterise tumour heterogeneity for precision radiation therapy

22 March 2022

Organizer: Eva Bezak, IOMP

Moderator: Eva Bezak, IOMP

Speaker: Annette Haworth

Prof Haworth is the Director of the Institute of Medical Physics at the University of Sydney and the course coordinator for the medical physics postgraduate program. She has more than 25 years experience as a clinical medical physicist having previously worked at the Peter MacCallum Cancer Centre in Melbourne Australia before moving to Sydney in 2016. Annette's research interests have focused on novel approaches to brachytherapy and radiotherapy treatments, in particular using quantitative imaging for biological optimization of treatment planning and treatment response.

Abstract:

Intra-tumoral heterogeneity is largely ignored in radiation therapy (RT) treatment planning. Imaging biomarkers derived from quantitative MRI (qMRI) enable voxel-wise mapping of biological characteristics, providing an opportunity to optimise RT dose distributions based on spatially defined Intra-tumoral biology. Mapping changes in qMRI post-treatment offers the opportunity for early identification of those at risk of recurrence. In this presentation I will showcase our work demonstrating how quantitative imaging may be used to produce 3-dimensional maps of tumour heterogeneity to facilitate a precision-based approach to biologically targeted RT treatment planning and treatment response.

IOMP webinar: Image quality monitoring, Medical Physics 3.0, and patient-centered care

9 February 2022

Organizer: Madan Rehani

Moderator: Madan Rehani

Speaker: Ehsan Samei

Ehsan Samei, PhD, DABR, FAAPM, FSPIE, FAIMBE, FIOMP, FACR is a tenured professor, Chief Imaging Physicist, and director of Center for Virtual Imaging Trials at Duke University. Authored over 320 referred papers, he is passionate about bridging the gap between scientific scholarship and clinical practice through virtual clinical trials, clinically-relevant metrologies, and Medical Physics 3.0. He aims towards quantitative patient-centric use of imaging, effectual realization of translational research, and clinical processes that are based on evidence.

Abstract:

While much of medical physics is vested with imaging and therapy technologies, those technologies are effective only to the extend they are used for the care of patients. The physicist is in fact vested with the expertise and the responsibility to ensure that each patient gets the optimum imaging and therapy towards the best clinical outcome. This involves a closer understanding of the clinical nuances of technologies in clinically-relevant quantitative terms, understanding how the advantages of technologies can be effectually realized in its implementation and patient-specific use, and monitoring to ensure the expected outcome is realized. This presentation offers a holistic perspective, anchored to the principles of Medical Physics 3.0, to integrate the rigor of science of medical physics and the relevance of practice towards patient-centered care.

IOMP webinar: Re-igniting the role of physics in medicine

19 January 2022

Organizer: Madan Rehani

Moderator: Madan Rehani

Speaker: Robert Jeraj

Dr. Robert Jeraj is a Professor of Medical Physics, Human Oncology, Radiology and Biomedical Engineering at the University of Wisconsin, Madison and a Professor of Physics at the University of Ljubljana, Slovenia, where he leads international research groups of medical physics. Dr. Jeraj is a founding member of the Topical Group on Medical Physics within American Physics Society (APS), the Working Group on the Future of Medical Physics Research and Academic Training within American Association of Physicists in Medicine (AAPM), the Medical Physics for World Benefit (MPWB) organization, and is a founding Editor in Chief of the Biomedical Physics and Engineering Express (BPEX) journal. He has served as a member of the Medical Imaging Drug Advisory Committee at Food and Drug Administration (FDA), and is on the Board of Commission on Accreditation of Medical Physics Education Programs (CAMPEP). Dr. Jeraj is an author of over 150 published papers, text books and book chapters, and is a frequent invited lecturer and presenter on the use of molecular imaging in therapeutic interventions and general applications of medical physics in radiation and medical oncology.

Abstract:

Medical physics has led to many achievements contributing to modern day medical practice, ranging from high-resolution diagnostics to high-precision treatment deliveries. However, the rapid pace of developments in medicine particularly fueled by personalized therapeutic approaches are posing some unique challenges. At the same time, they are providing new opportunities for involvement of physics in medicine beyond traditional roles. In this lecture, we will (1) review current trends in personalized medicine, (2) summarize some strategic initiatives aimed to address these trends by medical physics societies, (3) highlight the need for additional

skills and knowledge required to tackle the challenges and (4) overview some examples of physics involvement in medicine beyond traditional medical physics roles. Specifically, we will present state-of-the-art solutions in the area of quantitative imaging biomarkers, which could be extended and adopted on a global scale.
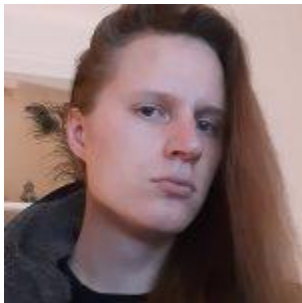
IOMP webinar: Modelling the invasiveness of high-grade gliomas using computational tools – from imaging to radiotherapy target definition

7 December 2021

Organizer: Eva Bezak

Moderator: Eva Bezak

Speaker: Wille Häger

Wille Häger is a PhD student at the Department of Physics, Stockholm University, and Department of Oncology and Pathology, Karolinska Institute, in Stockholm, Sweden, under the supervision of Prof. Iuliana Toma-Dasu and Dr. Marta Lazzeroni. His PhD project is focused on models and computational tools for simulating the tumour invasion of high-grade gliomas and the potential implications for radiotherapy.

Abstract:

High-grade gliomas (HGGs) are notoriously invasive of normal tissue, and to this day prognosis remains poor. The main issue in treating HGGs appears to be determining the extent of the tumour invasion, as regions of considerable clonogenic cell populations are not detectable using conventional diagnostic imaging methods. This presentation will discuss the use of modelling to simulate the HGG growth and its invasion of brain matter, how well the simulated invasion agrees with the conventional clinical target volume (CTV) delineation, and the future prospects of model assisted CTV delineation and probabilistic treatment planning.

IOMP webinar on IDMP 2021: Communicating the Role of Medical Physicists to the Public

7 November 2021

Organizer: Madan Rehani, President, IOMP

Moderators: Madan Rehani and Ibrahim Duhaini

Title: Why Communicating the Science is Worth the Effort

Professor Joan Leach

Director, Australian National Centre for the Public Awareness of Science

The Australian National University (ANU)

NEW BOOK: An Ethics of Science Communication

https://www.palgrave.com/gp/book/9783030321154

Professor Joan Leach, PhD is a TED talker. She is Director of the Australian National Centre for Public Awareness of Science and Chair of the Academic Board at The Australian National University. She also Chairs the National Committee for History and Philosophy of Science at the Australian Academy of Science. Her recent books include An Ethics of Science Communication (with Fabien Medvecky) and an edited collection, Science Communication: A Global Perspective which tells the stories of 39 nations and territories attempts to raise the profile of science over the last 50 years. While remaining transfixed by science, she advocates for better science communication that critically examines the social impacts of science, technology and biomedicine.

Title: Communication is Understanding Waiting to Happen

Jeanne Erdmann

Award winning health and science journalist

• Tagline: Independent health and science journalist, board member Association of Health Care Journalists, cofounder The Open Notebook

• She is freelance journalist who lives near St. Louis, Missouri. Nearly 20 years ago, she left the world of cells and microscopes for writing and reporting. Jeanne specializes in genetics, aging, end-of-life issues, and wellness. Her work has appeared in both trade and consumer publications, including Real Simple, Discover, Science News, Family Circle, Nature, Nature Medicine, Women's Health, and The Washington Post. She is a board member of the Association of Health Care Journalists, and co-founder and editor at The Open Notebook, a craft-focused site for science, health, and environmental writers. She's also been the recipient of numerous awards and fellowships.

Title: Journalists – love them hate them but you need them. How to make friends with the press and benefit from the results

Peter Rickwood

Executive Director, Atomic Reporters, Vienna, Austria.

He was environmental journalist on Canada's largest daily newspaper; then Press Officer for a decade at the International Atomic Energy Agency (IAEA); media advisor to the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO); consultant to the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR); and is founder Atomic Reporters which has been organizing training workshops bringing specialists and journalists, professional and citizen together, to promote nuclear literacy and support more informed reporting.

IOMP webinar: New Tools of Phantoms, Monte Carlo Calculations, and AI for Medical Physics Applications

6 October 2021

Organizer: Madan Rehani

Moderator: Madan Rehani

Speaker: Prof. Xie George Xu, University of Science and Technology of China (Hefei, China)

Prof. Xie George Xu is professor and director of the Institute of Nuclear Medical Physics, University of Science and Technology of China (Hefei, China). Before relocating to China recently, he was the Edward E. Hood Endowed Chair Professor of Engineering at Rensselaer Polytechnic Institute (Troy, New York, USA). He received a Ph. D. in Nuclear Engineering (health/medical physics focus) from Texas A&M University (College Station, Texas, USA) in 1994. Since 1995, Prof. Xu has mentored nearly 100 Ph.D and M.S. students in the U.S. and China. His research has focused on "radiation dosimetry" for radiation protection, medical imaging, and radiotherapy applications, with continuous funding by governmental agencies and private sector industry. His publication list includes 2 books, 200 peer-reviewed papers/chapters, 400 abstracts, and 140 invited talks. Widely known for his work on "computational phantoms" and "advanced Monte Carlo simulations", Prof. Xu is a fellow of American Nuclear Society (ANS), Health Physics Society (HPS), American Association of Physicists in Medicine (AAPM), and American Institute for Medical and Biological Engineering (AIMBE), as well as a council member of the National Council on Radiation Protection and Measurement (NCRP) and a past president of the Council on Ionizing Radiation Measurements and Standards (CIRMS). He has been on the editorial board of Medical Physics and Physics in Medicine & Biology for 20 years. Prof. Xu and his team have developed a number of commercial software tools including VirtualDose (a CT and IR patient dose reporting software), ARCHER (a GPU-based Monte

Carlo dose computing software for treatment planning and dose QA verification), and DeepViewer (an image segmentation and registration software tool). Prof. Xu has received numerous professional recognitions including, recently, CIRMS Randal S. Caswell Award for Distinguished Achievements (2015), HPS Distinguished Scientific Achievement Award (2018), ANS Arthur Holly Compton Award in Education (2020), ANS Rockwell Lifetime Achievement Award in Radiation Protection and Shielding (2020), and AAPM Edith H. Quimby Award for Lifetime Achievement in Medical Physics (2020).

Abstract:

Estimation of organ doses in medical physics depends on computational phantoms and Monte Carlo calculations – two tools that have seen major advancement recently. Phantoms have evolved from the 1st-generation stylized phantoms to 2nd-generation voxel phantoms, and to 3rd-generation boundary representative (BREP) phantoms. Aided with the latest deep-learning image segmentation tools, patient-specific phantoms can be created consisting of organ outlines ready for Monte Carlo calculations. And GPU-based Monte Carlo codes can reduce dose computing time from hours to less than one minute. This presentation will cover: (1) Historical review of computational phantoms and Monte Carlo codes, (2) Development of patient-specific phantoms using an automatic multi-organ segmentation tool, DeepViewer, that is based on neural convolutional network (called U-Net) , (3) Development of rapid Monte Carlo dose calculation code, Archer, that is based on nVidia GPU co-processors and virtual-source-modeling of medical accelerators. Examples in medical imaging dose (CT, PET/CT) and radiation treatment will be discussed.

IOMP webinar: Cardiac radioablation: An introduction, an overview, and how medical physicists could help shape its future

7 September 2021

Organizer: Eva Bezak

Moderator: Eva Bezak

Speaker: Suzy Lydiard, ACRF ImageX Institute, University of Sydney

Suzy Lydiard is a part-time PhD student at the ACRF ImageX Institute, University of Sydney, supervised by Prof. Paul Keall. Her PhD is investigating cardiac radioablation for atrial fibrillation, a new and developing non-invasive treatment alternative for the most common sustained cardiac arrhythmia. Her work is specifically evaluating the feasibility of an MRI-guided treatment on an MRI-Linac using non-invasive target tracking and MLC tracking. Suzy is also working as a clinical Radiation Oncology Medical Physicist at the Kathleen Kilgour Centre, New Zealand.

Presentation Overview: Cardiac radioablation has rapidly grabbed the attention of both clinicians and academics after stellar initial clinical results. Cardiac radioablation has the potential to advance and expand the clinical care available to those suffering from certain cardiac arrhythmias and is already being implemented within clinical trials globally. There are exciting and abundant opportunities for medical physicists and academics to help progress cardiac radioablation technologies and advance cardiac radioablation knowledge in order to make this treatment mainstream and accessible to those patients in need. This presentation will describe the clinical drivers for cardiac radioablation, discuss the challenges cardiac radioablation brings to radiotherapy, summarize the technology approaches currently utilized in clinical cardiac radioablation treatments, and identify potential research and development opportunities.

IOMP webinar: CTV-PTV Margins in Stereotactic Radiosurgery: Do we need them?

15 June 2021

Organizer: Eva Bezak

Moderator: Eva Bezak

Speaker: John Shakeshaft, Site-Senior Physicist ICON Cancer Centre, Queensland, Australia

John Shakeshaft currently works as the site-senior physicist at Gold Coast University Hospital within the ICON Cancer Care network. He has previously worked with both small and large radiation oncology departments across Australia and the UK (where he trained). He is the current chair of the Australasian College of Physical Scientists & Engineers in Medicine (ACPSEM) Radiation Oncology Specialist Group.

Recently he has also been the trial physicist for the Trans-Tasman Radiation Oncology Group (TROG) Cancer Research Stereotactic Radiosurgery (SRS) OUTRUN trial and chaired the technical working group developing guidelines for future TROG SRS trials.

CTV-PTV Margins in Stereotactic Radiosurgery: Do we need them? Traditionally in Radiation Oncology margins are added to the clinical target volume (CTV) to allow for geometrical uncertainties in the planning and treatment. However, in stereotactic radiosurgery (SRS) some practitioners, particularly those treating with a Gamma Knife®, have not added margins to the CTV to form a planning target volume (PTV). This inconsistent approach to handling CTV-PTV between centres providing an SRS service. The talk will consider:

– Geometrical uncertainties in SRS including the magnitude of the different contributing factors

– How different treatment modalities differ and the potential effect on margin requirements (for example achievable steepness of dose gradients)

– The effect of imaging for treatment position verification on modern treatment systems

– The ICRU91 approach for clinical trials

– Clinical evidence for the use of CTV-PTV margins in SRS

IOMP webinar: I tested this x-ray system: Is it acceptable for clinical use?

26 May 2021

Organizer: Madan Rehani
Moderator: Dr. Geraldine O Reilly, St. James's Hospital, Dublin
Speakers: Stephen Balter

Physicists make quantitative measurements to determine therapeutic and diagnostic equipment safety and performance. Measurement uncertainty can influence acceptability decisions. Inappropriate equipment acceptance might result in hazardous operation. Improper rejection could be hazardous to patients if alternative equipment is not available in a timely manner. This presentation reviews basic concepts and nomenclature for measuring instrument calibration and measurement uncertainty applicable to all areas of medical physics. A brief outline of the differences between manufacturers' and medical physicists' processes will be presented using fluoroscopic beam measurements as an example. It concludes with some clinical implications of acceptability.

Stephen Balter, Ph.D. is a Professor of Clinical Radiology (physics) at Columbia University in New York City. His primary clinical responsibility is in a high volume interventional cardiology department.

Dr. Balter is ABR certified and licensed by New York State in the areas of Diagnostic Imaging, Therapeutic Radiology, and Medical Health Physics. He received his Masters in Radiological Physics from Columbia, and his Ph.D. in Experimental Physics, from Brooklyn Polytechnic Institute.

Dr. Balter is an active participant in several physical and clinical societies. He is an elected fellow in the American Association of Physicists in Medicine (AAPM), American College of Medical Physics (ACMP), American College of Radiology (ACR), Society for Cardiac Imaging and Interventions (SCAI), and the Society for Interventional Radiology (SIR). He is a member of Council

of the National Council on Radiation Protection and Measurements (NCRP), and currently serves on three International Electrotechnical Commission (IEC) working groups.

Dr. Belter's interests have focused on brachytherapy, interventional radiology, and related health-physics topics. He has published over 200 papers, chapters, and books in these and related areas. Among these, he was the chair for NCRP Report 168 on fluoroscopic guided interventions. He has served as an invited lecturer and visiting professor in many USA and worldwide venues.

IOMP webinar: Publishing in medical physics

10 May 2021

Organizer: Madan Rehani

Moderator: Paolo Russo, Chair, Publication Committee, IOMP, Past Editor-in-Chief, Eur J Medical Physics

Speakers: Katia Parodi and John Boone

Individual topics

Katia Parodi: Keeping the pace with a rapidly evolving field of medical physics

John Boone: The fundamentals of a great paper

Prof. Dr. Katia Parodi

Chair of Experimental Physics – Medical Physics

Faculty of Physics at LMU Munich

Editor-in-Chief, Physics in Medicine & Biology

Katia Parodi received her Ph.D. in Physics from the University of Dresden, Germany, in 2004. She then worked as postdoctoral fellow at Massachusetts General Hospital and Harvard Medical School in Boston, USA. In 2006 she returned to Germany as tenured scientist and group leader at the Heidelberg Ion Therapy Center, obtaining in 2009 her Habilitation from the Heidelberg University. Since 2012 she is full professor and Chair of Medical Physics at the Physics Faculty of the Ludwig-Maximilians-Universität München (LMU) in Munich, where she initiated a dedicated curriculum for Medical Physics within the Physics Master of Science study. Her main research interests are in high precision image-guided radiotherapy with a special focus on ion beams, from advanced computational modeling to experimental developments of novel methods for imaging and in-vivo ion range monitoring for pre-clinical and clinical applications. Katia Parodi has been invited speaker and committee member at many conferences, contributed to over 200 publications in peer reviewed journals, 12 book chapters and a couple of patents. For her work, she received several national and international recognitions, including the Behnken Berger

Award in 2006, the IEEE Bruce Hasegawa Young Investigator Medical Imaging Science Award in 2009, the AAPM John S. Laughlin Young Scientist in 2015 and the awarding of an ERC Consolidator grant in 2016. In 2017-2018 she served as president of the German Society for Medical Physics, and is since 2021 the Editor-in-Chief of the journal Physics in Medicine and Biology.

John M. Boone, Ph.D.

Professor of Radiology and Biomedical Engineering

Editor-in-Chief, MEDICAL PHYSICS

John M. Boone, Ph.D. received his undergraduate degree in Biophysics at UC Berkeley and his MS and Ph.D. in Medical Physics at UC Irvine. After faculty positions at University of Missouri, Columbia and Thomas Jefferson University in Philadelphia, he is now Professor of Radiology and Biomedical Engineering at the University of California Davis, in Sacramento California. His research interests include the development of cone beam CT systems for dedicated breast imaging, and the use of Monte Carlo methods for radiation dose assessment in diagnostic radiology especially in breast imaging and CT. His lab has also developed accurate x-ray spectral models for diagnostic radiological imaging, non-destructive testing, and ortho-voltage therapy applications. His interests also extend to whole body CT, including the development and implementation of new methods for image quality evaluation (e.g. 3D MTF and 3D NPS) and for radiation dosimetry (Size Specific Dose Estimation – SSDE).

Monochromatic X-rays: A new source with potential to replace century-old technology

26 April 2021

Monochromatic X-rays: A new source with potential to replace century-old technology
Further information: https://pubmed.ncbi.nlm.nih.gov/33368354/
Moderator: John Damilakis
Speakers: Madan Rehani and Eric Silver

Dr. Madan M. Rehani is Director, Global Outreach for Radiation Protection at the Massachusetts General Hospital, Boston, USA. He is President, International Organization for Medical Physics (2018-2021). He was earlier Radiation Safety Specialist at the International Atomic Energy Agency for 11 years and prior to that Professor and Head of Medical Physics at the All India Institute of Medical Sciences, New Delhi, India. Dr. Rehani is a Member, International Commission on Radiological Protection (ICRP). He is author of 8 Annals of ICRP, 4 of which as Chair of the Task Group. He is Senior editor BJR, Assoc Editor, Eur J Medical Physics. He has more than 165 publications, has written 40 chapters in Books and has edited 5 books. He has published papers in high impact factor journals e.g. JAMA Intern Med, Br Med J, Eur Heart J, Cardiovascular Imaging, Am J Gastroenterol, Circulation J, The Lancet.

Eric Silver has dedicated his career to experimental high energy astrophysics. He spent 21 years as a Senior Astrophysicist at the Harvard-Smithsonian Center for Astrophysics (CfA) where he directed an interdisciplinary program of X-ray spectroscopy, polarimetry and low temperature physics for 1) the study of cosmic x-ray and gamma ray sources such as black holes, supernova remnants and clusters of galaxies; 2) fundamental physics investigations of highly charged ions produced in heavy ion

accelerators and laboratory plasmas; and 3) industrial and medical applications where high resolution x-ray spectroscopic imaging is important to materials and chemical analysis. The latter included studies of silicon wafers for the semiconductor industry, interstellar dust and cometary particles returned to Earth from NASA probes, examining artifacts and fine art for conservation science, and even mapping anti-cancer drugs at the cellular level. He received his B.S. degree in Physics from M.I.T. and Ph.D. in Astrophysics from Columbia University, has served on many NASA, NIH, DoE and NSF review panels, authored/co-authored 130+ publications on spectroscopy and x-ray imaging and is the co-editor of a book on spectroscopy. Eric was a recipient of a NIH Challenge Grant and the George E. Burch Fellowship for new medical applications and has 16 patents to his credit.

Artificial Intelligence and medical physics: The initial experience of the SINFONIA Horizon project'

27 April 2021

Further information: https://www.sinfonia-appraisal.eu/
Moderator: Mika Kortesniemi
Speakers: John Damilakis and Habib Zaidi

Prof. John Damilakis, PhD, FIOMP, FIUPESM
John Damilakis is professor & chairman at the Department of Medical Physics, School of Medicine, University of Crete & director of the Department of Medical Physics of the University Hospital of Heraklion, Crete, Greece. He is Vice President & President-elect of IOMP, Immediate Past President of EURAMED, Past President of EFOMP and Past President of the 'Hellenic Association of Medical Physics'. Prof. Damilakis is a member of 2 ICRP Task Groups & member of the steering committee of the 'EuroSafe Imaging' of the European Society of Radiology. As a Visiting Professor he has given lectures on dosimetry and radiation protection in Boston University, USA. His publications have been focused on medical radiation protection and dosimetry. He is editor of 2 books published by the IOP Publishing and Springer-Verlag and co-author of 2 chapters in books published by Springer and Academic Press. Number of publications in PubMed: 220, number of citations 7220, h-index 45 (Google Scholar, February 2021).

Professor Habib Zaidi is Chief physicist and head of the PET Instrumentation & Neuroimaging Laboratory at Geneva University Hospital and faculty member at the medical school of Geneva University. He is also a Professor at the University of Groningen (Netherlands) and the University of Southern Denmark. His research is

supported by the Swiss National Foundation, private foundations and industry (Total 8.3M US$) and centres on hybrid imaging instrumentation (PET/CT and PET/MRI), computational modelling and radiation dosimetry and deep learning. He was guest editor for 11 special issues of peer-reviewed journals and serves on the editorial board of leading journals in medical physics and medical imaging. He has been elevated to the grade of fellow of the IEEE, AIMBE and the AAPM. His academic accomplishments in the area of quantitative PET imaging have been well recognized by his peers since he is a recipient of many awards and distinctions among which the prestigious (100'000$) 2010 kuwait Prize of Applied sciences (known as the Middle Eastern Nobel Prize). Prof. Zaidi has been an invited speaker of over 160 keynote lectures and talks at an International level, has authored over 320 peer-reviewed articles in prominent journals and is the editor of four textbooks.

Patient radiation protection: How IAEA and WHO are contributing?

28 April 2021

Moderator: Madan Rehani

Speakers: Ola Holmberg and Maria Perez

More details: https://www.iomp.org/iomp-school-on-impw-2021-day-3

Dr. Ola Holmberg is the Head of the Radiation Protection of Patients Unit at the International Atomic Energy Agency (IAEA), Vienna, Austria since the last 12 years – an organization within the United Nations family. He is a medical physicist who has previously worked in Sweden, Ireland, the Netherlands and Denmark.

Dr María del Rosario Pérez is a physician who worked in the field of radiation protection for more than 3 decades. She received her M.D. in 1980 from the School of Medicine of the Buenos Aires University (Argentina). She completed her professional education on Diagnostic Imaging and Radiotherapy and worked as radiation oncologist at a public hospital until 1990. After obtaining a post-graduate diploma on Radiation Protection and Nuclear Safety she worked at the National Atomic Energy Commission (CNEA) and the Nuclear Regulatory Authority (ARN). Since 2007 she works at the WHO Radiation and Health Unit in Geneva (Switzerland). She represents WHO at the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), the IAEA Radiation Safety Standards Committee (RASSC), the International Commission on Radiological Protection (ICRP), the EC Art 31 Group of Experts and the Inter-Agency Committee on Radiation Safety (IACRS), which she is currently chairing.

Does contact shielding improve patient safety?

29 April 2021

Moderator: Chai Hong Yeong

Speaker: Paddy Gilligan

More details: https://www.iomp.org/iomp-school-on-impw-2021-day-4

Paddy Gilligan works as chief physicist in the Mater Private Hospital in Dublin Ireland. He has over thirty years' experience in diagnostic imaging, He has served on state boards for regulatory radiation protection agencies. He became associate professor in University College Dublin in 2017. He was the chair of the European congress of radiology physics programme in 2019 He was a member the radiation safety committee of the European Society of Radiology, and the Eurosafe imaging steering committee. Prior to becoming President of EFOMP he chaired the successful bid for ECMP 2022 for Dublin. He is a trustee of the Robert Boyle Foundation. He is currently chair of the Gonad and Patient Shielding (GAPS) group of experts who are in the process of producing a consensus document on patient shielding from the major European professional bodies involved in radiology.

The management of unintended and accidental exposures

30 April 2021

Moderator: Eva Bezak

Speaker: Colin Martin

More details: https://www.iomp.org/iomp-school-on-impw-2021-day-5

Dr Colin Martin worked as a hospital-based Medical Physicist in Radiation Protection in Glasgow and Aberdeen, Scotland for over 30 years. He has now retired from the NHS but is an honorary senior lecturer for the University of Glasgow. Colin is Vice-Chair of ICRP Committee 3 (Protection in Medicine), chairs two ICRP Task groups and is a member of several others. He is a member of various UK and EU working parties, COMARE, which advises the UK government on medical uses of radiation, and he has chaired two IAEA Technical Meetings on avoidance and prevention of radiation incidents in medicine. His research interests include radiation protection, diagnostic radiology, radiation dosimetry, and non-ionising physics. He has co-authored/edited several textbooks on radiation protection, written over 300 articles including 150 papers in peer reviewed scientific journals. Colin is a member of Editorial Boards for the Journal of Radiological Protection and Radiation Protection Dosimetry.

Joint IAEA–IOMP webinar: Patients Undergoing Recurrent CT Imaging: Managing Cumulative Doses

16 March 2021

Moderator: Jenia Vassileva (IAEA)

Presenter: Madan Rehani (IOMP)

https://www.iaea.org/resources/webinar/patients-undergoing-recurrent-ct-imaging-managing-cumulative-doses

Computed tomography (CT) and other diagnostic imaging and image-guided interventional procedures provide immense benefits for the diagnosis and management of many health conditions. The benefits far outweigh the radiation risks when the procedure is performed when required for the clinical care of the patient and with the minimum necessary exposure to achieve the diagnostic or interventional objective.

However, the risks increase when a patient undergoes recurrent imaging procedures involving ionizing radiation, from which some organs might accumulate higher doses in the range where epidemiologists believe there is increased probability of radiation-related adverse effects (particularly cancer).

Information made available from the wider use of automatic radiation exposure monitoring systems shows that the number of patients who accumulate effective doses of 100 mSv and higher over a few years as a result of recurrent CT procedures is greater than previously known. A study in which the IAEA has been involved estimated that this might concern nearly one million patients globally per year. The webinar will present the current knowledge on recurrent imaging and actions proposed at the IAEA Technical Meetings on radiation protection of patients undergoing recurrent imaging in 2019 and 2020. .

Learning objectives

Learn the level of recurrent CT imaging and associated radiation doses as per recent studies and global estimates and why this is of concern for radiation protection;

Understand which clinical conditions and patient groups are more likely to accumulate relatively high doses from recurrent imaging;

Learn how individual patient's radiation exposure history tracking adds patient management and what is the metrics;

Appreciate the need for the further development of strategies to improve radiation protection of patients undergoing recurrent medical imaging procedures.

Dr Madan M. Rehani is the Director of Global Outreach for Radiation Protection at the Massachusetts General Hospital in Boston, USA. He is also the President of the International Organization for Medical Physics (2018–2021). He worked previously as a Radiation Safety Specialist at the International Atomic Energy Agency for 11 years and as a Professor and the Head of Medical Physics at the All India Institute of Medical Sciences in New Delhi, India. Dr Rehani is a Member of the International Commission on Radiological Protection (ICRP). He is a co-author of eight Annals of the ICRP, four of which he served as Chair of the Task Group. He is a senior editor at the British Journal of Radiology and an associate editor of Medical Physics. He has published more than 155 papers and 39 book chapters and has edited five books.

Joint IAEA–IOMP–CIRSE webinar: What's new in understanding radiation risks for patients in interventional procedures

23 February 2021

Moderator: Jenia Vassileva (IAEA)

Presenters: Madan Rehani (IOMP), Werner Jaschke (CIRSE)

https://www.iaea.org/resources/webinar/whats-new-in-understanding-radiation-risks-for-patients-in-interventional-procedures

Fluoroscopically guided interventional (FGI) procedures provide an excellent alternative to many surgical interventions. However, since the early 1990s, the risk of tissue injuries like skin burn has garnered attention as such injuries continue to be reported. As a result, following the recommendations of the International Commission on Radiological Protection (ICRP) and the IAEA, some countries have introduced requirements for the follow up of patients who cross a defined threshold of dose at the patient entrance reference point. This has not only raised awareness but reduced the percentage of patients at risk of tissue reaction owing to higher skin doses. Recent literature has highlighted the risk of stochastic effects as estimated effective doses portray a sizable number of patients with a relatively high dose of 100 mSv or more from a single FGI procedure. The number of FGI procedures for an individual patient during a short period of 1 to 3 years has also been assessed.

The IAEA along with International Organization for Medical Physics (IOMP) and the Cardiovascular and Interventional Radiologic Society of Europe (CIRSE) will present current knowledge of the subject and actions that can help improve patient radiation protection.

Learning objectives

Learn about the results achieved in reducing the number of patients crossing the trigger level for tissue reactions;

Understand the newly available results on patients who receive relatively high effective doses (>100 mSv) either through a single or multiple interventional procedures in a period of 1 to 3 years;

Address the need to develop strategies and actions to improve radiation protection of patients undergoing FGI.

Dr Madan M. Rehani is the Director of Global Outreach for Radiation Protection at the Massachusetts General Hospital in Boston, USA. He is also the President of the International Organization for Medical Physics (2018–2021). He worked previously as a Radiation Safety Specialist at the International Atomic Energy Agency for 11 years and as a Professor and the Head of Medical Physics at the All India Institute of Medical Sciences in New Delhi, India. Dr Rehani is a member of the International Commission on Radiological Protection (ICRP). He is a co-author of eight Annals of the ICRP, four of which he served as Chair of the Task Group. He is a senior editor at the British Journal of Radiology and an associate editor of Medical Physics. He has published more than 155 papers and 39 book chapters and has edited five books.

Dr Werner Jaschke was Director and Chair of the Department of Radiology at Medical University Innsbruck, Austria (1993–2020). He has extensive experience in interventional radiology, especially in endovascular procedures of the body. He is the Chair of the Radiation Protection Subcommittee of the Cardiovascular and Interventional Radiologic Society of Europe (CIRSE), representing CIRSE in the EuroSafe Imaging campaign and in relevant European Commission tenders. Since 2014 he has been involved in organizing the CIRSE's Radiation Protection Pavilion, an annual awareness campaign for radiation safety. Dr Jaschke has authored/co-authored more than 300 papers in scientific journals. In 2019 he was invited to present the Andreas Grüntzig Lecture at the CIRSE Annual Meeting in Barcelona, Spain in acknowledgement of his outstanding contribution to interventional radiology.

IOMP webinar jointly with WHO, IRPA and IAEA

on Radiation Safety Culture

9 February 2021

Organizer and moderator: Prof. Madan Rehani, IOMP

Speakers in alphabetical orders of organization (IAEA, IOMP, IRPA, WHO):

Dr. Debbie Gilley, IAEA

Dr. Madan Rehani, IOMP

Dr. Bernard le Guen, IRPA

Dr. Maria Perez, WHO

We have so many tools and means to practice radiation safety. The transition from radiation safety to radiation safety culture occurs when we are able to make everyone involved practice safety. Thus, radiation safety culture has much to do with establishing culture. Experts from 4 major international organizations shall deliberate on this important topic and will cover both diagnostic and therapeutic activities in which staff in medical institutions are involved with.

Dr. Debbie Gilley is a Radiation Protection Specialist with the International Atomic Energy Agency in the Division of Radiation, Transport and Waste Safety Radiation Protection of Patients Unit. Her activities within the Agency included the development and implementation of the Safety in Radiation Oncology medical event reporting system (SAFRON), assisting in IAEA patient protection and safety campaigns and assisting countries in supporting radiation protections of patient activities. She is a contributing author of several IAEA publications on patient safety and a chapter in the recently published book entitled "Modern Technology of Radiation Oncology" and "Radiotherapy in Cancer Care: Facing the Global Challenge". Past professional responsibilities include Government Relations Specialist with the American Association of Physicists in Medicine (AAPM)

Twenty-four years of service to the Florida Bureau of Radiation Control, United States as Manager of the Training and Quality Assurance Program, Manager of the Radioactive Materials Program, Academically she has an undergraduate and master's degree from Florida State University and attended Oak Ridge Associated Universities.

Dr. Madan M. Rehani is Director, Global Outreach for Radiation Protection at the Massachusetts General Hospital, Boston, USA. He is President, International Organization for Medical Physics (2018-2021). He was earlier Radiation Safety Specialist at the International Atomic Energy Agency for 11 years and prior to that Professor and Head of Medical Physics at the All India Institute of Medical Sciences, New Delhi, India. Dr. Rehani is a Member, International Commission on Radiological Protection (ICRP). He is author of 8 Annals of ICRP, 4 of which as Chair of the Task Group. He is Senior editor BJR, Assoc Editor Medical Physics. He has more than 155 publications, has written 39 chapters in Books and has edited 5 books. He has published papers in high impact factor journals e.g. JAMA Intern Med, Br Med J, Eur Heart J, Cardiovascular Imaging, Am J Gastroenterol, Circulation J, The Lancet.

Dr Bernard le Guen is the IRPA President for 2021-2024 and was the IRPA Executive officer since 2012. Bernard le Guen is a medical Doctor (MD) and specialising in occupational medicine, in medical biology and in Radiation Protection. He is a senior fellow expert for Radiation Protection and Health for the EDF group. He is Chairman of the CEPN Governing Board (Nuclear Health Physics Research Centre) which assesses measures taken to protect the public from hazards associated with ionising radiation (technical, economic, social and health-related aspects). He received 2 awards from the American HPS in recognition of his contribution to radiation protection, the R.S. Landauer Award in 2011 and the William Morgan Award in 2019 . He launched an IRPA international initiative on Radiation Protection Culture in 2008, published an IRPA guidance on this subject in 2014 and is one of the co –author of the new common guidance on Safety Culture in Health Care.

Dr María del Rosario Pérez is a physician who worked in the field of radiation protection for more than 3 decades. She received her M.D. in 1980 from the School of Medicine of the Buenos Aires University (Argentina). She completed her professional education on Diagnostic Imaging and Radiotherapy and worked as radiation oncologist at a public hospital until 1990. After obtaining a post-graduate diploma on Radiation Protection and Nuclear Safety she worked at the National Atomic Energy Commission (CNEA) and the Nuclear Regulatory Authority (ARN). Since 2007 she works at the WHO Radiation and Health Unit in Geneva (Switzerland). She represents WHO at the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), the IAEA Radiation Safety Standards Committee (RASSC), the International Commission on Radiological Protection (ICRP), the EC Art 31 Group of Experts and the Inter-Agency Committee on Radiation Safety (IACRS), which she is currently chairing.

LAST WEBINAR for 2020: Personalized dosimetry for CT and interventional procedures

7 December 2020

Organizers and moderator: Madan Rehani, PhD

Speaker: Dr. Hilde Bosmans, PhD

University Hospital of the KU Leuven, Belgium

Hilde Bosmans is team leader of the medical physics experts in radiology in the University Hospital of the KU Leuven and for more than 100 centers in the Belgian breast cancer screening. She is also professor at the KU Leuven. With a team of PhD students and post doc researchers she works at dose and quality in radiology. Patient specific dosimetry has been the theme of several successful projects. The company Qaelum that develops and commercializes a dose management system is a spin-off of the department. Hilde Bosmans is also project leader of the EUTEMPE-RX courses for medical physics experts in radiology

Publishing in medical physics journals

24 November 2020

Organizers: Madan Rehani and Paolo Russo

Moderator: Paolo Russo

Speakers: Paolo Russo, Experience of Physica Medica/EJMP & Iuliana Toma-Dasu: Being a successful author

Paolo Russo was born in Napoli (Italy) in 1958. In 1981 he graduated in Physics magna cumlaude at the University of Napoli "Federico II", where he became in 1984 research assistant, then associate professor and then full professor of medical physics. His scientific activity is entirely in the field of Medical Physics, mainly in the development of systems for X-ray and gamma-ray medical imaging, with a focus on techniques for X-ray breast imaging. He served as a reviewer for various international peer reviewed scientific journals and for national and European Science funding agencies. From 2008 to 2012 he was Associate Editor for the Medical Imaging area of the journal "Physica Medica: European Journal of Medical Physics", and for 2013-2020 he is Editor-in-Chief of this journal. In 2018-19 he was Chair of the Publications an Communications Committee of the European Federation of Organizations for Medical Physics and for 2018-2021 he is Chair of the Publications Committee of the International Organization for Medical Physics; for 2018-2023 he is member of the Board of Directors of the International Medical Physics Certification Board. He co-authored over 160 papers in international peer reviewed journals and scientific book chapters and over 100 communications to international conferences.

Iuliana Toma-Dasu is Professor in Medical Radiation Physics and the Head of the Medical Radiation Physics division at the Department of Physics, Stockholm University, affiliated to the Department of Oncology and Pathology at Karolinska Institutet in Stockholm, Sweden. Iuliana Toma-Dasu studied Medical Physics at Umeå University, Sweden, where she also became a certified medical physicist and received a Ph.D. degree. In parallel with her involvement in the educational program for the medical physicists run at Stockholm University, her main research interests focus on biologically optimised adaptive radiation therapy, including particle therapy, modelling the tumour microenvironment and the risks from radiotherapy.

Medical physicist as a health professional

7 November 2020

Moderator: Madan Rehani

Panelists

· IAEA: Ola Holmberg, Giorgia Loreti

· IOMP

o Madan Rehani, President IOMP

o Ibrahim Duhaini, IDMP

· Regional Organizations of IOMP

o Ad Maas, Europe, EFOMP (backup Brenda Byrne)

o Hassan Kharita, Middle-East, MEFOMP

o Sandra Guzman, Latin America, ALFIM

o Taofeeq Ige, Africa, FAMPO

o Arun Chougule, Asia, AFOMP

o Freddy Haryanto, South East Asia, SEAFOMP

Dr. Ola Holmberg is the Head of the Radiation Protection of Patients Unit at the International Atomic Energy Agency (IAEA), Vienna, Austria since the last 12 years – an organization within the United Nations family. He is a medical physicist who has previously worked in Sweden, Ireland, the Netherlands and Denmark.

Giorgia Loreti is a Training Officer at the International Atomic Energy Agency (IAEA). Her work focuses on ensuring access to quality education in Medical Physics, adherence to standards, as well as recognition of the profession. Previously, she worked as clinical medical physicist at the S. Orsola University Hospital in Bologna.

Dr. Madan M. Rehani is Director, Global Outreach for Radiation Protection at the Massachusetts General Hospital, Boston, USA. He is President, International Organization for Medical Physics (2018-2021). He was earlier Radiation Safety Specialist at the International Atomic Energy Agency for 11 years and prior to that Professor and Head of Medical Physics at the All India Institute of Medical Sciences, New Delhi, India. Dr. Rehani is a Member, International Commission on Radiological Protection (ICRP). He is author of 8 Annals of ICRP, 4 of which as Chair of the Task Group. He is Senior editor BJR, Assoc Editor Medical Physics. He has more than 155 publications, has written 39 chapters in Books and has edited 5 books. He has published papers in high impact factor journals e.g. JAMA Intern Med, Br Med J, Eur Heart J, Cardiovascular Imaging, Am J Gastroenterol, Circulation J, The Lancet.

Dr Ibrahim Duhaini is the chief medical physicist and radiation safety officer at Rafik Hariri University Hospital since 2004. He is also a Medical Physics instructor at the Lebanese University. Ibrahim has won several awards in recent years in the field of Medical Physics: The International Day of Medical Physics Award in 2015, the International Organization of Medical Physics Presidential Award in 2016, the International Organization of Medical Physics Fellow Award (FIOMP) in 2017, and the Lebanese University Pioneer Award in 2018.

Ibrahim was a founding member of the Middle East Federation of Organizations of Medical Physics (MEFOMP) and was elected President for two terms (2009-2015). Currently he is the Treasurer of the International Organization of Medical Physics (IOMP) for the term 2018-2021. Also, he serves as the IDMP Coordinator.

Ibrahim has more than 20 years of experience in the field of radiation therapy and safety and is Board Certified by the International Medical Physics Certification Board (IMPCB) in 2018.

Dr. Ad J.J. Maas is chair of EFOMP's Professional Matters committee and member of the EFOMP Board of Officers since 2018. He is a member of a Medical Ethics and Research Committee in the Netherlands and a member of EU Expert Panels on Medical Devices and In Vitro Diagnostic Devices.

Mohammad Hassan KHARITA, PhD in Radiation Dosimetry MEFOMP Secretary General since 2018 Director of Radiation Safety – Hamad Medical Corporation – Qatar Medical physicist specialized in Diagnostic Radiology and Health Physics

Sandra Guzman is a doctor in Medical Physics from the University of Sao Paulo-Brazil, President of the Latin American Association of Medical Physics (2019-2022), President of the Peruvian Society of Medical Physics (2008-2016), President of the Cusco 2010 organizing committee (Latin American Congress of Medical Physics), organizer of national events, university professor and clinical medical physicist in Radiotherapy with more than 18 years of experience. Winner of the IOMP award (IDMP 2016 Award) and recognition from the AAPM-2017.

Dr. Taofeeq Ige is the pioneer Secretary-General of the Federation of African Medical Physics Organization (FAMPO) and currently the President. He serves as committee member of the IOMP (Awards and Honours) and also the Health Technology Task Group of the International Union of Physical and Engineering Sciences in Medicine (HTTG-IUPESM).

Dr. Arun Chougule is the Senior Professor and Head Radiological Physics, SMS Medical College, Jaipur with 36 years of professional and teaching experience, Ex. Pro Vice Chancellor, RUHS Dean Faculty of Paramedical Science. Immediate Past President of AMPI and current President of AFOMP and Chair ETC of IOMP. Publications over 110 and more than 300 presentations. Research interest- radiation biology, experimental dosimetry, radiation safety, QA-QC. Awarded with IOMP-IDMP 2016, AFOMP Member Excellent Presentation Awards, Outstanding Faculty award 2019 SMS Medical College, Dr. Farukh Abdulla Sher – e- Kashmir best researcher award, AFOMP outstanding Medical physicists 2020.

Dr. rer.nat. Freddy Haryanto is president of SEAFOMP since 2019. He is lecturer on Physics Department of Institut Teknologi Bandung, Indonesia. He is specialized on Monte Carlo simulation for Radiotherapy. He has interest also in small field dosimetry.

e-Learning in Medical Physics Education – How much, When and How – A Reflection After 20 Years Experience

15 October 2020

Moderator: Prof. Arun Chougule

Speaker: Prof. Slavik Tabakov, PhD, Dr.h.c, FIPEM, FHEA, FIOMP

Prof Slavik Tabakov, FIPEM, FHEA, FIOMP is the current Vice-President of the International Union for Physical and Engineering Sciences in Medicine (IUPESM), which has some 150,000 members worldwide. Prof. Tabakov was also President of the International Organization for Medical Physics (IOMP) from 2015 to 2018. He is an active contributor to the international development of medical physics for over 30 years. Prof Tabakov was born in Plovdiv, Bulgaria and graduated at Technical University Sofia. He has been trained and specialised in X-ray Diagnostic Radiology Physics and Engineering in USA, France and Germany.He started his career at Medical University Plovdiv, where he habilitated in 1990. Since 1991 he works at King's College Hospital and King's College London, UK, where he is the Founding Director of MSc Clinical Sciences (Medical Physics), MSc Clinical Sciences (Clinical Engineering), and MSc Medical Engineering and Physics. He is also Co-Director of the International College on Medical Physics at ICTP, Trieste, Italy. Prof Tabakov has led 7 international projects, which developed the first e-learning in medical physics, the first educational website in the profession, the first Medical Physics Dictionary (translated to 31 languages) and the first e-Encyclopaedia of Medical Physics (www.emitel2.eu). Prof Tabakov is Founding Co-Editor in Chief of the IOMP Journal *Medical Physics International*. He has Chaired the Education and Training Committees of IOMP, IFMBE and IUPESM and has advised the development of 15 MSc courses in various countries. Among his many awards are the King's College London Teaching Excellence Award, the EU Award for Education – the Leonardo Da Vinci Award, the IOMP Harold Johns Medal for Excellence in Teaching and International Education Leadership.

Effective dose: Thriving or dying?

6 October 2020

Organizer & moderator: Prof. Madan Rehani, President, IOMP

Speaker 1: Colin Martin on Effective dose in Medicine

Speaker 2: Madan Rehani: Effective dose: Is it poor man's cake?

Panel discussion "Is Effective dose thriving or dying?": Colin Martin and Madan Rehani

Dr Colin Martin worked as a hospital-based Medical Physicist in Radiation Protection in Glasgow and Aberdeen, Scotland for over 30 years. He has now retired from the NHS but is an honorary senior lecturer for the University of Glasgow. Colin is Vice-Chairman of ICRP Committee 3 (Protection in Medicine), and a member of several ICRP Task groups, including TG79 on the use of dose quantities in radiation protection. He is a member of various IAEA committees, UK and EU working parties, and COMARE, which advises the UK government on medical uses of radiation. His research interests include radiation protection, diagnostic radiology, radiation dosimetry, and non-ionising physics. He has co-authored/edited several textbooks on radiation protection, written over 200 articles including 140 papers in peer reviewed scientific journals. Colin is a member of Editorial Boards for the Journal of Radiological Protection and Radiation Protection Dosimetry.

Dr. Madan M. Rehani is Director, Global Outreach for Radiation Protection at the Massachusetts General Hospital, Boston, USA. He is President, International Organization for Medical Physics (2018-2021). He was earlier Radiation Safety Specialist at the International Atomic Energy Agency for 11 years and prior to that Professor and Head of Medical Physics at the All India Institute of Medical Sciences, New Delhi, India. Dr. Rehani is a Member, International Commission on Radiological Protection (ICRP). He is author of 8 Annals of ICRP, 4 of which as Chair of the Task Group. He is Senior editor BJR,

Assoc Editor Medical Physics. He has more than 155 publications, has written 39 chapters in Books and has edited 5 books. He has published papers in high impact factor journals e.g. JAMA Intern Med, Br Med J, Eur Heart J, Cardiovascular Imaging, Am J Gastroenterol, Circulation J, The Lancet.

Proton Facility Shielding: Regulatory and Design Aspects

23 September 2020

Organizer: Prof. Madan Rehani, President, IOMP
Moderator: Prof. Geoffrey Ibbott, Chair Science Committee, IOMP
Speakers:

Katja Maria Langen: Proton Therapy Shielding – Regulatory Aspects
Katja Maria Langen is Professor and Associate Director of Medical Physics at Emory University in Atlanta, Georgia. She received the equivalent of a B.S. in health physics from the Berufsakademie Karlsruhe, and both an M.S. and a Ph.D. in medical physics from the University of Wisconsin. After conducting clinical and research training, Dr. Langan took a position at the MD Anderson Cancer Center in Orlando and was in charge of planning for a proton facility. From there, she moved to the University of Maryland Proton Treatment Center, before taking her current position. Among other publications and committee responsibilities, she recently contributed to an IAEA project on Staffing and Training Requirements for a First Proton Facility.

Nisy Elizabeth Ipe: **Proton Therapy Shielding – Physics and Design Considerations**
Nisy Elizabeth Ipe is a consulting radiation physicist in shielding design.   She has a Ph.D. from Purdue University. Previously she was the Head of the Radiation Physics Department at SLAC National Laboratory, Stanford, California. She has 35 years of experience in shielding design and has shielded many proton therapy facilities. She has written 3 book chapters on proton therapy shielding. She was the Task Group Chair for PTCOG Report 1: Shielding and Radiation Safety for Charged Particle Therapy Facilities; and a consultant on NCRP Report 151.   She has given invited talks at various national and international schools, workshops and conferences (ACMP, SEAAPM, AAPM, HPS, PTCCOG, SATIF, etc.)

From radiobiological challenges to imaging biomarkers in personalised radiotherapy

9 September 2020

Organizerr: Prof. Madan Rehani, President, IOMP
Moderator: Prof. Eva Bezak, Secretary General, IOMP
Speakers

Biomarkers for hypoxia and proliferation: from imaging to outcome prediction

Iuliana Toma-Dasu is Professor in Medical Radiation Physics and the Head of the Medical Radiation Physics division at the Department of Physics, Stockholm University, affiliated to the Department of Oncology and Pathology at Karolinska Institutet in Stockholm, Sweden. Iuliana Toma-Dasu studied Medical Physics at Umeå University, Sweden, where she also became a certified medical physicist and received a Ph.D. degree. In parallel with her involvement in the educational program for the medical physicists run at Stockholm University, her main research interests focus on biologically optimised adaptive radiation therapy, including particle therapy, modelling the tumour microenvironment and the risks from radiotherapy.

Biomarkers for cancer stem cells: from imaging to outcome prediction
Loredana G. Marcu is Professor of Medical Physics at the University of Oradea, Romania and Adjunct Professor at School of Health Sciences, University of South Australia. She is a radiotherapy medical physicist, being educated and trained in Adelaide, South Australia. Her current research interests cover in silico modelling of tumour growth and response to treatment, radiobiology, targeted therapies, and the risk of second cancer after radiotherapy. She has published 15 books/book chapters on physics, radiotherapy and radiobiology and over 100 scientific papers. Loredana Marcu is involved in several professional activities within EFOMP and IUPESM.

The importance of certification and accreditation in medical physics

17 August 2020

Moderator: Prof. Arun Chougule

Speaker: Prof. Colin G. Orton, Ph.D.

Professor Emeritus

Wayne State University

USA

IOMP Webinar Series on AI and ML in Medicine

4 August 2020

Organizer: Prof. Madan Rehani, President, IOMP

Moderator: Prof. Eva Bezak, Secretary General, IOMP

Speakers:

Engaging medical professionals, physicists, engineers, and biologists in medical machine learning projects: experience from the Australian Institute for Machine Learning

Dr Johan Verjans

Cardiologist

Royal Adelaide Hospital and Deputy director Medical Machine

Learning

Australian Institute for Machine Learning, Adelaide

Dr Verjans is a physician-scientist combining cutting-edge research and patient care as a Cardiologist at the Royal Adelaide Hospital. During his research career (PhD Maastricht University, University of California; Post-doctoral fellow, Harvard Medical School), he has predominantly focused on translational pre-clinical and clinical imaging biomarkers using advanced invasive and non-invasive molecular imaging strategies to detect, track and predict disease at an early stage. His recent research has focused on imaging biomarkers from large datasets using supervised and unsupervised machine learning strategies. As Deputy Director of Medical Machine Learning at the Australian Institute for Machine Learning at the University of Adelaide, his main role is to connect world-class machine learning capabilities to the Biomedical Precinct in Adelaide. He is Associate editor of the Netherlands Heart Journal, including editor of a focus issue on Machine Learning in Cardiology. He authored recently the Cardiology chapter for Springer Nature's first book on Artificial intelligence in Medical Imaging.

Expanding Quantitative Medicine through AI and Automation.

Dr Price Jackson

Senior Medical Physicist

Peter McCallum Cancer Centre

Melbourne

AI is showing the potential to automate many time-consuming measurements in medical imaging. While efforts to standardise and improve the efficiency of existing manual processes are of great benefit, there is also the potential to apply complex quantitative analyses in routine imaging that would otherwise be too resource intensive to consider for the larger population; often times with a clinical value that is yet unclear. This talk will provide examples of AI organ segmentation as applied to nuclear medicine and radiation oncology with discussion of initiating research work in these areas.

Dr Jackson is a medical physicist at Peter MacCallum Cancer centre. He has worked as a post-doctoral researcher supporting their radionuclide therapy service where he developed image-based dosimetry software and protocols. He is currently a clinical radiology physicist and maintains a number of research interests in image analysis which now includes development of neural network tools.

AI in clinical trials

A/Prof Lois Holloway

Research Medical Physicist

Ingham Institute for Applied Medical Research

Sydney

Clinical trials in radiation oncology require stringent quality assurance to ensure that protocol violations do not impact on the ability to answer the trial question. Consistency in clinical trials is essential to ensuring that we correctly answer the clinical trial question being asked, without this we risk biased results or studies that despite significant time, energy and resources are underpowered to answer the question posed. Manual review to ensure this occurs is an incredibly time consuming exercise and challenging to achieve

in a timely manner. There are a number of approaches using artificial intelligence being considered to address these challenges. These include deep learning networks to consider autosegmentation approaches and knowledge based planning approaches which both utilise retrospective datasets to predict likely outcomes on current datasets. As per all artificial intelligence approaches these must be validated carefully.

A/Prof Holloway leads the medical physics research group at the Ingham Institute and Liverpool & Macarthur Cancer Therapy centres. She has an interest in learning from 'large' datasets and in particular imaging data such that we can make the best decisions for our patients. She leads the OzCAT distributed data learning research program and is a member of the Australian MRI-linac research program.

Panel discussion: Speakers + Dr Sykes

Dr Jonathan Sykes

Lead Radiation Oncology Medical Physicist – Research

Sydney West Cancer Network

Sydney

Dr Jonathan Sykes is an Australia and UK Qualified Medical Physicist with 25 years' experience in clinical radiotherapy and related research at Western Sydney Local Health District and two of the UKs largest (and leading) cancer centres. He is internationally recognised for research and development in image guided radiotherapy (IGRT) and clinical applications of image registration. He is also an Adjunct Senior Lecturer at the University of Sydney where he lectures on the Masters Medical Physics course and is associate supervisor for 4 PhD and 1 Masters students.

Understanding the limitations of current CT dosimetry and the way forward

20 July 2020

Organizer: Prof. Arun Chougule
Speaker: Prof. John Damilakis
Moderator: Prof. Eva Bezak

Prof. John Damilakis, PhD

John Damilakis is professor and chairman at the Department of Medical Physics, School of Medicine, University of Crete and director of the Department of Medical Physics of the University Hospital of Heraklion, Crete, Greece. He is Vice President and President-elect of the 'International Organization for Medical Physics' (IOMP), Immediate Past President of the 'European Alliance for Medical Radiation Protection Research' (EURAMED), Past President of the 'European Federation of Organizations for Medical Physics' (EFOMP) and Past President of the 'Hellenic Association of Medical Physics'. Prof. Damilakis is a member of 2 ICRP Task Groups (TG 108 and TG 109) and member of the steering committee of the 'EuroSafe Imaging' of the ESR. He is coordinator or an active research member of several European and national projects. As a Visiting Professor he has given lectures on dosimetry and radiation protection in Boston University, USA. His publications have been focused on medical radiation protection and dosimetry. He is editor of 2 books published by the IOP Publishing and Springer-Verlag and co-author of 2 chapters in books published by Springer and Academic Press. Number of publications in PubMed: 213, h-index 45 (Google Scholar). Many of these publications are in leading journals such as Medical Physics, Physics in Medicine and Biology, Radiology, Investigative Radiology and European Radiology. John Damilakis has given more than 300 invited presentations in national and international conferences including ECR, RSNA, AAPM, IAEA, ICRP, IOMP and EFOMP meetings. He has received 10 awards for his work.

What is radiomics? What is its relationship to machine learning and deep learning?

Potential value and pitfalls of machine learning for radiomics applications

9 July 2020

Webinar Topics:

1. What is radiomics? What is its relationship to machine learning and deep learning? **Arman Rahmin**, UBC, Vancouver, Canada

2. Potential value and pitfalls of machine learning for radiomics applications by **Mathieu Hatt,** INSERM, France

To check the corresponding time in your country please check this link: https://greenwichmeantime.com/time-gadgets/time-zone-converter/

Organizer: Prof. Madan Rehani, President, IOMP

Speakers:

Arman Rahmin is Associate Professor of Radiology and Physics at the University of British Columbia (UBC), as well as Senior Scientist and Provincial Medical Imaging Physicist at BC Cancer, Vancouver, Canada. He received his PhD in medical imaging physics at UBC. Following doctoral studies, he was recruited by Johns Hopkins University (JHU) to lead the high-resolution brain PET imaging physics program and to pursue research at the JHU Department of Radiology. In 2018, he was recruited back to Vancouver, where he leads the provincial molecular imaging and therapy physics program and his lab (rahmimlab.com) pursues research in tomographic image generation and analysis. He has published a book, over 130 journal articles and 280 conference proceeding papers/abstracts, and delivered more than 90 invited lectures worldwide. He was president (2018-2019) of

the Physics, Instrumentation and Data Sciences (PIDS) Council of the Society of Nuclear Medicine & Molecular Imaging (SNMMI), and was awarded the John S. Laughlin Young Scientist Award by the American Association of Physicists in Medicine (AAPM) in 2016

Mathieu Hatt is a computer scientist. He received his PhD in 2008 and his habilitation to supervise research in 2012. His main skills and expertise lie in radiomics, from automated image segmentation to features extraction, as well as machine (deep) learning methods, for PET/CT, MRI and CT modalities. He is an elected member of the EANM physics committee, the SNMMI physics, data science and instrumentation council board of directors, and the IEEE nuclear medical and imaging sciences council.

Artificial Intelligence in Medical Physics and Medicine: Challenges and Opportunities

23 June 2020

Moderator: Prof. Madan Rehani, President, IOMP

Speaker:

Prof. Steve Jiang, Ph.D.

Vice Chair, Department of Radiation Oncology;

Director, Division of Medical Physics and Engineering

University of Texas Southwestern Medical Center, USA

Dr. Steve Jiang received his Ph.D. in Medical Physics from Medical College of Ohio in 1998. After completing his postdoctoral training at Stanford University, he joined Massachusetts General Hospital and Harvard Medical School in 2000 as an Assistant Professor of Radiation Oncology. In 2007, Dr. Jiang was recruited to University of California San Diego as a tenured Associate Professor to build Center for Advanced Radiotherapy Technologies, for which he was the founding and executive director. He was then promoted to Full Professor with tenure in 2011. In October 2013, Dr. Jiang joined University of Texas Southwestern Medical Center as a tenured Full Professor, Barbara Crittenden Professor in Cancer Research, Vice Chair of Radiation Oncology Department, and Director of Medical Physics and Engineering Division. Dr. Jiang is a Fellow of Institute of Physics and American Association of Physicists in Medicine. Dr. Jiang's research in various areas of cancer radiotherapy has been funded by federal, state, charitable, and industrial grants for over 15 million dollars, resulting in over 200 peer-reviewed journal papers with an H-index of 75. His current research interest is on the development and deployment of artificial intelligence technologies to solve medical problems. He is the founding director for both Medical Artificial Intelligence and Automation Laboratory and Program of Excellence in Intelligent Medicine at UT Southwestern. He has supervised over 30 postdoctoral fellows and 10 Ph.D. students.

Physics aspect of Clinical Implementation of MR Linac

15 June 2020

Moderator: Prof. Arun Chougule, IOMP

Speaker: Prof. K. Y. Cheung

Prof. K. Y. Cheung

Senior Medical Physicist

Medical Physics and Research Department

Hong Kong Sanatorium & Hospital

Hong Kong

Radionuclide therapy patients in public: The original social distancing

15 May 2020

Moderator: I. Duhaini

Speaker: N. Forwood

Nicholas Forwood is Senior Medical Physics Specialist/Radiation Safety Officer at Concord Repatriation General Hospital. Experienced Medical Physicist and Radiation Safety Officer with a demonstrated history of working in the hospital & health care industry. Skilled in Nuclear Medicine Physics, Healthcare, Clinical Research, and Patient Safety. Strong healthcare services professional graduated from University of Sydney.

Smaller! Faster! More! Advanced X-Ray Breast Imaging and its Role Beyond Cancer Diagnosis

14 May 2020

**Moderator: M. Stoeva**

Speaker: I. Sechopoulos

 Dr. Sechopoulos is the director of the Advanced X-ray Tomographic Imaging (AXTI) laboratory of the Department of Radiology, Nuclear Medicine, and Anatomy of the Radboud University Medical Center, and scientific advisor of the Dutch Expert Center for Screening (LRCB). He obtained his Ph.D. from the Georgia Institute of Technology, in Atlanta, USA, performing research in the area of digital breast tomosynthesis at Emory University. Since then, his main area of research is the development of advanced x-ray-based imaging techniques, especially for breast cancer detection, diagnosis and therapy, in addition to performing research on various aspects of body CT. Dr. Sechopoulos is or has been a member or chair of two dozen different tasks groups and committees of the American Association of Physicists in Medicine (AAPM), the European Federation for Organization of Medical Physics (EFOMP), the Radiological Society of North America (RSNA), and the European Society of Breast Imaging (EUSOBI). He is a member of the editorial board of the international journals Medical Physics and Radiology, and associate editor of Physica Medica: European Journal of Medical Physics.

A comprehensive approach to the management of radiotherapy patients with implanted cardiac devices

13 May 2020

Moderator: A. Chougule

Speaker: D. Mihailidis
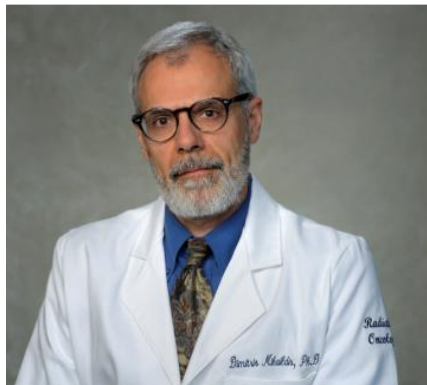
Dr. Dimitris Mihailidis is an Associate Professor of Radiation Oncology with the Perelman School of Medicine at the University of Pennsylvania. He holds a BS in Physics from the University of Ioannina, Greece and a PhD in Nuclear Physics from University of Minnesota. His research interests include new technologies in radiation therapy and treatment deliveries, treatment plan optimization based on biological parameters, and electron beam dosimetry. His clinical responsibilities include the clinical development of new treatment techniques, implementation of novel clinical techniques in the radiotherapy external beam and brachytherapy treatments, developing polices for managing RT patients with implanted cardiac devices, starting up new radiotherapy physics programs, shielding and quality assurance of radiation physics, and radiation safety and protection. He has chaired numerous committees and task groups of the American Association of Physicists in Medicine and has published over 100 peer reviewed scientific articles, reports and book chapters. He is co-author of "Khan's Lectures: Handbook of the Physics of Radiation Therapy" and the Editor for Book Reviews for the Medical Physics Journal. He is a Fellow of the American Association of Physicists in Medicine and the American College of Medical Physics. Dr. Mihailidis is certified by the American Board of Medical Physics and the American Board of Radiology and serves as examiner for both certification boards. Dr. Mihailidis directs and co-teaches the Radiation Detection and Measurement course at the University of Pennsylvania Graduate Programs.

Monte Carlo simulation of dosimetry problems in proton therapy

12 May 2020

Moderator: E. Bezak

Speaker: Lorenzo Brualla

Lorenzo Brualla

West German Proton Therapy Centre Essen (WPE)

Hufelandstr. 55, 45147 Essen, Germany

CT scan parameters and radiation dose

11 May 2020

Moderator: John Damilakis

Speaker: Mahadevappa Mahesh

Mahadevappa Mahesh, MS, PhD, is the Professor of Radiology and Cardiology at the Johns Hopkins University School of Medicine, Baltimore, MD. He is also the Chief Physicist at the Johns Hopkins Hospital, Baltimore, MD.

Dr Mahesh is board certified from the American Board of Radiology in diagnostic radiological physics and is a member of the Radiation Control Advisory Board for the State of Maryland. His research interests are in medical imaging, particularly in areas of computed tomography (CT), interventional fluoroscopy and digital mammography.

Dr Mahesh is currently Associate Editor for the Journal of American College of Radiology and board member for the American Association of Physicists in Medicine (AAPM) and the American College of Radiology. He also serves as subject-matter-expert (SME) to the United Nations-International Atomic Energy Agency (UN-IAEA).

Dr Mahesh is the author of the textbook titled 'MDCT Physics: The Basics – Technology, Image Quality and Radiation Dose'.