EFOMP
EUROPEAN FEDERATION OF ORGANISATIONS FOR MEDICAL PHYSICS
Quarterly Newsletter

European Medical Physics News

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The ECMP 2022: A Gathering Event of the European Medical Physics Societies!
Dublin from 17 - 20 August 2022.

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Contents

EDITORIAL

Welcome to the Autumn 2022 Issue of European Medical Physics News, the Quarterly Newsletter of EFOMP.

Autumn brings with it a slew of wonderful developments. It is a time of transition, a time to reflect on the significance of change as we move from one season to the next, in this case, from the bright, buzzing, verdant summer to the dark, quiet, dormant winter. This is a human life cycle exploration that starts with direct experience, moves on to analysis, and finally reaches the unconscious mind as a whole. Sadly, this fall issue features a tribute to two former presidents and Honorary Members of the EFOMP: Prof Dr Wolfgang Schlegel, who died on June 30, 2022, at the age of 77, and Prof Dr Hans Karl Leetz, who died in July 2022, at the age of 91. Both were actively advancing medical physics science and the medical physics profession on a national and global scale, at both institutional and organisational levels. Our hearts go out to their families as we mourn the loss of both.

Despite this unfortunate news, this newsletter contains a series of positive updates that demonstrate the European Medical Physics Society's ongoing dedication to the provision and advancement of health care services. For instance, as can be seen on the cover, the European Congress of Medical Physics, held in Dublin this past August, was a smashing success, with many participants, excellent talks on every topic of medical physics, and an impressive exhibition of products from our esteemed sponsors and company members. Naomi McElroy, who was one of the event's headliners and a dedicated worker behind the scenes, explains the event in this issue and provides the details that are included. The council and officers of EFOMP had the privilege of attending face-to-face meetings alongside the events of the congress. The upcoming congresses will be in Munich, Germany for ECMP2024 and Valencia, Spain for ECMP2026.

I am incredibly pleased to announce in this release the emergence of the EFOMP mailbase discussion list in its formally recognised status. The EFOMP mailbase is a new communication platform for medical physicists not only in Europe but also worldwide. If you have a technical or scholarly inquiry, realise that it's not unprecedented and that someone out there probably knows the solution. You'll surely benefit from others' experiences and insights through this forum's discussion.

Joining the EFOMP mailbase is very simple. Basically, what you need to do is to send a subscription request by visiting the public subscription page at the following link: https://lists.efomp.org/mailman/listinfo/europeanmedicalphysics

Enter your email address, add your name (optional), pick a password and confirm it, then click the Subscribe button. Your subscription request will be sent to the moderator for approval.

Meanwhile, you can send your first message/messages to the group using the email: europeanmedicalphysics@lists.efomp.org

Once more, your messages will be sent to the moderator for approval before being delivered to you and the whole list. So, it will take some time before it is sent out.

This issue of the newsletter has numerous recurrent elements, including a topical message from EFOMP President Paddy Gilligan and a review of recent EFOMP initiatives by EFOMP Secretary General Efi Koutsouveli. In addition, this issue of the newsletter includes a list of EFOMP and member company articles and announcements.

For this autumn issue of EMP News, Iuliana Toma-Dasu selected four articles from the most recent issue of Physica Medica (EJMP); Danielle Dobbe-Kalkman provided a synopsis of the book: "e-Learning in Medical Physics and Engineering – Building Educational Modules with Moodle" by Vassilka Tabakova; and an overview of Mindaugas Ilickas's MSc thesis on Analysis of Similarity and Dosimetry Data Variability for the Left Breast Without Lymph Nodes Case is presented.

In addition, in our popular Medical Physicist's art section, the fifth article by Prof. Jim Malone in his “Art to Challenge and Inspire” series, this time about an exceptional painting that scientists can often easily relate to, entitled “The Birth of the World," by Joan Miró (Spanish, 1893–1983).

We have included nine articles from commercial companies, including conference sponsors and EFOMP Company Members, to round out this ECMP-focused issue. I am confident that you will enjoy reading about the products and activities of the companies. As always, this issue of European Medical Physics News contains a wide range of articles, which I hope that you will find interesting!

Mohamed Metwaly, PhD, is a Lead consultant clinical scientist and registered medical physics expert (MPE) in the RPA2000 record – UK. He is the head of Dosimetry and Imaging quality assurance service –radiotherapy physics - the United Lincolnshire Hospitals NHS Trust. He is the editor-in-chief of the Institute of Physics and Engineering in Medicine [IPEM] Report Series and the IPEM Rep to EFOMP. Since 2018, he has been an MPE reviewer at the Health Research Authority (HRA) who reviews and approves ionisation radiation exposure for research and clinical trials. He joined the UK Accreditation Service (UKAS) technical evaluation team for BS70000 in 2018. Since 2022, he has been a Care Quality Commission (CQC) Specialist Advisor – radiotherapy.

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EFOMP President's Message

EFOMP President Paddy Gilligan writes about the organisation's recent activities as well as prominent issues for Medical Physicists

Greetings, medical physics friends.
As the evenings shorten and we prepare for the cycle of nature to take its course, it is a time to reflect on what we have achieved in EFOMP since the summer and how that will prepare us for the months ahead.

At the time of writing, it has only been two weeks since our first face to face congress ended in Dublin. As president of EFOMP and of the congress (and as a member of the Irish NMO, the IAPM), I was immensely proud of what turned out to be a wonderful event. The theme of the congress was multiple energies, *"single patient focus."* This was the first time we had come face to face in four years and followed on from a successful online conference in Torino last year. We had over 843 delegates from forty-nine countries attend the congress, with the full capacity of our exhibition space taken. Of course, not everybody could be with us for ECMP 2022!

At the opening ceremony, we marked the recent passing of three special people, EFOMP past presidents, Prof. Dr. Hans-Karl Leetz and Prof. Dr. Wolfgang Schlegel, whose contributions are marked in this issue. We also marked the untimely death of Therese Kenny, the mother of the chair of the local organising committee, Dr. Emer Kenny, who inherited her mother's volunteering and community spirit. May they rest in peace!

A powerful presentation on medical physics during the war in Ukraine was given by Ruslan Zelinskyi at the congress. The Ukrainian NMO also had a practical request for immediate support for equipment such as immobilisation devices and an internship programme for physicists fleeing the war. EFOMP will look at ways we can support these initiatives.

We received notice that the Russian NMO AMPHR wished to terminate their involvement with EFOMP. We are sad that events have led to this and look forward to a day when conditions exist that might make their return to EFOMP a possibility.

Thanks to the efforts of the scientific and congress planning committees, a packed programme of exceptionally lofty standards was curated. The high attendance and engagement at all the sessions shows the cross pollination that can occur as medical physicists. To reflect the future looking perspective of EFOMP, the Congress featured some innovative aspects, such as the DIY fair and the early career section. The organisation of the congress was a tribute to the local organising committee, the Irish association of physicists in medicine, Abbey conference partners, and local and international volunteers, whose commitment was reflected in the excellent atmosphere, social programme, and facilities available at the congress. To achieve our aims of communication, integration, and education for our EFOMP volunteers, we keep the registration fees deliberately at a fraction of other congresses. This would not be possible without our world class vendors, sponsors, and other partners who supported us throughout the congress. Their commitment was evident in the professionalism of their stands and presentations, the support for free coffee and lunches, and the support for the Euro Fission Song Contest. The congress also saw many artistic events where people gave of themselves, reflecting the holistic nature of the medical physicist, including the song contest (won by the Edmund twins from Denmark), the lunchtime concert, and the art science walk. The organisers of and contributors to all these innovative events went above and beyond.

The congress also included three pre-congress schools and an innovative EUTempe workshop. The congress provides a forum for where EFOMP does business, such as our officers' meetings, council, committee meetings, and SIGS. The good news from the congress was that recognition of the ninth national registration scheme (Cyprus) was approved by the EFOMP board. This is one of the key requirements in developing a common training platform recognised by the European Commission. One of the highlights of the congress was the presentation of the EU commission's Olivier Lanoo from DG Grow on how to make mutual recognition of medical physics qualifications a reality under directive EC 55/13. EFOMP believes that we satisfy all the elements required to make this work. The commission will look for evidence that such a move will lead to economic growth, so we will work with our industry partners to achieve this.

The role of the medical device regulations and the requirement for input from the EFOMP was a theme that emerged from our Dutch NVKF welcome nation contribution. NVKF should be commended for their strong participation, great scientific sessions, strong European outlook, and their general appetite for great social interactions.

All this paves the way for a great ECMP 2024 in Munich to be hosted by the three nations of Germany, Switzerland, and Austria. I am pleased to say that the Dublin congress will be a hard act to follow. As EFOMP president, I also know that Yolanda Prezado, (congress president), Katia Parodi (Local Organising Committee and scientific co-chair) and the three NMOs will exceed our expectations for the congress as a vehicle for the growth of medical physics in Europe.

With best wishes

Yolanda Prezado, the scheduled president of the ECMP 2024 congress, is receiving a goat skin drum present from the ECMP 2022 congress president Paddy Gilligan.

Assoc. Prof. Paddy Gilligan, President of EFOMP

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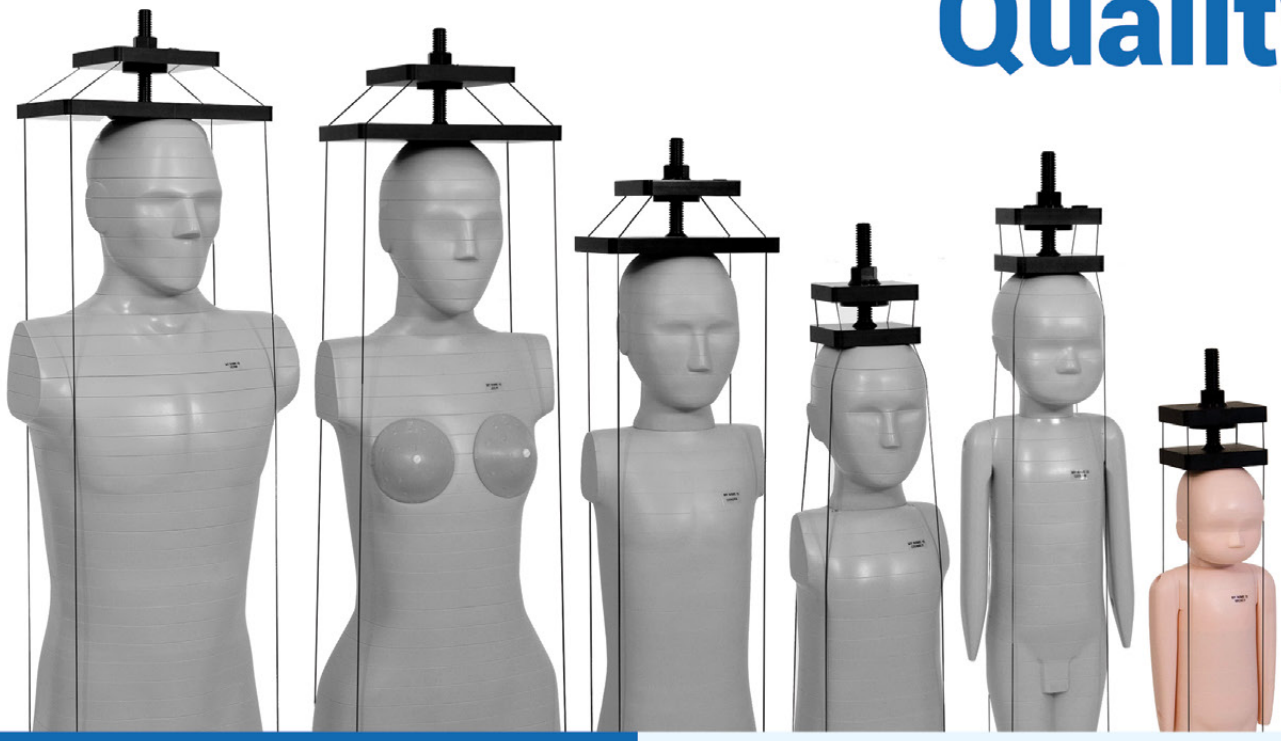

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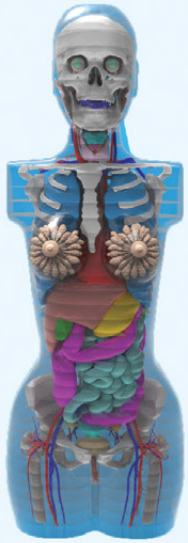

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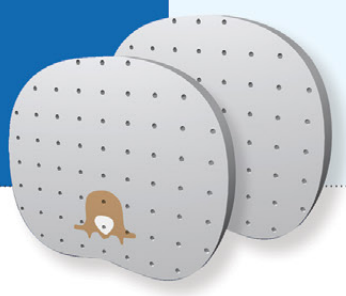

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EFOMP Secretary General's Report (June 2022–August 2022)

In this article you will find an update on the institutional matters of our organisation during the last three months.

EFOMP at the European Congress of Radiology 2022
ECR2022 took place onsite in Vienna and online from July 13 to 17, 2022. Ioannis Sechopoulos chaired the Medical Imaging Subcommittee this year. The preparations for ECR 2023 have already started. The Postgraduate Educational Programme and Physics in Medical Imaging subcommittee members held a meeting to plan the physics contribution for ECR2023.

Medical Imaging subcommittee 2023 chair: Osvaldo Rampado (IT)
Medical Imaging subcommittee 2024 chair: Lucie Sukupova (CZ)

From left to right: Annalisa Trianni (IT), Osvaldo Rampado (IT), Paddy Gilligan (IE), Agnieszka Kuchcińska (PL), Marco Brambilla (IT), Lucie Sukupova (CZ), Ioannis Sechopoulos (NL), Ioannis Seimenis (GR), Roberto Sanchez Casanueva (ES).

EFOMP's Officer Meeting and Annual Council 2022 during ECMP2022
The EFOMP Officers' Autumn meeting was held in Dublin, Ireland in conjunction with the Annual Council meeting. Among other educational and professional issues, the creation of four new working groups has been discussed and approved:

- Working Group on Physiological Measurements and Medical Physicists - EFOMP Policy Statement 20 chaired by Petro Julkunen (FI)
- Working Group on Quality Controls in Conventional and Solid State Detector Gamma Cameras is chaired by Laetitia Imbert (FR)
- Working Group on VMAT Breast - chaired by Tuomas Koivumäki (FI)
- AAPM-EFOMP Task Group on Invasive Cardiovascular X-ray Imaging - co-chaired by Hilde Bosmans (BE)

Two Special Interest Groups on Dental Imaging and Early Career Medical Physicists are underway, and a call for members will appear soon on the EFOMP website.

During the Annual Council of National Registration Schemes (NRS), certificates have been awarded to Cyprus, France, Greece, Ireland, and Hungary. Nine out of twenty-seven countries now have EFOMP approved NRS. The EFOMP Professional Matters committee, chaired by Brenda Byrne, encourages National Member Organisations to submit applications to get EFOMP approval on the education, training, and registration of Medical Physics Experts in their countries.

The European Congress of Medical Physics (ECMP) venues for our upcoming congresses will be Munich, Germany for ECMP2024 and Valencia, Spain for ECMP2026.

In Memoriam Prof. Dr. Wolfgang Schlegel & Prof. Dr. Hans Karl Leetz.
Prof. Dr. Wolfgang Schlegel passed away on June 30, 2022, at the age of 77. Wolfgang Schlegel worked for most of his career at the German Cancer Research Centre, where he headed the Department of Medical Physics in Radiation Therapy from 1994 to 2014. He was an Honorary Member of the German Society for Medical Physics (DGMP) and a recipient of their DGMP Glocker Medal. Prof. Dr. Wolfgang Schlegel was a pioneer in medical physics. Numerous procedures and techniques that are used today in clinics and practices worldwide and enable more precise irradiation of tumors can be traced back to the developments of Schlegel and his colleagues. He was President of EFOMP from 2006 to 2008 and became an Honorary Member in 2018.

At the age of 91, Prof. Dr. Hans-Karl Leetz passed away in July 2022. Prof. Leetz was Director of the Institute of Medical Physics at Saarland University in the Department of Clinical Medicine from 1985 to 1996. In a distinct way, Prof. Leetz was involved in scientific committees on a national and international level. He is a founding member of the DGMP and a recipient of the DGMP Glocker Medal. He was chairman of the DGMP, conference

president, and served on the board of the DGMP for 19 years. He is the holder of the Honorary Clasp of the Radiological Standardisation Committee in Germany. Prof. Dr. Hans-Karl Leetz was President of EFOMP from 1987 to 1989 and became an Honorary Member in 2002.

Open Calls
Governing committee – EFOMP officers
A call has been launched for the positions of: Vice President (in 2023) to become President in 2024. Assistant Secretary General (in 2023) to become SG in 2024; Treasurer (in 2024); Vice Chair of Communications & Publications (in 2023) to become Chair in 2024. An electronic postal ballot will be launched in October 2022, and the officers elected will take their places on the 1st of January 2023.

Honorary Membership - EFOMP awards
One of the underlying principles of EFOMP's Internal Regulations is to strengthen Medical Physics in Europe by fostering and coordinating the activities of National Member Organisations. EFOMP recognises that individual members of NMOs contribute to this aim through their outstanding work in various areas. For this reason, two awards have been created: the EFOMP Medal and Honorary Membership.

This year, each NMO was invited to nominate a single candidate whose merits, within his/her country, meet the aim of the Honorary Membership, namely: "Recognizing an individual who through his/her career has contributed to advancements in research, education and training or organisational affairs and professional activities in medical physics in Europe". Nominations can be submitted to secretary@efomp.org

Projects
A new projects subpage has been recently added on the EFOMP website where past and recent projects are described.

Current projects
Endorsed projects

The project "SAMIRA study on the implementation of the Euratom and the EU legal bases with respect to the therapeutic uses of radiopharmaceuticals," nicknamed SIMPLERAD, is funded under tender no. ENER/D3/2021/253-3, with EFOMP being a key partner in the project. The project officially started on May 1, 2022, and the kick-off meeting took place on May 23, 2022. Work package 2 of this project aims to carry out a survey on the implementation of the relevant European legal requirements with respect to therapeutic nuclear medicine, which will be distributed through the consortium's contacts, i.e., the national delegates and societies of EANM, EFOMP, and HERCA. The questionnaire seeks to identify relevant government/health authorities and their associated roles in reference to the regulation of radiation protection and pharmaceutical practice. The pre-survey allows for answers from the EU27 as well as Norway, Switzerland, the UK and the US.

NMOs' contribution to EC Projects related surveys is highly appreciated as the projects' outcomes have an impact on our daily clinical practice.

Policy Statement Working Groups
A Working Group (WG) entitled "Dosimetry in Nuclear Medicine Therapy- Molecular Therapy" will operate under the Scientific Committee from August 2022 to September 2023. The growing development of Molecular Radiotherapy raises the question of the role and involvement of the Medical Physics Expert in clinical therapeutic nuclear medicine dosimetry. The role and competences of medical physicists and medical physics experts under 2013/59/EURATOM (BSS) were addressed in EFOMP policy statement 16. The specificity of Molecular Therapy calls for a more detailed description of how EFOMP understands and wishes to promote the implementation of the BSS. The WG will be chaired by Manuel Bardiès (FR) and will write the Policy Statement 19 which will present EFOMP's point of view on the role that medical physicists should play in therapeutic applications of nuclear medicine.

The composition is as follows:
Members: Klaus Bacher (BE), Carlo Chiesa (IT), Glen Flux (UK), Pablo Minguez Gabiña (ES), Steffie Peters (NL), Joao Santos (PT), Katarina Sjögreen-Gleisner (SE), Caroline Stokke (NO), J Tran-Gia (DE).

Consultants: Robin De Nijs (DK), George Kagadis (GR), Thiago Lima (SW), Maria Lyra (GR), Stephan Nekolla (DE).

EFOMP school
EFOMP school (ESMPE), chaired by Brendan McClean, ran three successful editions during the 4th European Congress of Medical Physics. Fruitful exchange of views and dialogue, as well as ideas for upcoming school editions, came from these courses.

- EFOMP protocol for quality control of Digital Breast Tomosynthesis
- EFOMP protocol for quality control of PET/CT PET/MR scanners
- Adaptive Radiotherapy: Pros and Cons of In-room versus Out-of-Room Imaging

The 5th ESMPE course for this year, entitled "Statistics in Medical Physics", will be held on the 13th-15th October 2022, in Athens, Greece. ESMPE has designed a course to be accessible to all medical physicists, including students and those working in clinical environments, which will cover this key area. The aim of the course will be to introduce statistical methods from basic concepts to

Lectures and participants at the "Adaptive Radiotherapy: Pros and Cons of In-room versus Out-of-Room Imaging".

facilitate design, interpretation, and analysis of studies to applied topics such as uncertainty propagation in radiation dosimetry. Data handling and interpretation are central to all areas of medical physics, from research and development applications to clinical service. Appropriate statistical analysis of data is essential to the preparation of reports and publications, interpreting QA data, and formulation of tolerance and action levels.

ESMPE has decided that this event will be in a hybrid format. Participants will be on-site in Athens, Greece where possible, but the school will also be live streamed so participants can join live online if they cannot travel to the venue. More info and registration here.

See you either in Athens or online!

Efi Koutsouveli works as a Medical Physics Expert in the Medical Physics department of Hygeia Hospital, Athens, Greece. Her professional focus is on radiotherapy units (external radiotherapy & brachytherapy). Her special interests are in Hospital Quality Management Systems and Oncology Information Systems. She is currently the Treasurer of the Hellenic Association of Medical Physicists (HAMP) and EFOMP's Secretary General. In 2019, she received the IOMP-IDMP award for promoting medical physics to a larger audience. Email: secretary@efomp.org

MEETING REPORT

The European Congress of Medical Physics (ECMP) 2022: A Report of Success by Naomi McElroy

Now is the moment to reflect on ECMP 2022 and acknowledge the incredible outcome of putting all our efforts into one EFOMP Congress: The Dublin event that attracted 843 visitors from forty-nine countries in August 2022.

The welcome reception of the ECMP 2022 – Dublin. Front row speakers: David Lavin (former IAPM president, member of LOC), Councillor Donna Cooney (Deputy Lord Mayor of Dublin), Prof Ehsan Samei (incoming President AAPM), Prof John Damilakis (President IOMP), Prof Paddy Gilligan (ECMP & EFOMP President), Prof Daire Keogh (President DCU)

Well, what a whirlwind of science, research, innovation, technology, and getting to see people at a big live event for the first time since 2020! As you can understand, things have been busy behind the scenes, pulling together the extensive and varied scientific programme, introducing new events for the Congress but also making sure some fun is had as well. Now, it's time to reflect on ECMP 2022 and for those of us on assorted organising committees, those who provided content, and those who participated in the event, it's time to take stock of the fabulous outcome of all the multiple energies coming together for a single EFOMP Congress focus! There were 49 countries represented among the 843 participants who visited Dublin.

The week kicked off on Tuesday with the EURAMED rocc-n-roll WP4 Workshop on the digital revolution and ethical challenges for medical applications of ionising radiation. There was plenty of brain storming performed over the course of the day by the 17 participants to advance the three objectives of the meeting. We look forward to the reports this work will produce.

Good weather for the welcome reception with entertainment by Code of Behaviour.

Wednesday was a focus day for Medical Physics Experts and those aspiring to become MPEs. ESMPE offers three different EBAMP accredited courses in Radiotherapy, Nuclear Medicine, and Diagnostic imaging. The courses were well attended, with 75, 44, and 58 registrants, respectively. For those seeking accreditation as MPEs, there was an EEB European Diploma in Medical Physics (EDMP) and European Attestation Certification (EACMPE) exams available. Congratulations to those who undertook the exams and gained their certification or diploma. There was also the EUTEMPE Atelier, where 34 participants had the opportunity to test their problem-solving skills and receive beneficial feedback from those who might have already encountered similar issues in the work environment. Our 11 sponsors and 17 exhibitors' set-ups on Wednesday to catch those early bird participants attending the pre-congress day; they enhanced the ECMP 2022 by providing industry support to the event while demonstrating to congress attendees their latest products and developments.

Paddy Gilligan (left) and Ehsan Samei (right)

Wednesday evening also brought the Opening Ceremony. After the welcoming speeches, the weather gods smiled upon us (this can be somewhat of a rarity!) for the finger food and entertainment outdoors in the courtyard. It was a proper chance to mingle and meet colleagues both old and new for catch ups and discussion as we were entertained by the brass band, Code of Behaviour. Further musical entertainment was available at one of Dublin's best loved music venues, Whelan's, for the "Eurofission" social night. It certainly looked like all involved enjoyed this evening.

Then, with the arrival of Thursday, the Congress got properly into motion. As with previous events, there were 4 parallel sessions on offer, including morning refresher courses first thing and lunchtime symposia from the congress sponsors. However, there were also two new additions: the Early Career section – a welcoming and pressure free environment for those starting out in Medical Physics to present their work and hear talks by some influential physicists further on in their careers; and the DIY fair, where the medical physicists had a chance to showcase their innovative software and phantom solutions to address local problems – did you find something that would help in your department?

For those who wanted a more rounded experience of the day, there was a

The brainstorming team for the EURAMED rocc-n-roll Pre-congress Workshop. Back Row: Alan Tkaczyk, Jim Malone, Hugo de las Heras Gala, Jonas Teuwen, Ignacio Garcia, Asad Zameer, Jonas Andersson, Ioannis Sechopoulos, M. Mahesh
Front Row: Jennifer Miller, Efi Koutsouveli, Jing Ma, Susan Molyneux-Hodgson, Matthias Gutberlet, Erato Stylianou Markidou, Erik Briers

Participants try their hand at Hurling – the fastest ball game on grass!

lunchtime walkabout and talk by Jim Malone and Fran Hegarty on "Art to Challenge and Inspire Medical Physics", and this event proved a hit on Thursday and again on Friday. Thursday's social event had a distinctly Irish feel, with over 50 people trying their hand at both Hurling and Gaelic football—once again, the fine weather meant participants had a chance to put the theory they had learnt into practice on the local pitches. There was also a 20-year reunion for those who had taken part in the Galway MSc in Medical Physics – a great chance to see the legacy left behind by the late Wil van der Putten.

Friday was another jam packed day starting with refresher courses, followed by more scientific sessions, welcome nation sessions, joint sessions, and a chance to meet a European special interest group in Radionuclide Internal Dosimetry who are looking to encourage more people to join in this area. At the same time, Friday lunchtime offered sponsors symposia and the chance to see more musically talented Medical Physcisits with a concert given by Nyquist Music founder Ehsan Samei, accompanied by Bryan Mullen and Katerina Speranskaya. There was also a gap in the parallel sessions to allow time to visit the posters, sponsors, and the DIY fair. Friday was rounded off with a social evening at Croke Park – a chance for those who had taken part in the previous evenings GAA experience to appreciate the world class venue where these sports are played. Those attending the evening also had a chance to try a few steps of traditional dancing—our Congress president was spotted dancing with a sweeping brush!

The Eurofission social night in Whelans of Wexford Street.

Gaelic football skills in action at the Gaelic Games Experience

There was still a good turnout for the Saturday sessions, and EFOMP officers had a busy day with the annual EFOMP Council meeting taking place. At the closing ceremony, Paddy Gilligan continued the tradition from the previous congress of handing over an item from a goat to the incoming 2024 Congress President, Yolanda Prezado – in this case, it was a Bodhrán, a traditional Irish drum made from goatskin! Overall, the feedback on the 4th ECMP Congress seems extremely positive, with people happy to get back to attending an in-person event. As always, there are many thanks needed: all those who volunteered on the Congress Planning /Scientific / Local organising committees, our student volunteers at the event; our congress partner Abbey Conference & Events, our sponsors, and exhibitors, all those who submitted work; attendees, and participants; venue and venue staff; and anyone else who contributed that I have failed to mention above. Thank you all for helping to make this event such a success.

Naomi McElroy, B.Eng. M.Sc. has been working in the field of Medical Physics for almost half her life. She works as a Senior Medical Physicist in St Lukes's Hospital, Rathgar which is part of the St Luke's Radiation Oncology Network (SLRON) in Dublin. Her current work focuses on nuclear medicine therapies, and providing physics support in diagnostic imaging and radiation protection. She is a past Honorary Treasurer for the IAPM, currently serves on the IAPM Council and is registered as an MPE with the Irish College of Physicists in Medicine (ICPM). She is on the Local Organising Committee(LOC) for ECMP 2022 and looks forward to welcoming you to Dublin later this year.

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EFOMP COMPANY MEMBER ARTICLE

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CIRS Solutions Set for Take-Off on Historic Artemis I Space Flight

With the Sun Nuclear corporate office just minutes away from the Kennedy Space Centre in Florida (U.S.), we have the exciting opportunity to watch as spaceships launch from Earth. Now, as NASA (the U.S. National Aeronautics and Space Administration) prepares for its Artemis I flight to the Moon, we get to witness two CIRS phantoms take flight.

Why are these phantoms headed to space?
One of the major risks to humans in space travel is radiation exposure once outside of the earth's orbit. An international effort among the German Aerospace Centre, the Israel Space Agency, and NASA aims to understand the level of risk and develop protective measures.

Enter the ATOM® Phantom from CIRS, now part of Sun Nuclear.

Artemis is a series of flights aimed at exploring the Moon and Mars. The first flight in the series will be an uncrewed flight to complete a series of tests, including understanding radiation exposure risks for the flight crew.

Meet Helga & Zohar.
As part of the Artemis I mission, two CIRS phantoms, named Helga and Zohar for this mission, will fly in the passenger seats of Orion during its first flight to the Moon. Both are modelled on humans, so that the radiation dose can be measured in the particularly radiation-sensitive organs. Helga and Zohar will fly as proxies for female astronauts to help determine the risk to radiation sensitive organs and ensure more inclusive possibilities for the future of human space travel. This mission will land the first woman and the first person of colour on the Moon.

Both phantoms will be equipped with radiation detectors, and Zohar will wear a radiation protection vest while Helga will not, in order to understand the radiation levels that may be encountered in space and how effective the protective vest is for avoiding radiation.

As of the time of publication, Artemis I is set to launch late September or early October. So, look up to the skies — a phantom used in the field of radiation therapy quality management could be above you right soon.

To learn more about the Artemis I mission, visit: https://www.nasa.gov/artemis-1

About the ATOM® Phantom
The ATOM® Phantom Family represents a full line of anthropomorphic, cross-sectional dosimetry phantoms that leverage a wealth of tissue simulation experience and expertise. ATOM Phantoms are uniquely designed for the investigation of organ doses and whole-body effective doses, as well as the verification of therapeutic radiation doses. Our proprietary technology enables us to produce ATOM Phantoms with average soft tissue, average bone tissue, cartilage, spinal cord, spinal disks, lung, brain, and sinus tissues.

Click here to learn why the ATOM phantoms, with thousands in use worldwide, set the standard for anthropomorphic dosimetry phantoms. See the ATOM Phantoms at upcoming events, including DGMP (Germany) and the ASTRO Annual Meeting (U.S.).

About Sun Nuclear & CIRS
Sun Nuclear and CIRS are now part of Mirion Medical, a growing group within the Mirion Technologies family. With complementary and proven product portfolios, we share a commitment to easing technology adoption, optimising quality management, and ensuring patient safety.

References:

https://www.nasa.gov/specials/artemis-i-press-kit/

https://www.dlr.de/me/en/desktopdefault.aspx/tabid-14114/

Image sources: The European Space Agency and DL

Preparing the phantoms for flight in the Orion spacecraft

Jill Retan is a Marketing Content Developer for Sun Nuclear, based out of the Wisconsin (U.S.) office.

BOOK REVIEW

Book Review: "e-Learning in Medical Physics and Engineering – Building Educational Modules with Moodle" by Vassilka Tabakova

CRC Press, 1st edition (2021), 152 pages. Hardcover: ISBN 9781138347328 (£52.99), Paperback: ISBN 9781032243696 (£42.99), eBook: ISBN 9780429437052 (£38.69). Link to book on publisher's web site.

DESCRIPTION: This hardcover publication is a guide to how you can build educational modules using one of the most popular free open-source learning platforms: Moodle. The book contains step-by-step instructions of how to build a module for higher education in Moodle. The most outstanding feature of this book is the step-by-step instructions of how to create these modules in Moodle, which are illustrated within many screenshots of the platform.

PURPOSE: The purpose of this book is to guide the reader in using Moodle as an online learning platform. The topics range from a description of Moodle as a virtual learning environment, to role-specific functions in Moodle, ending with the results of a survey in low- and middle-income countries. The book communicates the topics covered well, providing enough detail for readers to be able to build their own courses, by using examples and over sixty screenshots.

AUDIENCE: This book is intended as a guide for educators, programme administrators, and programme directors of all levels in medical physics and engineering. However, it can also be helpful to other medical and medical-related specialties or disciplines with a strong imaging component. An important strength of this book is that it is not necessary to have special or extensive IT knowledge, or be familiar with programming, to be capable to apply the information in this book and start using Moodle.

CONTENT/FEATURES: The book starts in the first chapter with a discussion on the definition, types, and advantages of e-learning. It also describes the pioneering and award-winning projects in the field of e-learning for medical physicists. In the second chapter, Moodle is introduced as a virtual learning platform. A list of prerequisites for introducing a learning platform at one's own facility is included, as well as a list of actions the teacher must take to be prepared to use an online platform. The third and fourth chapters of the book contain practical step-by-step instructions, clarifying and explaining the different roles that exist with-

in the system, such as teacher, manager, and student. The final chapter of the book provides the results of a survey in lower- and middle-income countries, and suggestions on how to build a Moodle environment with limited resources. As previously mentioned, the inclusion of several examples and screenshots is a real strength of the book, providing not only the perspective of the educators, but also that of the students.

ASSESSMENT: This book is easy to read and comprehend, even without having extensive IT knowledge. The examples provided are invaluable if you decide to start building your own module in Moodle. The author is clearly very experienced in using Moodle, and is therefore able to share practical tips, which are very helpful when designing your own modules, which may otherwise be very easy to miss.

This book sticks to the basic building blocks of online modules, and to the traditional way of building modules as mostly used in higher education. If and when you want to start designing your own modules on Moodle, this book is a great guide. If you're interested in taking advantage of everything that Moodle is capable of doing, then this book is a great introduction to getting used to Moodle. Then, after getting familiar with Moodle by means of this book, educators can take the next step and learn to design a very broad variety of learning content, using the many options and plugins that are available to extend Moodle's capabilities.

Although the screenshots are relatively small and not always easily readable in the hardcopy of the book, they serve their purpose of guiding the reader through the steps to create content.

In summary, the step-by-step descriptions and many useful tips make this book a very useful and practical guide when you start using Moodle in your medical physics courses. Lately, online learning has taken a permanent place in our educational landscape, and therefore this book is a highly recommended source of information for all educators!

Danielle Dobbe-Kalkman is a Senior Learning Specialist at the LRCB, the Dutch Expert Centre for Screening, and the educational expert of the EUTEMPE consortium. She regularly presents on tactics to improve educational efforts and assists with the design of courses to enhance their didactic value. Danielle sits on the Editorial Board of EMP News as an Advisor.

ESMPE European School for Medical Physics Experts

Statistics in Medical Physics

13th-15th October 2022, Athens, Greece

EFOMP in collaboration with the Hellenic Association of Medical Physics (HAMP) and the 2nd Department of Radiology, Medical School, National and Kapodistrian University of Athens would like to invite you to the next ESMPE on **13th-15th October 2022**.

The school will be aimed at advanced tasks connected with the use of statistical methods in data handling and interpretation. The school will cover the methods of inferential statistics most frequently used in the medical field, the statistical methods used in radiomics, the treatment of errors an uncertainties in radiation dosimetry. This course is designed to be accessible to all medical physicists including students and those working in clinical environments and are involved in data management and research.

This two-day event has been accredited by EBAMP (European Board of Accreditation for Medical Physics) as a CPD event for Medical Physicists at EQF Level 8 and awarded 39 CPD credit points (33 CPD credit points for those who do not sit for or do not pass the examination). As in past school editions, there will be an optional examination at the end for those seeking a higher level of certification beyond attendance.

ESMPE have decided this event will be in a hybrid format. Participants will be on-site in Athens where possible, but the school will also be live-streamed so participants can join live online if they cannot travel to the venue. Please note: All times shown are in Greek time (CET+1h).

Content

Sample Size determination. Sample size determination for different study designs
Evaluation of a diagnostic test– Sensitivity, specificity, diagnostic accuracy, ROC methods
Applied regression analysis. Analysis of variance, Analysis of Covariance, multiple regression, logistic regression
Survival analysis – Relative risks Odds ratio. Survival curves with Kaplan Meyer; Log-rank test; Cox models
Statistical methods in radiomics.
Errors an uncertainties in radiation dosimetry – Theory of error and uncertainty analysis: Type A and B uncertainty, assessment of the quality of a measurement or calculation.
Agreement in Radiotherapy – How to assess agreement in Dose distributions and Volume

Final exam

The final exam is voluntary. Participants can gain additional credits when successfully pass the test.

Organisers

Brendan McClean (Chair of the School), Marco Brambilla (Scientific Chair)
Efi Koutsouveli, Pola Platoni (HAMP)

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National and Kapodistrian University of Athens
EST. 1837

1969
ΕΦΙΕ
Ένωση Φυσικών Ιατρικής Ελλάδος

Course language	English
Level	MPE
Registration fee* (2 main meals, 5 coffee breaks, 1 social dinner)	300 € 350 € (from 10th September 2022)
Reduced registration fee* • subsidized by EFOMP • first-come, first-served policy	150 € - for the first 15 attendees (max. 2 from one country) coming from the following European countries: Albania, Belarus, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, Estonia, Greece, Hungary, Kosovo, Latvia, Lithuania, North Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Ukraine.
Maximum number of participants	80
Duration	13th-15th October 2022
Study load	15 hours of lectures and demonstrations
Venue	National and Kapodistrian University of Athens (NKUA), "Alkis Argyriadis" Amphitheatre Central building, Panepistimiou 30, Athens 106 79
GPS coordinates	https://goo.gl/maps/t7yPZdYAJZS5tGSw7
Accommodation	Individual
Information, programme at:	www.efomp.org
Registration	Electronic registration via EFOMP website
Registration period	1st April - 30th September 2022

* payment must be done in 14 days following the pre-registration, otherwise pre-registration will be cancelled and neither free place nor subsidized or ordinary fee can be granted for repeated registration

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Ένωση Φυσικών Ιατρικής Ελλάδος

ART AND SCIENCE

Art to Challenge and Inspire: Images and Reflections for Medical Physics (5)

Professor Jim Malone writes about an exceptional painting that scientists can often easily relate to

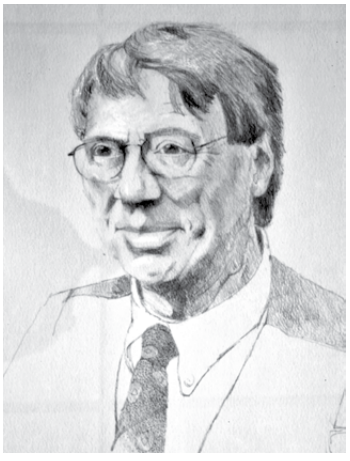
The Birth of the World (1925) was painted by Joan Miro (1893–1983) at his family's farm in Catalonia. The background involved a relatively uncontrolled application of paint, which was then overlaid with deliberately planned explicit shapes and lines, some in striking colour. Miro said of this process: "I begin painting and as I paint, the picture begins to assert itself." The first stage is free, unconscious.--- but the second stage is carefully calculated. Many artists use this approach to great effect, and we will see more from them in future articles. Hopefully, you will find this picture both intriguing and rewarding. Feedback is welcome and please send it to jifmal@gmail.com

The Birth of the World

(see next page)

Miro's paintings are often regarded as visual art's Book of Genesis. It has an ethereal quality, draws one in, and is strangely absorbing. Even in the scientific imagination, it can evoke awe, and it conveys a sense of quasi-mystical revelation. These features are often present in great art and great science. But are they under-celebrated in medical physics?

Definite shapes emerge from the murky chaos. Hints of the world we know are symbolised by the bird. Or is it a kite, or a figure with a white head, or a shooting star, or a balloon on a string, or is it sperm? Miro had a poetic imagination, often evident in his work, and said, "Each grain of dust contains the soul of something marvellous." A poetic sense of wonder might be aspired to more often, and is consistent with science.



Jim Malone is Professor (Emeritus) of Medical Physics and was Dean of the School of Medicine at Trinity College Dublin/ St James's Hospital. He also works/worked regularly with the WHO, IAEA, IEC, ICRP and the EC. He was recently awarded the EFOMP Medal, is an active researcher and has wide interests in the humanities. Recent publications include books on Ethics for Radiation Protection in Medicine, and on Mystery and the Culture of Science.

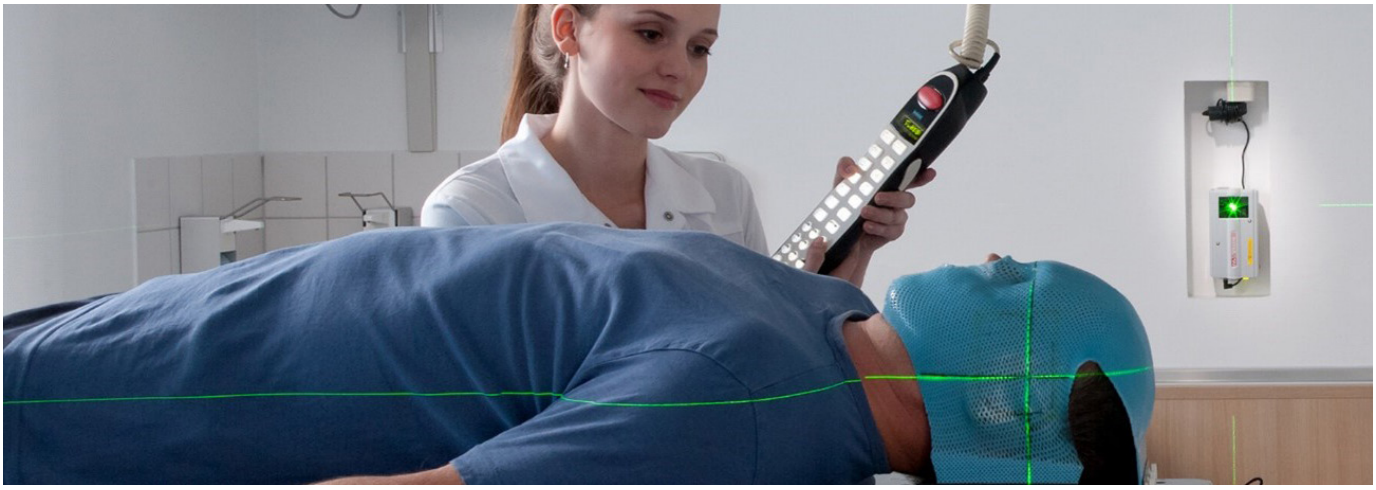
The drawing to the left is a study for a portrait, pencil on card, by Desmond Hickey (gifted by the artist).

The Birth of the World (1925). Joan by Miro (1893 – 1983). (See previous page).
Image © Museum of Modern Art (MoMa), New York.
http://www.moma.org Oil on canvas. 251 x 200 cm. © Successió Miró, ADAGP Paris/IVARO Dublin, 2022.

EFOMP COMPANY MEMBER ARTICLE

External Lasers Ensure Precise, Repeatable Patient Positioning At All LINACs

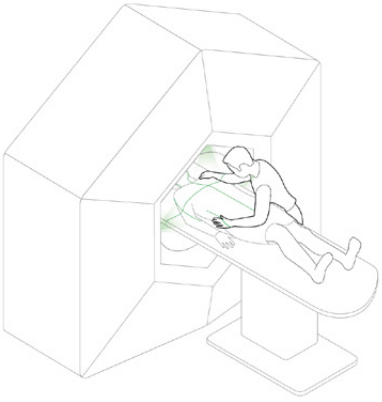
The APOLLO laser system from LAP improves workplace ergonomics and increases patient safety.



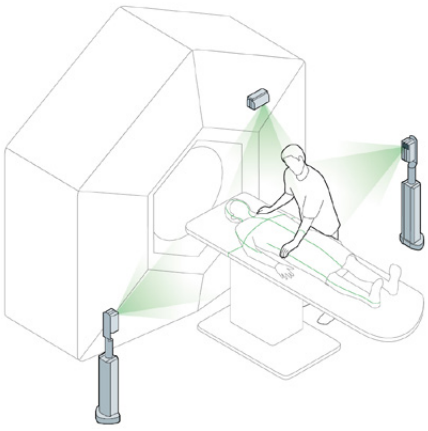
Patient safety, patient throughput, and patient experience: these are the clinical reference points informing the development roadmap for the APOLLO lasers from LAP. With around 3,000 units shipped annually to radiation oncology clinics worldwide, APOLLO lasers are pervasive, ensuring accurate, repeatable positioning of the patient versus the LINAC isocentre to enhance the safety of radiation delivery while streamlining the radiotherapy workflow.

Why external lasers?

Regardless of which LINAC is used, bore-type or C-Arm, clinical staff and patients benefit from precise and easy positioning with external lasers. For the RT team, the principal motivation for deploying APOLLO lasers is to optimise the machine and workflow ergonomics in the treatment room—creating the conditions for streamlined patient positioning at scale. A case in point is the alignment of larger patients on the treatment couch before irradiation in a bore-type linac. *"With the help of APOLLO lasers, the therapist can lift and rotate the patient in an ergonomically friendly position before the treatment couch enters the bore – after which any repositioning becomes cumbersome and time-consuming. Our clinical customers tell us that lifting the patient this way makes it easier to go to the last millimetre regarding positioning accuracy."* Raphael Schmidt, the responsible product manager at LAP, notes.



Patient alignment with internal lasers only: Lateral rotation is necessary when positioning in the bore. At the same time, the conditions are very unfavourable during lifting as the leverage effects are greater.



Patient alignment with external lasers:
Working in an upright position relieves the spine of the therapist and prevents it from twisting. In addi-

tion, the patient is easily accessible.

Making QA easier and enhancing efficiency

Equally significant, the APOLLO lasers represent a core enabling technology for manufacturer-independent quality assurance. The QA tasks are usually performed in the evening hours after patient treatments. Two factors are decisive: precision and efficiency. Both are enhanced with the use of external lasers. There are supporting tools integrated inconspicuously into the workflow and are reliable and highly long-lasting without compromise over many years. Accurate positioning helps the clinical team stay on schedule. Less repositioning is needed, and more patients can be treated.

About the APOLLO lasers

The APOLLO system has three (optionally four) lasers for the coronal, sagittal, and transversal body planes. Different attachment systems and adjustable retainers allow LAP to adapt the laser system to the specifics of the customer's treatment room and LINAC set-up. The APOLLO MR3T was designed for use on MR devices. It meets all the criteria for use in an MR environment.

Torsten Hartmann: Director of Product Management Healthcare

EFOMP COMPANY MEMBER ARTICLE

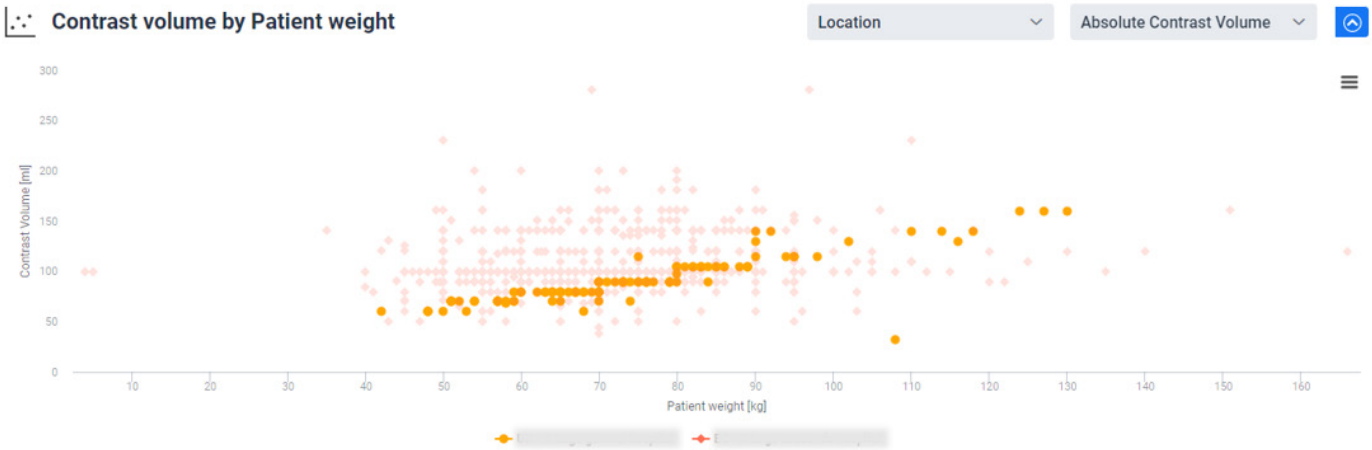
Qaelum's CONTRAST as a Tool to Monitor Usage and Manage the Contrast Media Shortage

Anna Romanyukha, PhD and Niki Fitousi, PhD, MPE, of Qaelum's Research Department, write about the company's tools for the management of contrast media

A COVID-19 related shutdown of the Shanghai GE Healthcare plant due to the city lockdown in April caused a global shortage of iodinated contrast media iohexol (Omnipaque) and iodixanol (Visipaque). Diminished contrast media availability has strained medical imaging facilities all over the world, prompting radiological societies and government healthcare agencies to recommend immediate conservation of contrast stocks. Hospitals have been forced to postpone non-urgent medical imaging examinations, which, similar to initial pandemic-related measures, may result in the aftermath of late patient diagnoses. Possible ways to mitigate the crisis have been offered by various radiology associations around the world.

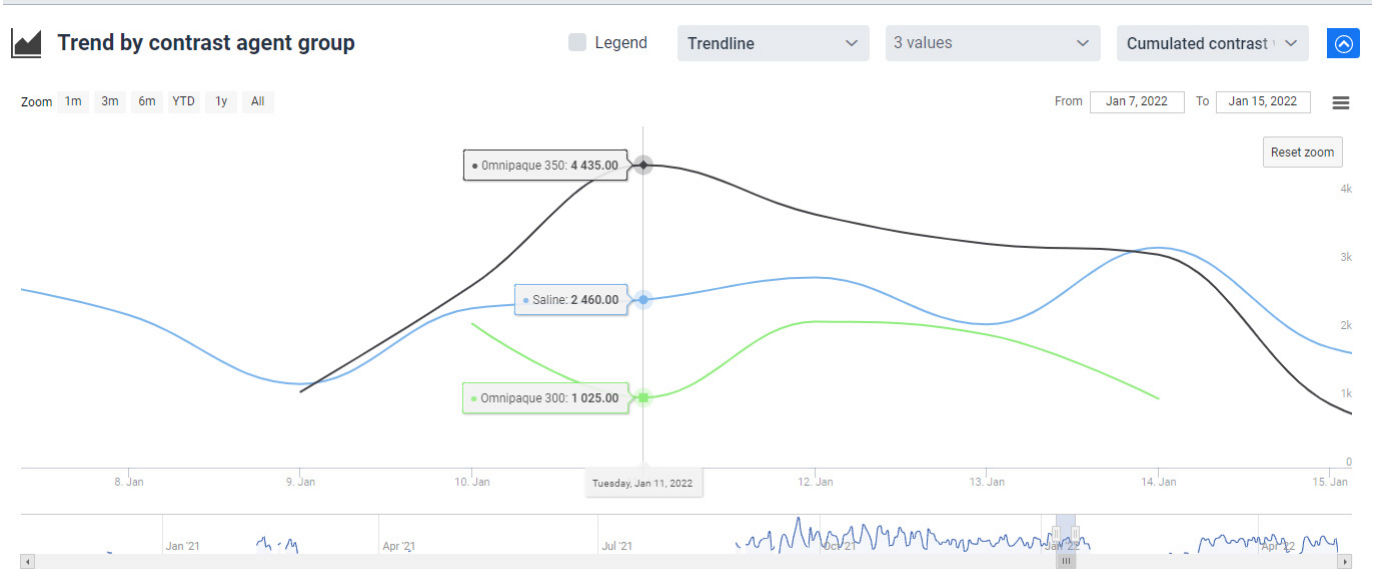
One strategy to limit the risk, according to expert advice for healthcare providers, is to set up a **diversified network of contrast media suppliers;** FOQAL-CONTRAST is a **vendor-neutral software** that allows to centralize and handle data from injectors of different vendors. Contrast volumes and costs can be tracked for each brand and concentration combination in order to have an **overview of the consumed contrast distribution among suppliers** and avoid relying on a single one.

Another important recommendation for contrast conservation is ensuring that **weight-based protocols** are used. This can be performed by monitoring contrast volumes with respect to patient weight, as indicated in the example shown below for different locations.



Qaelum is a forward thinking company that developed a contrast management solution before the contrast shortage took place. Contrast Management is one of the multiple modules of Qaelum's comprehensive quality platform FOQAL, and is a powerful software solution to be relied upon when following the recommended mitigation strategies (FOQAL-CONTRAST, Qaelum). The module allows clinics to evaluate existing contrast stocks and usage trends, and track the impact of introduced actions and conservation measures over time.

When managing multiple facilities, **contrast consumption can be evaluated by location** to correctly assess inventory needs and identify approaches tailored to the hospital type. Cumulated contrast volume can be evaluated by site, program name, scheduled procedure, or contrast agent group to calculate daily consumption and forecast how long stocks will satisfy imaging needs under normal and critical conditions. Average contrast volume or number of studies are among the multiple data types that can be plotted, and specific procedures



can be selected to estimate contrast consumption for critical conditions.

The **most frequently performed contrast enhanced procedures can be identified and targeted** for contrast volume reduction, as shown below in the analysis of average contrast volumes by study description.

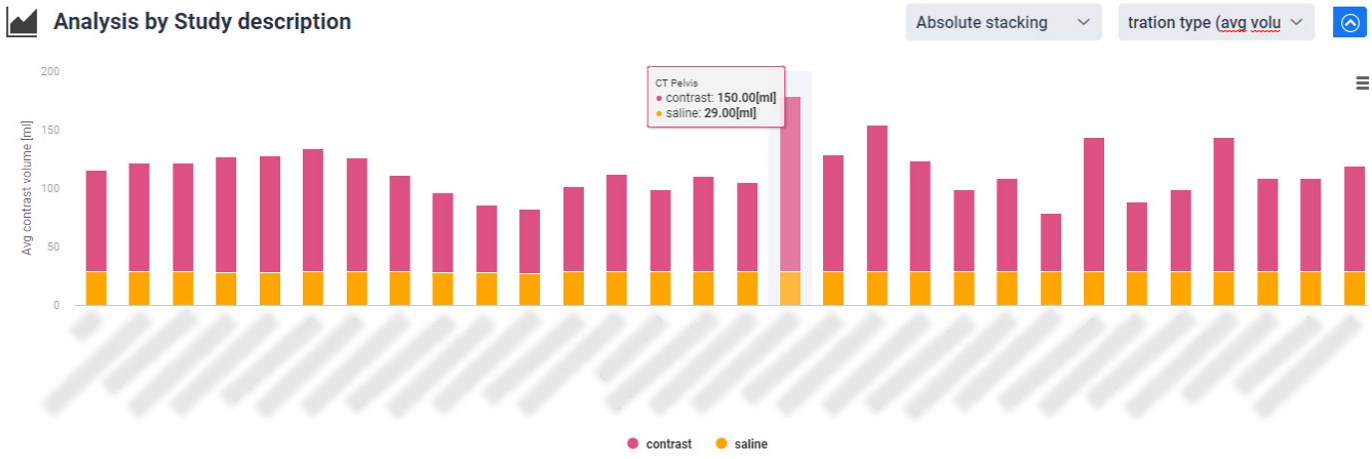
Where optimization is needed, **Improvements** can be created with automatic population of the relevant data, possibility to assign users, and track improvement progress, ensuring consistent communication between staff. The data can also be exported to customized templates or used for further analysis.

Contrast waste can be assessed by tracking used contrast volume pertaining to various contrast media container sizes. Single use packages can be repackaged to optimize contrast use in lower volume studies.

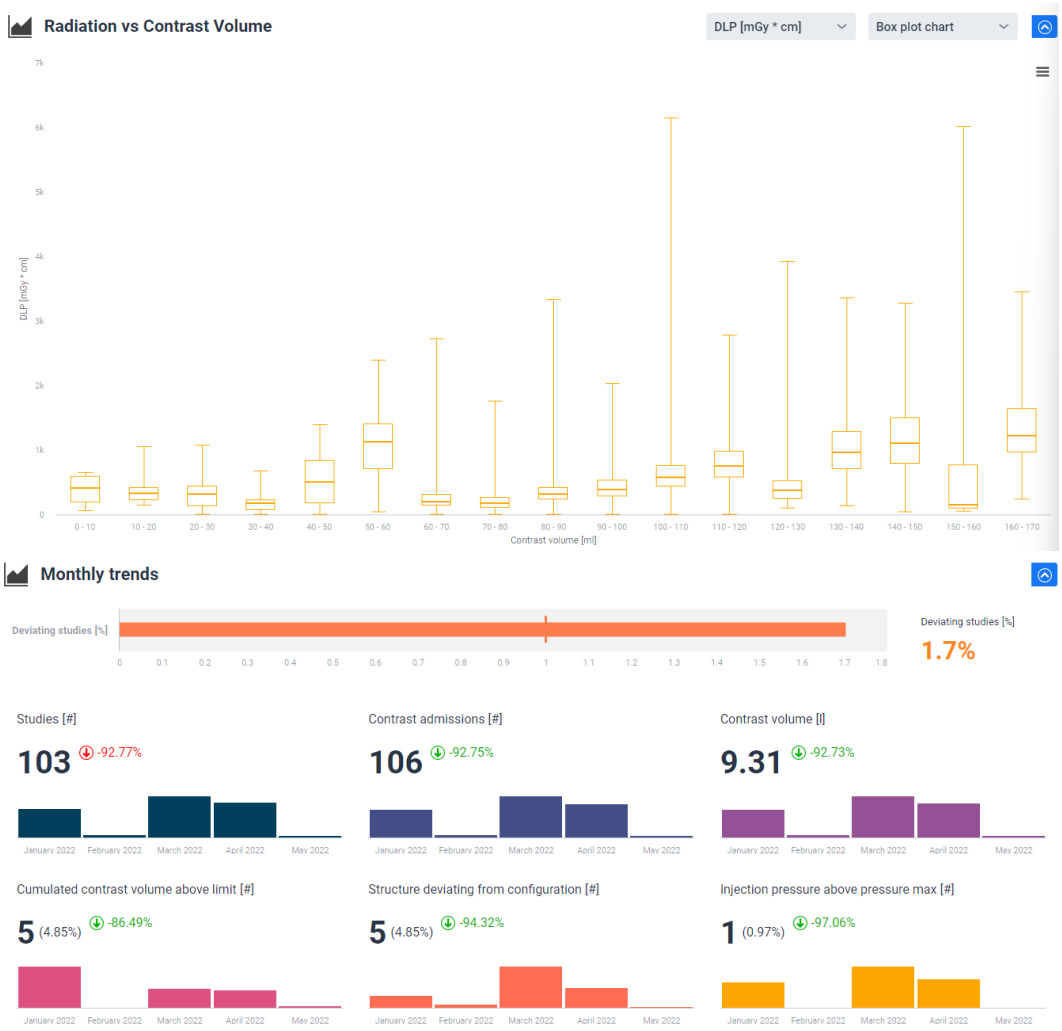
Contrast usage can be correlated and monitored with respect to **radiation dose** when the corresponding CT study data is also collected.

Time snapshots before and after optimization allow to monitor the impact of activities, like adherence to weight-based protocols, repackaging for waste reduction, reducing the number of exams requiring contrast or extra training of technologists. Customized targets can be set and automated insights help to identify outliers.

Not only contrast usage, but also s**ite-, program name-, and study description- specific financial contrast costs** are tracked to increase the efficiency of the department or facility.



The American College of Radiology urges in a statement released in May regarding contrast media shortage: “Do not sacrifice image quality by using suboptimal doses”. Qaelum’s FOQAL platform combines the Contrast management module with other advanced quality related tools. Use FOQAL-FORMS to get direct **feedback** from radiologists **regarding image quality** issues when reducing contrast volumes in protocols. Combine CONTRAST with the CT Repeat software to identify and optimize **excess contrast and radiation dose resulting from superfluous repeated scans.**



Qaelum's vendor-neutral Contrast Management solution is a comprehensive, customizable, and powerful tool for managing contrast usage in the medical imaging department. Several healthcare channels question whether this supply disruption is in reality the new norm, and medical imaging departments should be prepared for the future. Contact us for a demo of **Qaelum's products that ensure quality and efficiency** in the radiology department- from patient radiation dose management to contrast media usage, CT repeat scan analysis, and remote monitoring of quality tasks.

Reference

"Statement from the ACR Committee on Drugs and Contrast Media". American College of Radiology, May 6, 2022. https://www.acr.org/Advocacy-and-Economics/ACR-Position-Statements/Contrast-Media-Shortage.

Anna Romanyukha received her Ph.D. degree in medical physics from the Centre of Medical Radiation Physics (UOW, Australia) and her M.Sc. degree in health physics from Georgetown University (Washington DC, USA). She worked as a post baccalaureate and pre doctoral fellow at the National Cancer Institute (NIH, Washington DC) on various projects including radiation dose estimation from diagnostic exposures. She now works in Qaelum NV, focusing on advanced software tools in patient radiation dose management and quality.

Niki Fitousi, PhD, is a certified medical physicist from Greece, currently working in Belgium. She is a member of the Hellenic Association of Medical Physicists (member of EFOMP). Her professional experience includes work in all fields of Medical Physics (Radiation Therapy, Diagnostic Radiology and Nuclear Medicine). She is now the Head of Research in Qaelum, focusing mostly in the field of dosimetry and image quality in medical imaging.

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Physica Medica: Editor's Choice

Iuliana Toma-Dasu chose these four articles from the latest issue of Physica Medica (EJMP) as they were intriguing to her for the autumnal issue of EMP News.

Saw and Ng **Current challenges of implementing artificial intelligence in medical imaging** Phys. Med. 2022;100: 12-17 https://doi.org/10.1016/j.ejmp.2022.06.003 https://www.physicamedica.com/article/S1120-1797(22)01996-2/fulltext

In this short and well-structured review, the authors present an overview of the main challenges in implementing AI in medical imaging, considering not only the technical aspects but also the AI policies and regulatory frameworks. The work is therefore put in the right context of developments in AI technology driven by the interests of the beneficiaries, and it should therefore be of interest to the various stakeholders in this field, including the healthcare sector and policy makers.

L. Marcu et al. **The role of medical physicists in clinical trials across Europe** Phys. Med. 2022;100: 31-38 https://doi.org/10.1016/j.ejmp.2022.06.008 https://www.physicamedica.com/article/S1120-1797(22)02001-4/fulltext

This paper presents the results of a remarkably interesting study performed by the EFOMP Working Group on the Role of Medical Physics Experts in Clinical Trials; more specifically, the results of a survey addressed to the National Member Organisations of EFOMP regarding the involvement of medical physicists in trial design, setup, and coordination of clinical trials. The results show the differences in the extent of the involvement of medical physicists in clinical trials across European countries and therefore should prompt the organisation of dedicated educational events and training opportunities for medical physicists on clinical trial design and conduct that would eventually lead to a standardisation of the practice within Europe.

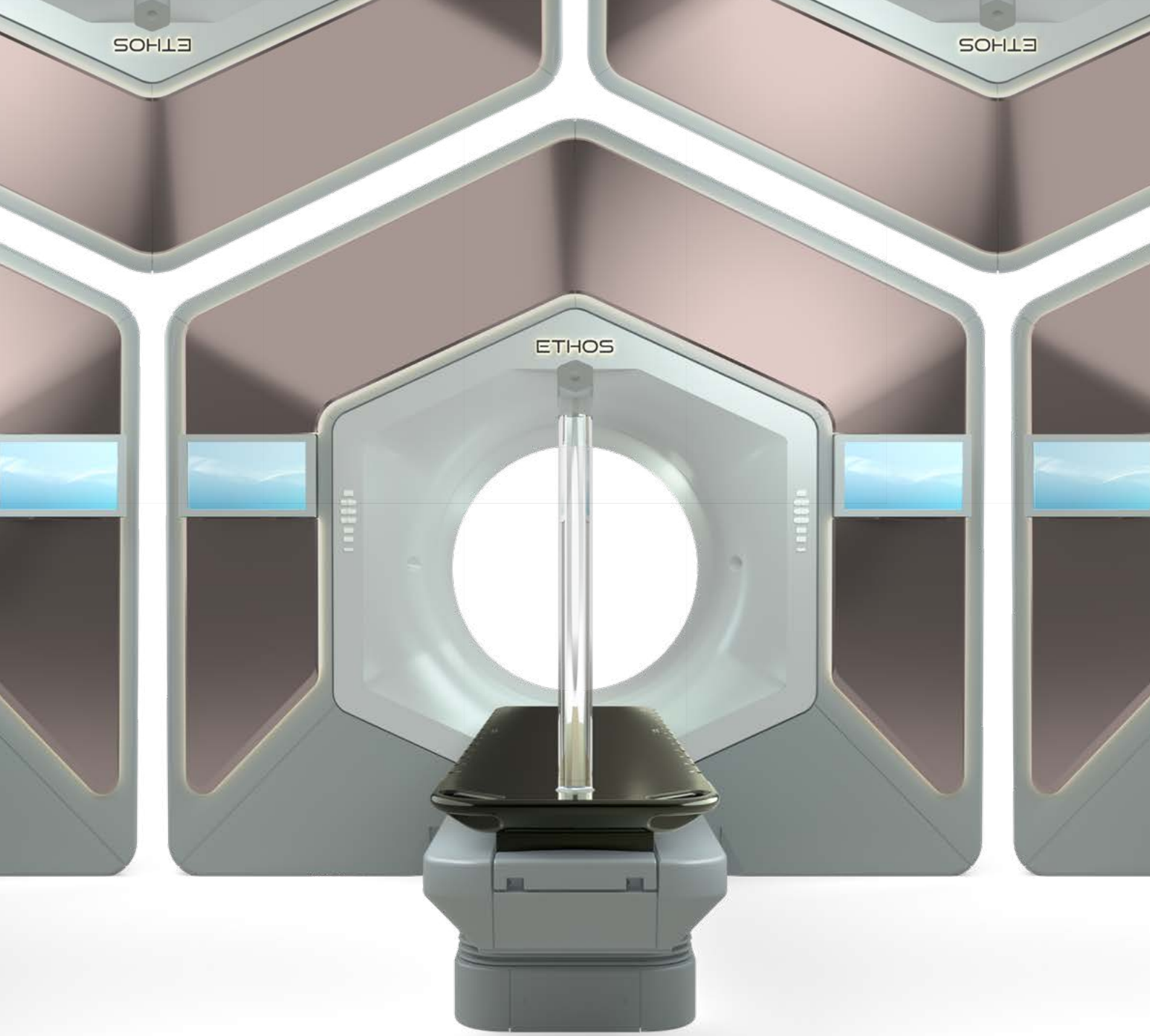
G. Reynés-Llompart et al. **Quality control in PET/CT and PET/MRI: Results of a survey amongst European countries** Phys. Med. 2022;99: 16-21 https://doi.org/10.1016/j.ejmp.2022.05.004 https://www.physicamedica.com/article/S1120-1797(22)01978-0/fulltext

This is another contribution of EFOMP coming from the EFOMP Working Group established in 2020 to issue recommendations for PET/CT/MRI Quality Control (QC). The methodology of this work is similar to the one in the article above; the study is based on a survey addressed to the European Medical Physics Experts on the QC protocols and accreditation programmes. The results indicated the dissimilarities between PET QC procedures across Europe and should eventually lead to proposing guidelines regarding the measurements that should be routinely used by the EFOMP country members.

L. Wilson et al. **Image-based data mining applies to data collected from children.** Phys. Med. 2022;99: 31-43 https://doi.org/10.1016/j.ejmp.2022.05.003 https://www.physicamedica.com/article/S1120-1797(22)01977-9/fulltext

To the best of my knowledge, this is the first study aiming at investigating to what extent image-based data mining is suitable for being used for paediatric analyses given the inherent anatomic variability between adults and children but also because the investigated endpoints might differ for children compared to adults. The results, based on a solid cohort of 167 children (aged 10 months to 20 years) who received proton radiotherapy for primary brain tumours, were very encouraging, showing that it is feasible to use image-based data mining to assess the late-effects in children.

Iuliana Toma-Dasu,
Editor-in-Chief of Physica Medica – European Journal of Medical Physics



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EFOMP COMPANY MEMBER ARTICLE

ClearCheck: Automated Plan Evaluation

RAD formation

Before I joined the Radformation team, I worked as a radiotherapy physicist in the clinic for ten years. I remember how we reported structure constraints for important SBRT, SRS, and various IMRT plans: we hunted through the DVH for precise values and manually entered the information into a spreadsheet. Because the process was time-consuming, we limited the number of sites we gathered structure dose data for and the number of constraints we used when we performed our analysis.

Plan reporting was another challenge. Gathering all the necessary plan information, saving individual screenshots and reports, and collating them all together felt like a chore.

Conveniently located within Eclipse and accessible via the scripting API, ClearCheck provides templates to automate plan evaluation and custom, comprehensive reports that document all aspects of the treatment plan.

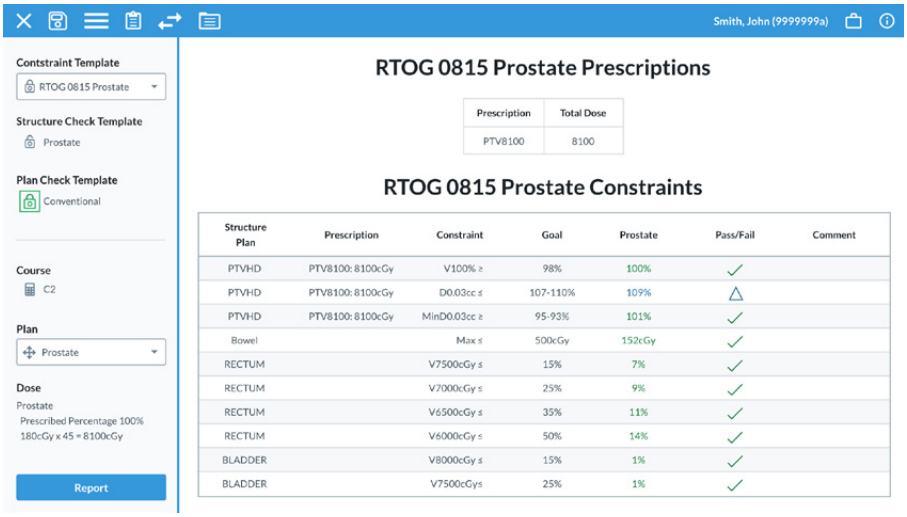
ClearCheck

It's no wonder that, within just five short years, ClearCheck has been installed and implemented in over 1,000 clinics worldwide. ClearCheck automates and standardizes dose constraints and plan reporting for departments using the Eclipse TPS.

Clinical Validation of ClearCheck :

Automating Dose Constraints Improves Accuracy and Efficiency:
The Karmanos Cancer Institute also had mixed emotions when collecting dose constraint information. While it is essential to ensure the doses to target structures and critical organs fall within predefined parameters, the process is time-consuming and prone to manual errors.

As part of an investigation presented at the 2018 ASTRO annual meeting, the team at Karmanos performed clinical dose constraints for 64 patients, manually and automatically using ClearCheck. After analysing 861 unique structure constraints both ways, they confirmed that reporting dose constraints manually was indeed error-prone. They discovered that 18 structures–approximately 2% of those reported manually–differed by more than 1% from the actual values from the treatment planning system, including several errors that were clinically relevant. In assessing constraints using ClearCheck, they found no constraint deviations.



Screenshot of ClearCheck Dose Constraint Evaluation

% Deviation	Number
<1	832
1-3	11
4-6	5
7-9	6
10-20	1
>20	6

Table 1: Constraint deviations and frequency

Meanwhile, automating dose constraints also saves valuable clinical resources. In measuring the required time to collect these values automatically, they found that they spent only 1.9 minutes defining, evaluating, and documenting structure doses versus 6.2 minutes when performed manually, on average—a 70% time savings. Because of ClearCheck's simplicity and speed, Karmanos could increase the number of constraints evaluated per plan by over 30%.

"The ability to evaluate all planning goals simultaneously during plan creation results in more efficient plan optimization and the realisation of planning goals." - J. Burmeister, et al.

Quick, standardised plan reports:

Recorded Time for Patient Plan Report Finalization			
Chart Time Category	Manual Finalization Time (min)	Semi-Automated Finalization Time (min)	Overall Reduction of Time (%)
≤10 Minutes (6)	8.2	6.7	13.9
11-20 Minutes (10)	15.3	7.7	46.5
21-30 Minutes (10)	25.8	9.3	63.6
31-40 Minutes (10)	35.3	11.7	67.2
≥40 Minutes (4)	83.5	24.0	70.5
All Patients (40)	28.7	10.6	53.4

The University of California San Diego team looked to improve plan documentation, which was manual and, at times, lengthy. In an abstract published at the 2020 ASTRO annual meeting, their team analyzed ClearCheck's automated plan documentation process and compared it to their previous workflow for potential time efficiency gains.

Using ClearCheck for automated plan report finalization reduced the time investment by 53.4% across the range of all patients, resulting in an average time savings of over 18 minutes per patient. For plans which required longer manual finalisation times—those requiring 40 minutes or more using their existing techniques—the time savings amounted to 70.5% with the automation and workflow tools provided by ClearCheck.

Conclusion

In short order, Radformation's ClearCheck has changed the way Eclipse users perform their plan evaluation and reporting, improving the quality of the plan review and providing incredible efficiency along the way. Visit the Radformation website to learn more about ClearCheck or schedule a personalized software demonstration.

Disclaimer: Some products may not be available in all markets.

References:

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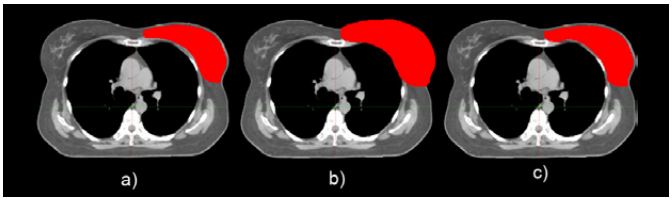
Tyler Blackwell, MS, DABR, is a medical physicist at Radformation, where he focuses on clinical collaborations and community engagement. Before joining Radformation, he spent a decade working as a clinical medical physicist in radiation therapy. He is active in several AAPM committees and is a member of the AAPM Board of Directors.

MEDICAL PHYSICS THESIS

Analysis of Similarity and Dosimetry Data Variability for the Left Breast Without Lymph Nodes Case

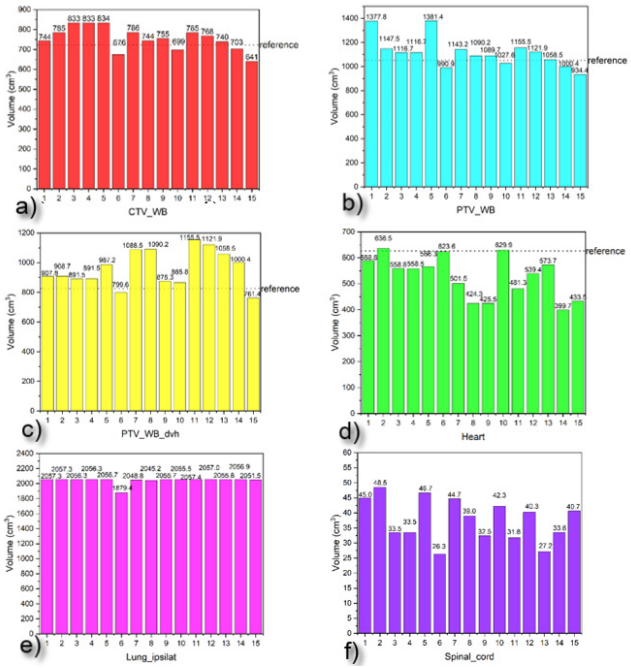
In June of 2022, Mindaugas Ilickas graduated from the Medical Physics MSc programme at the Kaunas University of Technology, Lithuania. Here is the briefly summarised thesis.

The foundation and most vulnerable step in the treatment planning process is target delineation [1]. Variations in target volume delineation in breast cancer have been extensively described in the literature [2, 3], with significant implications for tumour response and toxicity. Planning is sensitive to investigator subjectivity relating to human opinion, knowledge, and ability. Significant differences in target sizes for breast radiotherapy have been documented in earlier investigations [4–6]. Hurkmans et al. (2001) [5] observed that the clinical target volume (breast volume), as determined by various examiners based on CT, varied by 17.5% in a single systematic and analytical research study. Struikmans et al. (2005) [6] reported that the two sizes determined by various researchers overlapped on average by 87% or 56% for breast and boost volumes, respectively. This finding was supported by a second comprehensive investigation that used systematic analysis. It has been discovered that MRI images are the subject of the majority of studies assessing image similarity, with CT imaging research being incredibly uncommon. Planning a radiation treatment requires contouring target volumes and organs-at-risk (OARs). Tumour contouring is typically done manually in clinical settings, which takes time and has interobserver variability. Therefore, precise automatic segmentation is preferred. The radiation oncologist's or radiotherapy technician's experience, however, has a significant impact on the delineation quality and amount of time spent contouring.



Different treatment volumes: a) CTV_WB; b) PTV_WB; c) PTV_WB_dvh"

Materials and Methods:
For the patient with left breast cancer, an ESTRO-inspired reference delineation plan was used. The patient's



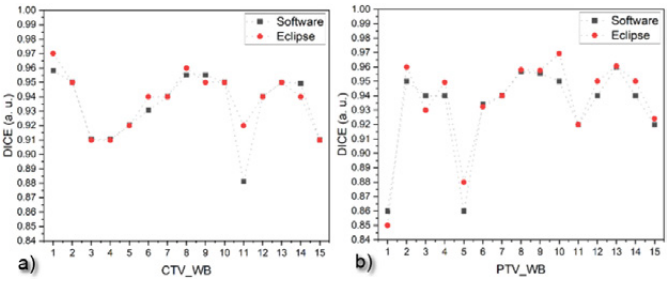
Different volumes: a) CTV_WB; b) PTV_WB; c) PTV_WB_dvh; d) Heart; e) Lung_ipsilat; f) Spinal_cord

target volumes (CTV_WB, PTV_WB, and PTV_WB_dvh; see Figure 1) and other pertinent structures (Heart, Spinal_cord, and Lung_ipsilat) were outlined by fifteen different radiation oncologists. The treatment planning system "Eclipse" and the open-source tool "Evaluate-Segmentation" were used to calculate and analyse the Dice Coefficient (DICE) [7] to determine the degree of variance in CTV_WB and PTV_WB.

Results:
First, the volumes of the various structures (CTV_WB, PTV_WB, PTV_WB_dvh, Heart, Lung_ipsilat, and Spinal_cord) drawn by the physicians were calculated using their coordinates of x = 10.97 cm, y = -10.60 cm, and z = 1.51 cm. In Figure 2, calculated volumes are displayed.

Figure 2 shows that the CTV_WB reference volume is 723

cm3; in comparison to the other volumes, four plans–the 6th, 9th, 14th, and 15th–are below the reference value and 11 are above it. Only 20 cm^3 is different between the 10th, 13th, and 15th plans in terms of volume. The PTV WB reference volume is 1052 cm^3, and four plans (the 6th, 10th, 14th, and 15th) fall below the reference value while 11 exceed it. Only the 10th and 13th plans' volumes differ by 30 cm^3. All plans, except for the 6th and 15th plans, are



larger than the PTV_WB_dvh reference volume of 824.4 cm^3, when compared to the other volumes. The Heart reference volume is 626.5 cm^3, and two plans–the 2nd and 10th–are above it while 13 are below it. Only the 2nd, 6th, and 10th plans differ in volume by less than 10 cm^3. Except for the 6th plan, all of the volumes in Lung_ipsilat are quite close to one another (the difference between volumes is < 10 cm^3). The first structure is one where nearly every volume is close to each other. Spinal_cord all volumes are in 25-50 cm^3 interval. Figure 3 displays the DICE similarity coefficient determined using the "Eclipse" treatment planning system and the open-source "EvaluateSegmentation" software for CTV_WB and PTV_WB structures.

Fig. 3 DICE similarity coefficient calculated with "EvaluateSegmentation" software (black) and "Eclipse" programme (red) comparison: a) CTV_WB structure; b) PTV_WB structure

Figure 3 shows the following differences in the DICE coefficient: CTV WB (0.88 a. u. to 0.96 a. u. (software) | 0.91 a. u. to 0.96 a. u. (Eclipse)), PTV WB (0.86 a. u. to 0.96 a. u. (software) | 0.85 a. u. to 0.97 a. u. (Eclipse)). It is understood that the more closely a volume resembles the original or reference, the higher the value that can be established (ideal case – the value is equal to 1 [8]). The CTV WB structure's only DICE value that changes by more than 0.04 a. u. is the 11th plan. This discrepancy might be explained by a mistake made by a human error when setting up photos for the "EvaluateSegmentation" software's measurement process.

Conclusions:

It is essential to confirm that target volumes (and organs at risk) were contoured in accordance with a specific technique and recommendations due to the heterogeneity in delineation revealed by similarity characteristics analysis, which is dependent on structure volume (it is found that structure volume differs by up to 50%). If not, it can have a significant effect on the final dosage prescribed and the OAR dose received.

References:

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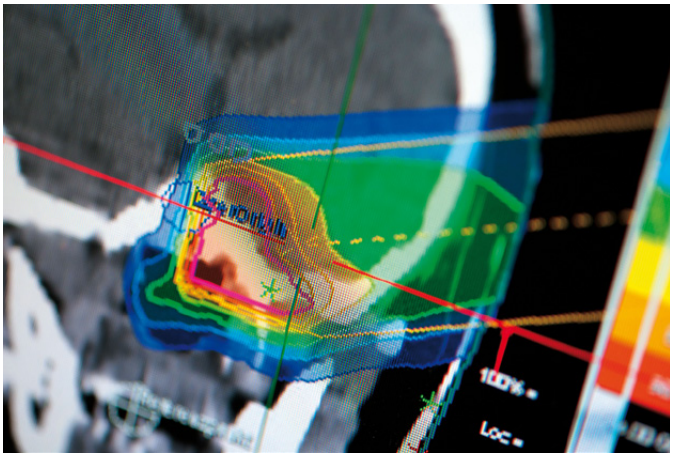
Mindaugas Ilickas

defended his master's thesis at the Kaunas University of Technology, Lithuania, in 2022. He is a first year PhD student in Material Engineering at Kaunas University of Technology and is currently investigating influence of the particle size and synergy on physical and antimicrobial/antiviral properties of the nanocomposite coatings.

UPCOMING VIRTUAL COURSES

Virtual Courses Announcement in the Field of Particle Therapy

For several years, the German Cancer Research Center in Heidelberg, Germany has successfully offered courses in the field of Particle Therapy. The courses are organized under the auspices of the Heidelberg Institute of Radiation Oncology (HIRO) in close cooperation with the Heidelberg Ion-Beam Therapy Center (HIT) as well as the University Hospital Heidelberg. Due to the current Covid-19 pandemic, the courses are hosted fully online, even in 2022 to ensure a save learning environment.



The courses are subdivided in an **online phase** of about five weeks (Oct. 17th until Nov. 20th 2022) and a **Live Online Phase** via **Zoom** of one week (Nov. 21st until Nov. 25th 2022, mainly from 4 – 7.30pm). During the online phase participants get access to the virtual learning environment (VLE) Moodle with learning materials such as pre-recorded video lectures, PDF scripts as well as short tasks to work on in small groups. The Live Online Phase is scheduled during the evenings to meet the adult's busy schedule. Furthermore, it allows for exchange between our experts and national and international participants to strengthen collaboration and the individual learning progress.

The courses are dedicated to Radiation Oncologists, Medical Physicists as well as national and international students or Post-Docs.

As one of the largest radiation therapy centres in Europe, the unique Ion-Beam Therapy Center with its isocentric gantry as well as many years of experience in online-enhanced teaching, Heidelberg is an excellent place for further education of physicians and physicists and young scientists.

Dates:
1. Registration Deadline: **Oct. 06th 2022**
2. Online Phase: **Oct. 17th - Nov. 20th 2022**
3. Live Online Phase via Zoom: **Nov. 21st - Nov. 25th 2022**

Programmes and further information:
www.dkfz.de/particle_course_en

Course Leaders:
Prof. Oliver Jäkel, PhD
Division of Medical Physics in Radiation Oncology,
German Cancer Research Center, Heidelberg, Germany
Prof. Jürgen Debus, MD, PhD
Department of Radiation Oncology and Radiotherapy,
Heidelberg University Hospital, Heidelberg, Germany

Local Organizing Team
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Web: www.dkfz.de/particle_course_en

Bio-sketch of Hosts:

Prof. Oliver Jäkel is head of the Division of Medical Physics in Radiation Oncology at the German Cancer Research Center. He holds a PhD in Physics and since 2011 he is a full professor at the Medical Faculty Heidelberg of Heidelberg University.

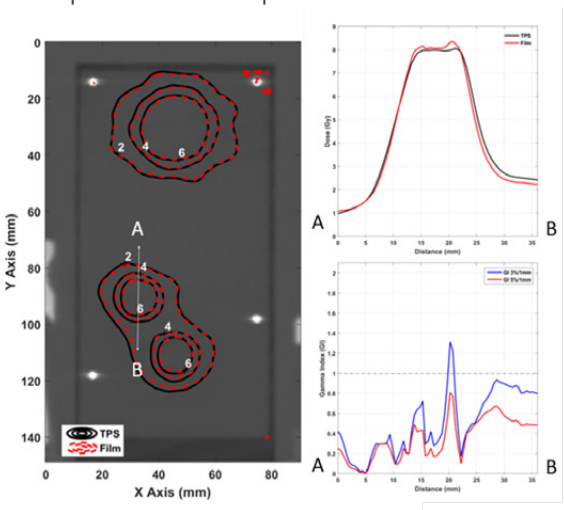
Prof. Jürgen Debus is a Medical Doctor in radiation oncology and holds a PhD in Physics. Since 2003 he is a full professor at the Medical Faculty Heidelberg of Heidelberg University and since 2014 its Vice Dean. He is also Chairman of the Department "Radiation Oncology" at the Heidelberg University Hospital.

EFOMP COMPANY MEMBER ARTICLE

A Powerful Tool for a Successful Quality Assessment: Indicative Film Dosimetry Results of an Intracranial SRS Treatment Delivery

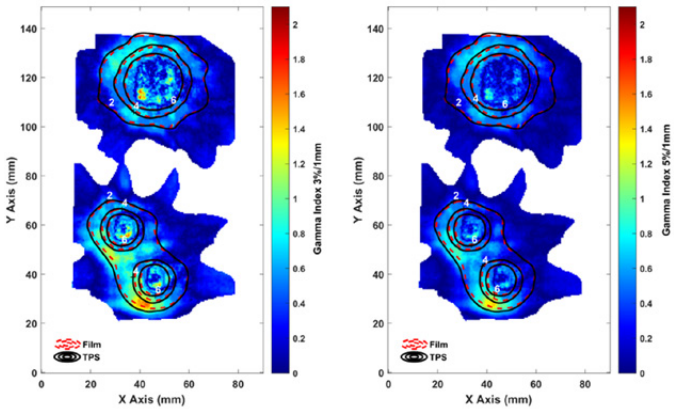
Part of RTsafe's recently introduced audit service "succeS^{R}S", is the remote film dosimetry service. Among others, this service will be offered to ISRS for their accreditation service of stereotactic radiosurgery centers.

External dosimetry audits are recognized as the ultimate method of evaluating the overall treatment accuracy, safety, and efficiency. RTsafe's variety of solutions form the new generation of QA and external dose verification in radiosurgery, covering all stages involved. In response to the increase in efficient radiotherapy worldwide, RTsafe has developed a novel approach in End-to-End QA testing, focused on SRS modalities. A set of remote dosimetry services is introduced, to support radiotherapy centers to promote best practice, and ensure high-quality SRS treatments. RTsafe's remote dosimetry services provide point (OSLs, TLDs), 2D (EBT3 & EBT-XD films) & 3D (polymer gel) dosimetric, and geometric accuracy through independent dose measurements. It is set up to evaluate the whole treatment chain, including clinical and technical aspects by reviewing at the same time procedures and protocols of the radiotherapy center. RTsafe's remote dosimetry services provide absolute dosimetry of high accuracy and reliability, assuring traceability to a primary standard dosimetry laboratory.



Sup-Inf – Coronal orientation: PTV 2 - (left) Slice of the reconstructed CT scan of the film phantom. Contours correspond to TPS calculations (black solid lines) and film measurements (red dashed lines) in Gy. (right) 1D profile comparison between calculated (TPS) and measured (Film) dose distributions at the location depicted by the white line. 1D gamma index calculations are also given using passing criteria 3%/1mm & 5%/1mm.

Using the film dosimetry service, the dosimetric quality, planned dose accuracy, and treatment deliverability of SRS procedures are evaluated. Following are some indicative results as presented in the evaluation dosimetry reports.

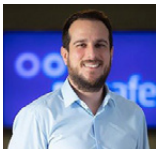


Coronal orientation: 2D comparison between calculated (TPS) and measured (Film) dose distributions in Gy values applying a 10% dose threshold. 3D gamma index calculations are given using passing criteria 3%/1mm (left) & 5%/1mm (right).

In the following table results for the 3D gamma index test of the film in coronal orientation are presented; comparing film-measured (reference) with the TPS-calculated (evaluated) dose distributions using a variety of passing criteria. Note that passing rates were calculated using a low-dose cut-off threshold of 10% of the prescribed dose.

For more information visit www.rt-safe.com or email info@rt-safe.com

Structure	Passing criteria		Global GI Passing Rate
	DD (%)	DTA (mm)	GI ≤ 1 (%)
	3	3	99.62
	3	2	99.55
Film Plane	**3**	**1**	**96.93**
	2	2	98.72
	5	**1**	**99.17**



Emmanouil Zoros is a medical physicist and a product manager. Emmanouil is responsible for product management, data analysis, and film dosimetry at RTsafe. He has a Diploma in Applied Mathematics & Physics from the National Technical University of Athens and a Master of Science in Medical Physics from the National and Kapodistrian University of Athens. His research interests focus on radiation therapy with an emphasis on quality assurance in stereotactic radiosurgery and experimental and computational dosimetry using Monte Carlo simulation techniques.

Georgios Kalaitzakis is a Product Manager. Georgios is responsible for the 3D digital design of the 3D printed phantom, the data analysis, the communication and the whole scientific support and guidance of the end user. He has a diploma in Electronic & Computer Engineering, where he focused on the estimation of pharmacokinetic parameters via dynamic contrast enhancement imaging to annotate the perfusion of the brain tumor. During his PhD in medical school in the University of Crete, he introduced advanced MRI biomarkers in CNS diseases.

EFOMP COMPANY MEMBER ARTICLE

Get the Most Out Of Your Pre-treatment QA With Monte Carlo Accuracy

Monte Carlo is the gold standard throughout the industry for dose calculation, with reported accuracy that is supported by numerous publications, conferences, and workshops dedicated to the topic. In particular, the European Workshop on Monte Carlo Treatment Planning was held for several years (2006, 2009, and 2012) to stimulate scientific information exchange.

I had the opportunity to attend two of the three workshops and still value the contacts and exchange of information provided. Since that time, the use of Monte Carlo in the clinic has steadily increased along with improved calculation speed.

In the US, the Imaging and Radiation Oncology Core (IROC) has been reporting for many years on dose inaccuracy when comparing the IROC phantom independent measurements to the clinic predictions. In a more recent publication, "IROC observed the surprising result that an independent recalculation dramatically outperformed institutional measurement-based QA in predicting whether a plan would pass the IROC phantom." (Kry 2019).

IMSure 3D™ Software from Standard Imaging utilises the SciMoCa Monte Carlo algorithm to perform an independent dose calculation. Using a proven dose calculation engine can provide improved error detection when compared to detector array measurements. Certainly, measurements do play a vital role in QA, but perhaps more emphasis on machine-specific measurement QA and selective use of pre-treatment QA measurements is reasonable when evaluating an overall QA strategy. Increased use of in vivo rather than pre-treatment measurement-based methods for patient specific QA merits consideration. In addition, calculation-only pre-treatment QA is less labor intensive and does not require LINAC time. From automatic importing and calculating to generating reports ready for review within minutes, physicists can save time during their QA routine with IMSure 3D. Comprehensive analysis tools, which focus on relevant criteria such as target volume and OAR metrics to help efficiently assess differences, contribute to good QA.

One of the sources of reported error stems from inferior quality beam models, with the most recent publication stating *"Typical TPS beam modelling parameters are associated with failing phantom audits - This is identified as a key factor contributing to the observed failing phantom results and highlights the need for accurate beam modelling."* (Glenn 2022).

TPS Dose, Monte Carlo Dose, and Gamma Viewer

Dose calculation engines of all algorithm types require high quality input in the form of the beam model. Beam modelling often uses the water tank scan data along with output factor measurements as a function of field size to tune each field independently. This data may contain inconsistencies that become 1:1 dose discrepancies of the same magnitude in the dose calculation. Custom vendor-provided beam modelling allows for comparison to data from other LINACs using the same energy.

A Monte Carlo beam model is consistent throughout, as the virtual sources rely on parameters (Ex: a primary spectra, secondary spectra, and source sizes) that must be fit to perform well at all field sizes. The beam model accuracy is ensured in IMSure 3D through custom machine-specific beam models for highly accurate simulations of planned delivery.

Standard Imaging is a leading manufacturer of QA instruments for radiation-based treatments. For more information, contact us here!

References

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Glenn MC, Brooks F, Peterson CB, Howell RM, Followill DS, Pollard-Larkin JM, Kry SF. Photon beam modelling variations predict errors in IMRT dosimetry audits. Radiother Oncol. 2022 Jan; 166:8-14.

Mary Napolitano, PhD, is Product Manager for patient QA solutions at Standard Imaging. She obtained her graduate degrees at the Georgia Institute of Technology and her bachelor's degree in Nuclear Engineering from the University of Cincinnati. Prior to Standard Imaging, Mary worked for multiple vendors in the radiation oncology domain.

EFOMP REPORT

Special Interest Group for Radionuclide Internal Dosimetry (SIG_FRID)

In this article, Pablo Mínguez Gabiña from Barakaldo, Spain, will continue his article in the last issue to provide his update on the activities of this EFOMP Special Interest Group.

The objective of the SIG_FRID is to establish a network of medical physicists working in radionuclide dosimetry. The SIG_FRID aims to fulfil the need for networking, education, research, and professional exchanges in this field.

The number of SIG_FRID members is currently at 123. New applications are always welcome (see below how to become a SIG member).

In the last term, the Steering Committee (SC) has had virtual monthly meetings (May 16th, June 22nd and July 21st).

A virtual general meeting of the SIG_FRID was held on June 9th. The different ongoing projects were presented and discussed with the attendance of nearly 60 participants.

Most of the SC members attended the European Congress of Medical Physics (ECMP) that took place in Dublin, and a face-to-face meeting was held on August 18th at the Dublin City University Campus to prepare for the "Meet the SIG" session organised on the 19th.

Some members of the SC of the SIG_FRID, from left to right: Manuel Bardiès, Pablo Minguez Gabiña, Carlo Chiesa, Ernesto Amato, Ana Denis Bacelar, and Steffie Peters

The "Meet the SIG" session on August 19th in Dublin allowed ECMP participants to discover the SIG_FRID activities and some of the members of the SC of the SIG_FRID. This was a remarkable success, with the presence of more than 70 medical physicists. We could discuss the achievements of the SIG_FRID after a little more than a year of existence. Suggestions coming from the audience were also noted and some have already been adopted. For example the use the SIG_FRID mail list to propose research topics, internships, PhD or Postdoc positions related to internal dosimetry is encouraged. Likewise, young colleagues or students can circulate their CV via the mailing list.

The latest advances in the priorities of the SIG_FRID (listed in previous EMP news) are summarised below. In those priorities that are not mentioned, the situation is like that in previous issues of the EMP newsletter:

Priority 1: Survey on the practice of clinical radionuclide dosimetry
The objective of this priority is to collect up-to-date information on the status of radionuclide internal dosimetry in the EFOMP member countries. An electronic questionnaire was distributed among centres that perform radionuclide therapy and more than 200 responses have been received. The analysis of the responses will start in September.

Priority 3: Education
An EANM-EFOMP Work Group was created for the revision of the core curriculum for medical physics experts under the coordination of Dimitris Visvikis. The kick-off meeting took place on April 27th. Sections were discussed and the draft of each section should be submitted by October. A specific section on nuclear medicine dosimetry will be included in the core curriculum.

Priority 4: Communication
A monthly newsletter has been issued for SIG_FRID members, and quarterly news for EMP news.

Slack is now being used as a communication tool among SIG_FRID members with different communication channels. The deployment of Slack should take place at the end of summer, with an invitation sent to every SIG_FRID member. It is hoped that Slack will allow fur-

ther exchanges between the SIG_FRID members.
Priority 5: Scientific Issues

There are currently four work groups:
- Time-activity data fitting (led by Gerhard Glatting).

- Treatment planning system comparison and harmonisation of their implementation (led by Lidia Strigari).

- Dose-effect model development (led by Lidia Strigari).

- Voxel S Values for internal dosimetry (led by Marta Cremonesi).

The last 3 work groups are still recruiting members, and more information should be provided in the next EMP News issue.

Priority 7: Regulatory Issues
The European Federation of Organisations for Medical Physics (EFOMP) is part of the project "SAMIRA Study on the Implementation of the Euratom and the EU legal bases with respect to the Therapeutic Uses of Radiopharmaceuticals", nicknamed SIMPLERAD, in collaboration with the European Institute for Biomedical Imaging Research (EIBIR) and the European Association of Nuclear Medicine (EANM).

The work packages WP1 and WP2 of that project have already started.
- WP1: Analysis of the interrelations between EU pharmaceutical legislation and Council Directive 2013/59/Euratom is ongoing.

-WP2: Survey and analysis of the implementation of relevant European legal requirements for therapeutic nuclear medicine: A pre-survey was defined and circulated within the member states and interviews have begun.
Moreover, EFOMP will issue a new policy statement (PS19) on dosimetry in nuclear medicine therapy for which a working group (chaired by Manuel Bardiès) has been created and will meet during the ECMP in Dublin.

Upcoming meetings:
- BIR/IDUG Molecular Radiotherapy Dosimetry 2022 (September 30). Oxford, UK.
https://www.mybir.org.uk/CPBase__event_detail?id=a173Y00000GALwiQAH&site=a0N2000000COvFsEAL

- 35th EANM Annual Congress. (October 15-19). Barcelona, Spain.
https://www.eanm.org/congresses-events/future-congress/

How to become a SIG_FRID member:
The SIG_FRID is meant for networking professionals with an interest in radionuclide dosimetry. Membership is open to all EFOMP members. The membership application procedure is explained on the SIG_FRID pages of the EFOMP web site: https://www.efomp.org/index.php?r=pages&id=sigs

The application form and a brief CV should be sent to the SIG_FRID secretary: sec.sig_frid@efomp.org

Pablo Mínguez Gabiña has been a senior medical physicist at the Gurutzeta/Cruces University Hospital in Barakaldo, Spain, since 2005. He has also been a part-time professor at the faculty of engineering of the University of the Basque Country in Bilbao since 2011. He has been a member of the Dosimetry Committee of the European Association of Nuclear Medicine since 2019. He is also a member of the Steering Committee of SIG_FRID.

EFOMP COMPANY MEMBER ARTICLE

The Power of Connection: Imaging Across the Comprehensive Cancer Care Continuum

Monte Carlo is the gold standard throughout the industry for dose calculation, with reported accuracy that is supported by numerous publications, conferences, and workshops dedicated to the topic. In particular, the European Workshop on Monte Carlo Treatment Planning was held for several years (2006, 2009, and 2012) to stimulate scientific information exchange.

Connected Imaging

"The idea of connected imaging is especially exciting to us," said Sasa Mutic, Senior Vice President, Radiation Treatment Solutions at Varian. *"As one company, we can now provide an ecosystem of solutions along every step of the cancer patient journey. Our joint R&D teams are looking across this expanded portfolio of world-class laboratory and imaging diagnostic products, radiotherapy solutions, and software, and looking for ways to connect them for more seamless integration between what happens outside the radiotherapy (RT) treatment vault and inside during treatment. "*

Imaging in Radiation Oncology

Volumetric imaging plays a crucial role at every step of the radiotherapy process. According to Anne Razavi, Senior Director for Global Product Marketing, Varian's next step for imaging inside the treatment vault is to focus our expertise on the speed and fidelity of CBCT imaging on Varian's treatment platforms, starting with the Ethos™ therapy system.

"CBCT images used for IGRT had to be of a certain quality for patient positioning," Razavi said. "But images for treatment planning or offline adaptation—they require more quality. We have been working on next-generation systems that produce cone-beam CT images with a level of soft-tissue contrast that is comparable to images from a modern CT scanner— and potentially reach image quality for CBCT that meets the American College of Radiology standards for diagnostic CT scanners."

"We are developing higher-quality, more accurate CBCT imaging that is also much faster than today's CBCT imaging," said Stephen Thompson, Director of Product Marketing. *"Given the scope of developments and never-before-seen capabilities, this really constitutes the next generation of CBCT imaging and is likely the largest development in CBCT in almost 20 years."*

"Providing the oncology care team with imaging capabilities wherever they need them, enabling the use of multi-modality imaging inside and outside the treatment room for holistic patient management, creating a better workflow integration between all image sources—these are the enhancements that are at the centre of our development projects going forward," said Mutic.

Anne Razavi, is a Senior Director of Global Product Marketing—Radiation Treatment Solutions at Varian. Anne started her career as a clinical medical physicist at the University of Rochester and University Hospital Charité in Berlin. She subsequently moved into medtech marketing, where her prior experience enabled her to serve as a clinical advisor to product development teams. She has been bringing the clinical perspective to product development efforts at Varian for over 13 years, and was instrumental in the successful launches of such products as HyperArc™ high-definition radiotherapy, Multicriteria Optimization (MCO), GPU-based optimization and dose calculation, RapidPlan® knowledge-based treatment planning, and more.

MEETING REPORT

6th European Congress on Radiation Protection

Csilla Pesznyák reports on the 6th European IRPA Congress, which took place in Budapest, Hungary, from 30th May – 3rd June 2022

Paddy Gilligan, President of EFOMP and Csilla Pesznyák, Co-chair of the Scientific Committee, President of ENEN

With the theme "Radiation Protection for Everyone", the congress has set a clear objective to engage scientists from different fields and draw attention to the importance of radiation protection. The congress achieved its goal as 433 participants from 56 countries came to share their results in 14 different scientific topics during this one week.

The official congress opening ceremony started the afternoon with speeches delivered by high-level representatives of organisations that play a major role in the field of radiation protection: Miroslav Pinak, Head of the Radiation Safety and Monitoring Section, International Atomic Energy Agency, Werner Rühm, Chair of International Commission on Radiological Protection, Paddy Gilligan, President of the European Federation of Organisations for Medical Physics, Csilla Pesznyák, President of the European Nuclear Education Network, Filip Vanhavere, Chairperson of Executive Board, European Radiation Dosimetry Group, Kádár Andrea Beatrix, President of Hungarian Atomic Energy Agency and Bernard Le Guen president of IRPA officially opened the congress.

13 young researchers took part in the Young Scientists and Professionals competition. The winner received free registration to the IRPA 16 congress in addition to a significant monetary prize.

In addition to the traditional IRPA programmes, new types of programmes such as the Start-up Competition and Art & Fun Corner were also integrated into the programme. With these innovations, we hope to create a new tradition for the IRPA community.

I would like to thank all the participants for coming. I appreciate the help of European IRPA associations in delegating experts to the scientific committees. There were 103 volunteers working in the local organising committees, the core and

extended scientific committees, and at the venue. The conference also hosted 9 refresher courses, 9 technical site visits, and 5 workshops. The president of the Congress was János Petrányi. The co-chairs of the scientific committee were Csilla Pesznyák and Tamás Pázmándi.

A satellite IAEA-IRPA workshop on Radiation safety culture training for healthcare professionals took place during the Congress, organised by Jenia Vassileva. The purpose of the event was to contribute to knowledge sharing on broader aspects of improving radiation protection and safety culture in healthcare. The focus of discussion was on the effective training approaches for enhancing the radiation safety culture traits as suggested in the IAEA Radiation Safety: Trait Talks handbook. More than 40 medical physicists took part in the workshop.

Our work is not done yet, as we still have to review the submitted papers and publish them. Selected articles will be published in the journal Radiation Protection and Dosimetry, and the rest of the reviewed papers will be published on the IRPA website.

The 7th European Congress of the International Radiation Protection Association will take place in Liverpool, UK, from 1-5 June 2026. However, we do not have to wait four years for an IRPA event – in two years' time, the World IRPA Congress will be held in Orlando, FL, USA.

Participants of the Satellite IAEA-IRPA workshop on Radiation Safety culture training for healthcare professionals

Csilla Pesznyák, is an Associate Professor at the Budapest University of Technology and Economics and Head of Radiation Protection Service, National Institute of Oncology, Hungary. She is President of the European Nuclear Education Network and Vice President of the Hungarian Society for Radiation Oncology. She is President of the Health Physics Section, Roland Eötvös Physical Society and a Board member of the Hungarian Society for Medical Physics.

EFOMP COMPANY MEMBER ARTICLE

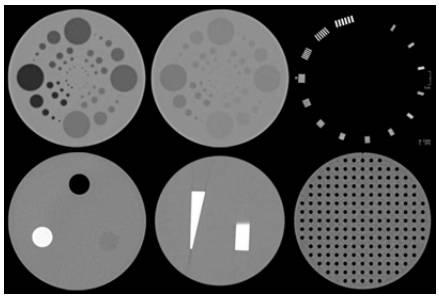
Tissue-equivalent Phantoms by A Phantom Specialist QRM: Accuracy And Efficiency in Image Performance Testing

Phantoms are used to evaluate radiation doses and attenuations within the human body. They play an important role in quality control and performance testing of radiation equipment used in imaging and therapeutic applications. Homogeneous phantoms with various shapes and features made from tissue-equivalent materials can simulate tissue characteristics, allowing medical physicists to assess the actual dose in tissues.

The Cone-Beam Phantom by QRM, a PTW company since 2020, helps medical physicists evaluate the image performance of computed tomography (CT) and Cone-Beam CT accurately and efficiently as required by national and international imaging protocols or vendor-specific guidelines. Its tissue-equivalent phantom body contains different sections, allowing the acquisition of all relevant image quality parameters with one single phantom. Performance parameters include in-plane spatial resolution; modulation transfer function (MTF) in different orientations; low-contrast resolution; contrast-to-noise ratio; in-plane geometrical accuracy; image homogeneity/noise; and CT number linearity (scaling). The CBCT Phantom is available in two models, Basic and Expert. Both models share the same 20 mm thick sections and can perform the same tests, but the Expert model is equipped with an enhanced low-contrast section.

With its compact, lightweight body, the solid phantom can be easily installed for testing, which makes it suitable for use in 3D dental, C-arm, or flat detector VCT devices.
Phantom setup is quick and intuitive: the phantom is placed on the patient couch and its position aligned using the in-room lasers.

Multiple sections for a comprehensive evaluation of image performance



The first section of the phantom consists of negative contrast steps to the background, altering between -3 HU to -200 HU with variable diameter. The precisely manufactured spatial resolution section of the Expert model, which is made up of 14 circularly aligned line patterns, enables measurements of in-plane resolution varying from 4 to 30 lp/cm. The third section comprises three cylindrical inserts of 24 cm in diameter, each made of bone- and water-equivalent material and air, enabling medical physicists to scale CT numbers and measure noise. Two perpendicularly aligned PTFE edges allow evaluation of the edge response of the CT scanner in terms of MTF (Modulation Transfer Function). An additional section has been designed for geometric accuracy checks, containing 177 holes, each of 3 mm in diameter, which are accurately aligned both vertically and horizontally. Both basic and expert phantom models have a plain section for measuring noise and homogeneity.

Commercial and customised phantoms for a wide range of applications
QRM is an expert in the development of imaging and therapy phantoms, which are made of soft tissue-, bone- and water-equivalent materials, solid resins, or PMMA. Apart from a wide range of commercially available phantoms, the company's core competence is in customised phantoms for specific user testing needs. With more than 25 years of experience in phantom development and research, QRM is a renowned specialist for implementing individual solutions, managing all aspects of the process – from phantom specification and design to production and final acceptance testing at QRM facilities. Since April 2020, PTW has held a majority share in QRM.

For more information about QRM phantoms and custom solutions, visit www.qrm.de.

Burcu Hiz Temizer is a Physics engineer and holds a Master's degree for Medical Physics. She currently works as a product manager at PTW Freiburg. In this role, she is responsible for developing dosimetry and QA solutions for diagnostic radiology.

Highlights of the European Matters Committee's activities

In this article, Loredana G. Marcu, chair of the EFOMP's European Matters Committee, provides some insight into the committee's achievements during the preceding two years

The European Matters Committee (EuM) is one of the six committees under the umbrella of EFOMP. The EuM's major roles include, but are not limited to, representing EFOMP's interests to various European and international bodies related to medical physics; formulating proposals addressed to appropriate European Union bodies (including the European Parliament and Commission) on medical physics matters; monitoring developments both within the European Union and internationally in relation to medical physics; and liaison with European and international organisations through various professional activities for the common benefit of medical physicists.

To reflect on the increasing number of international activities undertaken by the EuM this year, the nomenclature of this committee has changed to the European and International Matters Committee. In view of the above, EFOMP has strengthened the relationship with AAPM through the fructification of several activities stipulated in the memorandum of understanding between these two organisations. Therefore, the main collaborative aspects that are worth mentioning are the increasing scientific interactions and strategic relationships in the interest of medical physicists from both continents, the development of scientific, educational, and professional reports, and the establishment of joint working groups on topics of interest. Furthermore, EFOMP has joined (in 2021) the Global Liaisons Committee of the newly formed AAPM International Council. The goal of the Global Liaisons Committee is to encourage the development and maintenance of effective communication and harmonisation of global medical physics initiatives. Recently, another memorandum of understanding has been signed between EFOMP and a sister organisation – AFOMP (Asia-Oceania Federation of Organisations for Medical Physics), that will shortly be substantiated into a series of webinars on both professional and scientific aspects of medical physics.

An important task of the EuM is to nurture existing collaborations for the benefit of the medical physics community. In 2021, we started a webinar series in collaboration with COCIR, focusing on the importance of IEC standards and their application in the fundamental areas of medical physics: radiotherapy, diagnostic imaging, and nuclear medicine. The webinars were a success, and they will continue with another joint online topic later this year.

Several surveys have been designed and conducted by the EuM committee over the past couple of years and published in the European Journal of Medical Physics – Physica Medica. The EFOMP results on national radiotherapy dosimetry audits followed the implementation and transposition of the 2013/59/EURATOM across European countries [1]. During the hit of the Covid-19 pandemic, a survey on vaccination among medical physicists was initiated by EFOMP and conducted by EuM to evaluate the status of vaccination in various EFOMP member countries, as we anticipated that vaccination would promote patient safety by preserving medical physicists' treatment and diagnostic services, as well as permitting safe cross-border mobility to facilitate physical meetings related to EFOMP activities. [2].

The most recent survey conducted by EuM targeted the status of Early Career physicists in EFOMP member countries [3]. This is the first action towards the establishment of a new Special Interest Group on Early Career Medical Physicists within EFOMP. Some further steps were taken in Dublin (August 2022) at the European Congress in Medical Physics, where, for the first time, a section on early career was created in parallel with the other scientific and professional sessions. Young professionals very well received this initiative, which offered them a hub for communication, networking, and professional development. It was suggested that similar sections for early career medical physicists be organised at future meetings.

One of the most important current professional activities with EuM involvement is the collaboration with the Professional Matters Committee to update the Malaga declaration on the position of Medical Physics as a profession in Europe and the European legislation to recognise professional qualifications of Medical Physics Experts. In this regard, the two committees are working towards an application to the European Commission concerning the recognition of the Medical Physics Expert across the EU.

References:

1. Casares-Magaz O, Marcu LG, Prezado Y, Koutsouveli E, Brambilla M. EFOMP survey results on national radiotherapy dosimetry audits. Phys Med. 2021;84:10-14.

2. Marcu LG. COVID-19 vaccination rates of medical physicists throughout Europe. Phys Med 2021; 82:341 – 342.

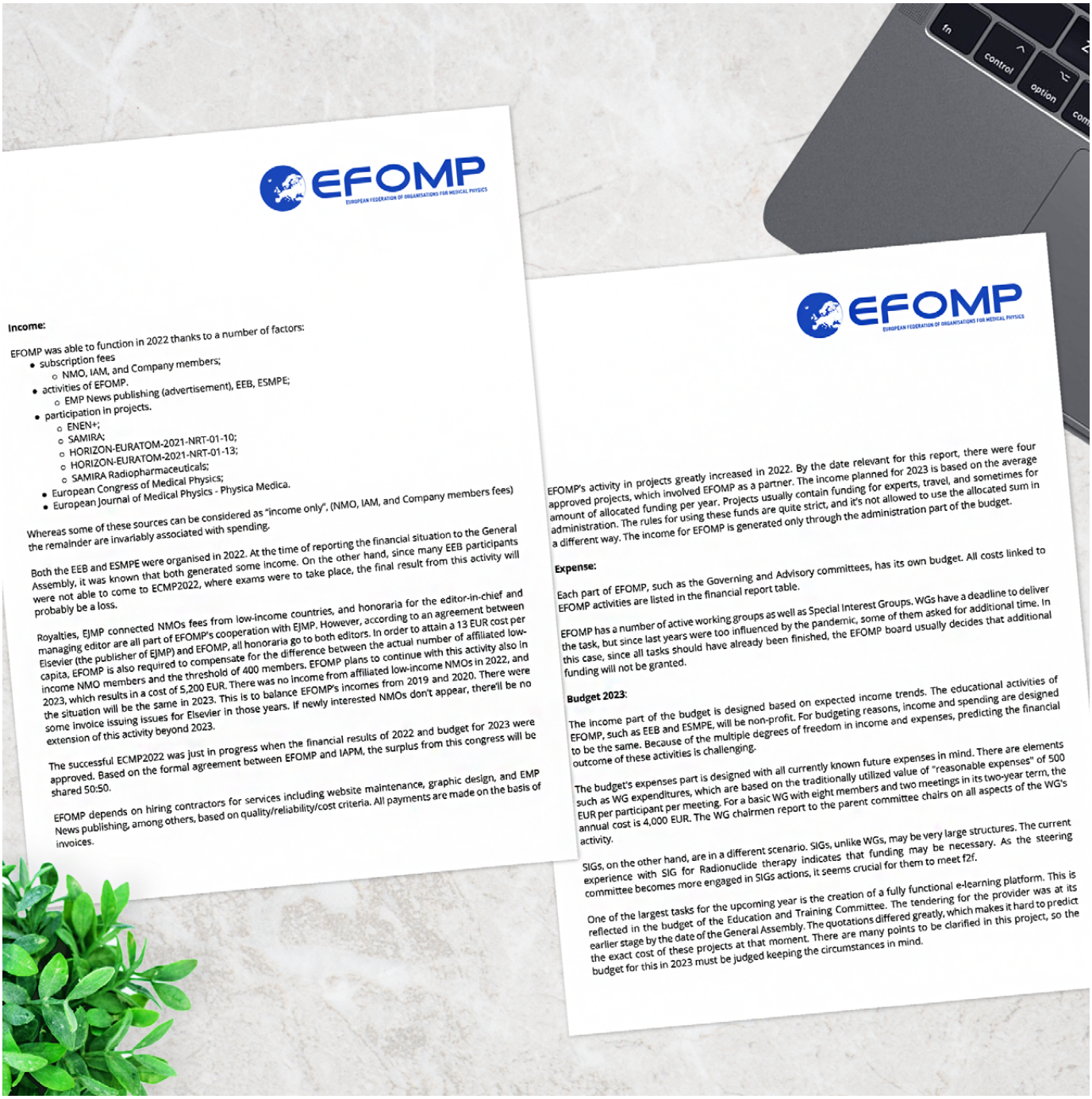
3. Marcu LG, Caruana CJ, Lopez-Medina A, Mazzoni LN, Polycarpou I, Manetou A, Koutsouveli E. Early career medical physicist groups in Europe: An EFOMP survey. Phys Med. 2022;95:89-93.

Loredana Marcu, is the president of the Romanian College of Medical Physicists (CFMR), a Professor of Medical Physics at the University of Oradea, Romania, and an Adjunct Professor at the School of Health Sciences, University of South Australia. She is a radiotherapy physicist and was educated and trained in Adelaide, South Australia, where she also worked as a TEAP (Training Education and Accreditation Programme) preceptor, supervising and coordinating the medical physics training and education of junior physicists in South Australia. Loredana Marcu is involved in several professional activities, as she is the chair of European Matters Committee (EFOMP), chair of Women subcommittee (IOMP), and co-chair of Women in Medical Physics and Biomedical Engineering Task Group (IUPESM).

Treasurer's Report for Financial Year 2022 & Budget for the Year 2023

This report covers the period from 11/2021 to 07/2022 – by Jaroslav Ptáček, Treasurer of EFOMP

The EFOMP bank account had 440,956 EUR as of August 02, 2022.



Income and Expenditure Account 2022 and budget 2023

	Actual 2.8.2022	Budget 2022	Budget 2023
NMO subscription	40 720,50 €	39 000,00 €	40 000,00 €
IAM subscription	7 357,02 €	12 000,00 €	10 000,00 €
Company member subscription	15 995,83 €	17 000,00 €	17 000,00 €
EMP News and Web advertising	9 600,00 €	12 000,00 €	10 000,00 €
Physica Medica – associated NMOs	0,00 €	2 626,00 €	0,00 €
Physica Medica – royalties	36 858,29 €	30 000,00 €	35 000,00 €
Physica Medica – honoraria	18 000,00 €	24 000,00 €	24 000,00 €
EEB	3 261,00 €	1 000,00 €	1 000,00 €
ESMPE	22 098,73 €	1 000,00 €	1 000,00 €
ENEN+	0,00 €	9 687,50 €	9 687,50 €
SAMIRA	0,00 €	0,00 €	64 900,00 €
HORIZON-EURATOM-2021-NRT-01-10	0,00 €	0,00 €	41 250,00 €
HORIZON-EURATOM-2021-NRT-01-13 ENEN#	47 850,00 €	0,00 €	36 250,00 €
SAMIRA radiopharmaceuticals		0,00 €	19 600,00 €
Other Income	3 334,00 €	0,00 €	0,00 €
Total Income	**205 075,37 €**	**148 313,50 €**	**309 687,50 €**
EFOMP board			
President	3 502,53 €	3 000,00 €	4 000,00 €
Past-President	362,15 €	2 000,00 €	2 000,00 €
Secretary General	309,00 €	1 000,00 €	1 000,00 €
Treasurer	0,00 €	0,00 €	1 000,00 €
Committee Chairs	0,00 €	3 000,00 €	6 000,00 €
Officers' meetings/General meeting	4 896,07 €	15 000,00 €	15 000,00 €
Total Expenditure EFOMP board	**9 069,75 €**	**24 000,00 €**	**29 000,00 €**
Communications & Publications Committee			
web domain fee	0,00 €	200,00 €	200,00 €
website maintenance and administration	0,00 €	3 000,00 €	3 000,00 €
online platform maintenance and administration	0,00 €	7 000,00 €	7 000,00 €
GoToMeeting, GoToWebinar licences	0,00 €	4 000,00 €	4 000,00 €
DOI service fee	217,80 €	300,00 €	300,00 €
EMP News production	860,00 €	2 000,00 €	2 000,00 €
Graphic art (posters, logos etc.)	0,00 €	1 500,00 €	1 500,00 €
Communications & Publications Committee - other	0,00 €	500,00 €	1 000,00 €
Total Expenditure Comm. & Publ. Committee	**1 077,80 €**	**18 500,00 €**	**19 000,00 €**
European Matters Committee			
EFOMP membership	3 000,00 €	4 100,00 €	4 100,00 €
Early career Medical Physicists SIG	0,00 €	1 500,00 €	1 500,00 €
European Matters Committee - other	0,00 €	500,00 €	7 000,00 €
Total Expenditure European Matters Committee	**3 000,00 €**	**6 100,00 €**	**12 600,00 €**
Education & Training Committee			
ESMPE	14 842,88 €	1 000,00 €	1 000,00 €
EEB	0,00 €	1 000,00 €	1 000,00 €
e-learning content creation	2 090,00 €	10 000,00 €	50 000,00 €
WG - Training for the healthcare professionals	0,00 €	5 000,00 €	5 000,00 €
WG - Diagnostic and Interventional Radiology Core Curriculum revision	0,00 €	5 000,00 €	5 000,00 €
WG - Nuclear Medicine Core Curriculum revision	0,00 €	5 000,00 €	5 000,00 €
Education & Training Committee - other	350,00 €	500,00 €	1 000,00 €
Total Expenditure Education & Training Committee	**17 282,88 €**	**27 500,00 €**	**68 000,00 €**
Professional Matters Committee			
WG - Involvement of exp. cycle med. dev.	0,00 €	5 000,00 €	0,00 €
Professional Matters Committee	0,00 €	1 000,00 €	1 000,00 €
Professional Matters Committee - other	0,00 €	500,00 €	1 000,00 €
WG - Policy Statement on Physiological Measurements			5 000,00 €
Total Expenditure Professional Matters Committee	**0,00 €**	**6 500,00 €**	**7 000,00 €**
Projects Committee	0,00 €	1 000,00 €	1 000,00 €
ENEN+	9 687,50 €	9 687,50 €	0,00 €
Projects Committee - other	0,00 €	500,00 €	1 000,00 €
SAMIRA	0,00 €	0,00 €	64 900,00 €
HORIZON-EURATOM-2021-NRT-01-10	0,00 €	0,00 €	33 000,00 €
HORIZON-EURATOM-2021-NRT-01-13 ENEN#	0,00 €	0,00 €	29 000,00 €
SAMIRA radiopharmaceuticals	0,00 €	0,00 €	19 600,00 €
Total Expenditure Projects Committee	**9 687,50 €**	**11 187,50 €**	**148 500,00 €**
Scientific Committee			
WG - Breast Tomosynthesis QC Protocol	1 186,33 €	5 000,00 €	0,00 €
WG - Angiographic and fluoroscopic syst.	0,00 €	5 000,00 €	0,00 €
WG - Role of MPE in clinical trials	0,00 €	4 000,00 €	4 000,00 €
WG - SPECT QC			5 000,00 €
WG - VMAT breast			5 000,00 €
SIG - Radionuclide dosimetry	0,00 €	500,00 €	5 000,00 €
WG_PETCTMRI QC	400,00 €	4 000,00 €	0,00 €
Scientific committee - other	0,00 €	13 500,00 €	10 000,00 €
SIG - Imaging in Dentistry	0,00 €	500,00 €	500,00 €
Total Expenditure Scientific Committee	**1 586,33 €**	**32 500,00 €**	**29 500,00 €**
EFOMP administration			
Bank charges	966,54 €	1 000,00 €	1 100,00 €
Audit fees	0,00 €	1 000,00 €	2 000,00 €
Association management	9 328,56 €	24 000,00 €	24 000,00 €
Legal and professional fees	0,00 €	1 000,00 €	1 000,00 €
Currency fluctuation	0,00 €	1 000,00 €	0,00 €
Other / contingency	-212,50 €	5 000,00 €	10 000,00 €
Association tax - provision	0,00 €	0,00 €	
Physica Medica – associated NMOs	0,00 €	4 125,00 €	5 200,00 €
Physica Medica – honoraria	18 000,00 €	24 000,00 €	24 000,00 €
Total Expenditure EFOMP administration	**28 082,60 €**	**61 125,00 €**	**67 300,00 €**
ECMP			
Income ECMP	0,00 €	100 000,00 €	0,00 €
Expenditure ECMP	704,50 €	100 000,00 €	0,00 €
Total ECMP	**704,50 €**	**0,00 €**	**0,00 €**
Total Expenditure	**70 491,36 €**	**187 412,50 €**	**380 900,00 €**
Result	**134 584,01 €**	**-39 099,00 €**	**-71 212,50 €**

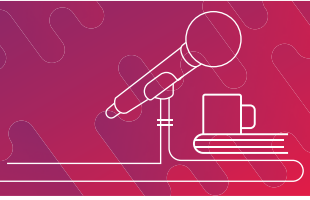
	31.12.2021	02.08.2022
Assets		
Shares in EIBIR	1 000 €	1 000 €
Stock	1 083 €	1 083 €
Debtors	17 660 €	6 991 €
Accrued assets	1 795 €	0 €
bank balances and cash		
RABO private account	294 218 €	431 882 €
RABO deposit account	0 €	0 €
Total	**315 755 €**	**440 956 €**

	31.12.2021	02.08.2022
Capital		
Balance brought forward	275 508 €	291 400 €
Surplus for year	15 892 €	134 584 €
	291 400 €	425 984 €
Short term liabilities		
Creditors	6 463 €	0 €
Balance EBAMP	10 100 €	11 110 €
VAT	0 €	733 €
Accrued liabilities	7 793 €	3 129 €
Question items	0 €	0 €
Total	**315 755 €**	**440 956 €**

Jaroslav Ptáček works as the head of the Department of Medical Physics and Radiation Protection in the University Hospital in Olomouc, Czech Republic. He is a medical physicist in nuclear medicine and focuses himself mainly on image processing, quality control and radiation protection. He is involved in teaching of medical physics and instrumentation in nuclear medicine and x-ray diagnostics in technologists' education programme. He is also involved in education and training of medical physicists in nuclear medicine in Czech Republic who are working on becoming qualified medical physicist. As a board member of Czech Association of Medical Physicists, he is involved in professional matters of medical physicists in Czech Republic. Since 2013 he has been a part of local organizing committee of ESMPE in Prague. From 2018-20 he was Secretary General of EFOMP and from January 2021 he has been Treasurer of EFOMP.

Upcoming Conferences and Educational Activities

This list was correct at the time of going to press.
For a complete, up-to-date list, please visit our **EVENTS WEB PAGE**



Sep 5th, 2022 - Sep 30th, 2022

4th Summer School in Medical Physics 2022: Radiobiology and Radiobiological Modelling for Radiotherapy
Online or hybrid (online and on-site) in Heidelberg / Germany

Sep 19th, 2022 - Sep 23rd, 2022

Erasmus Basic MRI Physics 2022 - Dundee, UK
NHS Tayside Medical Physics (University of Dundee), Scotland, UK

Sep 21st, 2022 - Sep 24th, 2022

German Conference on Medical Physics
Aachen, Germany

Sep 22nd, 2022 - Sep 23rd, 2022

BIR Annual Congress 2022
London, UK

Sep 23rd, 2022 - Sep 25th, 2022

Greek Congress of Medical Physics
Athens, Greece

Oct 13th, 2022 - Oct 15th, 2022

EFOMP School - Statistics in Medical Physics
Athens, Greece

Oct 14th, 2022 - Oct 15th, 2022

EuSoMII Annual Meeting 2022
Valencia, Spain

Oct 15th, 2022 - Oct 19th, 2022

EANM'22 – 35th Annual Congress of the European Association of Nuclear Medicine
Barcelona, Spain

Oct 17th, 2022 - Oct 19th, 2022

MRO Modern Radiation Oncology: Multidisciplinarity in the era of omics and AI guided oncology
Aula Brasca Fondazione Policlinico Universitario A. Gemelli IRCCS Largo A. Gemelli, 8 - Roma Oct

17th, 2022 - Oct 25th, 2022

Courses in the field of Particle Therapy 2022
Online

Oct 24th, 2022 - Oct 26th, 2022

Fourth Geant4 International User Conference at the physics-medicine-biology frontier
Napoli, Italy

Nov 13th, 2022 - Nov 16th, 2022

EPSM22: Engineering & Physical Sciences in Medicine Conference
Adelaide, Australia

Nov 25th, 2022

BIR/UCLH Masterclass: Prostate Cancer Theragnostics
Leonardo Royal London Tower Bridge 45 Prescot Street, London E1 8GP, GB

Dec 1st, 2022 - Dec 4th, 2022

Workshop on Advanced Dosimetry Techniques- Patient Specific QA
Novi Sad, Serbia

Dec 6th, 2022 - Dec 8th, 2022

4th Targeted Radiopharmaceuticals Summit Europe
Amsterdam, Netherlands

Dec 13th, 2022 - Dec 16th, 2022

International Conference on Integrated Medical Imaging in Cardiovascular Diseases (IMIC-2022)
Vienna, Austria

Feb 9th, 2023 - Feb 11th, 2023

Australasian Brachytherapy Group 32nd Annual Scientific Meeting
Vienna, Austria

EFOMP Structure

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President

Paddy Gilligan

Past President

Marco Brambilla

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Efi Koutsouveli

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Jaroslav Ptáček

Communications & Publications Committee

Chairperson

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European Matters Committee

Chairperson

Loredana Marcu

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Education & Training Committee

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Christoph Bert

Vise Chairperson

Veronica Rossetti

Professional Matters

Chairperson

Brenda Byrne

Projects Committee

Chairperson

Constantinos Koutsojannis

Scientific Committee

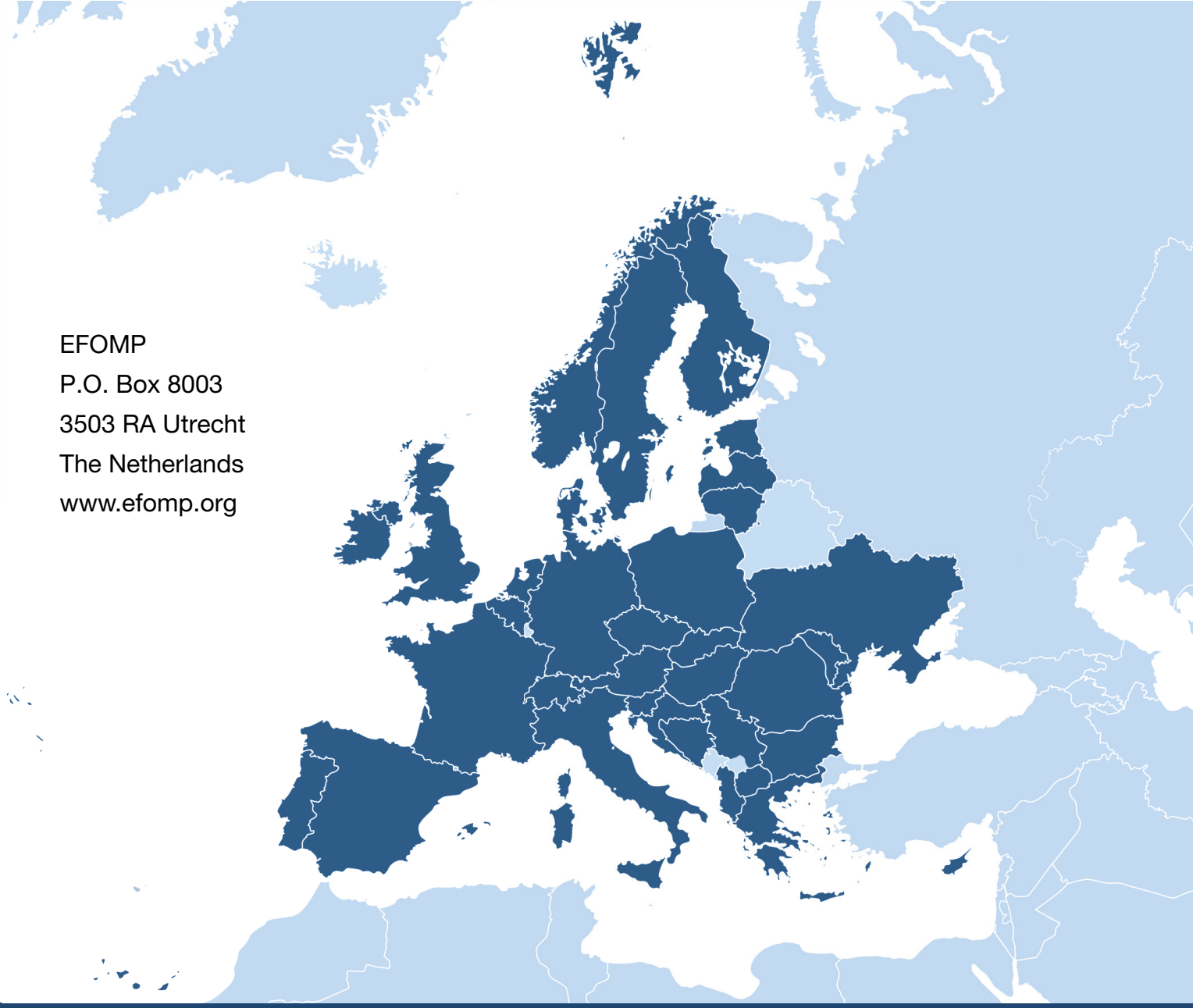
Chairperson

Brendan McClean

Vice Chairperson

Eeva Boman

EFOMP Company Members



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EFOMP

EUROPEAN FEDERATION
OF ORGANIZATIONS
FOR MEDICAL PHYSICS

The European Federation of Organisations in Medical Physics (EFOMP) was founded in May 1980 in London to serve as an umbrella organisation for medical physics societies in Europe. The current membership covers 36 national organisations which together represent more than 9000 medical physicists and clinical engineers working in the field of medical physics. The motto developed and used by EFOMP to underline the important work of medical physics societies in healthcare is “Applying physics to healthcare for the benefit of patients, staff and public”.

For more news and information about EFOMP activities please follow us on social networks or visit our website

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