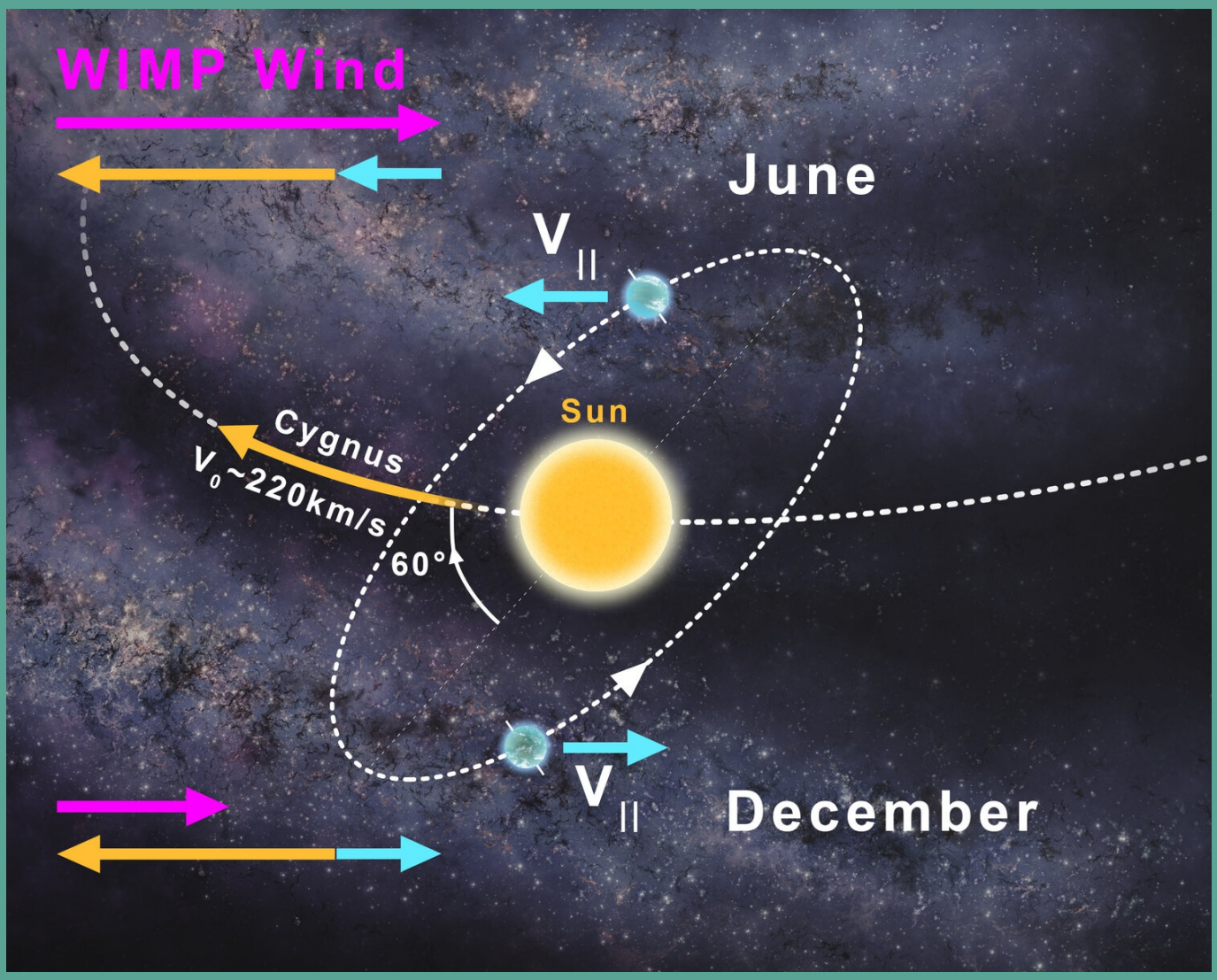
Volume 17, No. 1
March 2025

AFOMP Pulse

An Official Newsletter of Asia-Oceania Federation of Organizations for Medical Physics



Highlights

AFOMP IWD 2025 Poster is released
Meet the Expert: A/Prof Natalka Suchowerska interviewed by Dr. Vanessa Panettieri
Did you know ? Marvellous Science in Action: The big North-South venture to solve the dark matter puzzle
Book Review: Artificial Intelligence in Radiation Oncology and Biomedical Physics

Table of Contents

Editorial

Celebrating IWD2025, IMPW2025, AFOMP Silver Jubilee and Converging at IUPESM World Congress at Adelaide! – A Call to Action

Dear Readers!

Warm Greetings.

On behalf of the editorial board, I am delighted to present you, the year 2025 first edition of AFOMP PULSE, an official newsletter of Asia Oceania Federations of organization for Medical Physics, Volume.17: issue 1.

This issue is presented with lots of professional information of AFOMP activities such as official's messages and ExCom accomplishments, synopsis of meet the expert's interview, did you know¬ marvelous science in action?, professional and scientific articles, PhD abstracts, MCQs, NMO activities and IDMP2024 celebrations, professional news and updates and many other common interesting news on Medical Physics profession for the last six months in the AFOMP regions.

As 2025 approaches, the global medical physics communities have a unique opportunity to unite, celebrate, and advance our profession. IWD2025, IMPW2025, AFOMP's Silver Jubilee, and the IUPESM World Congress in Adelaide are four key milestones that call for our collective action and engagement.

International women's day celebration: AFOMP is celebrating international women's day by organizing a special webinar on 5th of march25 on "Second innings of women in medical physics" and releasing a poster dedicated to all women medical physicists (WMPs) of the region. We encourage all of you to actively participate in the activity to honor the dedication and contribution of women to science, families and to the whole society.

International Medical Physics Week (IMPW2025): IOMP dedicates a week to recognizing medical physicists' contributions to healthcare. IMPW2025, scheduled to be held from May 5-¬9, with theme focusing on "Potential and Challenges of AI-driven Innovations in Medical Physics." We encourage you all to organize and participate in local events, workshops, and webinars to showcase medical physics' impact. Share your knowledge, experiences, and innovations with professionals and the broader community.

AFOMP Silver Jubilee: This year 2025 marks the 25th anniversary of AFOMP, a federation that has played a pivotal role in unifying medical physics in the Asia Oceania region. Over the past two and a half decades, AFOMP has significantly contributed to professional development, education, and policymaking in the region. This Silver Jubilee is an occasion to reflect on our achievements, recognize our pioneers, and chart a path forward for the next era of medical physics excellence.

IUPESM World Congress 2025: Our federations AFOMP are invited to join for grant celebration at IUPESM World Congress 2025 which is scheduled to be held from 29th September-¬04th October, 2025 in Adelaide, Australia. Together, these four events create a powerful momentum for medical physics worldwide. Let us take up this call to action—organize and celebrate legacy, and converge at the IUPESM World Congress in Adelaide— events that will inspire, educate, and unite the medical physics community for the years to remember.

I would like to express my sincere thanks to the editorial board members, Prof. Eva Bezak, President AFOMP, Dr. Aik Hao Ng, AFOMP Secretary-general, Dr.M. Akhtaruzzaman, Scientific Editor

(Bangladesh), Dr Vanessa Panettieri. Educational Editor (Australia), and Dr. Zulaikha, Professional Editor (Malaysia) for their valuable contributions. I would like to extend my special thanks to Dr. Rajni Verma (India) for her invaluable role as a Technical Editor, playing a significant part in shaping our newsletter and bringing forth this issue.

We extend our gratitude for submitting news, articles, abstracts and other information and seeking your valuable feedback on our newsletter for further improvement.

Hope you enjoy in reading this issue of AFOMP Pulse, March 2025.

Thanks & Regards,
Dr. V .Subramani
Chief Editor, AFOMP Pulse Newsletter

AFOMP President's Message

Dear AFOMP Colleagues and friends,

Welcome to the first edition of AFOMP PULSE Newsletter in 2025. I would like to thank all our members and my ExCom colleagues for their work and commitment to AFOMP in 2024.

2024 ended up on a high note, with one of the highlights for me being the IOMP School on Intensity Modulated Radiation Therapy (IMRT) organized in collaboration with AFOMP in the AFOMP region. It was held from October 5-8, 2024, at the National Cancer Institute (NCI) in Putrajaya, Malaysia and hosted ~30 attendees from Malaysia, the Philippines, Indonesia, Bangladesh, Saudi Arabia, Iran, and even Mexico. Thanks to our excellent local NCI hosts, participants had access to clinical facilities, lecture rooms, and excellent hospitality. Partnering with Varian, the program offered hands-on training using treatment planning software, generating treatment plans for prostate, breast and head and neck IMRT. The planning sessions were accompanied by a QA session on a linear accelerator at the NCI. The immediate feedback was overwhelmingly positive and currently we conduct follow up zoom sessions to see how the participants are implementing the acquired knowledge in their clinical practice.

The last 2024 meeting of the AFOMP ExCom and Council meetings were conducted face-to-face in Penang, Malaysia, and many of the ExCom and Council members were fortunate enough to attend the **AOCMP/SEACOMP 2024** congress in person. AOCMP/SEACOMP 2024 received 380 abstracts and over 500 participants attended – with local hosts lead by Prof Jeannie Wong and Prof Chai-Hong Yeong, delivering a perfect professional meeting with exceptional hospitality (https://www.aocmp2024.com/). Attending in person, enabled us to have in depth discussions with medical physics colleagues in Asia and Southeast Asia to better understand the status of the profession and the support required from AFOMP.

I was honoured to deliver an opening talk of AOCMP 2024 on diversity, equity, and inclusion which are essential to fostering an innovative environment in all areas of science, including medical physics.

AOCMP2024 also presented an excellent video lecture by Professor Dr Youngiyih Han, Korea, who was awarded the 2024 Kiyonari Inamura oration for her services to the AFOMP region. Professor Han played a pivotal role in the establishment of the Samsung Proton Therapy Center and led the integration of IMRT, IGRT, and Tomotherapy systems at the Samsung Medical Center. She has also served as chair of the Asia-Oceania Particle Therapy Co-Operative Group and has served on several committees within the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) and the International Medical Physics Certification Board. She has over 90 peer-reviewed publications and 20 patents that have significantly impacted the field of radiation oncology. Our warmest congratulations to Professor Han.

Please note that the International Medical Physics Week (IMPW) will be held from 5 to 9 May this year and the topics are organized around the impact of artificial intelligence on our fields and health care. Program will be released in near future.

In 2025 we will also run AFOMP elections for the new term of AFOMP officers for the term period of 2026-2028 (the succession of officers usually occurs during the AOCMP). Relevant notification will be sent to our NMO contacts and Council members.

Next year will be equally exciting, with **IUPESM World Congress on Medical Physics and Biomedical Engineering 2025** preparations well underway.This tri-annual event will be held in Adelaide, Australia from 29/9 to 4/10 2025. Please visit https://wc2025.org/ for details. The exhibition and sponsorship packages have been launched (https://wc2025.org/sponsor-exhibitor/). Abstract submissions opened in September, with 27 determined tracks (https://wc2025.org/abstract-submissions/). Efforts are being made to provide student-friendly accommodations and secure travel grants for participants. The Local Organizing Committee aims for 30% of participants to be from low- to middle-income countries and 25% to be students.

Our confirmed plenary speakers include Prof Simon Cherry (UC Davis, the whole-body PET CT co-inventor), Dr Marian Sowa, Deputy Director of the Science Directorate, NASA and Jitendra Sharma, Managing Director and CEO of the Andhra Pradesh MedTech Zone (AMTZ), one of world's largest medical technology manufacturers, Prof Fiona Adshead, the chair of the Sustainable Healthcare Coalition that inspires partnerships and action on sustainable healthcare and past Deputy Chief Medical Officer and Director General in the UK Government, Director of Chronic Disease and Health Promotion at the World Health Organisation and more.

Lastly, none of the AFOMP activities and successes would happen without you – our members, wherever you are around the globe. Your continued support and and active participation in AFOMP events and activities are essential for the growth of the profession and improving the standards of education and training around the world.

Wishing you all the best in 2025

Eva Bezak
President, AFOMP

AFOMP Vice President's Message

Dear esteemed colleagues and friends,

It is my pleasure to write message for the AFOMP Newsletter. AFOMP is a MP organization that serves the update of knowledge and development of different aspects of medical physics by using training, education, conference etc. To provide quality education and clinical practice for the patient benefit in this region, AFOMP has been trying its best efforts through modifying the policies, constitution, membership categories and its various kinds since its inception.

AFOMP newsletter covers scientific aspects as well as different activities of the organization of Asia Pacific region. A broad spectrum of readers will inspire from these issues and will try to work as a team between different organization. Our predecessors have made AFOMP visible functional recognition as a scientific organization in recent years and its value importance is increasing day by day.

In most of the countries of Asia Oceania, medical physics is in developing and also somewhere underprivileged phase so AFOMP is continuously trying to provide message through AFOMP newsletter that every NMO, AFOMP need to be established their profession in Asia Oceania region. On the other hand activities taken by NMOs, need to be circulated through this newsletter.

If you have not taken advantage of these opportunities in the past, I want to urge you to consider submitting your article, both in radiation oncology and diagnostic imaging, radiation protection, news, events, cutting edge information in this field to interact with others. The diversity of perspectives that members bring to these newsletters will help the organization to meet its mission and remain current with emerging healthcare and legislative initiatives.

I believe commitment and participation of member countries in this region will bring us achievement which is intended to promote the growth of scientific practice of medical physics professionals. Finally, I want to express my gratitude to our previous and current committee chairs and members for the time they contribute to AFOMP newsletter.

Prof. Dr. Hasin Anupama Azhari
Vice President, AFOMP

AFOMP Immediate Past President's Message

Dear Readers,

I wish you a very happy, healthy and fruitful new year 2025.

New year has come with new opportunities to learn more, upgrade skills and stay current in the field of your specialization. AFOMP was founded in May 2000 and is celebrating its 25 years of commitment and service to medical physics. It's a long and glorious journey which has witnessed tremendous advancement in technology, education, practice and pivotal role of medical physicist in health care. AFOMP, one of the largest regional organizations of IOMP has been instrumental in the advancement and expansion of medical physics in the region. It has played a leading role by providing guidance and support for improving medical physics education and standards of medical physics as health profession.

Medical Physics is a multidimensional science which requires open mind and out of box thinking and therefore inclusive approach for collective development is key to success. Researcher, academician, industry and healthcare providers collaborations and mutual support will create an environment of growth for all.

Artificial Intelligence is already our companion in the dynamic field of medical physics which has opened gates to new horizons of growth which are ultra-fast and can surpass human capability in every field. This has made the role of medical physicist in the field even more important. AI is an excellent tool however; we need to decide kind of relation we want with it. Either we get slaved or master it. AI as all manmade things comes with flaws and glitches. For growth we need to embrace and understand it. We need to be proactive and needs an adaptive attitude towards learning.

The World Congress of Medical Physics and Biomedical Engineering- WC2025 [https://wc2025.org/] along with AOCMP2025 is being organized at Adelaide, Australia during 29 September- 4 October 2025, submit your abstracts and plan to participate.

I am hopeful that year 2025 will prove a great time of learning, developing and growing together for all of you. Let's join our hands and minds for better tomorrow.

Prof. Arun Chougule, PhD, FIOMP, FAMS
Immediate Past President IOMP
Chair ETC and Chairman IOMP Accreditation Board

AFOMP Secretary-General's Message

Dear colleagues,

Wishing you a wonderful start to 2025! I sincerely appreciate your continued support and collaboration, which have been instrumental to bring AFOMP to a greater height. I look forward to an even more productive and successful year ahead. Together, we can achieve remarkable milestones. My heartfelt gratitude to the Executive Committee, Council members, and our national member organisations (NMOs) for your unwavering dedication and outstanding contributions.

I am delighted to congratulate everyone on the resounding success of the Asia-Oceania Congress of Medical Physics (AOCMP) 2024, held in conjunction with SEACOMP 2024 in Penang, Malaysia. This remarkable event brought together more than 530 participants from over 34 countries, underscoring the strength and strong bonding of our regional and global medical physics community. My heartfelt appreciation goes to the organisers, speakers, and attendees for making this congress an outstanding platform in our region for knowledge sharing and networking.

During the congress, the AFOMP Executive Committee and Council held fruitful meetings.Several significant agendas were discussed and approved:

- The establishment of the AFOMP Early Career Medical Physicist (ECMP) Sub-committee, including the appointment of its Chair and members.
- Approval of amendments to the AFOMP Constitution, ensuring that our governance remains transparent, inclusive, and forward-thinking.
- Endorsement of the Medical Physics Educational Syllabus, providing a comprehensive framework to guide the training and development of future medical physicists.
- Announcement that the Korean Society of Medical Physics (KSMP) successfully won the bid to host AOCMP 2026. Congratulations to KSMP!

Looking ahead, I invite all NMOs and members to submit nominations for AFOMP officers for the 2025-2027 term. Your active participation is vital to ensure a diverse, dynamic, and dedicated leadership team for the years to come.

I am also excited to introduce you to the newly branded AFOMP website. This revitalised platform serves as a hub for information, resources, and updates about our activities. I encourage you to visit the website and explore its features.Additionally, I encourage all of you to contribute to AFOMP by submitting articles for our upcoming newsletters, participating in webinars, and sharing your insights and expertise. Let us continue to collaborate and grow together.

Finally, I am thrilled to invite you to join us at the IUPESM World Congress on Medical Physics and Biomedical Engineering2025, which will be held in conjunction with EPSM/ABEC 2025, ICMP 2025 and AOCMP 2025in Adelaide, Australia between 29 September and 4 October. This prestigious event with the theme "**Bridging the Gap: Science, Technology, and Clinical Practice for a Sustainable World**" promises to be an exceptional platform for scientific exchange and networking on a global scale.

Thank you for your dedication and continued support. Together we learn, serve and contribute!

Yours sincerely,
Dr. Aik Hao Ng
Secretary-General, AFOMP

Poster Released!!! AFOMP dedicates this poster to all Women Medical Physicists (WMPs) on the occasion of International Women's Day 2025

Prepared by Dr. Rajni Verma, Assistant Professor , Department of Radiological Physics, SMS Medical College and Hospitals,India

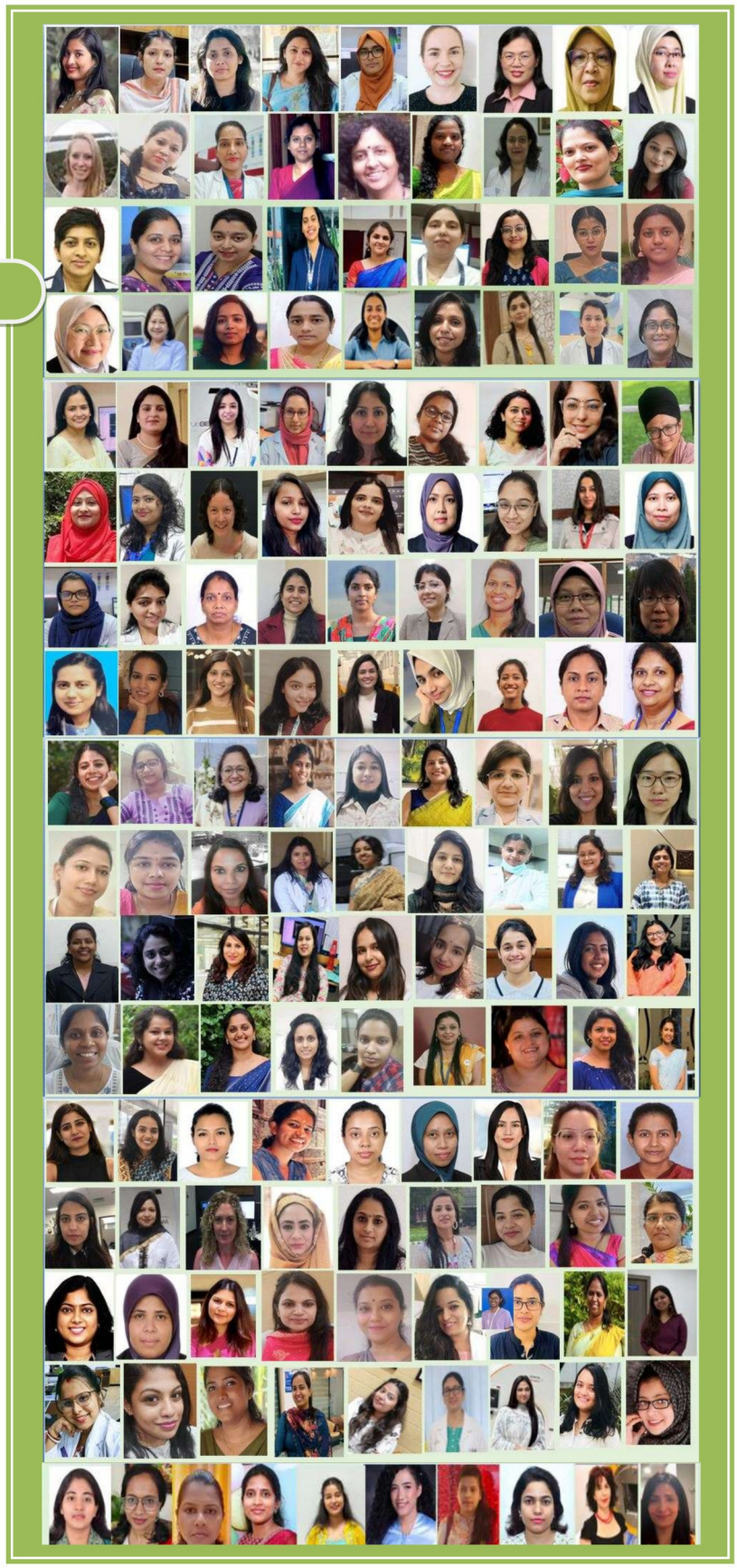
AFOMP

Wishes all the Incredible WomenMedical Physicists (WMPs) A very happy

International Women's Day 2025

We honor your contribution tomedical physics, family,

and whole society



Meet the Expert: Synopsis of interview with A/Prof Natalka Suchowerska

Interviewed by Dr. Vanessa Panettieri

View the Meet the Expert interview

Synopsis

A/Prof Natalka Suchowerska has worked at the junction of research, the clinic and academia for close to 40 years. In medical physics her area of expertise is in the use of ionising radiation in medicine. Most recently, as Director of VectorLAB, she embarked on a research programme developing the 3D printing of PAEK scaffolds and their bio-functionalization for bone replacement.

Natalka is an awarding-winning physicist, reviewer for several prestigious international journals in the fields of Medicine and Physics, presents at international conferences and was the Scientific co-chair (Physics) of the inaugural ESTRO meets ASIA conference. Natalka has held positions on several national and international committees, including IOMP. Her team, working from the radiobiology laboratory of VectorLAB, was the first to establish three classes of bystander response following therapeutic irradiation, for which they were awarded the Roberts Prize for the best paper in Physics in Medicine and Biology.

Natalka has led and developed many successful research collaborations, secured patents and in 2016 was named in the Top 100 Women of Influence sponsored by the AFR in the category of Innovation. For 2021, A/Prof Natalka Suchowerska was honoured to be awarded the ESTRO Honorary Membership for contribution to innovation in medical physics and in realising multidisciplinary and international collaborations.

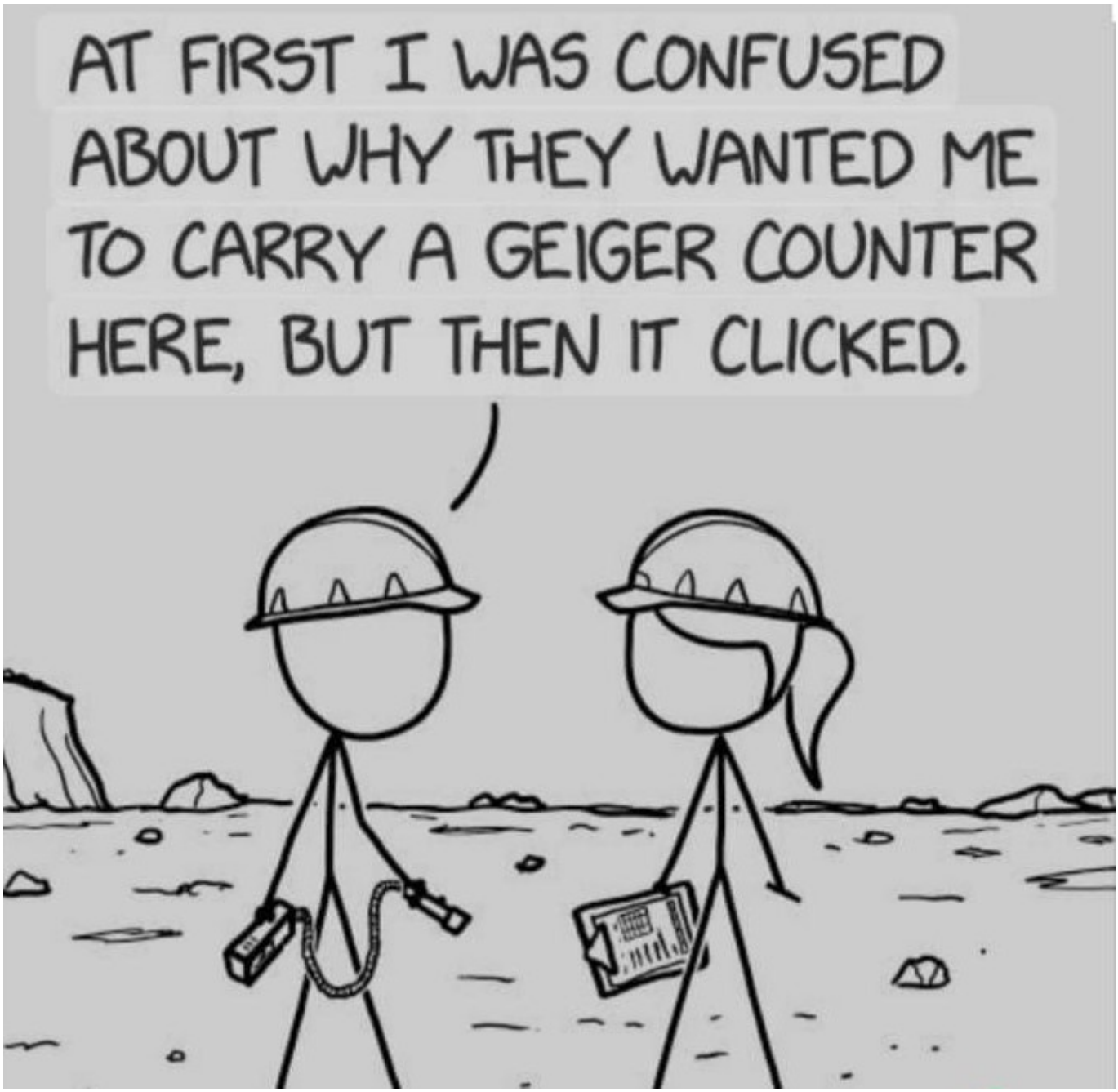
Since 2022, A/Prof Natalka Suchowerska stepped back from her clinical position and now works part time from the University of Sydney. This gives her the opportunity to become one of the founding

members of the international Help Ukraine Group (HUG): a team of oncology practitioners formed to support peer professionals in Ukraine during the war by providing medical supplies, hardware/software, virtual and in-person training and educational materials. Natalka recently certified (NAATI) as an interpreter in Ukrainian/English.

Natalka has broad experience in clinical service, teaching including course development and coordination, research and development, commercialisation and professional leadership.

– *Prepared by Dr. Vanessa Panettieri*

Sourced from internet by Dr. Rajni Verma, Assistant Professor , Department of Radiological Physics, SMS Medical College and Hospitals,India



Featured papers in AFOMP Journals – Editor's Choice

Sourced by A/Prof Vanessa Panettieri, Editor (Educational), AFOMP Pulse

Over the past six months, the AFOMP Journals—Physical and Engineering Sciences in Medicine, Journal of Medical Physics, and Radiological Physics and Technology—have continued to publish valuable contributions to our field.

Building on insights from the last issue of PULSE, our first focus section delves deeper into AI applications, examining how these advanced tools are transforming auto-segmentation of organs-at-risk structures across various anatomical sites. The featured paper compares commercially available products, offering valuable guidance to help you select the most suitable tool for your clinical practice. We hope it will assist in your current or future evaluations of these technologies.

Our second focus section explores patient treatment safety, highlighting novel approaches in wireless communication for medical implantable devices and the use of a body movement detection system to prevent re-irradiation during radiography. Additionally, we introduce a cost-effective camera system designed for patients undergoing breath-hold irradiation.

In our newly introduced "How to?" section, we examine the impact of mirror systems and flatbed scanner beds on response artifacts in film dosimetry, commonly used in patient-specific quality assurance.

Happy reading! And as always, we welcome your suggestions for topics to explore in future issues.

With contributions kindly provided by Dr Taylah Brennen and Sadia Aftab, Medical Physicists, Peter MacCallum Cancer Centre

---

1) Focus on: Artificial Intelligence

Physical and Engineering Sciences in Medicine
https://doi.org/10.1007/s13246-024-01513-x

SCIENTIFIC PAPER

Check for updates

Guidance on selecting and evaluating AI auto-segmentation systems in clinical radiotherapy: insights from a six-vendor analysis

Branimir Rusanov[1,2,3] · Martin A. Ebert[1,2,3,4,5] · Mahsheed Sabet[1,2,3] · Pejman Rowshanfarzad[1,3] · Nathaniel Barry[1,3] · Jake Kendrick[1,3] · Zaid Alkhatib[2] · Suki Gill[2] · Joshua Dass[2] · Nicholas Bucknell[2] · Jeremy Croker[2] · Colin Tang[2] · Rohen White[2] · Sean Bydder[2] · Mandy Taylor[2] · Luke Slama[2] · Godfrey Mukwada[1,2]

Received: 21 April 2024 / Accepted: 20 December 2024

https://doi.org/10.1007/s13246-024-01513-x

This paper by Rusanov et al., published in the Journal of Physical and Engineering Sciences in Medicinepresents a comprehensive evaluation of six vendors' products providing AI-based auto-segmentation systems, focusing on their performance, integration, data security, vendor support, and

ethical considerations. The assessment utilized a subtle set of criteria informed by clinical experience and existing literature, aiming at selecting the safest, least biased, and most efficient systems for clinical use. The authors provide some advice on the process to follow which includes access to trial software which in their view is essential for a thorough assessment of both quantitative and qualitative performance.

In this experience vendors A, B, and D provided trial licenses, while the other thres processed institutional data through secure file transfers. The study identified significant gaps in data security and transparency among all vendors, with most lacking detailed information on data collection, ownership, and de-identification practices. Vendor support tools were generally limited, as most vendors offered limited functionality beyond auto-segmentation, with Vendor B noted for its integration with the Eclipse treatment planning system and additional contour editing tools. Each vendor was scored across seven identified selection criteria, with scores ranging from 1 (poor) to 5 (excellent). Vendor A received the highest weighted score (3.83), indicating better integration and performance, while Vendor E scored the lowest (2.05). The study emphasised the importance of ethical practices in AI applications, including adherence to HIPAA and GDPR regulations. However, there was a general lack of transparency regarding the physical location of cloud servers and data handling. In conclusion, this evaluation provides valuable insights into the current landscape of AI auto-segmentation systems in radiation oncology, emphasizing the need for improved transparency, data security, and vendor support to enhance clinical outcomes. The findings serve as a guide for institutions considering the adoption of such technologies.

---

2) Focus on: Safety

Physical and Engineering Sciences in Medicine (2024) 47:1557–1570
https://doi.org/10.1007/s13246-024-01470-5

SCIENTIFIC PAPER

Check for updates

Load shift keying communication techniques in implantable devices

Francisco Pastene[1] · Martin Westermeyer[1] · Maxime Verstraeten[2] · Adrien Debelle[2] · Vicente Acuña[2] · Antoine Nonclercq[2] · Pablo Aqueveque[1]

Received: 12 September 2023 / Accepted: 28 July 2024 / Published online: 19 August 2024

https://doi.org/10.1007/s13246-024-01470-5

This paper by Pastene et al., published in the Journal of Physical and Engineering Sciences in Medicinediscusses advancements in wireless communication for medical implants, specifically focusing on inductive links. Medical implants, used in fields such as orthopedics, cardiac pacemakers, blood pumps, neural implants, and drug delivery systems, perform essential functions by replacing or restoring abilities lost due to diseases or injuries. The study compares three communication techniques: Short-Circuit Technique (SCT), Open-Circuit Technique (OCT), and the newly introduced Disconnected Load Technique (DLT). Each method has distinct operational behaviours. SCT uses a short-circuit across the load for data transmission, OCT disconnects the load, and DLT maintains the load in a disconnected state. This research highlights the importance of stable power delivery to implants and the need for adaptive

control strategies to handle variations in coil distance and load conditions. The study also explores the potential for increasing data rates by adjusting carrier frequencies and refining demodulation processes, while ensuring compliance with safety regulations regarding electromagnetic radiation. The methodology involved testing various coil distances and load conditions, focusing on parameters like modulation index and Bit Error Rate (BER). The results indicated that despite using a relatively low carrier frequency of 300 kHz, the techniques achieved adequate data rates for transmitting physiological signals. The findings have significant implications for medical applications, including smart prosthetics, chronic condition monitoring, and drug delivery systems. Although there is no universally accepted standard for communication frequency bands with medical implants, the European Telecommunications Standards Institute (ETSI) suggests the 300-500 kHz range for both powering and communicating with medical implants, which can go up to 31.5 W. The study underscores the necessity of complying with electromagnetic field regulations to ensure safety while developing communication systems for medical implants. The article concludes by acknowledging the study's limitations, such as the limited number of load scenarios tested, and suggests future research directions to enhance these communication techniques in biomedical engineering, potentially benefiting various stakeholders in healthcare and medical technology.

Radiological Physics and Technology (2024) 17:679–696
https://doi.org/10.1007/s12194-024-00820-y

RESEARCH ARTICLE

Check for updates

Development of a body movement detection system to avoid re-exposure during radiography

Michihiro Eto[1,2] · Tomofumi Nakawatari[3] · Yuji Hatanaka[4]

Received: 6 December 2023 / Revised: 7 June 2024 / Accepted: 9 June 2024 / Published online: 14 June 2024

https://doi.org/10.1007/s12194-024-00820-y

This study by Eto et al., published in Radiological Physics and Technology, introduces a body movement detection system designed to prevent unnecessary re-exposure during radiographic examinations of the chest and bones. The system accounts for breathing and involuntary movements, addressing a common challenge in medical imaging for patients who struggle to follow instructions or remain still during scans. Traditionally, post-processing techniques and deep learning tools have been used to correct motion blur after an X-ray is taken. However, this research takes a proactive approach, detecting movement before irradiation occurs. By doing so, it minimizes radiation exposure and improves imaging efficiency in hospitals. The system uses an RGB camera to monitor patients after positioning, analyzing video data in real time using inter-frame difference and optical flow estimation methods. To validate its effectiveness, researchers first tested the system with an anthropomorphic phantom head, simulating body movements using an inclined table and an acrylic plate caster. They then conducted a simulation with three patients, instructing them to assume body positions and breathing patterns similar to those exhibited during PA chest radiography. The results confirmed that the system can accurately detect body wobbles and respiratory motion in real time.

Beyond reducing unnecessary radiation exposure, this tool can also help confirm breath-holding status in patients who have difficulty communicating, ultimately improving radiographic accuracy and patient safety.

Original Article

A Cost-effective Breath-hold Coaching Camera System for Patients Undergoing External Beam Radiotherapy

Akash Mehta, Emma Horgan, Prabhakar Ramachandran, Christopher Noble
Department of Radiation Oncology, Princess Alexandra Hospital, Woolloongabba, Australia

https://doi.org/10.4103/jmp.jmp_101_24

As reported in several journals articles commercial systems are now routinely in use in clinical practice in order to account for organs motion and variation, which have been shown to affect delivery of the radiation for areas such as lung, liver or breast. Motion management, as it is often referred to, allows the use of very precise hypofractionation enabling the use of stereotactic treatment for both the brain and the body. Among various technological development the use of sophisticated surface guidance radiotherapy has grown in the last years not only as a tool for patient positioning but also to facilitate the use of breath hold (BH) in certain irradiations. However, some of this technology can be costly limiting its use to only a few departments and often to a limited number of treatment machines. In this work the authors explore the use of a cost-effective Time-of-Flight (ToF) camera system developed to coach patients undergoing treatment in BH, making BH treatments more accessible and reducing treatment delays. Their design is based on the use of a Wi-Fi-compatible Rasberry Pi 3B with and Arducam ToF camera connected in Raspberry Pi case. The interface includes an operator view and a patient view to allow them to observe the breathing pattern. The authors have tested it on volunteers and compared it with a commercial product demonstrating its equivalence and also its feasibility.

3) Focus on: how to?

Physical and Engineering Sciences in Medicine (2024) 47:1651–1663
https://doi.org/10.1007/s13246-024-01478-x

SCIENTIFIC PAPER

Effect of mirror system and scanner bed of a flatbed scanner on lateral response artefact in radiochromic film dosimetry

Tarafder Shameem[1,2] · Nick Bennie[1] · Martin Butson[2,3] · David Thwaites[2]

Received: 13 March 2024 / Accepted: 16 August 2024 / Published online: 12 September 2024

https://doi.org/10.1007/s13246-024-01478-x

This section provides practical information on tests and procedures that can be used in the clinic to ensure equipment accuracy and precision.

This paper by Shameem et al., published in the Journal of Physical and Engineering Sciences in Medicinefocuses on improving the measurement process of radiochromic film dosimetry, particularly using commercial flatbed scanners, specifically various EPSON models. The research systematically investigates several components of the scanner system including the path length effect and the polarization effects caused by the scanner's mirror systems.

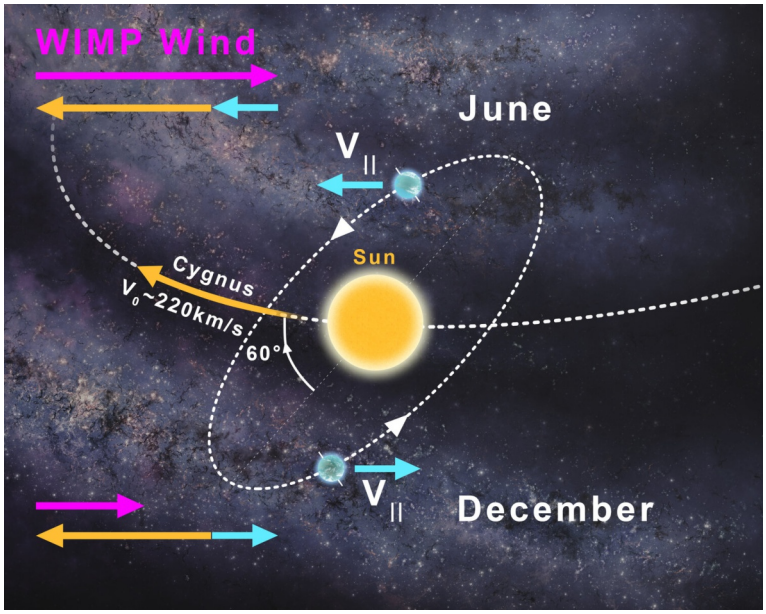
The aim of this work is to address the orientation effect and lateral response artifacts (LRA) that can affect the accuracy of dosimetry. EBT3 films were prepared and irradiated under controlled conditions, and their responses to varying doses and orientations were analyzed using the ImageJ and Excel software packages, focusing on the red and green color channels. The study examines how the materials used in the scanner bed such as glass and laminating pouches, affect the path length of light and, consequently, the measurement accuracy. It compares materials with different refractive indices to understand their impact on the scanning process. Additionally, the research investigates how the number and quality of mirrors in the scanner system influence the polarization of light, which can affect the readings obtained from the film. The study compares the polarization effects of different scanner models and mirror configurations. The report suggests an optimal scanner configuration that includes avoiding lenses with focal lengths below 50 mm, using glass as the scanner bed material, and limiting the use of mirrors to one or none, with specific angle considerations to minimize LRA effects. Overall, the report contributes to the understanding of how scanner design influences the accuracy of film dosimetry in radiation therapy, providing valuable insights for future improvements in measurement techniques and enhancing the reliability of dosimetry with radiochromic films, which is vital for accurate radiation therapy and patient safety.

The big North-South venture to solve the dark matter puzzle

Sourced by A/Prof Vanessa Panettieri, Editor (Educational), AFOMP Pulse

You've probably heard that (astro)particle physicists have been searching for dark matter for over three decades. What you might not know is that Australia is poised to play a unique role in this search in the coming years.

Dark matter refers to a new particle or particles beyond the Standard Model of quarks, leptons, and bosons. We strongly believe it exists because we can't otherwise explain several gravitational phenomena across different scales. Without dark matter, we wouldn't understand why peripheral stars in galaxies remain bound at high speeds, nor could we explain how galaxies move within clusters. The large-scale structure of the universe, which formed through gravitational collapse from a once-homogeneous cosmos, also points to its presence. Even the tiny temperature variations in the cosmic microwave background mapped in high resolution by modern satellites suggest dark matter's influence. These low-energy photons are remnants of a pivotal moment in cosmic history (~400,000 years after the Big Bang), when the hot plasma of light and matter (both visible and dark) cooled and expanded into the universe we see



today. From such observations, we can even estimate how much dark matter exists: a lot about five times more than visible matter!

Figure 1: The Sun's and Earth's orbital motions combine originating an annual modulation in the expected dark matter interaction signal

Yet, despite a global experimental effort, we have not yet detected dark matter's interactions with ordinary matter. The leading hypothesis is that the Milky Way is embedded in a vast, spherical halo of dark matter. As the Sun orbits the galactic center at 220 km/s, we effectively move through this invisible sea, creating a steady "wind" of dark matter particles passing through us. While these interactions are rare, some must occur; otherwise, we wouldn't be able to explain how dark matter formed. The goal of direct detection experiments is to observe these rare, faint interactions using increasingly large and sensitive detectors. To shelter from cosmic radiation, these experiments take place in underground laboratories—this is where Australia's newly commissioned Stawell Underground Physics Lab (SUPL), located in Victoria's Stawell gold mine, is set to make a difference.

To understand why, let's talk about the DAMA and SABRE experiments. While many experiments have reported null results, for over 20 years, Italian physicists of the DAMA experiment at Gran Sasso National Laboratory (LNGS) have observed an annual modulation in their NaI(Tl) scintillating crystal detector. They claim this is evidence of dark matter interactions. This could indeed be the case: its phase

Figure 2: The newly commissioned Stawell Underground Physics Laboratory in the state of Victoria awaits for detectors deployment

and period match the expected signal from dark matter, caused by the Earth's motion adding to the Sun's velocity for half the year and subtracting for the other half. However, other experiments using different materials and detection techniques have failed to find a compatible signal. This has sparked intense debate: is DAMA's modulation caused by some seasonal environmental effect? All proposed explanations of this kind fail to account for the characteristics of the oberved signal. And if it is really dark matter, is there a non trivial physics scenario at play, making direct comparisons between different target materials

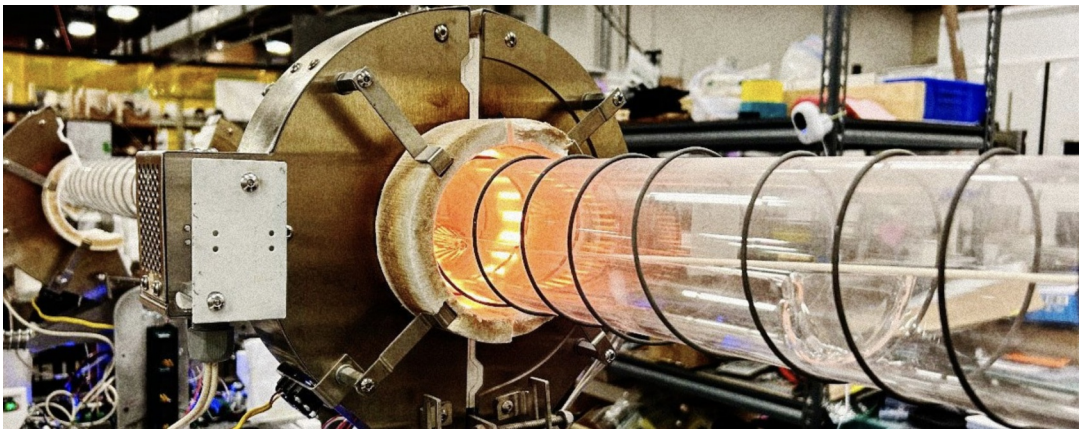
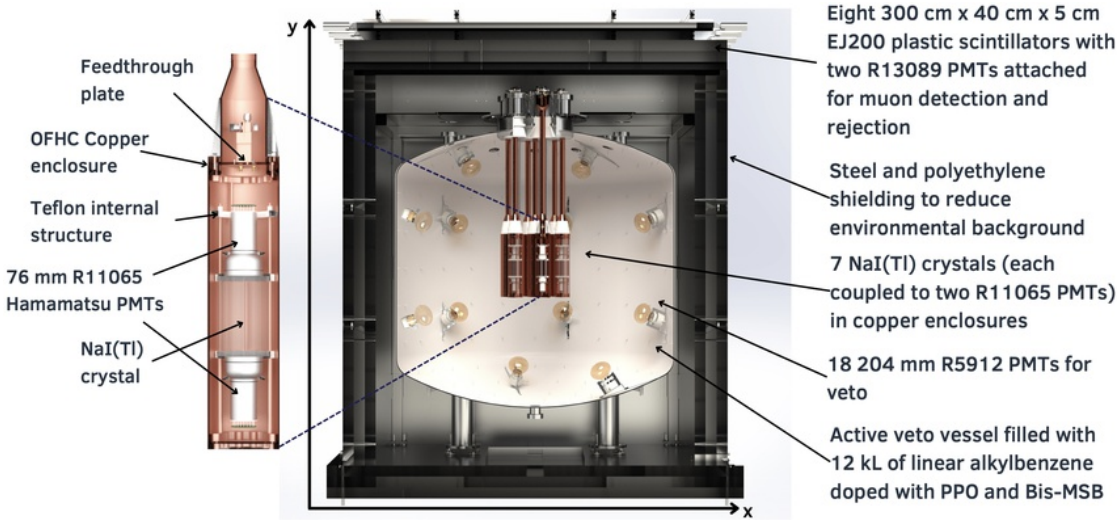


Figure 3: The zone refineing NaI ultra purification process developed by the SABRE collaboration

and techniques unreliable? With hundreds of papers published on this controversy, the only way to resolve it is to repeat DAMA's experiment using the same detection method.
That's easier said than done. Detecting such a faint signal requires materials with ultra-low levels of

natural radioactivity. DAMA's crystals, produced in the 1990s, were made using a proprietary purification process that has since been lost. After years of R&D and failed attempts, the SABRE experiment recently developed a new crystal-growing technology that may match or even surpass DAMA's radiopurity. Mass production is now underway.

But here's the catch: all underground physics labs are located in the Northern Hemisphere, buried in mines or under mountains. About ten years ago, when the SABRE collaboration was formed, a group of Australian research institutions (University of Melbourne, University of Sydney, Swinburne University, University of Adelaide, and Australian National University) joined forces with Italy's Istituto Nazionale di Fisica Nucleare (INFN) to establish the Southern Hemisphere's first underground physics lab at Stawell. The plan is to deploy two identical detector arrays one at LNGS and one at SUPL and analyze their data together. If DAMA's signal is caused by seasonal environmental effects, it would appear with opposite phase in the two hemispheres. However, if the modulation is due to dark matter, the signal's



peak around early June should be identical regardless of location, as it depends only on the combined motions of the Earth and Sun.

Thanks to this North-South collaboration, we may finally be on the verge of resolving one of the most debated results in fundamental physics over the past 20 years.

Prof. Davide D'Angelo
Physics department
Università degli Studi & I.N.F.N.Milan (Italy)

What's new? Key highlights from the editors

Sourced by A/Prof Vanessa Panettieri, Editor (Educational), AFOMP Pulse

Automated lattice radiation therapy treatment planning personalised to tumour size and shape

Mathieu Gaudreault, Kelvin K. Yu, David Chang, Tomas Kron, Nicholas Hardcastle, Sarat Chander, Adam Yeo, Physica Medica, Volume 125, 2024, 104490, ISSN 1120-1797,

https://doi.org/10.1016/j.ejmp.2024.104490

What inspired this study?

This study addresses the personalisation of the lattice radiation therapy (LRT) technique for easy implementation in a conventional radiotherapy linear accelerator. This technique involves irradiation of several boost regions in the tumour, in opposition with traditional uniform target coverage. It is usually prescribed to palliative patients with large tumours with cytoreduction (reduction in tumour volume) intent. When this treatment is needed, patients are generally in pain and time is an issue. However, preparing an LRT treatment plan manually takes a lot of time as each boost region must be contoured and managed individually during dose optimisation. Motivated by a former study of our research group automating the technique (10.1016/j.ejmp.2024.104490), we hypothesised that the overall technique could be personalised to the tumour volume to quickly generate treatment plans so that LRT could become an attractive option for clinical routine.

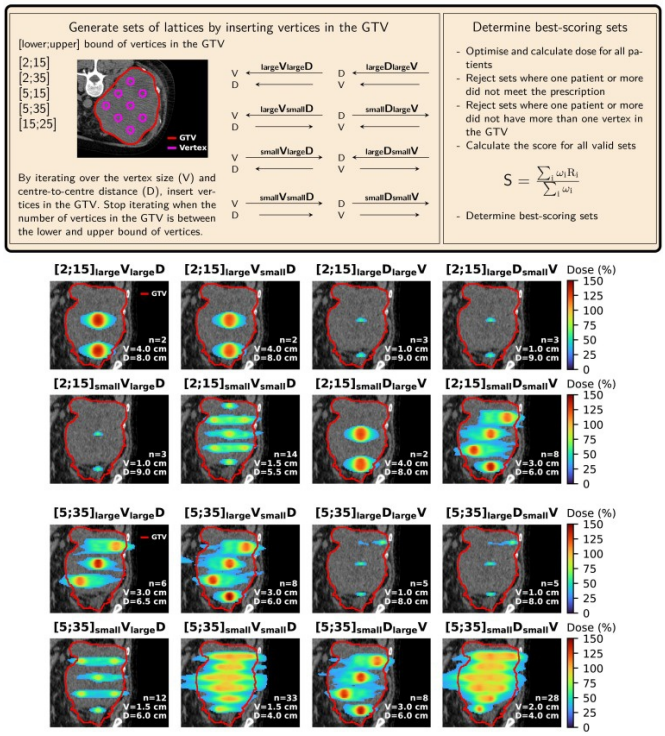
What were the key challenges in this research?

The underlying physiological mechanisms of the LRT technique are unknown. However, it is believed that irradiation triggers an immune response resulting in tumour cytoreduction. Therefore, a significant fraction of the tumour volume must be spared from high-dose regions for the immune response to occur.

However, parameters in terms of vertex size and centre-to centre distance leading to the optimal response are yet unknown in the literature. Consequently, the automation could not have been driven by gold standards based on clinical evidence.

What are the key takeaways from this study?

As we were missing clinical guidance, we explored the parameter space by varying the size and spacing of boost regions. We further devised a score based on the resulting dosimetry to judge the resulting plan quality. Plans with dosimetry clinically satisfactory were achieved with a size of 1.5 cm of diameter and 2.5 – 5 cm of centre-to-centre distance. Furthermore, a follow-up study from our research group demonstrated that



satisfactory dosimetry could be achieved with a few boost regions (< 15), which might allow manual planning in centres with low scripting ability.

Fig. 1. Workflow used in this study (top). Illustration of the selected geometrical parameters of each set in one patient by using [lower bound; upper bound] of [2;15] (middle) and [5;35] vertices (bottom). Different sets of lattices may lead to identical lattice geometry in a patient.

How does this research impact the future?

Personalising the LRT technique allowed the design of clinical trials aiming to drive the determination of parameters leading to optimal response. Cytoreduction is currently observed in around 50% of patients prescribed LRT. We hope that this number can be improved with a better understanding of the mechanisms driving the immune response, which might be correlated with the parameters used in the LRT technique.

On behalf of the lattice radiation therapy research group, ***Dr Mathieu Gaudreault****, Senior Researcher,Peter MacCallum Cancer Centre, Melbourne, Australia*

Article: Harnessing Radiobiology: Empowering Medical Physics in Cancer Care

Prof Arun Chougule PhD, FIOMP, FAMS
Chair ETC and Chairman IOMP accreditation Board
Immediate Past President of AFOMP
Member Board of Directors IMPCB
arunchougule11@gmail.com

Introduction

The field of cancer treatment has been significantly transformed by the integration of radiobiology and medical physics. This article delves into the essential principles of radiobiology and discusses how these principles empower medical physicists to optimize cancer care through advanced radiotherapy techniques.

First step is understanding basics of Radiobiology

Radiobiology is the study of the effects of ionizing radiation on biological systems, particularly at the cellular and molecular levels. Radiobiology examines how different types of radiation interact with living tissues. By understanding the underlined radiobiology, cancer treatments can be tailored to individual patients based on their unique tumour biology and genetic makeup for enhancing the effectiveness and safety of radiation therapy.

Key concepts include:

- **Cellular Response to Radiation**: Cells respond to radiation through various mechanisms, including DNA damage repair, apoptosis (programmed cell death), and cell cycle alterations.
- **Radiation Types**: Different types of radiation (e.g., X-rays, gamma rays, particle radiation) have distinct biological effects based on their energy and interaction with matter.
- **Dose-Response Relationships**: The relationship between the dose of radiation and its biological effect is fundamental in determining treatment protocols.

The Importance of Radiobiology in Cancer Treatment

Radiobiology examines how ionizing radiation affects living tissues, especially cancer cells. Understanding these effects by radiation oncologists and medical physicist is crucial for developing effective radiotherapy protocols.

The key aspects include:

- **Cellular Response**: Radiation can induce DNA damage in cells, leading to cell death or mutations. Bergonie and Tribondu in 1906 irradiated scrotum of ship with X rays and showed that rapidly dividing cells are more sensitive to ionizing radiation. Cancer cells, which often proliferate rapidly, are particularly vulnerable to such damage.
- **Dose-Response Relationship**: The relationship between radiation dose and the biological response of tissues is fundamental in designing treatment regimens with variables of total dose, dose per fraction, time between the fractions.
- **Cell Cycle Effects**: The cell cycle influences how cells respond to radiation. Cells in the mitotic

phase (M phase) are generally more sensitive to radiation than those in other phases. Understanding these dynamics helps schedule treatments at optimal times when cancer cells are most vulnerable while allowing healthy tissues time to recover.

Principles of Fractionation in Radiotherapy

Fractionation is a cornerstone of modern radiotherapy, based on six key principles known as the "6 R's of Radiobiology" which are critical concepts that guide the understanding of how radiotherapy can be optimized for cancer treatment. Each "R" represents a different biological factor that influences the effectiveness of radiation therapy.

The 6 R'sof radiotherapy and clinical implications of each componentare:

Repair: Normal tissues generally have a higher capacity for repair compared to tumour cells. Fractionated doses allow normal tissues to recover while continuously damaging tumour cells.

Clinical Implications:

A. Normal tissues typically have a greater capacity for repair than tumour tissues, which is why fractionated radiotherapy is often employed. This allows normal cells time to recover while continuously damaging tumour cells.

B. Enhancing repair mechanisms in normal tissues while inhibiting them in tumour cells could improve treatment outcomes.

Repopulation: Tumours can repopulate between treatment sessions; however, fractionation helps manage this by targeting actively dividing cells during their most vulnerable phases.

Clinical Implications:

A. Tumours may repopulate during treatment breaks, which can reduce the effectiveness of radiotherapy. Longer the total treatment period more will be repopulation component depending on type of cancer

B. Strategies such as dose escalation or shortening treatment breaks can be considered to counteract repopulation effects.

Reoxygenation: Oxygen enhances radiation effectiveness by facilitating free radical formation. Fractionation allows hypoxic tumour regions to become reoxygenated over time.

Clinical Implications:

A. Oxygen enhances the efficacy of radiation therapy due to its role in forming Reactive oxygen species (ROS) that cause additional cellular damage.

B. Strategies that improve oxygen delivery to tumours (e.g. more vascularity in tumour and more blood supply) can enhance treatment efficacy.

Redistribution: Tumour cells are at different stages of the cell cycle. Fractionation increases the likelihood that more tumour cells will be in a sensitive phase during subsequent treatments.

Clinical Implications:

A. Cells are most sensitive to radiation during specific phases (e.g., G2/M phase), while they are more resistant during others (e.g., S phase).

B. By fractionating doses, more tumour cells can be brought into sensitive phases between treatments, enhancing overall effectiveness.

Radiosensitivity: Radiosensitivity refers to the inherent susceptibility of cells to the damaging effects of radiation. Different tumour types and individual patient characteristics can lead to variation in radiosensitivity.

Clinical Implications:

A. Tumour cells with high radiosensitivity are more likely to be effectively destroyed by radiation.

B. Understanding the intrinsic radiosensitivity of tumours can help tailor treatment plans, including dose and fractionation schedules, to maximize tumour control while minimizing damage to healthy tissues.

Reactivation of Anti-Tumour Immune Response: The sixth "R" recognizes the role of radiotherapy in modulating the immune response against tumours.

Clinical Implications:

A. Radiation can induce immunogenic cell death and promote an anti-tumour immune response, potentially leading to systemic effects (abscopal effects).

B. Combining radiotherapy with immunotherapy may enhance overall treatment efficacy by leveraging the immune system's ability to target residual disease post-radiation.

C. Understanding how radiation affects the tumour microenvironment (TME) and immune cell dynamics is crucial for optimizing combination therapies.

The "6 R's of Radiobiology" provide a comprehensive framework for understanding and improving radiotherapy effectiveness in cancer treatment. By considering these factors, medical physicists and oncologists can develop more effective, individualized treatment plans that enhance tumour control while minimizing harm to normal tissues. The ongoing research into these areas continues to refine our understanding and application of radiotherapy in clinical practice.

Further, at the molecular level, radiation primarily causes DNA damage, which can lead to cell death or mutations. Understanding these mechanisms is crucial for optimizing treatment strategies:

- DNA Damage Response (DDR): Cells have evolved complex pathways to detect and repair DNA damage. Key proteins involved in DDR include p53, ATM (Ataxia Telangiectasia Mutated), and BRCA1/2. The efficacy of radiotherapy can be influenced by the functionality of these pathways.
- Tumour Microenvironment: The microenvironment surrounding a tumour can significantly affect its response to radiation. Factors such as hypoxia (low oxygen levels), acidity, and the presence of stromal cells can alter radiosensitivity.
- Apoptosis: If the damage is irreparable, cells may undergo programmed cell death to prevent the propagation of mutations.
- Highly Sensitive Tissues: Tissues with high proliferative rates, such as bone marrow and the lining of the gastrointestinal tract, are particularly vulnerable to radiation damage. Damage in these tissues can lead to significant clinical consequences, such as myelosuppression or mucositis.
- Less Sensitive Tissues: Tissues with lower turnover rates, such as nerve and muscle cells, are less affected by radiation exposure. However, understanding the long-term effects of low-dose radiation exposure on these tissues is essential for assessing cumulative risks due to ionising radiation exposure.

The radiation exposure can lead to both acute and late tissue reactions:

Acute Reactions: These occur shortly after exposure and are often seen in rapidly dividing tissues. Symptoms may include skin erythema, nausea, and vomiting due to damage to the gastrointestinal lining. The severity of acute reactions is influenced by factors such as dose rate and fractionation.

Late Reactions: Late effects develop over time and can result from cumulative damage to normal tissues. These may include fibrosis, vascular changes, and loss of organ function. Understanding the dose-effect relationships for late reactions is critical for developing strategies that minimize long-term complications

Radiation effects can also vary depending on how different tissues interact:

Tissue Architecture: In organs with complex architectures (e.g., the liver or lungs), partial exposure may lead to functional impairment only if a significant portion of the organ is affected. Conversely, in tubular organs/ serial organ (e.g., intestines, spinal cord), localized damage can have downstream effects on function

Immune System Involvement: The immune system plays a significant role in mediating tissue responses post-radiation exposure. Radiation can induce inflammatory responses that may exacerbate tissue damage or promote repair processes depending on the context

Tailoring Treatments Based on Tumour Biology

Though radiobiology is complex and depends on many intrinsic factors however precision radiation oncology leverages insights from radiobiology to customize treatment plans for individual patients:

- **Biomarkers of Radiosensitivity**: Identifying biomarkers that predict how a tumour will respond to radiation can guide treatment decisions. For instance, tumours with certain genetic mutations may be more susceptible to radiation-induced damage.
- **Genomic Profiling**: Advances in genomic technologies allow for comprehensive profiling of tumours. This information can help oncologists select the most effective radiation techniques and doses tailored to each patient's unique tumour characteristics.

The integration of radiobiological principles with cutting-edge technologies enhances treatment precision:

- **Stereotactic Body Radiation Therapy (SBRT)**: This technique delivers high doses of radiation precisely to tumour sites while minimizing exposure to surrounding healthy tissue. Understanding radiobiological principles allows for more effective dose fractionation schemes.
- **Image-Guided Radiation Therapy (IGRT)**: Incorporating real-time imaging ensures accurate delivery of radiation, adapting to any changes in patient positioning or tumour size.
- **Stereotactic Radiosurgery (SRS) and Stereotactic Body Radiation Therapy (SBRT)**: High-dose, highly focused techniques for treating small tumours or metastases.
- **Proton and Heavy Ion Therapy**: Leverages the Bragg peak to maximize tumour dose while minimizing exposure to normal tissues as well as particles have more RBE than photons requiring less radiation dose.
- **Adaptive Radiation Therapy**: As tumours change over time, adaptive approaches adjust treatment

plans based on real-time imaging and biological feedback. Radiobiology informs these adjustments by providing insights into how tumours respond to previous treatments [MR Linac, PET Linac].

As ionising radiation is a dual edged sword, one of the significant challenges in radiation oncology is minimizing side effects while maximizing therapeutic benefits:

- Normal Tissue Sparing: Insights from radiobiology help identify normal tissues that are at risk during treatment. Techniques such as IMRT, IGRT, ART utilize this knowledge to spare healthy tissues.
- Predictive Models: Developing predictive models based on radiobiological data can help anticipate adverse effects in patients, enabling proactive management strategies.

By applying radiobiological principles, clinicians can enhance treatment efficacy:

- Combination Therapies: Combining radiation with other modalities such as immunotherapy or targeted therapy can exploit synergistic effects. Understanding the timing and sequencing of these treatments is vital for maximizing patient outcomes.
- Personalized Dose Escalation: Radiobiology allows for personalized dose escalation strategies based on individual tumour responses, potentially increasing local control rates while minimizing toxicities.

The field of radiobiology is continually evolving, with ongoing research focused on:

- Understanding Tumour Heterogeneity: Investigating how different cell populations within a tumour respond to radiation will help refine treatment approaches.
- Exploring Novel Therapeutics: Research into agents that enhance radiosensitivity or protect normal tissues holds promise for improving patient outcomes.

As precision medicine becomes more integrated into oncology practice, the role of radiobiology and medical physicist will be paramount:

- Patient-Centric Approaches: Future advancements will likely focus on developing patient-centric models that incorporate radiobiological data into clinical decision-making processes.
- Collaborative Efforts: Interdisciplinary collaboration among oncologists, radiologists, molecular biologists, and geneticists will drive innovation in precision radiation oncology.

Radiobiological Research and Innovations

- **Hypoxia Modifiers**

  Efforts to overcome tumour hypoxia include the use of oxygen mimetics, hypoxia-selective cytotoxins, and advanced imaging modalities like PET scans with hypoxia-specific tracers.

- **Radioprotectors and Sensitizers**

  Radioprotectors shield normal tissues from radiation damage, while radiosensitizers enhance tumour response. Examples include amifostine (radioprotector) and cisplatin (radiosensitizer).

- **Immunoradiotherapy**

Radiation's ability to modulate the immune system has led to the development of Immunoradiotherapy. Combining radiation with immune checkpoint inhibitors enhances the systemic anti-tumour response, offering a promising avenue for treating advanced cancers.

- **Radiomics and Artificial Intelligence**

  Personalized Cancer Care

  Radiobiology supports the emerging field of personalized medicine by integrating genomic and molecular profiling. Techniques such as Radiogenomics and biomarker-based approaches identify patients most likely to benefit from specific radiation strategies. Radiomics extracts quantitative data from medical images, revealing patterns linked to tumour biology. When combined with AI, radiomics enables improved treatment planning, response prediction, and outcome assessment.

Challenges and Future Directions

Despite its transformative potential, radiobiology faces challenges such as:

- Limited understanding of tumour heterogeneity and its impact on radiation response.
- Balancing therapeutic efficacy with long-term toxicity.
- Translating laboratory findings into clinical practice.

Future directions include integrating radiobiology with other disciplines, such as computational modelling and systems biology, to create holistic approaches to cancer care. Continued research into Radiogenomics, adaptive radiotherapy, and combination therapies promises to revolutionize the field further.

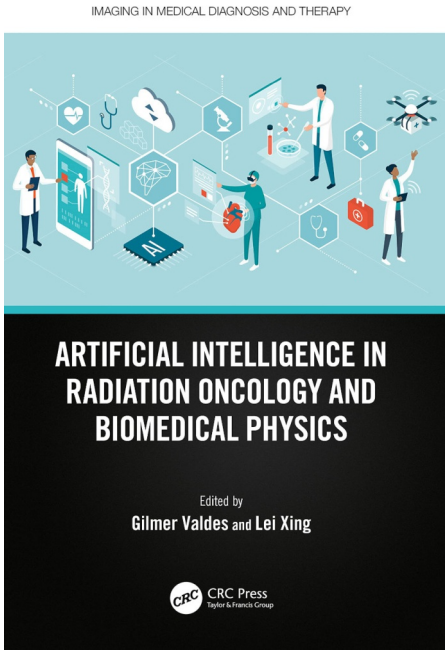
Conclusion

Radiobiology plays a pivotal role in understanding the effects of radiation on healthy tissues, which is crucial for optimizing radiation therapy in cancer treatment. By elucidating the biological responses to radiation, radiobiology informs clinical practices that aim to maximize tumour control while minimizing damage to surrounding healthy tissues. Therefore radiobiology is an essential component of precision radiation oncology, providing critical insights that enhance our understanding of how cancer cells respond to ionizing radiation. By integrating radiobiological principles into clinical practice, we can develop more effective and personalized treatment strategies that improve patient outcomes while minimizing side effects. As research continues to advance our knowledge in this field, the future holds great promise for refining cancer therapies through a deeper understanding of the intricate relationship between radiation and biological systems. Therefore, **Radiobiology is indispensable in empowering medical physicists to advance cancer care**. By bridging the gap between biology and physics, it provides the foundation for innovative, patient-centred treatment strategies. As the field evolves, leveraging radiobiological insights will remain central to improving outcomes and shaping the future of radiation oncology.

Book Review: Artificial Intelligence in Radiation Oncology and Biomedical Physics

Edited by **Gilmer Valdes and Lei Xing**

Md Akhtaruzzaman, PhD, Radiation Oncology Department, Evercare Hospital Chattogram, Bangladesh



Artificial intelligence (AI) is increasingly being incorporated into radiation oncology and medical physics. A thorough overview of the most recent developments in AI applications in radiation oncology and biomedical physics may be found in the book "Artificial Intelligence in Radiation Oncology and Biomedical Physics", which was released by CRC Press in 2023. This book, which is edited by two well-known specialists, Gilmer Valdes and Lei Xing, brings together the works of top researchers and specialists from around the globe and offers insightful information about how AI might improve patient care., treatment planning, and clinical decision-making.

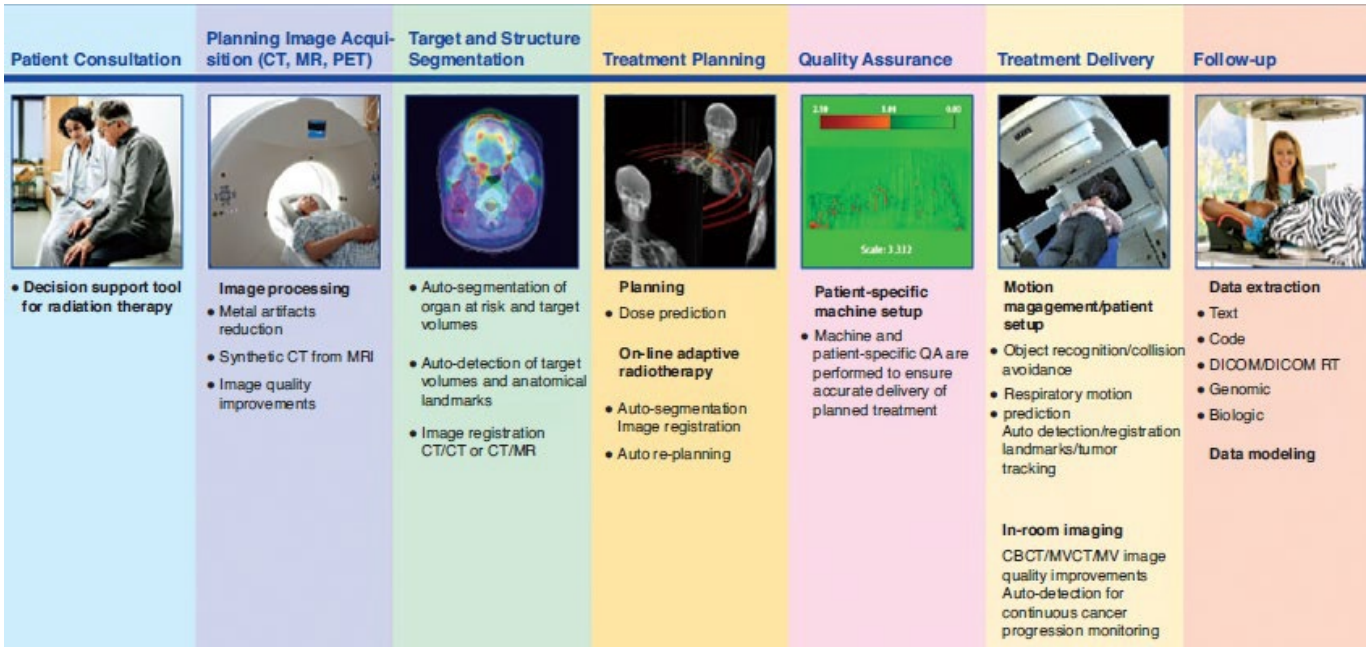
The book covers a wide range of AI applications in medical physics and radiation therapy and is organized into eight chapters. Before diving into machine learning-based outcome prediction, treatment planning, picture segmentation, motion management, and quality assurance, it starts with an overview of AI's importance in radiotherapy. A forward-looking view of the developing function of AI in medical physics and radiation oncology is given in the final chapter.

The following topics are included:

- AI-driven automation in radiotherapy – Techniques such as auto-contouring, dose prediction, and knowledge-based planning, error detection, outcome modeling.
- Machine learning for radiotherapy outcome prediction – Utilizing AI to improve patient-specific treatment outcomes using various imaging modalities, quantitative imaging biomarkers, machine learning predictors.
- Image registration and segmentation – Applying deep learning models for precise tumor and organ segmentation by anatomical region.
- Reinforcement learning in treatment planning and image processing – Enhancing radiation dose delivery optimization and improving personalized treatment approaches through advanced data analysis.
- AI and ML in motion management and image guided radiation therapy – Exploring the roles of AI and ML in inter- and intra-fractional imaging, adaptive planning, and real-time tumor tracking.
- Quality assurance and error detection – AI's contribution to improving radiation therapy's safety and effectiveness, including patient-specific QA, treatment delivery, and chart review.
- Challenges and future directions – Interpretability, ethical issues, and clinical validation of AI models. Furthermore, to guarantee safety and effectiveness, the incorporation of AI into clinical practice necessitates frequent upgrades and strict standards.

The main strength of the book is its practical orientation. Medical physicists, radiation oncologists, and AI researchers working in the healthcare sector may find it especially helpful as each chapter covers theoretical ideas of AI while also emphasizing practical applications. The book is enhanced with citations

to the latest AI techniques, case examples, and illustrations. Another notable aspect of the book is its emphasis on clinical translation. Rather than merely presenting AI models, it assesses their feasibility in medical settings, considering challenges such as data constraints, regulatory barriers, and interpretability concerns.



Although the book is highly informative but it requires some knowledge of medical physics, radiation oncology, and artificial intelligence. Some parts may be difficult for readers who don't have a strong foundation in machine learning and artificial intelligence. Furthermore, given how quickly AI is developing, some of the approaches presented may soon be replaced by more sophisticated ones. It would be helpful to get updates on new developments in medical physics AI in a future edition.

For professionals and researchers who want to understand how AI affects medical physics and cancer treatment, "Artificial Intelligence in Radiation Oncology and Biomedical Physics" is a valuable resource. The book provides a progressive viewpoint on how machine learning can revolutionize radiotherapy while skillfully bridging the gap between AI research and clinical practice. The book adds a lot to the literature on artificial intelligence in healthcare, even though some of its portions could be technically challenging. For specialists in radiation oncology, medical imaging, and related fields, it is therefore strongly advised.

IWD celebration 2025: Report on AFOMP Women's Special Webinar

Prepared by Dr. Rajni Verma, Assistant Professor , Department of Radiological Physics, SMS Medical College and Hospitals,India

The **Asia-Oceania Federation of Organizations for Medical Physics (AFOMP)** hosted a special webinar on **March 5, 2025**, in celebration of **International Women's Day (IWD) 2025**. The webinar focused on the theme "**Second Innings of Women in Medical Physics**," addressing the challenges faced by women medical physicists (WMPs) in **restarting their careers** after a long sabbatical due to family responsibilities. Cultural norms, familial expectations, and societal pressures often make this transition difficult, presenting a significant concern for many women medical physicists worldwide.

Objective

The webinar aimed to **inspire and empower** women medical physicists by sharing success stories of

professionals who made a significant impact in the field. It also highlighted the **role of male mentors** in supporting women throughout their careers. The discussion provided **valuable insights and practical strategies** for women looking to re-enter or advance in the profession after a career break.

Speakers and Moderator

The webinar featured distinguished speakers:

- **Prof. Eva Bezak (Australia)** – A prominent leader in medical physics, she shared her experiences on the **importance of mentorship, policies, realistic expectations, and a balanced approach** to career growth.
- **Prof. Arun Chougule (India)** – A renowned expert who emphasized the **need for gender equity** in scientific and academic environments. He also **advocated for the role of male mentors** in supporting women in medical physics, encouraging his male colleagues to be **more inclusive and**

supportive.

- **Prof. Jeannie Hsiu Ding Wong (Malaysia)** – A respected figure in medical physics, she provided insights into the **evolving opportunities** for women in the profession. She emphasized maintaining a **positive outlook on career interruptions** and suggested a **gradual, sustainable approach** to re-entering the workforce.

The session was **dynamically moderated** by **Dr. Rajni Verma (India)**, who facilitated engaging discussions and interactive exchanges among speakers and participants.

Highlights

The webinar was well-attended, with **94 participants** from across the AFOMP region.

- **Theme of "Second Innings"**: Discussions revolved around **challenges and opportunities** in the second phase of a woman's career, including leadership roles, research, and balancing professional and personal commitments.
- **Keynote Presentations**: Speakers shared **valuable insights** from their personal journeys, discussing how they overcame obstacles, broke barriers, and paved the way for future generations of women in medical physics.
- **Interactive Discussion**: The session included an **interactive Q&A**, where participants engaged with speakers, voiced their concerns, shared experiences, and sought professional advice.
- **AFOMP IWD 2025 Poster**: To commemorate International Women's Day 2025, **AFOMP released a dedicated poster** honoring women medical physicists across the region.

Outcomes

- The event underscored the importance of **continuous professional development and networking** for women in medical physics.
- Discussions highlighted the need to **increase the visibility of women in leadership positions** and emphasized the role of **mentorship in career advancement.**

Conclusion

The A**FOMP Women's Special Webinar on March 5, 2025**, was a **significant and impactful event** that actively engaged the medical physics community. It reinforced the message that **women play a crucial role** in shaping the future of medical physics and that their contributions should be **recognized, supported, and celebrated** throughout every stage of their careers.

NMO Activity Report: ICMPROI – 2025, Dhaka, Bangladesh

4th International Conference on Medical Physics in Radiation Oncology and Imaging – 2025, Dhaka, Bangladesh

The 4th International Conference on Medical Physics in Radiation Oncology and Imaging (ICMPROI 2025) was held on February 13-14, 2025, at the Brac University Campus in Dhaka, Bangladesh, under the theme "**Medical Physics in Cancer Care: Challenges and Opportunities for International Cooperation**". Jointly organized by the **Bangladesh Medical Physics Society (BMPS)** and **BRAC University (BRACU)**, and in co-operation with the South Asia Centre for Medical Physics and Cancer Research (SCMPCR), the conference emphasized global collaboration to advance cancer treatment and medical physics. Endorsed by the International Organization for Medical Physics (IOMP) and the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP).

This program divided into inaugural programme, plenary & scientific session, vendor presentation, poster session, cultural program, Best Oral and poster award ceremony and valedictory session. A total of 250 participants were in attendance from 15 different countries in Asia, Europe, Middle East and the US. The aim of this program was to develop medical physics in South Asia, sharing experiences with scientists and sharing experiences with scientists and helping the medical physics community by collaborative work.

PRE-CONGRESS WORKSHOP ON RADIATION ONCOLOGY AND MEDICAL PHYSICS:

Prior to the main conference, BMPS, in collaboration with Combined Military Hospital (CMH) Cancer Center, organized a Pre-Congress Hands-On Workshop on Radiation Oncology and Medical Physics on February 12, 2025, at Cancer Centre, CMH Dhaka. The workshop was attended by 60 medical physicists and radiation oncologists from various hospitals across Bangladesh and featured internationally renowned facilitators, including Dr. Vrinda Singla (Max Super Specialty Hospital, India), Dr. Manju Sharma (University of California, San Francisco, USA), and Dr. Maria Mania Aspradakis (Cantonal Hospital Winterthur, Switzerland). The hands-on training covered essential topics such as contouring guidelines for head & neck and prostate cases, small-field dosimetry, and end-to-end quality assurance (QA) procedures in radiotherapy. The workshop concluded with a certificate distribution ceremony and an interactive Q&A session, reinforcing the importance of collaboration between radiation oncologists and medical physicists.

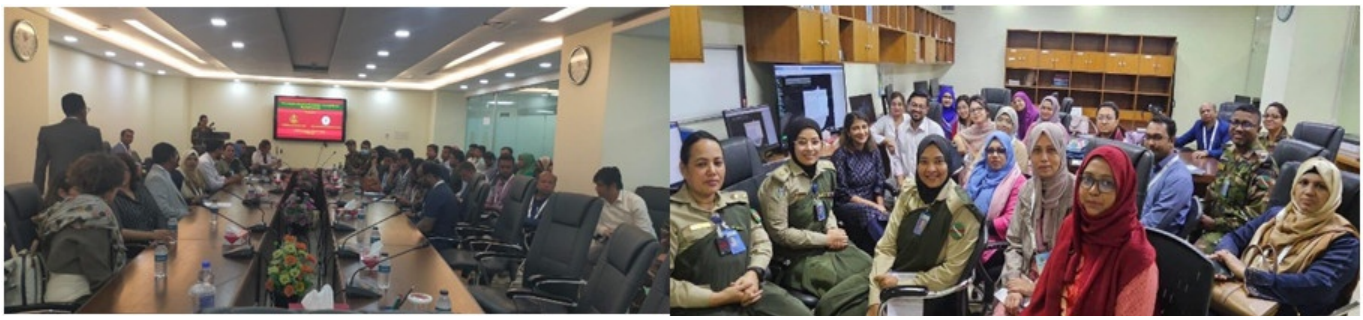


Fig-1:Pre-Congress Hands-On Workshop at CMH Dhaka

INAUGURAL CEREMONY

Prof. Dr. Mohammad Anwar Hossen (Chief Guest), Member, University Grants Commission of Bangladesh Prof. **Dr. Syed Ferhat Anwar**, (Special Guest), Vice Chancellor, BRAC University and

Patron, ICMPROI-2025; **Prof. Dr. G. A. Zakaria** (Keynote Speaker &Patron), Professor of the Anhalt University of Applied Sciences, Germany, Founder Chairman, South Asia Centre for Medical Physics and Cancer Research (SCMPCR); **Prof. Dr. Syed Md. Akram Hussain**, (Special Guest), Member, Health Sector Reform Commission and Senior Consultant, Square Hospital Limited; **Dr. Md. Jahangir Kabir**, (Guest of Honor), Associate Professor and Director (In-charge), National Institute of Cancer Research & Hospital (NICRH); **Eng. Md. Nurul Haque**, (Guest of Honor), Chief Operating Officer, LZ Group of Companies & Former President, RUET Alumni Association; **Dr. Manju Sharma**, (Guest of Honor), Associate Professor, University of California, San Francisco, USA; **Prof. Dr. AFM Yusuf Haider**, (Organizing Chairperson), ICMPROI-2025; **Prof. Dr. H. Anupama Azhari** (Organizing chairperson), **Dr. Md. Akhtaruzzaman** (President of BMPS& Organizing Secretary, ICMPROI-2025).

They delivered valuable speeches on medical physics and radiation oncology, sharing experiences with scientists and helping the medical physics community by collaborative work.

Fig-2: Inaugural Ceremony: ICMPROI -2025

SCIENTIFIC SESSION

Keynote Lectures (1), Plenary Lectures (4) Invited Lectures (26), sponsor presentations (06), Oral (50) and poster presentations (100) in different area such as radiation oncology, radiation protection, treatment planning system, dosimetry, brachytherapy, radiology, molecular imaging, nuclear medicine, imaging, and advanced biomedical engineering were presented by local and foreign presenters during this program.

Fig-3: Scientific Session and Poster Presentation

VENDOR PRESENTATION:

Six vendors presented their paper on modern and updated technology of medical physics from Radformation, Varian Medical Systems, Medinvest Ltd, BEBIG Medical, CDR System, VisionRT.

CULTURAL PROGRAM:

On the first day, a cultural function was arranged by the conference organizer. This program focused on the traditional cultures and life styles of Bangladesh. The participants enjoyed the program followed by a

grand dinner.

AWARD CEREMONY:

Judges selected three best papers based on the evaluation criteria out of 50 oral presentations. Also, selected three best poster presentation based on the evaluation criteria out of 100 posters.

Position	Oral Paper	Poster Presentation
1st	**Md Jobairul Islam, Bangladesh** "Free-Breathing VMAT and IMRT versus Deep Inspiration Breath- Hold 3D-CRT Techniques for Left-Breast Cancer: A Practical Solution for Developing Countries"	**Shahadat Hossain Shuvo, Bangladesh** "Enhanced Patient-Specific Quality Assurance Protocol for IMRT In Head And Neck Cancer: A Comprehensive Multi-Detector Analysis with Risk-Based Assessment"
2nd	**Suresh Poudel, Nepal** "Does microDiamond Detector necessitate Profile Correction? – A Monte Carlo Approach to Answer the Question"	**Adiba Hasan Prova, Bangladesh** "Exploring the Association among Breast Cancer Risk Factors,Biomarker Profiles, and Tumor Stages: A Study from Dhaka, Bangladesh"
3rd	**Md Omar Sunny, Bangladesh** "Advances in Image-Guided Radiotherapy (IGRT): Clinical Impacts and Insights"	**R.S. Karki, Nepal** "Uncertainty in Harshaw 6600 Dosemeters: A Study of Routine Dosemeter services at Nepal academy of science and technology"

BMPS PRESENTS MEMENTO TO PROFESSOR DR. GOLAM ABU ZAKARIA FOR RECEIVING GERMANY'S 'FEDERAL CROSS OF MERIT:

BMPS proudly congratulates **Professor Dr. Golam Abu Zakaria**, Advisory Member of BMPS, on receiving **Germany's highest civilian honor, the 'Federal Cross of Merit'**, in 2023. This prestigious award recognizes his outstanding contributions to **medical physics and international scientific collaboration**. celebrate this remarkable achievement, **BMPS presented a memento** to Professor Zakaria, honoring his dedication and impact. His success is a source of pride for **Bangladesh's medical physics community**.

CLOSING CEREMONY

BMPS President, former President, Vice President, Secretary and Treasurer shared their experiences about the arrangement of this international program for the inspiring young generation. Local and foreign participants gave their opinions regarding the outcome of the conference (Fig: 08). According to the sequence of BMPS activities, the next 5th International Conference on Medical Physics in Radiation Oncology and Imaging (ICMPROI)", 2028, Bangladesh was announced during the closing ceremony.

CONCLUSION ACKNOWLEDGEMENT

We are deeply thankful to all of our BMPS members, local and foreign participants, colleagues, contributors, organizing committee members, co-organizers, sponsors, scientists, researchers, students, and everyone else who supported ICMPROI 2025. Your contributions, enthusiasm, and collaborative spirit were instrumental in making this conference a success and in advancing the field of medical physics in cancer care.

ICMPROI 2025 was a resounding success, drawing 250 participants from 15 countries across Asia, Europe, the Middle East, and the US. The conference not only advanced the field of medical physics but also underscored the critical role of international collaboration in enhancing cancer care. Through dynamic presentations, cultural exchanges, and robust discussions, the event set the stage for future innovations and collaborative research in radiation oncology and imaging.

Global Recognition of the Medical Physics Profession

Contribution by Dr Zulaikha Jamalludin Editor (Professional), AFOMP Pulse

Medical physics is an essential field within healthcare, combining physics principles with medical applications to ensure accurate diagnosis and effective treatment, particularly in radiation therapy, diagnostic imaging, and nuclear medicine. The global recognition of medical physics as a profession has evolved significantly, but challenges remain in some regions.

Global Acknowledgment of Medical Physics

The field of medical physics is widely acknowledged as a key component of modern healthcare. Several international organizations have contributed to its professional recognition:

1. International Organization for Medical Physics (IOMP): The IOMP promotes the role of medical physicists worldwide, advocating for education, training, and professional development.
2. World Health Organization (WHO): Recognizes medical physicists as healthcare professionals contributing to patient safety and treatment efficacy.
3. International Atomic Energy Agency (IAEA): Supports the development of medical physics through training programs and guidelines, especially in radiation protection and radiotherapy.

Regional Recognition and Challenges

a. North America
   Medical physics is well-recognized in the United States and Canada. Certification through bodies such as the American Board of Radiology (ABR) and the Canadian College of Physicists in Medicine (CCPM) is required for professional practice, ensuring a high standard of expertise and competency.

b. Europe
   European countries have established accreditation and certification processes through national and regional organizations such as the European Federation of Organisations for Medical Physics (EFOMP). The European Commission has also recognized the importance of the Medical Physics Expert (MPE) designation.

c. Asia
   Recognition of medical physics in Asia varies significantly among countries. Developed nations like Japan and South Korea have well-established certification pathways through organizations such as the Japan Board for Medical Physicist Qualification (JBMPQ) and the Korean Society of Medical Physics (KSMP). India has emerging certification frameworks governed by the Atomic Energy Regulatory Board (AERB). However, many developing Asian countries lack standardized accreditation processes, making professional recognition inconsistent across the region. Efforts by the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) are helping to bridge these gaps by promoting education, training, and certification initiatives.

d. Asia-Pacific
   Countries such as Australia and New Zealand have well-defined pathways for medical physics certification through organizations like the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM). However, in developing nations within the Pacific region, professional recognition varies, and standardization efforts are ongoing.

e. Latin America

f. Recognition of medical physics in Latin America is growing, with professional societies like the Federation of Latin American Medical Physics Organizations (FELAMP) working toward unified certification standards. However, disparities exist between countries in terms of training and recognition.

g. Africa & Middle East
Medical physics is still developing in many parts of Africa and the Middle East. South Africa has a structured accreditation system through the Health Professions Council of South Africa (HPCSA), but other regions lack formalized certification and recognition, highlighting the need for global efforts in professional standardization.

Challenges in Medical Physics Education and Certification

a. Impact of Minimum Qualifications:
In some countries, the minimum qualification to become a medical physicist is only an undergraduate bachelor's degree. This can pose challenges to the quality and competency of professionals in the field. Without advanced education and clinical training, there is a risk of inadequate knowledge in radiation safety, treatment planning, and quality assurance, which could compromise patient care.

b. Need for Standardized Graduate-Level Training:
International organizations like the IOMP and IAEA recommend postgraduate-level education (Master's or PhD) as the minimum qualification for clinical medical physicists. Countries with lower entry requirements may need to enhance their programs to align with global standards.

c. Clinical Training and Residency Programs:
A structured clinical training or residency program is essential to ensure competency. Countries that lack formalized training pathways should implement supervised clinical experience as part of medical physics certification.

Efforts to Improve Global Recognition

a. IAEA Guidelines for Certification:
The International Atomic Energy Agency (IAEA) has developed guidelines for the certification of clinically qualified medical physicists (IAEA TCS71), emphasizing structured education, clinical training, and competency assessment. These guidelines provide a framework for countries aiming to establish or improve certification programs and ensure a standardized level of expertise among medical physicists.

b. Postgraduate Medical Physics Academic Programs:
The IAEA has also developed documents that outline structured postgraduate education in medical physics (IAEA TCS56). These programs ensure that graduates obtain the necessary theoretical knowledge and clinical training to meet international competency standards, improving professional quality in countries where only a bachelor's degree is required.

c. Standardization Initiatives:
International organizations are pushing for standardized certification requirements to facilitate global mobility for medical physicists.

d. Education & Training Programs:
Efforts by the IAEA, WHO, and IOMP to establish educational frameworks and training guidelines help improve recognition in underserved regions.

e. Collaboration & Networking:
Strengthening international collaboration between institutions and professional societies fosters knowledge exchange and elevates the profession's global standing.

Conclusion: While medical physics is well-recognized in many developed countries, challenges remain in achieving global uniformity in professional recognition. Continued efforts by international organizations, governments, and professional bodies are essential to ensuring that medical physicists worldwide receive appropriate acknowledgment for their critical contributions to healthcare.

Medical Physics Training: Comprehensive Online Courses for Healthcare Professionals

Contribution by Dr Zulaikha Jamalludin Editor (Professional), AFOMP Pulse

Medical Physics Training (https://www.medicalphysicstraining.com/) offers a range of online courses tailored for medical professionals seeking to enhance their knowledge in various physics-related domains. Developed by a board-certified physicist and a licensed professional nurse educator with over 40 years of combined educational experience, these courses are designed to accommodate the schedules of busy healthcare providers.

Course Offerings:

1. 80-Hour Nuclear Cardiology Physics and Board Review
   - Description: This course is compatible with CBNC, APCA, NRC, State, and ACGME requirements, providing comprehensive coverage of nuclear cardiology physics.
   - Price: $380 (group discounts available)
   - Features: Unlimited access until course completion, immediate certificate issuance upon completion, and a complimentary Echo Physics Board Review Course included.
2. Ambulatory Surgical Center Training Series
   - Description: A series of 47 courses designed to meet regulatory compliance training needs for ambulatory surgical centers.
   - Price: $60 per person for 365 days of access or $7 per course per student for 45 days of access.
   - Features: Comprehensive competency modules covering various aspects of surgical center operations.
3. Ultrasound Physics Board Review Courses
   - Description: Courses tailored for the physics portions of the ARDMS SPI Exam and ARRT Sonography or Vascular Sonography Physics exams.
   - Price: $45 for a 3-month access period.
   - Features: Focused content to aid in board exam preparation, excluding clinical content.
4. Radiologic Technologist and Radiation Therapy Courses
   - Description: Programs designed for educational institutions to supplement or replace physics semester courses, as well as board reviews.
   - Price: $50 per student per semester or year-long programs.
   - Features: Comprehensive physics education tailored for radiologic technologists and radiation therapy students.

Additional Information:

Course Access: Online access is extended as needed to ensure participants can complete their courses and obtain necessary certifications without time constraints.
Support: For questions or further information, contact lsmith@medicalphysicstraining.com or support@medicalphysicstraining.com

Medical Physics Training is committed to providing high-quality, accessible education to medical professionals, ensuring they meet certification requirements and excel in their respective fields.

Funding Committee Report

Byungchul Cho, Ph.D. Chair, AFOMP Funding Committee

Here are some updates from the Funding Committee

- New Corporate Members:
- Radformation joined AFOMP as a Corporate Member in 2024.
- RaySearch Laboratories joined AFOMP as a Corporate Member in 2025.
- Departure of a Corporate Member: PTW Corporation has discontinued their Corporate Membership with AFOMP. We extend our sincere gratitude to PTW for their valuable support as a Corporate Member for the past five years and look forward to potential future collaborations.
- Successful Industrial Webinar: AFOMP hosted an Industrial Webinar featuring Radformation as the guest presenter on November 27th, 2024. The webinar garnered significant interest with over 300 registrations and over 160 participants.

Funding Committee Vision & Mission:

- Vision: To ensure the long-term financial sustainability of AFOMP through diverse and innovative funding strategies.
- Mission: To actively seek and secure funding from various sources, including corporate sponsorships, grants, and other fundraising initiatives, to support the core activities and strategic goals of AFOMP.

We are pleased to report these positive developments and look forward to continued growth and success for AFOMP.

Sincerely,

AFOMP Professional Relations Committee Updates

Chair PRC: Dr Mary Joan

Greetings from AFOMP PRC to one and all.

As the current PRC-AFOMP is entering the third and final year of the tenure, I would like to take this opportunity to thank you all for your warm response, exuberant enthusiasm and strong support in all our activities. Wish you all continued success in achieving professional and personal goals.

We had a successful 24thAOCMP held in conjunction with the SEAFOMP 2024 at Penang, Malaysia during 10-13 October 2024. Delegates from many AFOMP National Member Organizations actively participated in the conference with oral and poster presentations, invited talks and special symposia. PRC could reach out to many and had invigorating discussions on professional challenges and development goals. 11 AFOMP Travel Award winners could successfully attend the conference. Congratulations to the winners.I am glad to share with you all that the AFOMP travel awards budget is doubled for the IUPSEM WC and AOCMP 2025 to be held in Adelaide Australia from 29 September to 4th October 2025 to ensure effective support and better participation. Please keep visiting the conference and AFOMP website for updates.

The AFOMP monthly webinars and schools are continuing on a successful note with enthusiastic participation of members from AFOMP as well as outside the region. The 1st AFOMP Industrial webinar in collaboration with Radformation on 27th November 2024. Thank you very much all of you for the active participation in all the webinars and schools. Hearty welcome to the webinars of 2025 and looking forward to having your continued participation in the upcoming webinars.

As we strive forward for excellence in medical physics and professional competitiveness, AFOMP PRC is trying to reach out to all medical physicists in the region to support and collaborate for the betterment of each one's professional pursuits. Please feel free to reach out at prc.afomp@gmail.com. AFOMP has LinkedIn and Twitter (X) profiles and a YouTube channel through which AFOMP activities, medical physics news etc. are shared. We have recently launched a Facebook AND Bluesky accounts. Follow the accounts to keep ourselves updated with the AFOMP educational and professional activities.

AFOMP LinkedIn | AFOMP X (Twitter) | AFOMP Facebook | AFOMP Bluesky | AFOMP Youtube

Thanking you all for the continuing support and looking forward to strengthening the outreach and support to each and every medical physicist in the region.

Report: IDMP symposium on "Inspiring the Next Generation of Medical Physicists" at KLE University, India

Pioneering Symposium in "Advances in Medical Physics for Future Generation"

On the occasion of

International Day of Medical Physics (IDMP)

Theme: Inspiring the Next Generation of Medical Physicists

23rd November 2024

Boopalan Balaji
Chief Medical Physicist and Radiological Safety Officer, KLE Cancer Hospital,
KLES Dr. Prabhakar Kore Hospital and MRC, Jawaharlal Nehru Medical College,
KLE Academy of Higher Education and Research, Belagavi.
Email of presenting author: balanmp6@gmail.com

On 23rd November 2024, a pioneering symposium on "Advances in Medical Physics for Future Generations" with the theme of "Inspiring the Next Generation of Medical Physicists" was organized by the Medical Physics Division, Department of Radiation Oncology, KLE Cancer Hospital, Jawaharlal Nehru Medical College, KLE Academy of Higher Education and Research, Belagavi, to commemorate the International Day of Medical Physics 2024. The symposium was held in Prof. (Dr.) V.D. Patil Hall, KLE Convention Centre, JNMC Campus, KLE University, Belagavi.

The International Organization for Medical Physics (IOMP) started celebrating Madam Marie Curie's birthday (7th November) every year as International Day of Medical Physics. The purpose of celebration of IDMP is 1) Providing guidance and support to students and early career professionals. 2) Keeping young professionals updated on advancements in the medical physics field through workshops, symposiums, conferences, webinars, etc. 3) Facilitating idea exchange and collaboration through networking and 4) Highlighting accomplishments and raising public awareness about this profession.

On this International Day of Medical Physics celebration, we turned our focus to the future of healthcare-specifically, to the next generation of medical physicists. As we celebrate the vital contributions of medical physicists worldwide, it is essential that we inspire and empower young minds to take up the challenge of advancing this dynamic and impactful field. Medical physicists are at the heart of many of the innovations that improve patient care, from developing advanced imaging technologies to optimizing radiation treatments for cancer. But as healthcare continues to evolve, the need for skilled and passionate medical physicists are important.

We encouraged students, educators, and professionals alike to join forces in fostering a greater understanding of medical physics and its potential. Through mentorship, accessible education, and hands-on experience, we ignited the curiosity and creativity of tomorrow's medical physicists. We celebrated and supported those who inspire, educate, and mentor the future leaders of medical physics, ensuring that the next generation is ready to meet the challenges and opportunities of the future with passion, innovation, and dedication.

In view of these, we had received the 150 participants from the southern part of India with the regional states of Karnataka, Maharashtra, Telangana, Andhra Pradesh, Goa, and Tamil Nadu, and also some participants from Gurgaon, Haryana. Participants include young enthusiastic students, interns, young medical physicists, and senior medical physicists.

The Symposium was started with inaugural function which was graced by Chief Guest Prof. (Dr.) Nitin M. Gangane, Hon'ble Vice Chancellor, KAHER, Belagavi and Guests of Honour Prof. (Dr.) M. S.

Ganachari, Hon'ble Registrar, KAHER, Belagavi, Prof. (Dr.) V.D. Patil, Director, Hospital Development & New Projects, JNMC, KAHER, Belagavi, Prof. (Mrs.) N.S. Mahantashetti, Principal, J. N. Medical college, Belagavi, Prof. (Dr.) Rajesh Powar, Vice-Principal, J. N. Medical college, Belagavi, Prof. (Dr.) V.M. Pattanshetti, Vice-Principal, J. N. Medical college, Belagavi, Prof. (Dr.) Arif Maldar, Medical Superintendent, KLES Dr. Prabhakar Kore Charitable Hospital, Belagavi, Prof. (Dr.) M. V. Jali, Medical Director & CE, KLE Cancer Hospital, Belagavi, Dr. (Col.) M. Dayananda, Medical Director, KLES Dr. Prabhakar Kore Hospital & MRC, Belagavi.

Prayer Song

Welcome address by Dr. Imtiaz Ahmed

Introduction of IDMP 2024 by AMPI-K President

The inaugural program started with the prayer song. Dr. Imtiaz Ahmed, Prof. and Head of Radiation Oncology and the Organizing Chairman, welcomed the chief guest, guests of honor, invited speakers, chairpersons, and delegates, followed with lighting the lamp by the chief guest and other dignitaries. Mr. E. Rajadurai, AMPI-Karnataka Chapter Chairperson, spoke about the importance of celebrating the IDMP and highlighted the contributions of Madam Marie Curie in the field of medical physics. He also added the objectives of the IDMP and the theme of IDMP 2024, "Inspiring the Next Generation of Medical Physicists." Our chief guest, Prof. (Dr.) Nitin M. Gangane, Hon'ble Vice Chancellor, KAHER, delivered the speech about the importance of the medical physicist role, not only with radiation therapy but also with major contributions to diagnostic radiology and nuclear medicine and the demand of medical physicists with a huge scope in academia and research. He also appreciated the radiation oncology department's effort for organizing the symposium and wished the event success for the grant success. He also encouraged the young professionals to utilize the opportunity to mingle and collaborate with the seniors. The inaugural function is ended with a vote of thanks by Mr. Boopalan Balaji, Chief Medical Physicist and RSO, and the organizing secretary, extending gratitude for all the dignitaries, invited faculties, delegates, and the supporting team.

Welcome speech by Vice Chancellor, KAHER

Dr. Sanjay S Supe Memorial Award awarded to Dr. Ramesh Babu

In recognition of the excellence achieved and professional thoroughness exhibited in the field of medical/ radiological physics, the Executive Committee of the Association of Medical Physicists of India (Karnataka Chapter) considered and privileged to confer and honor the "Dr. Sanjay S Supe Oration

Award" for the year 2024 to Dr. S. Ramesh Babu, Senior Medical Physicist & Radiation Safety Officer, Karnataka Medical College & Research Institute, Hubli, Karnataka, during the International Day of Medical Physics 2024 celebrations and annual meeting of AMPI(K) hosted by KLE Academy of Higher Education & Research, Belagavi, on this day of 23rd November 2024 at Belagavi, Karnataka. The citation and the award were honored by Dr. M. V. Jali, Medical Director & CE, KLE Cancer Hospital, and by the Executive Committee Members of AMPI-K, Senior Physicists of the Karnataka Chapter. Academic Session-1 was started with Dr. S. Ramesh Babu by delivering the Dr. Sanjay S Supe Memorial oration for the year 2024 and excellent speech about the Advances in Medical Physics right from the lower to higher end techniques in Diagnostic Imaging, Nuclear Imaging and Radiotherapy. Second Invited Speaker Dr. Jerrin Amalraj, Lead Medical Physicist and RSO, Apollo Hospitals, Bangalore delivered the talk on Robotic Radiosurgery – The Relevance of Dedicated SRS Systems Versus Multimodality C-Arm Linac in Modern Radiosurgery. He has provided his excellent talk in the workflow of Cyberknife Robotic Radiosurgery System and difference in workflow with C-Arm Linac's and merits & demerits of dedicated RS systems vs Multi- Modality C-Arm Linacs. Session-1 was Chaired by Dr. K.M. Ganesh, Professor in Radiation Physics, Kidwai Memorial Institute of Oncology, Bangalore and Dr. Ashwin Patil, Professor in Radiology, Jawaharlal Nehru Medical College, KAHER, Belagavi.

Session 1,2,3,4 Chairpersons

Session-2 was chaired by Dr. Sathiyan S, Prof. and Head of Radiological Physics, Kidwai Memorial Institute of Oncology, Bangalore, and Dr. Mahesh Kalloli, Associate Professor in Surgical Oncology, Jawaharlal Nehru Medical College, KAHER, Belagavi. The first invited talk in Session-2 was presented on the topic of optimizing radiation oncology through robotic automation with script integration in Elekta Monaco and Varian Eclipse TPS by Dr. Pichandi Anchineyan, Director of Medical Physics, Healthcare Global Enterprises Pvt. Ltd., Bengaluru. He delivered his wonderful talk about the importance of artificial intelligence and the use of machine learning for the automation in planning of RT and real-world data scripting in the group of hospitals in HCG to enhance the planning output and to improve the standardization in the plan quality. Dr. Ravikumar, Professor and Head of Radiation Physics, Sri Shankara

Cancer Hospital and Research Centre, Bengaluru, delivered his excellent talk on Advances in Patient-Specific Quality Assurance. He spoke about the need for patient-specific QA in complex treatment, methods of PSQA, AAPM TG-218 recommendations for a point dose, planar dose, and 3D volumetric verification and its tolerance and action limits; a comparison of commercially available devices; challenges facing PSQA and machine learning virtual QA; and its interpretation in QA results. The third invited talk was presented in Essence of Motion management in Hypo fractionated Radiotherapy by Dr. N. Karthikeyan, Senior Medical Physicist and RSO, Mazumdar Shaw Medical Centre, Narayana Health, Bangalore. He spoke about the impacts of respiratory motion in radiotherapy, respiratory motion management techniques, types of motion management, systems for external and internal motion monitoring during RT delivery, hybrid methods, the recommended workflow for motion management, and the future scope in motion management.

Invited Talks by Dr. Jerrin Amalraj, Dr. Pichandi A., Dr. Ravikumar, Dr. Karthikeyan N, Shri. Ponnusamy, Shri. E. Rajadurai

Session-3 was chaired by of Dr. Shanmukhappa Kaginelli, Associate Professor and Head, JSS Academy of Higher Education and Research, Mysore, Dr. Kumar Vinchurkar, Professor and Head, Department of Surgical Oncology and Dr. Praful Maste, Professor and Head Neuro Surgery Department, Jawaharlal Nehru Medical college, KAHER, Belagavi. Session-3 first invited talk was in Commissioning and performance testing of the Catalyst HD+ Surface Guided Radiotherapy Platform by Dr. Karthikeyan S,

Chief Medical Physicist and RSO, Aster Hospitals, Bangalore. He presented about what is Surface Guided Radiotherapy and why we wanted to use SGRT, how does C-RAD SGRT work and useful for patients, commissioning, Quality Assurance, Integration of CRAD SGRT with LINAC, workflow and different types of Visual Monitoring devices. The next invited talk was presented by Shri. Ponnusamy, Senior Scientific Officer, Department of Neurosurgery, NIMHANS, Bangalore about the Precision in Practice: The role of Gamma Knife ICON in Stereotactic Radiosurgery. He spoke about the history of Gamma Knife Radiosurgery, CBCT image guidance optical motion tracking and gating capability Gamma Knife ICON machine and its frame systems, the modern way of source loading in the Gamma Knife machines, Quality Assurance tests, design of Gamma Knife Perfexion and ICON models, Layout requirement for Gamma Knife Systems and its radiation protection surveys, Gamma Knife SRS treatment workflow starting with Simulation, Planning, treatment plan Evaluation and Execution and finally treatment outcomes for Brain Metastases, Meningiomas, Vestibular Schwannomas, Vascular Disorders and challenges faced during treatment and post treatment. Last and final invited talk was presented in the topic of External beam planning for breast cancer patients: Practical Guidelines and suggestions for an effective planning strategy by Shri. E. Rajadurai, Chief Medical Physicist and RSO, Baptist Hospital, Bangalore. He presented about the simulation and scanning process for breast RT, different RT techniques of 3DCRT, IMRT & VMAT and its pros and cons of each technique. He also added the importance of beam arrangements and recommended the beam alignments for each technique for use reducing the OARs doses and better target coverage to fulfil the aim of RT.

Oral Presentation by Mr. Jagadish R, Ms. Kriuthika Prakasam, Mr. Thilakraj S, Ms. Ankita Narvekar, Mr. Mohammad Abdul Fatha, Mr. Ram Kumar

We have received the research abstracts from participants to present their research work in this symposium to encourage the young medical physicists and shortlisted eight abstracts were allowed to present during the symposium. The following abstracts were presented in the symposium 1) Validation of Treatment Couch model included in Eclipse TPS by Mr. Sridhar CH, Senior Medical Physicist, Father Muller Medical College and Hospital, Mangalore 2) An Institutional experience of India's first Shinva Linac machines: Commissioning and clinical performance by Mr. Jagadish R, Senior Medical Physicist, Indrayani Hospital, Pune 3) Setting the tolerance and action limit for patient specific quality assurance of craniospinal irradiation volumetric modulated arc therapy based on AAPM TG-218 report by Ms. Kiruthika Prakasam, Resident Medical Physicist, KMIO, Bengalore 4) An Initial Clinical experience of Total Skin Electron Irradiation at State Cancer Institute (SCI)-Karnataka by Mr. Mohammad Abdul Fatha, Resident Medical Physicist, KMIO, Bangalore 5) Quantification and comparison of the reference dose measurements using IAEA TRS-398 protocols and its revised version by Mr.Thilakraj S, Resident Medical Physicist, KMIO, Bangalore 6) Comparison of 2D,3DCRT, IMRT & VMAT planning for Oesophagus cancer in sequential method by Ms. Ankita Narvekar, Junior Medical Physicist, KLE Cancer Hospital, JNMC, KAHER, Belagavi 7) Comparative study of Manual Constraint-based and template constraint-based treatment plans generated by Varian ETHOS for Head and Neck Cancer Patients by Mr. Ram Kumar, Medical Physicist, HCG, Bangalore and 8) Evaluation of Relative Electron Density Vs Hounsfield unit of dedicated CT Simulator for various RT Protocols by Mr. Havin Kumar KP, Medical Physicist, KLE Cancer Hospital, KAHER, Belagavi. This Session-4 was chaired by the chairpersons of Dr. Maruthu Pandiayan, Chief Medical Physicist, Gleanegles BGS Global, Bangalore, Dr. Rohan Bhise, Professor and Head, Department of Medical Oncology and Dr. Rajendra Mali, Professor and RSO, Department of Diagnostic Radiology, Jawaharlal Nehru Medical College, KAHER, Belagavi. Scientific committee have selected 2 best oral presentations and AMPI-K awarded the case prize to encourage their

A part of Audience, Question and Answer Session, IDMP Group Photo, Organising Committee

active participation and presented their research paper. The symposium was ended with the valedictory function and prize distribution to winners of oral presenters. Mr. Mohammad Abdul Fatha and Mr. Havin Kumar received the Best Oral Presentation Award from Dr. M. V. Jali, Medical Director & CE, KLE Cancer Hospital, KAHER. Dr. Senthil Manikandan, AMPI-K Secretary provided the vote of thanks and appreciated the organizers who made the IDMP celebration with grand success. Dr. M.V. Jali, Medical

Director and CE delivered the short speech of grand success of IDMP 2024 with his appreciation for the Association of Medical Physicists of India-Karnataka Chapter for giving the opportunity to conduct this event and also thanked KLE university for provided the support and encouragement for this event. He also thanked all the invited speakers and faculties from the various cities and wished all the delegates, students and young medical physicist for their future endeavours and thanked them for wonderful contribution and active participation in this symposium. The symposium concluded with the inspiration for the younger generation of medical physicist with fulfil the objective of the theme “Inspiring the next generation of Medical Physicist”.

SCMPCR E-Learning Program (ELP-09): An Initiative to Advance Brachytherapy Practices

SCMPCR E-Learning Program (ELP-09): An Initiative to Advance Brachytherapy Practices

1. Introduction

The South Asia Centre for Medical Physics and Cancer Research (SCMPCR), in collaboration with the Alo Bhubon Trust (Alo-BT), successfully conducted the SCMPCR E-learning Program (ELP-09): Brachytherapy Practices for Medical Physicists and Radiation Oncologists – Intracavitary and Interstitial Procedures from November 1 to November 22, 2024.

As radiation oncology continues to evolve, brachytherapy remains a crucial modality that offers precise, localized radiation delivery with minimal impact on surrounding healthy tissues. However, access to standardized brachytherapy training remains limited in many regions, creating disparities in treatment quality.

To bridge this gap, SCMPCR ELP-09 was designed as a structured, interactive, and globally accessible program, offering specialized training in brachytherapy to medical physicists, radiation oncologists, and radiotherapy professionals. The program successfully integrated theoretical concepts with real-world applications, providing an advanced understanding of dosimetry, imaging, quality assurance, and treatment planning.

The program was officially accredited by the International Organization for Medical Physics (IOMP) and awarded 16 CPD points to participants who successfully completed the assessment. The curriculum consisted of nine live lectures (1 hour each) and a final examination (1-hour MCQ-based test) conducted on the ClassMarker platform.

With participation from over 15 countries across Asia, Europe, the Middle East, and North America, SCMPCR ELP-09 had a truly global impact, reinforcing SCMPCR's commitment to strengthening international collaboration in radiation oncology and medical physics education.

2. Objectives and Global Significance

The primary objectives of SCMPCR ELP-09 were:

- To enhance global expertise in brachytherapy, focusing on intracavitary and interstitial procedures.
- To introduce cutting-edge imaging techniques (MRI, CT, Ultrasound) in adaptive brachytherapy.
- To establish standardized training for medical physicists and radiation oncologists, ensuring uniform best practices worldwide.
- To facilitate international collaboration between professionals, institutions, and industry partners.
- To promote the integration of emerging technologies, such as AI-driven treatment planning and real-time adaptive brachytherapy.

The program not only empowered local medical professionals with specialized knowledge but also enhanced global clinical practices, ensuring that brachytherapy techniques are consistently applied across different healthcare systems.

By integrating expert faculty, industry leaders, and global participants, SCMPCR ELP-09 successfully strengthened international cooperation in cancer treatment and research.

3. Structure of the Program

3.1 Curriculum Overview

SCMPCR ELP-09 was designed to provide a step-by-step learning experience, covering fundamental, technical, and clinical aspects of brachytherapy. Each lecture was followed by a live Q&A session, encouraging direct engagement between participants and experts.

4. Global and Local Impact

4.1 Global Reach and Participation

The program attracted medical physicists and radiation oncologists from over 15 countries, ensuring broad geographical representation:

- Asia-Pacific: Bangladesh, India, Nepal, Pakistan, Sri Lanka, Malaysia, Indonesia, Thailand
- Middle East & North Africa: UAE, Saudi Arabia, Egypt
- Europe:Germany, Belgium, Netherlands, France
- North America: Canada, USA

This diverse international audience emphasized the growing demand for high-quality brachy therapy education and SCMPCR's role in facilitating global knowledge exchange.

Lecture No.	Topic	Speaker	Moderator
1	Introduction to Dosimetric Terms and Quantities for Brachytherapy	Prof. Dr. Hasin Anupama Azhari (Bangladesh)	Dr. Mary Joan (India)
2	Advanced Techniques in Brachytherapy: Present Status and Future Development	Dr. Frank Hensley (Germany)	Shayori Bhattacharjee (India)
3	Electronic Brachytherapy: Physical Basics and Medical Applications	Dipl.-Ing. Volker Steil (Germany)	Pratiksha Shahi (Nepal)
4	Prostate Brachytherapy: Interstitial Procedures, Imaging and Contouring	Prof. Dr. Ben Vanneste (Belgium)	Dr. Shafatuj Jahan (Bangladesh)
5	Intraoperative Breast Brachytherapy: Implementation and Clinical Considerations	Dr. Sujata Sarkar (India) Mahasin Gazi (India)	Dr. Vijitha Ramanathan Srilanka
6	Intracavitary Brachytherapy in Gynecological Cancer: Techniques and Planning	Dr. med. Robert Semrau (Germany)	Dr. Shejuti Sharmin (Bangladesh)
7	Application of Vienna and Cylinder Applicators in Gynecological Brachytherapy	Prof. Dr. Pamela Jeyaraj (India)	Dr. Jannatul Ferdause (Bangladesh)
8	MRI-Based Adaptive Gynecological Brachytherapy	Dr. Raju Srivastava (Belgium)	Dr. Atif Masood (Pakistan)
9	Practical Demonstration from Industry Experts	Steven Yong (Germany), Nastik Bhandari (Australia)	Dr. Anwarul Islam (Bangladesh)

4.2 Local Impact and Clinical Applications

- Standardization of Treatment Practices: Many participants from resource-limited settings gained access to advanced treatment protocols, improving patient care quality in their institutions.

- Technology Transfer: The integration of MRI-based adaptive brachytherapy was particularly beneficial for oncology centers adopting new imaging-guided treatment techniques.
- Strengthening of Professional Networks: Many participants collaborated on research and clinical projects, fostering long-term international cooperation.
- Improving Patient Outcomes: By applying TG-43 dosimetry protocols and adaptive planning, clinics can now optimize dose delivery, minimizing complications and enhancing treatment efficacy.

5. Final Examination and Certification

The final examination, held on November 22, 2024, was a 45-question MCQ-based test conducted via ClassMarker.

- Participants scoring 50% or higher received a CPD Certificate (16 Points).
- Participants who attended but did not pass received an Attendance Certificate.

Certificates were distributed electronically, ensuring easy accessibility for all participants.

6. Conclusion and Future Directions

The SCMPCR ELP-09 program marked a significant advancement in global brachytherapy education.

SCMPCR is committed to:

- Expanding future programs into AI-driven radiation therapy & SRS/SBRT.
- Developing hybrid training models, integrating hands-on workshops.
- Strengthening collaborations with leading universities, industry leaders, and research institutions.

We extend our sincere gratitude to our faculty, moderators, industry partners, and participants for making SCMPCR ELP-09 a resounding success.

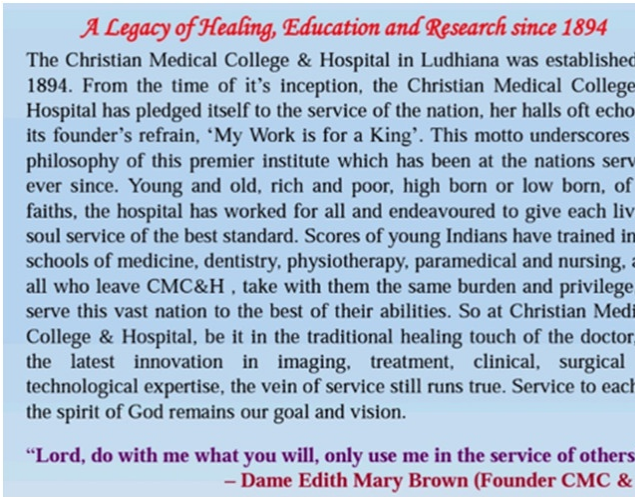
Report: IDMP Conference on Radiation Applications in Medicine at CMCH, Ludhiana, India

To commemorate
International Day of Medical Physics (IDMP) & International Day of Radiology (IDoR)
30th November 2024

On 30th November 2024, a conference on Radiation Applications in Medicine with the theme 'Inspiring the future generations of radiation professionals' was organized by the Departments of Radiation Oncology and Radio Diagnosis Christian Medical College & Hospital, Ludhiana to commemorate the International Day of Medical Physics (IDMP) and the International Day of Radiology (IDoR) 2024. This conference was accredited with 4 credit hours by the Punjab Medical Council. The conference was held in the Lady Willingdon Assembly Hall, Christian Medical College and Hospital, Ludhiana.

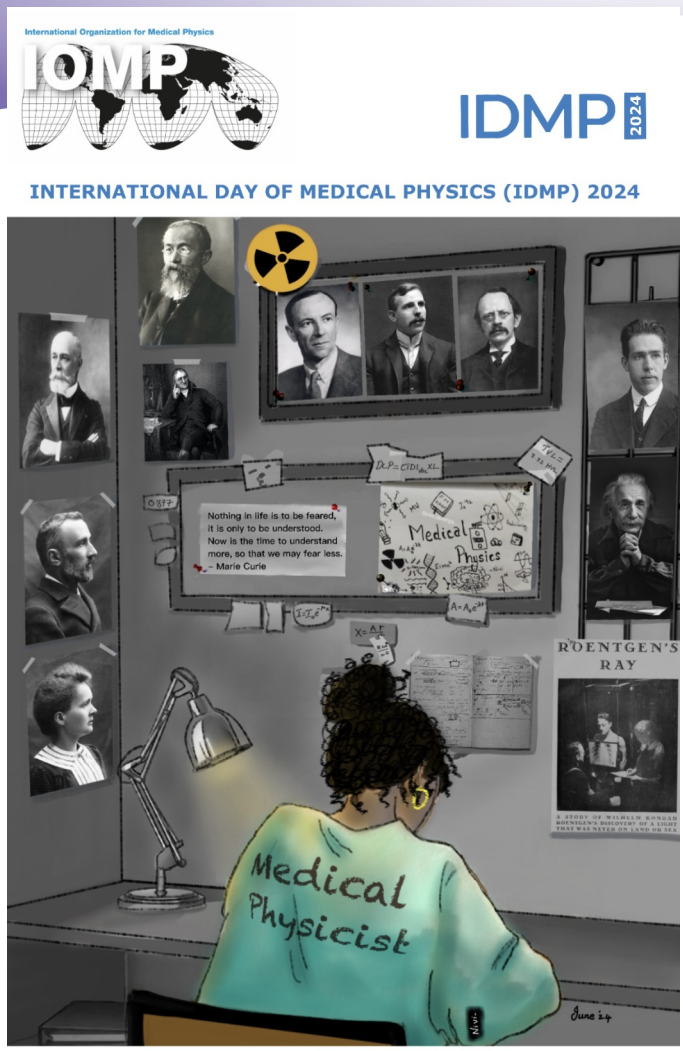
Contribution of Medical Physics in healthcare is multi-dimensional and it has improved the healthcare tremendously. The recent advancements in Medical Physics may it be in Radio diagnosis, Radiotherapy, Nuclear Medicine and various fields specially using ionizing radiation has made monumental sprints. To bring over it and recognize the contribution of Medical Physics to healthcare, International Organization for Medical Physics (IOMP) has started to celebrate 7th November, the birthday of Madam Marie Curie as International Day of Medical Physics (IDMP) since 2013. The main purpose of IDMP celebrations include motivating the organization of activities that result in the promotion of the subject of medical physics globally, increasing the visibility of the profession and outreach to fellow professionals and general public. Since the 7th day of November 2013, the very first International Day of Medical Physics, where various academic and teaching institutes showcased the contributions of medical physicists to healthcare globally and continues to be celebrated annually thereafter. Discovery of X-rays on 8 November 1895 by German physicist Prof Wilhelm Roentgen has revolutionized the medical diagnosis and treatment. The anniversary of this discovery is celebrated around the world as IDoR in recognition of the remarkable contributions made by radiological imaging and radiological treatment to health care, and the role of radiation professionals in providing quality care to patients.

Christian Medical College and Hospital Ludhiana has been always in the forefront to avail the best diagnostic and treatment facilities to treat patients since 1894. The teaching and training program for radiotherapy technologists in CMC Ludhiana dates to early 1960's and the MD Radiation Oncology program at the institute completed 30 years. The departments of Radiation Oncology and Radio Diagnosis collectively decided to commemorate the IDMP and IDoR 2024 and more than 450 healthcare professionals and trainees attended the conference.


A Legacy of Healing, Education and Research since 1894

The Christian Medical College & Hospital in Ludhiana was established 1894. From the time of it's inception, the Christian Medical College Hospital has pledged itself to the service of the nation, her halls oft echo its founder's refrain, 'My Work is for a King'. This motto underscores philosophy of this premier institute which has been at the nations serv ever since. Young and old, rich and poor, high born or low born, of faiths, the hospital has worked for all and endeavoured to give each liv soul service of the best standard. Scores of young Indians have trained in schools of medicine, dentistry, physiotherapy, paramedical and nursing, all who leave CMC&H , take with them the same burden and privilege serve this vast nation to the best of their abilities. So at Christian Medi College & Hospital, be it in the traditional healing touch of the doctor the latest innovation in imaging, treatment, clinical, surgical technological expertise, the vein of service still runs true. Service to each the spirit of God remains our goal and vision.

"Lord, do with me what you will, only use me in the service of others
– Dame Edith Mary Brown (Founder CMC &



Inspiring the next generation of Medical Physicists

Honourable Sub Divisional Magistrate, Moga, Ms Swati Tiwana inaugurated the conference and addressed the gathering of more than 300 delegates from across Punjab and neighboring states. She highlighted the importance of creating awareness among general public and emphasized the immense contribution of Madam Marie Curie to the health sector. Professor Dr MK Mahajan, guest of honour, a senior radiation oncologist from CMC Ludhiana illuminated the contributions of Sir Wilhelm Roentgen with the discovery of X-Rays. Professor Karamveer Goel Member Punjab Medical Council congratulated the organizing team and announce four credit hours. Prof Dr William Bhati, Director CMC Ludhiana congratulated the organizing team and said that more such conferences need to be conducted to create awareness. Prof Dinesh Badyal, Vice Principal encouraged the conduct of academic programs and conveyed the wishes of Dr Jeyaraj Pandian Principal CMCH. Prof Dr Pamela Jeyaraj, Head, Department of Radiation Oncology and Organizing Chairperson mentioned about the contributions made by the founder Dame Edith Mary Brown and the services rendered to cancer patients and Prof Dr Mary Joan, Organizing Secretary extended the vote of thanks to the entire invited faculty, delegates and the team of support persons.

Scientific Schedule

(30th November 2024 Saturday)

Morning Session

Time	Proceedings	Chairperson
08.00AM- 08.30AM (30 min)	Registration	
08.30AM- 09.00AM (30 min)	Inauguration	
09.00AM-09.30AM	Tea	
Session I		
09.30AM- 09.45AM (12+3 min)	Inspiring the future generations of Radiation Professionals **Dr M K Mahajan, Ludhiana**	Dr V K Dangwal Dr BS Rana
09.45AM- 10.00AM (12+3 min)	Mechanical Thrombectomy: CMC experience **Dr Rajeshwar Sanhota, Ludhiana**	Dr Harpal Singh Dr Ishu Sharma
10.00AM- 10.15AM (12+3 min)	Radiation Accidents: Causes, Consequences & Preparedness **Dr Preety Negi, Jalandhar**	Dr Sandva Sood Dr Pranay Pawar
10.15AM- 10.30AM (12+3 min)	Liver SBRT by Exac Trac Gating **Mr Rakesh Kaul, New Delhi**	Dr Preethi Paul Dr Tapasya Dhar
10.30AM- 10.45AM (12+3 min)	Theragnostics: Present and Future **Dr Dhananjay Kumar, New Delhi**	Mr Alok K Yadav Dr Gurpreet Kaur
Session II		
10.45AM-11.00AM (12+ 3 Min)	Safe Practice in Radiotherapy **Dr Kamlesh Passi, Ludhiana**	Dr Romikant Grover Dr Vivek Kumar
11.00AM-11.15AM (12+ 3 Min)	Advancing Imaging and Diagnostics with ultra-sound **Dr Chithra Krishnamoorthy, Noida**	Dr Shekhar Kapoor Dr Neha Chitkara
11.15AM-11.30AM (12+3 Min)	Building a culture of Radiation Safety **Dr Parneet Singh, Panchkula**	Dr Nitin Aggarwal Dr Navneet Kumar
11.30AM-11.45AM (12+3 Min)	Factors affecting SNR and CNR **Mr Yashpaul Samberia, Faridkot**	Dr Parvez Haque Mr Joy Anzer

Session III		
12.00noon- 12.15PM (13+2 min)	Small Field Dosimetry **Dr Reena Sharma, Chandigarh**	Dr Narjeet Kaur Dr Gurpreet Thiara
12.15PM- 12.30PM (13+2 min)	Radiation Protection in a Changing World **Dr Gourav Goyal, Bhatinda**	Dr Mary John Mr Shashank Shukla
12.30PM- 12.45PM (13+2 min)	Transportation of Radioactive Material **Mr Ramesh Chandra Sharma, Jaipur**	Dr Jaspinder Kaur Dr John Livingston
12.45PM- 01.00PM (13+2 min)	MR Linac- Early clinical experience in India **Dr Vivek Immanuel, New Delhi**	Dr Abhishek Samuel Ms Satinder Kaur
01.00PM- 02.00PM (60 min)	Lunch	
Afternoon Session		
Session IV		
02.00PM- 03.00PM (60 min)	**e-Poster Session I** Ms Nidhi Goswami Mr Abhishek Sehrawat Mr Vikram Singh Ms Shivani Bhakal, Ms Gunjann Sharma	**e-Poster Session II** Mr Mukesh Jain Mr Narender Sharma Mr Munish Sanhotra Ms Urvashi, Ms Kushpinder Kaur
03.00PM- 03.30PM (30 min)	Tea	
03.30PM- 04.30PM (60 min)	**e-Poster Session III** Mr Randhir Singh Doad Mr Mirza Burhan Ms Eswari Vigneshwaran Ms Ripanpreet Kaur	**Still and Working Models** Dr Kewal Aaditya Ms Rama Bhaw ani Mr Gurpreet Singh Mr Devaraju S
04.30PM-05.00PM	Prize Distribution and Valedictory Function	

The theme of this year's IDMP celebrations was 'Inspiring the future generation of medical physicists' and it inspires us to continue our collective commitment to improving patient care, advancing medical technology, and enhancing the overall well-being of our communities. The IDMP day is dedicated to raising awareness about the role of medical physicists in healthcare and their contributions to the well-being of patients. Medical physicists play a crucial role in areas such as radiation therapy, diagnostic imaging, and nuclear medicine, ensuring the safe and effective use of medical technology. The International Day of Medical Physics serves to highlight the importance of their work in improving the diagnosis and treatment of diseases and promoting the well-being of individuals worldwide. The rapidly evolving applications of physics in medicine demands new set of skills as well as outlooks to meet the challenges efficiently and successfully. This CME offered a forum for radiation professionals of various healthcare streams to come together and share invaluable experiences for improving the practice of applications of radiation in medicine. The scientific program included a key note talk by veteran radiation oncologist and former Professor and Head of Department of Radiation Oncology, CMC Ludhiana on the theme 'Inspiring the future generations of radiation professionals'. He has emphasized not only the contributions of scientists and clinical medical physicists to the field of radiation oncology, but also reiterated the importance of the role of medical physicists in routine clinical activities of radiation oncology, academic and research work. The session was moderated by Dr Sandhya Sood, Radiation Oncologist, Dayanand Medical College and Hospital Ludhiana and Dr Pranay Pawar, Vascular Surgeon, CMCH Ludhiana. Following the keynote address, Dr Rajeshwar Sahonta, Associate Professor of Neurology and Interventional Neurology spoke about the 'Mechanical Thrombectomy: CMC Experience, moderated by Dr Harpal Singh, Prof and Head, Dept of Gastroenterology, CMCH Dr Ishu Sharma, Radiation Oncologist, Mohan Dai Oswal Cancer Hospital Ludhiana.

A talk on Radiation accidents causes, consequences and preparedness by Dr Preety Negi, Radiation Oncologist, Capitol Hospital, Jalandhar was followed moderated by Dr Gurpreet Kaur, Senior Medical Physicist, Dept of Radiation Oncology, Baba Farid Government Medical College Faridkot and Mr. Alok K Yadav, Dept of Nuclear Medicine, Baba Farid Government Medical College Faridkot.

The next talk was 'Liver SBRT by ExacTrac Gating' by Mr Rakesh Kaul, Senior Radiotherapy Technologist, Max Hospital, New Delhi moderated by Dr Preeti Paul, Prof and Head, Dept of Pathology, CMC Ludhiana and Dr Tapasya Dhar, Prof., Dept of Genecology and Obstetrics, CMC Ludhiana. The next talk was on 'Theragnostics: Present and Future', by Dr Dhananjay Kumar, Medical Physicist, Dept of Nuclear Medicine, Yashoda Hospital, New Delhi moderated by Dr Parvez Haque, Prof and Head, Department of Surgery, CMCH Ludhiana and Mr Joy Anzer, Senior Radiology Technologist, CMCH Ludhiana. Following that the 'Safe Practice in Radiotherapy' was discussed by Dr Kamlesh Passi, Senior Consultant Medical Physicist, Dept of Radiation Oncology, Mohan Dai Oswal Cancer Hospital Ludhiana. This session was moderated by Dr Romikant Grover, Radiation Oncologist, Baba Farid Govt Medical College, Faridkot and Dr Vivek Kumar, Chairperson, Centre for Medical Physics, Punjab University, Chandigarh. A thriving discussion followed including various practical situations and challenges considering patient safety and patient doses. Next Talk was 'Advancing Imaging and Diagnostics with ultra-sound' by Dr DrChithra Krishnamoorthy, Medical Physicist, AMITY University, Noida moderated By Dr Shekhar Kapoor, Head, Oral Medicine and Radiology and Dr Neha Chitkara, Assistant Professor, Christian Dental College Ludhiana. Dr Parneet Singh, Radiation Oncologist, Panchkula deliberated on 'Building a culture of Radiation Safety' moderated by Dr Navneet Kumar, Prof and Head, Dept of ENT AND Dr Mary John, Prof and Head, Dept of Internal Medicine CMC Ludhiana. Dr Reena Sharma, Senior Medical Physicist, Dept of Radiation Oncology, PGI Chandigarh spoke on 'Small Field Dosimetry' moderated by Dr Narjeet Kaur, Prof and Head, Dept of Anesthesia and Dr Gurpreet Thiara, Head, Dept of Transfusion Medicine, CMC Ludhiana. Dr Gourav Goyal, Radiation Oncologist, Advanced Cancer Institute, Bhatinda spoke about 'Radiation Protection in a Changing World' moderated by Mr. Shashank Shukla, Medical Physicist, Kamla Nehru Medical College, Allahabad and Mr. Devaraju S, Senior Medical Physicist, HomiBhabha Cancer Hospital, Sangrur. Following that Mr Ramesh Chandra Sharma, Senior Technologist, SMS Medical College, Jaipur presented 'Transportation of Radioactive Material' moderated by Dr Jaspinder Kaur, Radiation Oncologist, Satguru Pratap Singh Hospital Ludhiana and Dr John Livingston, Dept of Cardiology CMC Ludhiana. The morning session concluded with a talk on 'MR Linac- Early clinical experience in India' by Dr Vivek Immanuel Radiation Oncologist, Fortis Hospital New Delhi moderated by Dr Abhishek Samuel, Dept of Orthopedics, CMC Ludhiana and Ms. Satinder Kaur, Senior Medical Physicist, Department of Radiation Oncology, PGI Chandigarh.

e-Poster presentations were followed after lunch on the theme 'Radiation Applications in Medicine' for the graduate and post graduate students to promote awareness and to nurture all round development.42 e-

posters were presented by medical physicists, radiology MD residents and BSc technology trainees, radiation oncology MD residents and BSc radiotherapy technology trainees from various medical colleges and teaching institutions across Punjab. A major attraction was the 5 models prepared and presented by graduate students upholding the spirit of the IDMP celebrations. Ms. Nidhi Goswami, Mr Abhishek Sehrawat, Mr. Vikram Singh, Ms. Shivani Bhakal, Ms. Gunjann Sharma, Mr. Narender Sharma, Mr. Munish Sanhotra, Ms. Urvashi, Ms. Kushpinder Kaur, Mr. Randhir Singh Doad, Mr. Mirza Burhan, Ms. Eswari Vigneshwaran, Ms. Ripanpreet Kaur, Dr Kewal Aaditya, Ms. Rama Bhawani, Mr. Gurpreet Singh, Mr. Devaraju S; a panel of Medical physicists, radiologists, radiation oncologists and technologists from various institutions across Punjab moderated and judged the e-poster presentations and models.

Ms. Nimmi Mathew, HomiBhabha Cancer Hospital Sangrur won the 1stPrizefrommedical Physicists. Dr Harshit Chouhan, MD RT, Dr Guntas, MD RD and Dr Benhur Jojan MD RD won the 1st, 2nd and 3rd prizes respectively from PG residents. Ms. Sejal Sharma, Ms. Kiran and Mr. Bhupendra Kothotiya won the 1st, 2nd and 3rd prizes respectively from radiotherapy technology students. From Radiology technology students Ms. Tanvi, Ms. Anumeet and Ms. Rukhsah won the 1st, 2nd and 3rd prizes. In the model session, Mr. Sahil (RD), Ms. Harshpreet (RD) and Ms. Vaishnavi (RT)won the 1st, 2nd and 3rd prizes. Dr Maria Thomas, Associate Director, CMCH Ludhiana presented the awards (certificate, trophy and momento) to the winners during the valedictory function. Following the prize distribution, the conference came to an end with a vote of thanks and the ethos of IDMP and IDoR strongly reverberating in all participants.

Punjab Focus

हर खबर _आपके लिए

पंजाब टेवम

पंजाब फोकस

आवश्यकता

हर गाँव और कस्बे मे मेहनती पत्रकारों की जरूरत है ।

Chief Editor Reena Sharma

M.7986036795 RNI NO.PUNBIL/2014/62126 E-mail:reenasharma49760@gmail.com

करिश्चयन मेडिकल हॉस्पिटल लुधियाना ने एक दिवसीय सीएम ई का आयोजन किया

Chairpersons

लुधियाना (ब्यूरो)बीते शनिवार को लुधियाना के करिश्चयन मेडिकल हॉस्पिटल के रेडियोथेरेपी एवं रेडियोलॉजी विभाग ने एक दिवसीय सीएमई का आयोजन किया! विभिन्न प्रदेशों के हॉस्पिटल एवं मेडिकल कॉलेजस के लगभग बीस वक्ताओं एवं दो सौ रेडियोलॉजी व रेडियोथेरेपी के स्टूडेंट्स ने भाग लिया! हॉस्पिटल के विकिरण विभागाध्यक्ष डॉ. सुभाष सिंगला एवं रेडियोथेरेपी विभाग के अध्यक्ष डॉ. पमेला ने मुख्य वक्ताओं का गुलदस्ते दे कर स्वागत किया. कार्यक्रम की अध्यक्षता डॉ. मेरी जॉन ने की! इस गोष्टी में ISRT पंजाब इकाई के पदाधिकारिओं ने भी प्रमुखता से भाग लिया! ISRT से उत्तरी -पश्चिम के मुख्य संयोजक श्री रणधीर सिंह डोड एवं महा सचिव श्री नरेंदर शर्मा ने स्टूडेंट्स के पेपर प्रदर्शनी में मुख्य निर्णायक की भूमिका निभाई! विभाग के मुख्य अधिकारी एवं ISRT पंजाब इकाई के प्रधान श्री जॉय एनजर व उपप्रधान श्रीमती मंजिन्दर कौर धानोवा ने आए हुए सभी मेहमानों का तहदिल से धन्यवाद किया व भविष्य में भी रेडियोलोजी से सम्बंधित कार्यक्रम करवाने का आश्वासन दिया .

To commemorate the International Day of Medical Physics & International Day of Radiology

Enhancing precision at the Institut de Cancérologie de Seine-et-Marne with LAP's LUNA 3D SGRT system

The Institut de Cancérologie de Seine-et-Marne (ICSM) is proud to be at the forefront of adopting innovative technologies in cancer treatment. Our facility is equipped with state-of-the-art technology, including TrueBeam STX with Dynamic Exactrac and RGSC, Clinac 2300ix, and HALCYON integrated with the LUNA 3D Surface Guided Radiation Therapy (SGRT) system. We treat approximately 1,700 patients annually, including 350 stereotactic and 200 Deep Inspiration Breath Hold (DIBH) treatments.

Our journey with SGRT began with implementing Dynamic Exactrac for patient positioning, alignment, and treatment monitoring. This system contributed to the success of our DIBH procedures, combining RGSC and SGRT with a threshold set at 3 mm to ensure high precision.

The installation of LUNA 3D at ICSM commenced with an LAP site inspection in January. This was followed by server preparation and theoretical training before the system delivery in February. The installation occurred fast, within a few days only in March, followed by practical training. This phased approach ensured that our team was well-prepared to use the new system.

The LUNA 3D system incorporates four strategically placed camera pods, three in front and one at the rear of our HALCYON, to enhance monitoring and positioning accuracy during treatments. The camera pods fit very well into our treatment room thanks to their attractive design.

Figure: LUNA 3D SGRT installed at HALCYON Linac

Before LUNA 3D, our HALCYON treatment workflow involved multiple steps, including patient setup with immobilisation systems, alignment using tattoo reference points, positioning at the treatment isocentre, and verification with CBCT imaging. The absence of a 6D couch and 2D kV imaging presented challenges, often requiring up to two CBCT scans to correct rotations and tilting. With LUNA 3D, this workflow has been significantly streamlined. The system allows verification of patient setup and alignment, including correcting rotational and tilt errors. This upgrade reduces the Frequency of multiple CBCT scans per session, improving treatment efficiency and precision.

The primary objective of using LUNA 3D SGRT was to enhance the precision of patient setup and reduce radiation exposure. This advancement saves time, decreases patient dose, and contributes to a more streamlined treatment process. Looking ahead, we aim to further optimise the use of LUNA 3D by moving towards eliminating tattoo reference points, thus enhancing the patient experience. Additionally, we are exploring the system's potential in continuous monitoring for improved safety and incorporating

DIBH capabilities.

Implementing LUNA 3D at ICSM marks a significant step forward in our SGRT treatment capabilities. The LUNA 3D system ensures precise patient positioning and contributes to safer, more efficient treatments. We are excited about future advancements and sharing our experiences to support other medical physicists in embracing similar technologies. We received excellent support from the LAP branch in France throughout the project. We also had a team of experts from LAP Germany at our side. We are now looking forward to smooth, continuous clinical use for the benefit of our patients.

Dr Kassis, Head of the Physics Unit at Institut de Cancerologie de Seine et Marne (www.icsm77.com), has 20 years of experience in radiotherapy. He has led the implementation of advanced treatment techniques, including VMATand stereotactic methods, and played a key role in expanding radiotherapy centres. Notably, he has overseen the installation of state-of-the-art equipment such as the TrueBeam STX and CyberKnife systems.

IUPESM 2025: Call for special Symposium !

We are pleased to announce submissions are now open for Special Symposium sessions for the IUPESM World Congress 2025.

Special Symposium is an important element to our Congress program, and Special Symposium sessions are included in the draft program available via the WC website:

IUPESM 2025 – Program Overview.xlsx

For information and to submit a proposal for Special Symposium visit the website here.

We kindly ask to share this email with link to the Special Symposium web page with your networks and encourage submissions for Special Symposium.

We look forward to receiving your submissions for Special Symposium and should you have any questions please let us know.

IUPESM 2025 Updates

Meet your Congress Ambassadors

International Scientific Chair
Prof M. Mahesh, MS, PhD, FAAPM, FACR, FACMP, FSCCT, FIOMP
Professor of Radiology and Cardiology
Johns Hopkins University
United States

Global Health/Post-Pandemic/ Preparedness
Prof Leandro Pecchia
Chair, Biomedical Engineering
University Campus Bio-Medico
Italy

Digital Health, Cybersecurity, Telehealth, Digital Therapeutics, Risk Management of Digital Technologies
Prof Trish Williams
Professor, Digital Health Systems
Flinders University
Australia

Meet our 2025 Ambassadors

Submit your Abstract!

Closing 11:59pm ACDT on Sunday 2 March 2025

The IUPESM World Congress 2025 is calling for innovators, researchers, and professionals to submit abstracts across diverse themes, from Radiation Biology and Radiation Protection to Biosignals Processing.

Presentation Formats

Oral Presentation	Digital Poster	Special Session

Submit your abstract

Plan your visit Adelaide!

Playing host to the IUPESM World Congress 2025 is Adelaide, where cutting-edge innovation meets breath-taking landscapes and rolling vineyards.

To assist all delegates in planning the perfect stay, we've partnered with Booking.com and nearby properties to bring you more discounted options on where to stay for your upcoming trip.

Start booking your stay

Register early and save $$$

Do you need a Visa ?

Planning your international trip to Adelaide for the IUPESM World Congress 2025?

Don't forget to check your visa requirements! Depending on your country of origin, processing times can vary, so we recommend applying as early as possible. Visit the official Australian immigration website for details and ensure a smooth journey to the Congress.

Visa and entry requirements

Sponsors + Exhibitors

Behind every great congress is a network of pioneers and innovators, and IUPESM World Congress 2025 is no exception.

We're thrilled to introduce our esteemed sponsors and exhibitors — industry leaders committed to advancing science, technology, and healthcare. Explore the companies that will be showcasing their expertise, products, and research at the Congress.

Platinum Partner

varian
A Siemens Healthineers Company

Gold Partners

Elekta

Congress Supporter

SUN NUCLEAR
A MIRION MEDICAL COMPANY

ROOFCLIMB
Adelaide Oval

THANK YOU TO OUR EXHIBITORS

alphaXRT · Australian Government Australian Radiation Protection and Nuclear Safety Agency · arpansa · BRAINLAB · Elekta · FRESENIUS KABI

gama healthcare · inMed MEDICAL | SCIENTIFIC | SOLUTIONS · LAP · PTW THE DOSIMETRY COMPANY

Radiation SAUNDERS · SUN NUCLEAR A MIRION MEDICAL COMPANY · THE medical ROOM · varian A Siemens Healthineers Company

Sponsorship & Exhibition Opportunities

JOINTLY ORGANISED BY

ACPSEM Australasian College of Physical Scientists & Engineers in Medicine · ENGINEERS AUSTRALIA · IUPESM IOMP IFMBE · IFMBE · IOMP

THIS CONGRESS IS SUPPORTED BY

Business Events Adelaide · SOUTH AUSTRALIA · Government of South Australia Department of the Premier and Cabinet · ADELAIDE CONVENTION CENTRE

MCQ in Medical Physics

1. A patient is prescribed to a depth of 5 cm using a single 6 MV x-ray beam. If 15 MV is prescribed instead:

A. max body dose will increase
B. entrance dose will increase
C. dose to the prescription point will increase
D. exit dose will increase
E. all of the above

2. A patient is treated on a linac (100 cm SAD) with a field adjacent to a previously treated field. The previous field has a collimator setting of 22 x 22 cm 2, 110 cm SSD. The current field has a collimator setting of 10 x 10 cm 2, 100 cm SSD. What gap is required at the skin for these fields to intersect at 5 cm depth?

A. 0.68
B. 0.70
C. 0.75
D. 0.80
E. 1.02

3. Which of the following detectors would be the best one lo locate a dropped I-125 seed?

A. Gas ionization type survey meter
B. Thermoluminescent dosimeter.
C. Air-equivalent wall "thimble" ionization chamber
D. Film badge.
E. Geiger counter

4. Based on the ICRP 60 (1990) and BEIR V (1990) reports, what whole-body dose delivered to a large group of people would result in the death of 50% of the group within 60 days, without medical intervention?

A. 1000 cGy
B. 700 cGy.
C. 450 cGy
D. 150 cGy
E. 50 cGy

5. An electron, a proton, and an alpha particle each have 20 MeV kinetic energy. Which of the following statements is true?

A. The alpha particle travels at almost the speed of light.
B. The alpha particle has the least total relativistic energy (i.e.. kinetic plus rest mass energy).
C. The proton has the highest total relativistic energy
D. The electron travels almost at the speed of light.
E. None of' the above

6. A new isotope Cs-131 with a half-life of approximately 10 days can be used for permanent implants If the activity of a calibration seed is 1.000 mCi on a given day and time, the activity 24 hours prior to this time is_____ mCi.

A. 0.900
B. 0.933
C. 1.072
D. 1.100
E. 1.148

7. Why don't electrons ever get invited to medical physics parties?

A. They always cause a scene
B. They are too negative
C. They can't handle the radiation
D. They always accelerate too quickly

Answers

PhD Abstracts: Application of Monte Carlo Simulation in the Treatment Planning for Radiation Therapy

Md. Anwarul Islam[1], Md. Abdul Mannan Chowdhury[2], Golam Abu Zakaria[3]

[1]PhD Student, Jahangirnagar University, Dhaka, Bangladesh
[2]Professor of Physics, Jahangirnagar University, Dhaka, Bangladesh
[3]Professor of Clinical Engineering, Anhalt University of Applied Sciences, Koethen, Germany

Email: anwarpabna@gmail.com

Abstract:

The goal of radiotherapy is to deliver optimum dose to the target and minimum dose to the critical structures. It requires fast and accurate methods of dose measurement to achieve this goal. The dose distribution to the tumor depends on the correct dose measurement. Experimental dose measurement is very complex, time consuming and needs a lot of attention including very many factors. A few percentage of error is always considered for the experimental measurement. Monte Carlo methods are well known and considered as gold standard for dose calculation in radiotherapy. To calculate the dose in heterogeneous media and in the regions of electronic disequilibrium, the Monte Carlo method is rooted by the fundamental laws of the particle Physics interactions is used. The purpose of this study was to simulate dose calculation of external photon beam using EGSnrc Monte Carlo (MC) code and compare them with the measured doses in homogenous and inhomogeneous medium. The complete geometry of the Elekta Synergy and Varian Clinac 2300CD linear accelerator (Linac) treatment head were designed using BEAMnrc MC Code and calculate dose by using DOSXYZnrc MC Code which are user codes from the EGSnrc. All the physical and technical parameters were provided by the manufacturers for designing the module. The Elekta Synergy was simulated to compare the MC Simulated data with experimental measurement data in homogeneous medium. Due to unavailability of Elekta data base commercial TPS for this study a Varian Clinac 2300CD was also designed to compare MC and commercial TPS. The MC simulated data of Varian model were compared with the commercial TPS algorithm of AAA and Acuros XB in homogeneous and inhomogeneous media. The water, air, lung and bone have been used as inhomogeneous media. A wide ranges of beam energy and Field with Half Maximum (FWHM) were investigated for 6 MV beam to match the realistic clinical measured data. A number of relative data and a single absolute data have been investigated. The relative data were PDD, Off Axis Beam Profile and Output Factor for the field size of 5 x 5 cm, 10 x 10 cm, 30 x 30 and 5 x 30 cm. The PDD of inhomogeneous media has been calculated with AAA and AXB algorithm in TPS and compared with MC code at 10 x 10 cm. The absolute data were investigated for a standard field size of 10 x 10 cm. The gamma criteria of 3%/3mm has been used to evaluate the difference between the measured and MC data. Other two criteria of 2%/2 and 1%/1mm also have been used to see the difference medium and extreme conditions. In homogeneous media, the average gamma pass rate of PDD for 3%/3mm, 2%/2mm and 1%/1mm for all field sizes were 100%, 100 % and 98.75% respectively. The results of Off Axis Beam Profile were 100%, 98.79% and 85.23% respectively for the same gamma criteria and field sizes. The results showed a very good agreement between measured and MC simulated data in homogeneous media. In inhomogeneous water-air media, the gamma pass rate for 3%/3mm, 2%/2mm and 1%/1mm of AAA VS MC and AXB VS MC 68.1,63.8, 40.4 and 85.1,83.0 72.3 respectively. Here MC data have comparatively good agreement with AXB algorithm in water-air media. In water-lung media the pass rate were 78.7, 72.3, 55.3 and 97.9, 97.9, 89.4 respectively. Here MC data have very good agreement with AXB data in all criteria. In water-bone media, the gamma pass rate was 97.9, 66.0, 19.1 and 97.9, 97.9, 91.5 respectively. In water-bone media gamma pass rate have good agreement at 3%/3mm with MC data where as in other two conditions were not meet. MC data have very good agreement with AXB data in all

gamma pass rate criteria. The results showed MC simulated data have very good agreement with AXB calculated data in all media. In case of air and lung media the AAA data have showed less pass rate. AXB calculation algorithm adopted MC simulation method and our results also showed good agreement with AXB. So the MC module has been correctly designed in this study.

The results showed that the BEAMnrc and DOSXYZnrc codes were an excellent tool for simulating the PDDs and beam profiles in homogeneous and inhomogeneous media. Therefore, the model built in this study used as promising method to calculate the dose distribution at any media.

PhD Abstracts: Impact of Sensitive Volume and Measurement Resolution of Multiple Detectors in Dosimetry of Flattening Filter Free Beam

Kanakavel Kandasamy[a], Dr. James Jebaseelan Samuel[b]
a – Research Scholar; b – Research Guide
Department of Physics, School of Advanced Science, Vellore Institute of Technology, Vellore, Tamilnadu, India.

Modern cancer radiotherapy treatments use a high-energy X-ray beam without a flattening filter (FF) in a linear accelerator as a flattening filter-free (FFF) beam to increase the therapeutic ratio, thereby increasing tumor control probability and decreasing normal tissue complication probability. The removal of the flattening filter (FF) results in significant changes in the beam's characteristics, making it difficult to measure. Profile analysis using the conventional method is unsuitable for FFF beams because the intensity changes dramatically along the beam's lateral axis. So, measuring the dosimetric parameters of the FFF beam with high-dose rate beams is very challenging and requires extreme care in choosing the right detector for the right measurement. We want to find out if the different ion chambers and silicon detectors work well with the FFF beam by looking at their linearity, sensitivity, reproducibility, energy dependence, dose rate dependence, percentage depth dose (PDD), profiles, and output factors. This included research on the feasibility of using different two-dimensional array systems for profile measurement, as well as their impact on results. In addition to the above, we also did some novelty work with a new flat ion chamber for surface dose measurement for both 6FF and 6FFF beams. The findings reveal that the detector's type and sensitive volume, measurement resolution during PDDs and profiles, and analysis software all have an impact on the measured field size, penumbra, output factor, and degree of unflatness. A larger volume results in a higher volume averaging effect, which in turn leads to a higher penumbra. Similarly, the higher the measurement resolution, the more accurate the profile analysis was possible. The flat chamber needed to have an overresponse correction for the buildup region of the given beam, especially for determining the surface dose. Overall, a measuring chamber must have a minimal volume and minimal perturbation effect for routine beam measurements. 2D arrays must have optimal detector resolution for routine profile measurements.

Keywords: FFF Beam, Detector volume, Measurement resolution, Flat chamber, 2D array, Volume averaging effect.

AFOMP Travel Awards for AFOMP Members

- Md. Mokhlesur Rahman (Bangladesh)
- Sadia Afrin Sarah (Bangladesh)
- Yiling Wang (China)
- Sheeba Gunasekaran (India)
- Rajalakshmi K A (India)
- Yanurita Dwihapsari (Indonesia)
- Hanifa Fithraturrahma (Malaysia)
- Muhammad Hafiz Hanafi (Malaysia)
- Loja, Christine (Philippines)
- Magdaong, Nikkitita (Philippines)
- Samuel Meng-En Lian (Singapore)
- Urshella Hishaam (Sri Lanka)
- Wiroon Monkongsubsin (Thailand)

New Product – Available Now

Mako – a meter and a milestone.

World, meet the future of X-ray quality assurance and testing!

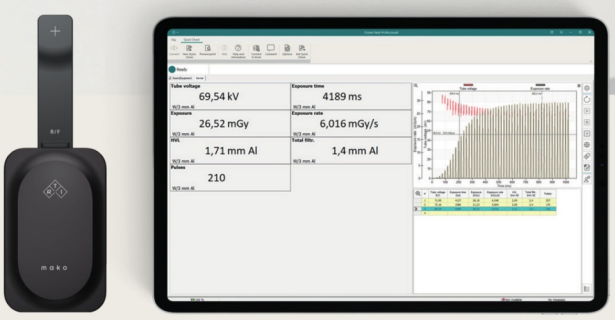
Efficiency
Accuracy
Versatility

Mako is a cutting-edge solution that revolutionizes your way of working with plug-and-play simplicity. With groundbreaking new sensor technology, best-ever accuracy, unrivaled in the market[1], Mako is the most efficient and versatile meter with the industry's broadest application range.

Place Mako Probes in any orientation in the X-ray beam, for the most efficient measurements of kVp, time, HVL, total filtration, dose, dose rate, frame rate etc, while revelling in the captivating presentation of waveform data. Add mAs, DAP, CTDI, light etc, utilizing the wide selection of options.

[1] ±1.5 % kVp uncertainty across entire measurement range.

Read more



Beyond the hills of spreadsheets, Ocean Next™ software awaits. Ocean Next™ gathers data from Mako in real-time so you can truly excel. Immerse yourself in a world of streamlined routines and complete traceability with Ocean Next™.

RTI

INDEPENDENT X-RAY
QUALITY ASSURANCE

RTI Group • sales@rtigroup.com
Phone: +46 31 746 36 00 • www.rtigroup.com

Officers and Council of AFOMP

President

Prof. Eva Bezak, PhD, FACPSEM
Professor in Medical Radiation,
University of South Australia
Adelaide, Australia
Email: eva.bezak@adelaide.edu.au

Vice President & Chair of Awards and Honors Committee

Prof. Dr. Hasin Anupama Azhari
Department of Medical Physics and Biomedical Engineering (MPBME), United International University,
Dhaka 1212, Bangladesh
Email: ahasinanupama@gmail.com

Secretary General

Dr. Aik Hao Ng
Senior Lecturer and medical physicist
Faculty of Medicine, University of Malaya
AFOMP correspondence should be addressed to: **Email**: sg.afomp@gmail.com

Immediate Past President

Prof. Arun Chougule
Dean &Chief Academic Officer,
Swasthya Kalyan Group of Institutions, Jaipur,
Ex-Dean Faculty of Paramedical Sciences
Ex-Pro Vice-Chancellor, Rajasthan University of health Sciences,
Ex-Sr. Professor & Head, Department of Radiological Physics

Treasurer

Dr. Taweap Sanghangthum
Assistant Professor and medical physicist Faculty of Medicine ,
Chulalongkorn University, Thailand
Email: mairt34@yahoo.com

Chair, Science Committee

Prof. Shigekazu Fukuda, Japan
Professor, National Institute of Radiological Sciences,
National, Institutes for Quantum and Radiological Science and Technology
Email: fukuda.shigekazu@qst.go.jp

Chair, Education & Training Committee

Prof. Xiance jin
Chief medical physicist and Vice director
Radiation and Medical Oncology Department,
The First Affiliated Hospital of Wenzhou Medical University
Email: jinxc1979@hotmail.com

Chair, Professional Relations Committee

Dr. Mary Joan
Associate Professor and Radiological Safety Officer,
Department of Radiation Oncology
Christian Medical College and Hospital,
Ludhiana Punjab, India 141008
Email: mary.joan@cmcludhiana.in

Chair, Funding Committee

Prof. Byungchul Cho
Professor and Medical Physicist
Department of Radiation Oncology, Asan Medical Center,
University of Ulsan College of Medicine
Email: cho.byungchul@gmail.com

AFOMP Website Manager

Asst. Prof. Rajni Verma
Department of Radiological Physics
SMS Medical College and Hospitals, Jaipur, India.302004
Email: 1989vermarajni@gmail.com

Chair, Publishing Committee

Dr. V. Subramani
Associate Professor,
Department of Radiation Oncology,
Dr. B.R.A.IRCH, AIIMS New Delhi, India
Email: manismpaiims@gmail.com

AFOMP PULSE NEWSLETTER
Editorial Board
(2023-2025)

Chairman, Publishing Committee
Dr.V.Subramani (India)

AFOMP President
Prof.Eva Bezak (Australia)

AFOMP Secretary-General
Dr.Aik Hao Ng (Malaysia)

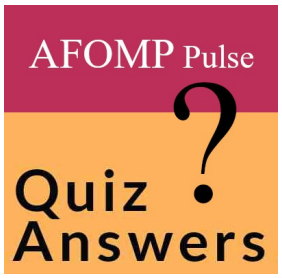
Editor (Scientific)
Dr.M. Akhtaruzzman (Bangladesh)

Editor (Educational)
Dr.Vanessa Panettieri (Australia)

Editor (Professional)
Dr.Zulaikha (Malaysia)

Editor (Technical)
Dr.Rajni Verma (India)

Answer for MCQ Quiz !



1. A patient is prescribed to a depth of 5 cm using a single 6 MV x-ray beam. If 15 MV is prescribed instead:

ANSWER: D. exit dose will increase

2. A patient is treated on a linac (100 cm SAD) with a field adjacent to a previously treated field. The previous field has a collimator setting of 22 x 22 cm 2, 110 cm SSD. The current field has a collimator setting of 10 x 10 cm 2, 100 cm SSD. What gap is required at the skin for these fields to intersect at 5 cm depth?

ANSWER: D. 0.80

3. Which of the following detectors would be the best one lo locate a dropped I-125 seed?
ANSWER: E. Geiger counter

4. Based on the ICRP 60 (1990) and BEIR V (1990) reports, what whole-body dose delivered to a large group of people would result in the death of 50% of the group within 60 days, without medical intervention?

ANSWER: C. 450 cGy

5. An electron, a proton, and an alpha particle each have 20 MeV kinetic energy. Which of the following statements is true?

ANSWER: D. The electron travels almost at the speed of light.

6. A new isotope Cs-131 with a half-life of approximately 10 days can be used for permanent implants If the activity of a calibration seed is 1.000 mCi on a given day and time, the activity 24 hours prior to this time is_____ mCi.

ANSWER: C. 1.072

7. Why don't electrons ever get invited to medical physics parties?

ANSWER: B. They are too negative

Notes

afompnewsletter@gmail.com

www.afomp.org