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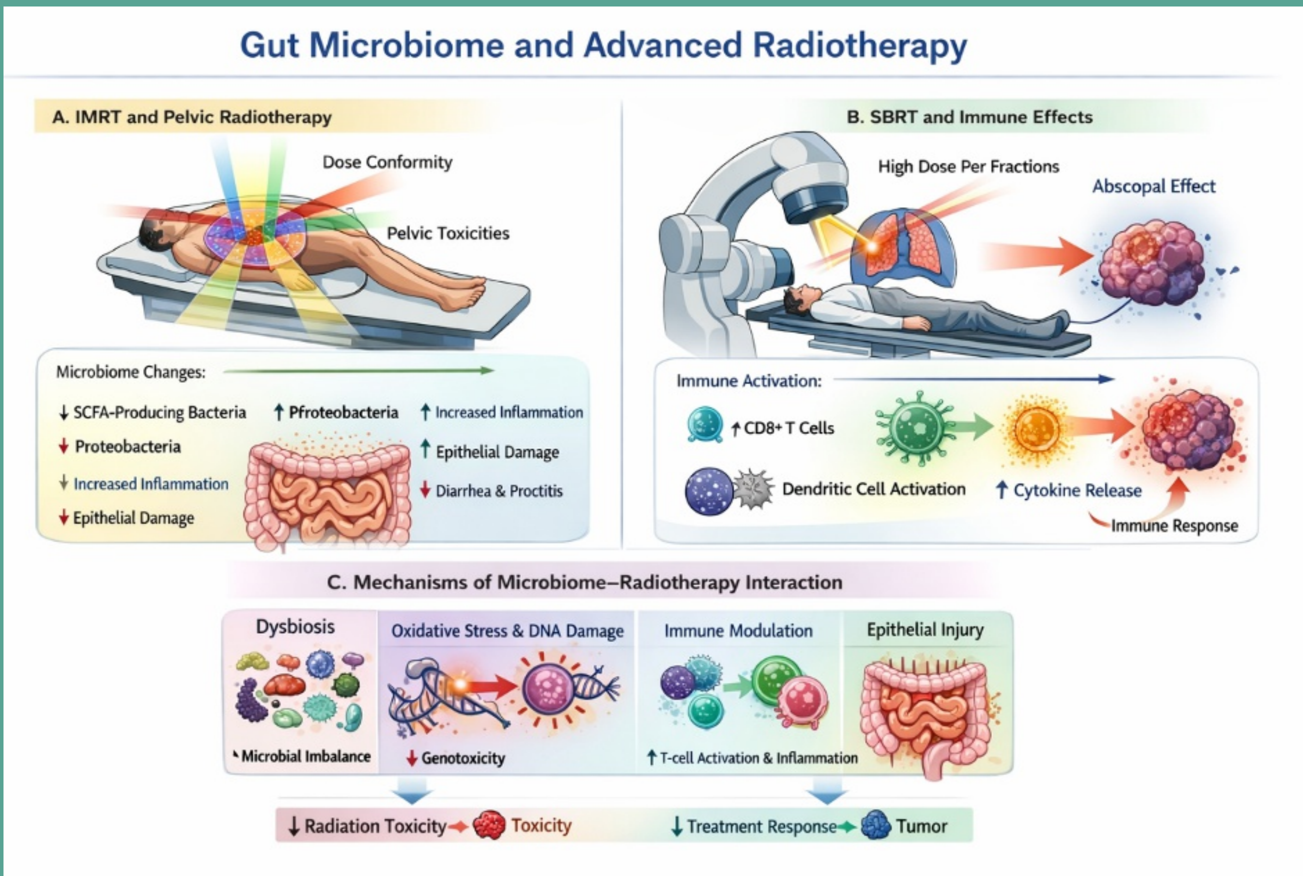
AFOMP Pulse

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



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Editorial

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Dear Readers,

Warm Greetings !

On behalf of the editorial board, I am delighted to present you, the year 2026 first edition of AFOMP PULSE, an official newsletter of Asia Oceania Federations of organization for Medical Physics, Volume.18: 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 marvellous science in action, professional and scientific articles, PhD abstracts, MCQs, NMO activities and IDMP2025 celebrations, professional news and updates and many other common interesting news on Medical Physics profession for the last six months in the AFOMP regions.

International Medical Physics Week (IMPW2026): IOMP dedicates a week to recognizing medical physicists' contributions to healthcare. IMPW2026, scheduled to be held from April 20-24, with theme focusing on "Sustainability in Healthcare: Medical Physics Contribution" 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.

AOCMP2026@Seoul: This year 26th annual congress of AFOMP is scheduled to be held at Busan from 9–11 September 2026. This important regional congress will provide an excellent platform for scientific exchange, professional collaboration, and the continued advancement of medical physics within our community.

I would like to express my sincere thanks to the editorial board members for their valuable contributions. I would like to extend my special thanks to Dr. Rajni Verma for her invaluable role as convenor in performing all editorial tasks of the newsletter and coordinating with all stakeholders in shaping and bringing forth this issue of newsletter.

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 2026.

Thanks & Regards,
Dr. V .Subramani
Chairman, AFOMP Publication Committee

AFOMP President's Message

Dear Colleagues and Friends,

It is my great pleasure to address you through this issue of the AFOMP Newsletter. The field of medical physics across Asia Oceania continues to grow rapidly, driven by technological innovation, increasing clinical demands, and a shared commitment to improving patient care. Our region is diverse in resources and expertise, yet united by a common goal to ensure safe, accurate, and high-quality use of radiation and imaging technologies in medicine.

Over the past years, AFOMP has strengthened its focus on education, training, and regional collaboration. Through webinars, schools, and joint scientific activities, we aim to support both early-career and experienced medical physicists in keeping pace with evolving technologies such as AI-driven treatment planning, advanced imaging, and precision radiotherapy. Capacity building remains a priority, especially for countries where the need for qualified medical physicists is increasing alongside expanding cancer and diagnostic services.

I am particularly encouraged by the growing engagement of young professionals and students in AFOMP initiatives. Their energy and ideas are vital for sustaining innovation and leadership in our profession. We will continue to promote mentorship, research collaboration, and knowledge exchange across member organizations to build a stronger, more connected community.

AFOMP stands committed to advancing gender equity in medical physics, empowering women to lead innovations that improve patient care and community wellbeing. This year Women's Day, we honor the contributions of women in medical physics - pioneers, mentors, and changemakers - whose work inspires the next generation of leaders.

Let us reaffirm our commitment to professional excellence, patient safety, and equitable access to quality healthcare technologies throughout the region.

Thank you for your continued dedication and support.

Warm regards,
Prof. Dr. Hasin Anupama Azhari
President, AFOMP

AFOMP Vice President's Message

Dear colleagues and friends in the medical physics community,

A New Term, A Digital Frontier: Unity in the Age of AI

It is a privilege to connect with you through the pages of the AFOMP Pulse following the recent election of the AFOMP office. I want to begin by extending my heartfelt gratitude to all who participated in the electoral process. The enthusiasm and engagement from our National Member Organizations (NMOs) demonstrate the vitality of our Federation and the collective commitment to shaping its future.

Spring is a time of renewal in many parts of the world, and it serves as a fitting metaphor for the ongoing evolution of our field. The landscape of medical physics is evolving faster than ever, driven largely by the integration of Artificial Intelligence (AI). From AI-assisted segmentation to deep learning in diagnostic imaging, the tools we use are changing fundamentally. This presents a dual reality: the promise of increased efficiency, but also the challenge of validating and regulating these technologies.

As medical physicist, often, our work happens behind the scenes - in the quiet calibration of a linear accelerator or the rigorous quality assurance of a scanner. But in the era of AI, our role is becoming more critical, not less. As AI algorithms become ubiquitous in radiology and oncology, the risk of automation bias grows. Who will ensure that the AI's contour is anatomically correct? Who will troubleshoot when a deep learning model encounters an edge case it wasn't trained on? That responsibility falls to us. AI is not a replacement for the medical physicist; it is a powerful tool that elevates our role as the ultimate safeguard of clinical quality.

In my role, I have witnessed the incredible enthusiasm of our young medical physicists. They are digital natives, adept at computation and eager to push the boundaries of technology. However, as AI begins to automate routine tasks, our educational focus must evolve. The next generation must move from being users of AI to being the auditors and ethical guardians of these systems. We must connect experienced pioneers - who understand the fundamental physics behind the images - with the trainees who will need to marry that foundational knowledge with data science. The future of healthcare in AFOMP depends not just on adopting AI, but on mastering it responsibly.

I look forward to working with the new Executive Board and all NMOs to turn these strategic challenges into opportunities for growth. Let us continue to share our knowledge, support our trainees, and advocate for the vital role we play in healthcare.

Thank you for your continued passion and hard work.

Sincerely,
Xiance Jin

AFOMP Immediate Past President's Message

Dear Colleagues and friends,

In October 2025 I concluded my term as President of the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) for 2022-2025, and serving in this role was a great honour as well as responsibility and I thoroughly enjoyed working not only with the ExCom team but many of you across the region.

No farewells are without thanks, and I must express my gratitude to our dedicated Executive Committee. It has been a privilege to work alongside such a committed and collaborative team. Your diligence, enthusiasm, and support have enabled us to function effectively and deliver of AFOMP mission of advancing the medical physics profession in the region.

My term finished the celebrations of 25th Anniversary of AFOMP, conducted during the Asia-Oceania Congress of Medical Physics 2025 (AOCMP2025), held as part of the IUPESM World Congress 2025 in Adelaide, Australia. This event and the special session held showcased the strength, scientific excellence, and friendships of colleagues in our region. (Thank you, Prof Subramani and Dr Rajni, for making the celebrations to happen.) At the same time, AFOMP held a number of region-specific sessions and symposia at Congress, where the high scientific standards of the congress reflected the collective effort of our EXCOM and member organizations. Dr Aik Hao also organized a number of sessions for the early career medical physicists (Thank you Dr Aik Hao).

Over the past three years, AFOMP has made developments across multiple fronts. We strengthened and expanded our awards program, recognizing outstanding professionals and inspiring the next generation of medical physicists (Thank you, Prof Anupama). Our education and training initiatives were further enhanced (Thank you, Prof Jin and Prof Fukuda-san), also through a more structured and sustainable sponsorship system, enabling broader participation and capacity building across the region (Thank you Byung-Chol and Dr Taweap).

We worked deliberately to foster a cohesive and transparent team culture within EXCOM, guided by shared goals and mutual respect. Importantly, we revamped our communication channels - modernizing our social media platforms (Thank you Prof Mary Joan) and reinvigorating the AFOMP PULSE newsletter to ensure more dynamic engagement with our members. The development and documentation of clear Standard Operating Procedures (SOPs) have also laid a strong governance
foundation that will benefit future teams.

These achievements were not the work of one individual, but of a truly united team committed to advancing medical physics in the Asia-Oceania region.

As we transition into the new term (202-2028), I extend my warmest congratulations and full support to our current AFOMP President, Prof Anupama Azhari. I have every confidence that under her capable leadership, AFOMP will continue to grow in impact, visibility, and service to our community.

Thank you once again to the past EXCOM members, our national member organizations, and all volunteers who have contributed their time and expertise.

Serving as your President has been an honour and a deeply rewarding journey.

With regards,
Prof. Eva Bezak

AFOMP Secretary-General's Message

Dear colleagues,

As we begin 2026, I would like to express my heartfelt gratitude for the trust and confidence you have placed in me to continue serving as Secretary-General of AFOMP for a second term. It is truly an honour to serve our professional community. I remain deeply committed to working together with all of you, our National Member Organisations (NMOs), council members, executive committees, regional leaders and dedicated volunteers, to further strengthen our collaboration and to advance the quality and impact of medical physics across our region. Through unity, professionalism, and shared purpose, we can continue to elevate standards of practice, education, and research for the benefit of patients and society.

I would also like to extend my warmest congratulations to everyone involved in the extraordinary success of the IUPESM World Congress on Medical Physics and Biomedical Engineering, held in conjunction with AOCMP 2025 in Adelaide in October 2025. This landmark event was not only scientifically outstanding but also historically significant for AFOMP.

During the congress, we proudly celebrated the 25th anniversary of AFOMP's formation, a meaningful milestone that reflects a quarter century of dedication, growth, and regional cooperation. A special highlight was the launch of the 25thAnniversary Issue of the AFOMP Pulse Newsletter, and the AFOMP leaders-members sharing session, commemorating our journey and achievements over the years.

Another remarkable achievement was the Early Career Medical Physicist Social Network Meeting, which brought together more than 150 delegates from around the world. The enthusiasm, energy, and vision of our early career colleagues were truly inspiring and reaffirm our confidence in the future of our profession. The AFOMP Award Ceremony was also a memorable occasion, recognising distinguished contributions and excellence within our community. I extend my sincere appreciation to all award recipients and nominees for their exemplary service and achievements.

As we embark on this new term of AFOMP leadership, I look forward to working closely with our dedicated executive committee members under the leadership of Professor Hasin Anupama. With renewed synergy, fresh ideas, and collective commitment, we are well positioned to reach new heights and to further strengthen AFOMP's role both regionally and globally.

Finally, I warmly invite you to join us at AOCMP 2026, to be held in Busan, Korea, from 9–11 September 2026. I encourage all members to participate actively and continue building our vibrant and forward-looking medical physics community.

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

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

AFOMP Treasurer's Message

Dear Readers,

As Treasurer of AFOMP, it is my great pleasure to extend my warmest congratulations to AFOMP on reaching its Silver Jubilee. Over the past 25 years, AFOMP has grown into a vital platform for communication, collaboration, and knowledge sharing among medical physicists across the Asia–Oceania region.

This milestone is a testament to the dedication and vision of its founding members, leaders, and all colleagues who have contributed to the development and success of AFOMP through the years.

I would also like to take this opportunity to congratulate AFOMP Pulse, which has played a significant role in documenting and disseminating AFOMP's activities, thereby connecting and inspiring our community.

I sincerely wish AFOMP and AFOMP Pulse continued success in advancing medical physics and in strengthening our professional community for many more years ahead.

With best wishes,
Dr. Taweap Sanghangthum
Treasurer, AFOMP

International Women's Day Special: A reflection

Eva Bezak
The Immediate Past President of the Asian-Oceanian Federation of Organizations for Medical Physics (AFOMP)

On 8th March, we celebrate the International Women's Day, honouring the achievements of women across our Asia-Oceania region, including their scientific competence, intellectual rigor, curiosity, and different perspective that women bring to medical physics and healthcare.

When asked to write this short article for the AFOMP PULSE newsletter, I reflected on my own journey: I wanted to be a scientist from early childhood.

Initially, a palaeontologist (well, what child does not want to dig for dinosaur bones) and then, at about 14 years of age, I decided to study physics – a subject that would enable me to understand the workings of our universe. It was not completely surprising, as I was good at maths and sciences, developing in Year 6 (primary school) my own solutions to some combinatorics problems and equations with one unknown. When deciding on my university studies, I looked at the list of most difficult courses, and right at the top was nuclear physics. So that was what I decided to enroll in; perhaps making my parents a bit disappointed for not going to medicine, but they would never try to discourage me from my own decisions. That it is perhaps what drove me in life: looking at difficulties as challenges that were there to tackle rather than being afraid of problems.

Have I met with discrimination? Yes, unfortunately. I feel that women have to prove themselves in a number of ways: a) that they are competent scientists and b) that they can manage work, high level appointments with family and household duties. But I can stand my ground. Luckily, times seem to be changing. In the years post PhD, I became the first female president of the Australasian College of Physical Scientists and Engineers in Medicine, I was the first female president of AFOMP and now I am honoured to serve as president of IOMP.

Additionally, I was a founding member of Women in Medical Physics and Biomedical Engineering Task Group under IUPESM. My work did not go unnoticed, as in 2019 I was included in the South Australian Women's Honour Roll of women who have made a significant impact on the community, women who are role models and leaders.

But, enough about me. In our medical physics profession, scientific competence ensures safety, precision, and trust. When these qualities are nurtured in an inclusive environment, supported by kindness and strengthened through mentorship, they become forces for transformation. As leaders, colleagues, and mentors, we share responsibility for cultivating spaces where talent thrives and potential is realized without barriers. It is a striking paradox that although women drive nearly 80% of healthcare decisions for families, women have historically faced persistent challenges in accessing quality healthcare. These challenges include lack of representation in medical research, misdiagnosis, conscious and unconscious bias, and under-treatment. Such inequities influence outcomes, erode trust, and limit progress (https://www.zealvc.co/press/2024-Health-Equity).

Research and business data consistently demonstrate that diverse teams are more adept at problem-solving, foster greater creativity, and accelerate innovation compared to homogenous groups. Homogenous teams may feel easier, but easy may not deliver the best performance or outcomes. All science, including medical physics, benefits greatly from the varied viewpoints and experiences that diverse teams bring, leading to quicker advancements and novel insights in research and clinical methodologies.

Yet diversity alone is not enough. We must first focus on inclusion, and diversity will improve as a result. In an inclusive culture, people make a valued contribution and derive a genuine sense of belonging. An inclusive culture provides the foundation for supporting those who may be unintentionally marginalised. It ensures that competence is recognized, voices are heard, and contributions are respected.

I operate and teach others to adopt what I call the "4G Network Principle" (my own term): Gender, Generation, Geography, and Genetics (ethnicity). When we intentionally build teams that reflect diversity across these four dimensions, we strengthen our clinical processes, scientific development, and thus enhance patient-centred care. Different lived experiences shape better research questions. Broader representation improves study design. Inclusive leadership drives innovation.

Diversity, Equity and Inclusion principles should also govern talent pipelines: attracting, developing, mentoring, sponsoring, and retaining the next generations of diverse and inclusive global leaders at all levels of your organizations (https://www.mckinsey.com/capabilities/people-and-organizational-performance/our-insights/why-diversity-matters).

Together, we can ensure that the future of medical physics, and healthcare more broadly, is not only innovative, but equitable and inclusive.

Beyond dose distribution: Gut microbiome as a new biological determinant in modern radiotherapy

Prof. Arun Chougule PhD, FIUPESM, FIOMP, FAMS
Past President of AFOMP and Immediate past Chair of ETC IOMP
Vice President of Indian Society of Radiation Biology (ISRB)
arunchougule11@gmail.com

Introduction: From Physical Precision to Biological Precision

Over the last two decades, radiation oncology has witnessed remarkable technological advances. Techniques such as intensity-modulated radiotherapy (IMRT), stereotactic body radiotherapy (SBRT), and image-guided radiotherapy (IGRT) have allowed medical physicists to sculpt dose distributions with millimetric precision. Yet, despite similar dose–volume histograms (DVHs), clinicians frequently observe significant inter-patient variability in treatment response and normal tissue toxicity.

This inconsistency raises an important question: Are physical dose parameters alone sufficient to explain radiotherapy outcomes? Emerging evidence suggests that the gut microbiome, the complex community of microorganisms residing in the gastrointestinal tract may be a critical, previously overlooked biological modifier of radiotherapy response and toxicity. Gut microbiota may be an important player in modulating tumour microenvironment, ultimately affecting treatment efficacy. The gut microbiome can influence both the effectiveness of cancer treatment and the severity of cancer treatment induced gastrointestinal toxicities

Why should Medical Physicists care about the Gut Microbiome?

At first glance, the gut microbiome may appear far removed from beam modelling, inverse planning, or quality assurance. However, the microbiome directly influences several processes that are central to radiotherapy:

- Radiation-induced inflammation
- DNA damage response and repair
- Immune activation and suppression
- Normal tissue regeneration

For pelvic, abdominal, and even extra abdominal radiotherapy, these biological effects can significantly alter the therapeutic ratio, irrespective of how well the dose is optimized.

Radiotherapy induced Dysbiosis: An unintended Biological Effect

Ionizing radiation does not affect only tumour cells and normal tissues, it also alters gut microbial ecosystems. Radiotherapy can induce dysbiosis, characterized by:

- Reduced microbial diversity
- Loss of beneficial short-chain fatty acid (SCFA) producing bacteria
- Expansion of pro-inflammatory and pathogenic species

These changes are particularly pronounced during:

- Pelvic IMRT (cervical, prostate, rectal cancers)
- Abdominal SBRT
- Chemoradiation protocols

Importantly, dysbiosis may persist long after treatment, contributing to chronic radiation toxicity.

IMRT and the microbiome: more than bowel dose constraints

IMRT has significantly reduced high-dose exposure to bowel loops, yet **acute diarrhoea and chronic radiation proctitis** remain common. Recent clinical studies indicate that:

- Patients with low baseline gut microbial diversity experience higher grade gastrointestinal toxicity
- Loss of Faecalibacterium prausnitzii (a butyrate producing bacterium) correlates with mucosal inflammation
- Increased Proteobacteria abundance is associated with severe proctitis

This suggests that two patients with identical DVHs may respond very differently due to underlying microbiome differences, a paradigm familiar to physicists working in Radiogenomics, now extending into **Radiomicrobiomics**.

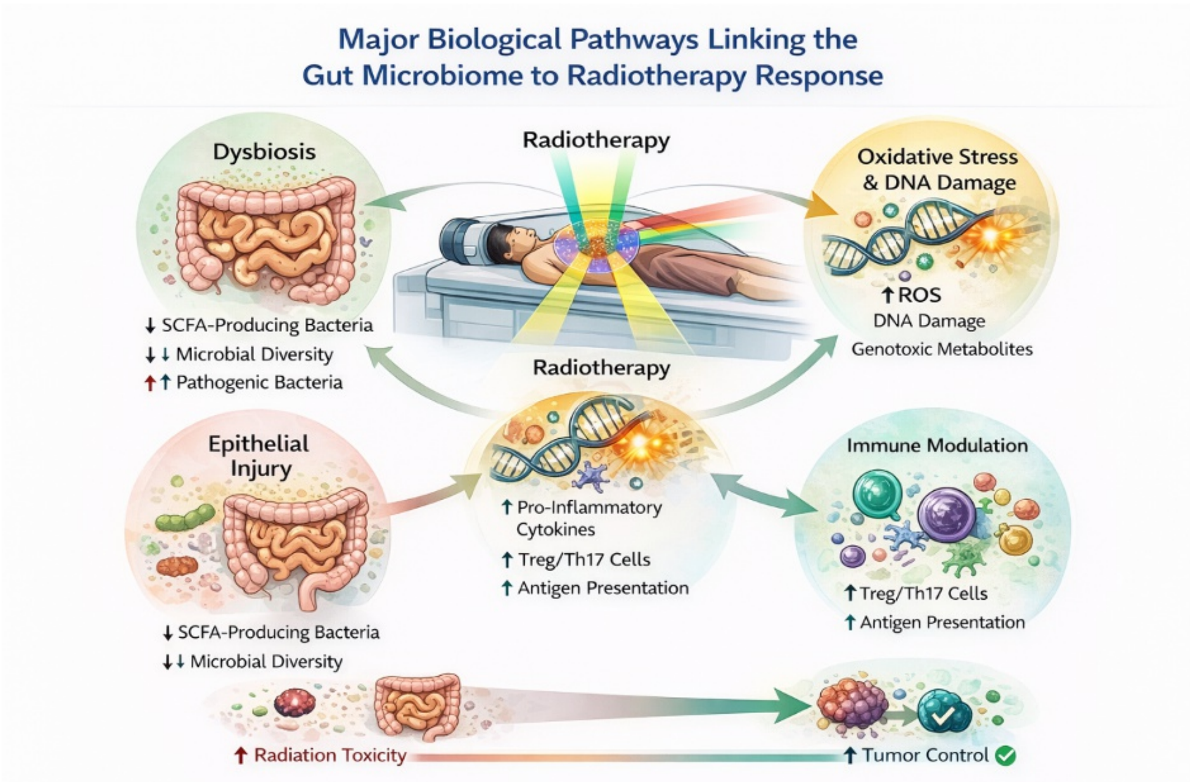

Figure 1. Schematic representation of gut major pathways on microbiome alterations during radiotherapy response

SBRT, High Dose per Fraction, and Immune Modulation

SBRT introduces unique radiobiological effects:

- High dose per fraction
- Vascular damage
- Strong immune activation

The gut microbiome modulates these effects by shaping systemic immune responses. Preclinical and early clinical evidence suggests that:

- Favourable microbiome profiles enhance immune mediated tumour control
- Antibiotic induced microbiome depletion reduces SBRT efficacy
- The microbiome influences the likelihood of observing the abscopal effect

For medical physicists involved in SBRT planning, this reinforces the idea that biological context matters as much as geometric accuracy.

Pelvic and abdominal radiotherapy: A Microbiome-critical site

Pelvic and abdominal radiotherapy represents the most clinically relevant interface between radiation and the gut microbiome. Radiation induced changes in gut flora contribute to:

Clinical Effect	Microbiome Contribution
Acute diarrhoea	Inflammatory dysbiosis
Chronic proctitis	Persistent microbial imbalance
Late enteropathy	Impaired epithelial regeneration

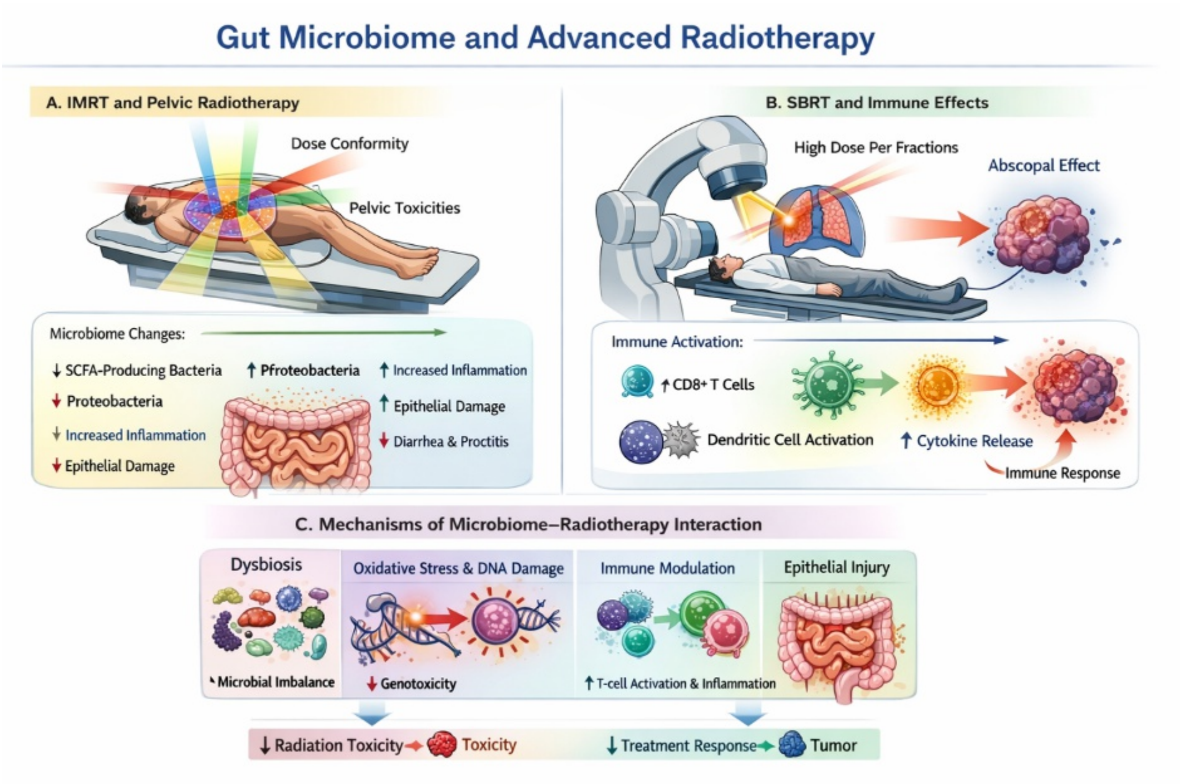

Figure 2. Major biological pathways linking the gut microbiome to radiotherapy response.

Radiotherapy induced dysbiosis amplifies oxidative stress, DNA damage, inflammatory cytokine release, and immune dysregulation. Altered antigen presentation and imbalance between regulatory (Treg) and effector (Th17/$CD8^+$) immune cells influence both tumour control and normal tissue injury. These pathways operate independently of physical dose parameters and help explain inter-patient variability in outcomes.

The microbiome immune radiotherapy axis

With the deeper understanding of radiobiology underlying radiotherapy management of cancer, it is now recognized that radiotherapy works as an immune modulating treatment. The gut microbiome acts as a biological amplifier of this effect by:

- Enhancing antigen presentation
- Promoting CD8+ T-cell activation
- Regulating cytokine signalling

This triad is especially relevant in combined radiotherapy with immunotherapy protocols, where microbiome composition can determine treatment success or failure.

Clinical translation: what can be done today?

While microbiome guided radiotherapy planning is not yet routine, several practical considerations are already relevant:

- **Avoid unnecessary antibiotics** during radiotherapy
- Encourage **high fibre diets** to support SCFA production
- Consider probiotics cautiously in selected patients
- Recognize unexplained toxicity as a possible biological and not as dosimetric phenomenon

Future integration may include baseline microbiome profiling alongside imaging and dosimetric data.

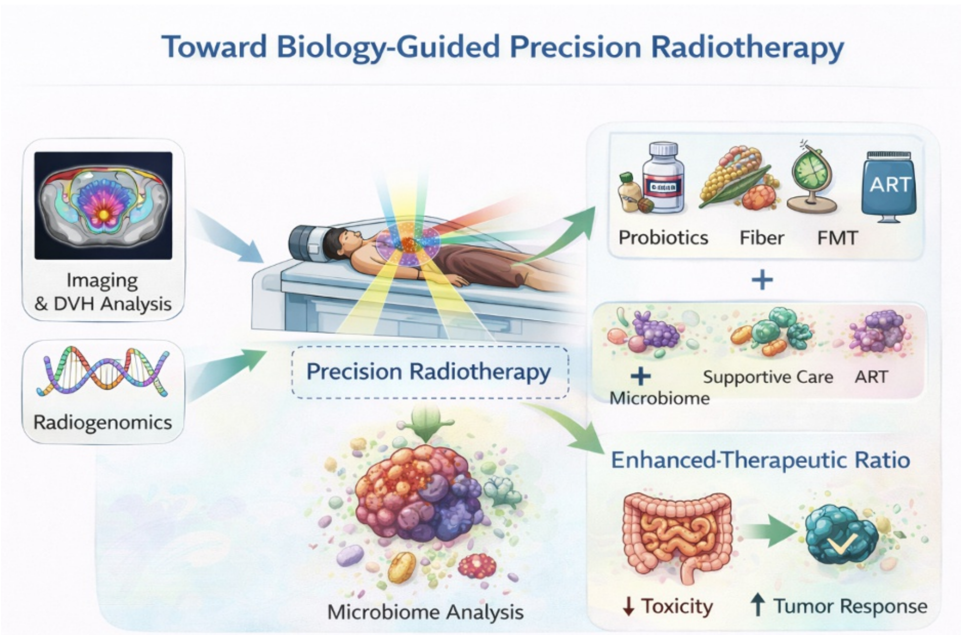

Figure 3 : Future radiation oncology workflows may incorporate baseline microbiome profiling alongside imaging, DVH analysis, and Radiogenomics. Microbiome informed supportive care and adaptive strategies could improve therapeutic ratio by reducing toxicity and enhancing tumour response without altering prescribed dose.

Implications of understanding of microbiome effect by Medical Physicists

The evolution of radiotherapy has progressed from conventional dose delivery to advanced technics such as CRT, IMRT, IGRT and the next frontier can be **biology guided radiotherapy**, where microbiome data complements Radiogenomics, functional imaging, and AI-driven planning. For medical physicists, this represents an opportunity to expand the scope of precision from shaping dose distributions to understanding biological variability.

Conclusion

The gut microbiome is emerging as a significant biological determinant of radiotherapy response and toxicity, particularly in IMRT, SBRT, and pelvic radiotherapy. While advanced technology has optimized physical dose delivery, biological heterogeneity continues to shape clinical outcomes. Integrating microbiome science into radiation oncology offers a promising pathway toward truly personalized radiotherapy where physics and biology work in harmony to improve patient care.

Further readings

1. Jing Liu, Chao Liu, Jinbo Yue : Radiotherapy and the gut microbiome: facts and fiction. Radiat Oncol. 2021 Jan 13;16:9. doi: 10.1186/s13014-020-01735-9
2. Gerassy-Vainberg, S., Blatt, A., Danin-Poleg, Y., Gershovich, K., Sabo, E., Nevelsky, A., Daniel, S., Dahan, A., Ziv, O., Dheer, R., Abreu, M. T., Koren, O., Kashi, Y., & Chowers, Y. (2018). Radiation induces proinflammatory dysbiosis: Transmission of inflammatory susceptibility by host cytokine induction. Gut, 67(1), 97-107. https://doi.org/10.1136/gutjnl-2017-313789
3. Li-Wei Xie et al.: Gut microbiota and radiation-induced injury: mechanistic insights and microbial therapies. Gut Microbes. Volume 17, 2025 https://doi.org/10.1080/19490976.2025.2528429
4. Beth A Helmink, M A Wadud Khan, Amanda Hermann, Vancheswaran Gopalakrishnan, Jennifer A Wargo :The microbiome, cancer, and cancer therapy. Nat Med. 2019 Mar;25(3):377-388. doi: 10.1038/s41591-019-0377-7.

Meet the Expert: Prof Abu Golam Zakaria interviewed by Dr. Rajni Verma

https://youtu.be/-y1zig6iLGo

The AFOMP *Meet the Expert* series proudly features **Prof. Dr. Golam Abu Zakaria**, a globally respected leader and pioneer in the field of medical physics. His career represents an extraordinary blend of scientific innovation, visionary leadership, academic excellence, and dedicated service to the international medical physics community.

Born in Naogaon, Bangladesh, Professor Zakaria's academic journey began with outstanding scholastic achievements that led him to pursue higher education in Germany. He completed his Master's degree in Physics with specialization in Medical Physics at Martin Luther University Halle-Wittenberg. He later earned his Ph.D. in Medical Physics with *Magna Cum Laude* distinction from the University of Heidelberg - one of Europe's most prestigious institutions.

During his early scientific career, Professor Zakaria made groundbreaking technical contributions. He developed the first electron ionization chamber in East Germany to address the absence of dedicated instrumentation for accurate electron dose measurements in radiation therapy. This innovation was successfully utilized for several years in clinical practice. Furthermore, during his doctoral research, he developed a Treatment Planning System (TPS) based on a pencil beam approach for three-dimensional electron dose calculations. This system was implemented at Heidelberg University Hospital and served clinical needs for over a decade - a remarkable achievement demonstrating the practical impact of his research.

Beyond his scientific accomplishments, Professor Zakaria is widely recognized for his leadership in strengthening medical physics education and accreditation globally. He served as Chairman of the DGMP Task Group on Medical Physics in Developing Countries, where he actively promoted capacity building and knowledge transfer between developed and developing nations. His long-standing commitment to international cooperation reflects his belief that equitable access to quality medical physics education is fundamental to improving cancer care worldwide.

At the international level, he has played a pivotal role in shaping accreditation standards. He has served as Vice Chair of the IOMP Accreditation Board and Chairman of the Accreditation Committee-2 of the International Medical Physics Certification Board (IMPCB). Through these roles, he has contributed significantly to establishing and maintaining high standards in medical physics training, certification, and professional recognition across multiple regions.

Professor Zakaria is the **Founder Chairman of the South Asia Centre for Medical Physics and Cancer Research (SCMPCR), Dhaka**, an institution dedicated to advancing education, research, and professional development in the region. His vision for SCMPCR reflects his commitment to building sustainable infrastructure for medical physics in South Asia. Over the decades, he has supervised more than 230 Bachelor's, Master's, Residency, and Ph.D. students, mentoring generations of professionals who now serve in academia, hospitals, and research institutions worldwide.

His contributions have been widely acknowledged through numerous prestigious honors and recognitions. He is a Fellow of the International Organization for Medical Physics (FIOMP) and recipient of the Harold Johns Medal, awarded in recognition of excellence in teaching and outstanding contributions to the national and international development of medical physics. In 2024, he was awarded the Federal Cross of Merit (Bundesverdienstkreuz), Germany's highest civilian honor, recognizing his exceptional services to health, education, and international cooperation.

Professor Zakaria's life and career exemplify the qualities of a true bridge-builder - connecting continents, institutions, and generations. He has fostered collaborations between Europe, Asia, and Africa, promoted academic exchange, and championed inclusive growth in the profession. His work extends beyond scientific advancement to nurturing human capital, inspiring young professionals, and strengthening global solidarity within the medical physics community.

In this AFOMP Meet the Expert session, Professor Zakaria shares insights from his decades-long journey - reflecting on scientific innovation, leadership challenges, global accreditation, and the future of medical physics in developing regions. His experiences provide invaluable guidance for early-career professionals, educators, policymakers, and international organizations working to enhance cancer care and radiation safety worldwide.

The session stands as a tribute not only to his achievements but also to his enduring commitment to advancing medical physics for the benefit of humanity. Through dedication, humility, and visionary leadership, Professor Zakaria continues to inspire the global community and shape the future of the profession.

- Prepared by Dr. Rajni Verma

Featured papers in AFOMP journals – Editor's Choice

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

Welcome back to our Featured Papers section. Once again, we have explored the AFOMP journals: Physical and Engineering Sciences in Medicine, Journal of Medical Physics, and Radiological Physics and Technology, which continue to publish valuable contributions to our field and bring us novel and engaging content.

This issue highlights a range of themes across both established and emerging techniques. Total Body Irradiation (TBI), for example, remains a well-established treatment modality, yet its implementation still varies considerably between institutions. While recent developments have shifted practice from conventional extended SSD techniques to VMAT-based approaches, transforming what was traditionally an SSD setup into an isocentric solution, the conventional method remains an attractive and practical option for many centres. The work by Ganesh et al provides a clearly defined and practical framework for commissioning extended-SSD TBI, offering a structured pathway for centres introducing or refining this technique.

Turning to MRI-guided radiotherapy, Rezzoug and co-authors explore how magnetic fields, once the exclusive domain of imaging, can reshape electron beam behaviour in therapy. Using Monte Carlo simulations, they investigate how parallel magnetic fields influence dose conformity, effectively guiding electron beams into tighter, more controlled distributions. It is a compelling reminder that in MRI-guided radiotherapy, physics does not merely support clinical practice but it actively shapes it.

In the ever-fundamental area of dosimetry (always a favourite among our readers), recent papers reinforce a simple truth: even in a discipline built on precision, there is always more depth to explore, sometimes quite literally. The study by Moghaddasi et al examines the subtleties of photon beam dosimetry, challenging common assumptions regarding ion recombination and the effective point of measurement (EPOM). Their findings highlight how variations with depth can meaningfully influence what we are measuring.

Finally, Miyauchi et al turn the spotlight to imaging dose in respiratory motion-tracking radiotherapy. While motion tracking represents a technological triumph, it carries the trade-off of additional kV imaging dose. This work provides a careful quantitative evaluation of entrance skin dose, exploring a component of treatment that often remains in the background but is essential to comprehensive patient dose assessment.

Happy reading! As always, we welcome your suggestions for topics to explore in future issues, and let us know if you would like your next paper to be featured in this section.

With contributions kindly provided by Sadia Aftab, Medical Physicists, Peter MacCallum Cancer Centre (Australia)

1) Focus on: specialised techniques

a**. TBI**

This article by Ganesh T et al., published in Journal of Medical Physics describes the commissioning, dosimetric characterisation, and long-term stability of a bilateral (parallel-opposed) extended source-to-surface distance (SSD) total body irradiation (TBI) technique implemented on an Elekta

Synergy linear accelerator. The technique uses an extended SSD (>300 cm) and a specially designed Perspex TBI box filled with rice bags to ensure full-scatter conditions and patient immobilization.

Commissioning of Bilateral (Parallel Opposed) Extended Source-to-surface Distance Total Body Irradiation Technique and Its Long-term Stability

Tharmarnadar Ganesh[1], Biplab Sarkar[1,2], Anusheel Munshi[1,3], Bidhu Kalyan Mohanti[1,4], S. Venu Gopal[1,5], Gourav Gulia[1], Soumya Roy[1,6], Harpreet Kaur[1,7], Satheeshkumar Anbazhagan[1,8], Kanan Jassal[1,9], Sasikumar Rathinamuthu[1,10], Upendra K. Giri[1,11], Sandeep Singh Dhilan[1,12], Vijendra Kumar[13], Pallab Sarkar[14]

[1]Department of Radiation Oncology, Fortis Memorial Research Institute, Gurgaon, Haryana, [2]Department of Radiation Oncology, Apollo Multispeciality Hospitals, [6]Department of Radiation Oncology, Manipal Hospitals, [14]Department of Physiology, City College, Kolkata, West Bengal, [3]Department of Radiation Oncology, BLK MAX Hospital, [12]Department of Radiation Oncology, Rajiv Gandhi Cancer Institute and Research Center, New Delhi, [4]Bagchi Sri Shankara Cancer Centre and Research Institute, Bhubaneswar, Odisha, [8]Department of Radiation Oncology, Madras Medical College, Rajiv Gandhi Government General Hospital, Chennai, Tamil Nadu, [9]Department of Radiation Oncology, Inlaks and Budhrani Hospital, Pune, Maharashtra, [10]Department of Radiation Oncology, Omega Hospitals, Guntur, Andhrapradesh, [5]Department of Radiation Oncology, Yashoda Super Speciality Hospital and Cancer Institute, Sanjay nagar, Ghaziabad, [11]Department of Radiation Oncology, Apex Super Specialty Hospital and Post Graduate Institute, Varanasi, Uttar Pradesh, [13]Department of Medical and Radiation Physics, National Institute of Science Education and Research, Bhubaneswar, Odisha, India, [7]Allan Blair Cancer Centre, Regina, Saskatchewan, Canada

Abstract

Aim : This article describes the commissioning of a total body irradiation (TBI) technique using bilateral-parallel-opposed fields at extended source-to-surface distance (SSD). **Material:** The measurements are based on the actual patient treatment geometry, which requires the patient to be placed inside a Perspex box. The gaps between the patient and the walls of the Perspex box were filled with rice bags to achieve full scattering conditions. The TBI box's lateral separation can be adjusted to 42 cm, 52 cm, or 62 cm by inserting the removable side walls to either of the three pairs of slots. A Farmer chamber, inserted inside a water-equivalent plastic slab phantom placed under full scattering conditions, was used for depth dose and profile measurements. The extended SSD was 333.5 cm, and the available field size was 132 cm × 132 cm. For output measurement, dose-to-water calibration factors for 6 MV and 15 MV energies were derived for the extended SSD. Bilateral-opposed fields were measured at three different separations to calculate lateral tissue effects. **Result:** For the 6 MV and 15 MV beams at a 42 cm separation, the midline-to-surface dose ratios were 1:1.17 and 1:1.08, respectively. As the separation increased, this ratio increased faster for the 6 MV beam and slower for the 15 MV beam. For the end-to-end quality assurance test (monitor unit to dose verification), the noted deviations were − 2.16% for the 6 MV beam and − 1.27% for the 15 MV beam. **Conclusion:** This article presents the detailed commissioning and long-term stability of the extended SSD TBI technique.

Keywords: Bilateral, extended source-to-surface distance, total body irradiation

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The study details all key dosimetric measurements – percentage depth doses (PDDs), beam profiles, output calibration, cross-calibration factors, and monitor-unit (MU) verification – for both 6 MV and 15 MV photon beams. Results showed predictable depth-dose behaviour, clinically acceptable beam flatness, and stable dose delivery across patient separations, ranging from thin to large. End-to-end testing using a Rando phantom demonstrated dose deviations of only −2.16% (6 MV) and −1.27% (15 MV) from expected values, confirming accurate MU calculation and delivery. Long-term quality assurance over five years showed consistent dose-per-MU stability.

Overall, the article provides a comprehensive commissioning workflow for centres wishing to implement extended-SSD TBI, demonstrating that the technique is simple, robust, cost-effective, and remains clinically relevant – especially in settings where advanced VMAT or Tomotherapy based TBI are not feasible.

b. MRI-guided RT

Radiological Physics and Technology
https://doi.org/10.1007/s12194-026-01017-1

RESEARCH ARTICLE

Enhancement of electron beam conformity in MRI-guided radiotherapy with parallel magnetic fields: a Monte Carlo analysis

Mohammed Rezzoug[1,2] · Yassine Oulhouq[1,3] · Omar Hamzaoui[1] · Mustapha Zerfaoui[1] · Abdeslem Rrhioua[1] · Dikra Bakari[4]

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DOI: 10.1007/s12194-026-01017-1

This very interesting study by Rezzoug M et al, published in Radiological Physics and Technology, presents a comprehensive analysis of how parallel magnetic fields can enhance the performance of clinical electron beams in MRI-guided radiotherapy. Using extensive Monte Carlo simulations spanning magnetic field strengths from 0-3 T, electron energies of 6, 12, and 15 MeV, and clinical field sizes ranging from 3 × 3 to 15 × 15 cm², the authors systematically evaluated how magnetic confinement alters depth-dose characteristics, lateral spread, and dose conformity. Their results demonstrate that parallel magnetic fields produce substantial beam sharpening, reducing lateral penumbra by 32-50% and improving field conformity through helical confinement of electrons, without inducing the problematic electron return effect observed in perpendicular MRI-Linac geometries. Low-energy electrons (6 MeV) exhibited stable and predictable dosimetric behaviour across all tested field strengths, while higher energies showed field-size-dependent variability. Importantly, the study identifies an optimal operating window around 1.5-2 T, where the balance between effective lateral confinement and beam stability is maximized.

The authors also acknowledge several limitations that influence interpretation and future clinical translation. Although homogeneous water phantoms were essential for initial dosimetric mapping, they do not replicate the anatomical complexity of real patients, particularly at interfaces where magnetic-field-sensitive dose perturbations may arise. The simulations further assume a perfectly uniform magnetic field, whereas actual MRI-Linac systems incorporate gradient fields that can affect electron trajectories and dose distributions. Additionally, secondary particle transport and scatter within heterogeneous tissues (e.g., lung-bone interfaces) may differ from simulated behaviour. The study remains purely theoretical, as it lacks experimental measurements that are necessary to validate the Monte Carlo predictions. Finally, the simulations do not incorporate patient-specific anatomy, motion, or realistic treatment-planning constraints, meaning further refinement and integration into clinical systems is required before practical implementation.

Overall, the findings demonstrate that parallel magnetic fields can significantly improve dose precision and conformity in MRI-guided electron therapy, offering a promising pathway for future MRI-Linac development and potentially enabling reduced treatment margins and improved clinical outcomes.

2) Focus on: dosimetry

a. Reference dosimetry

Physical and Engineering Sciences in Medicine
https://doi.org/10.1007/s13246-026-01709-3

SCIENTIFIC PAPER

Depth matters: ion recombination variations and EPOM assumptions in high energy photon beam dosimetry

Leyla Moghaddasi[1,2] · Regina Bromley[1] · Robert Finnegan[1,3] · Natasha Gabay[1] · Jeremy Booth[1,3]

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DOI: 10.1007/s13246-026-01709-3

This study by Moghaddasi L et al, published in Physical and Engineering Sciences in Medicine, investigates how ion recombination and effective point-of-measurement (EPOM) assumptions influence the accuracy of percentage depth dose (PDD) measurements in megavoltage photon beams, with a particular focus on flattening filter-free (FFF) beams where dose-per-pulse (DPP) is high. Using three ionisation chambers (ROOS, SNC125, CC13), the authors experimentally characterised depth-dependent ion recombination correction factors (ks) across multiple beam energies and field sizes using the two-voltage method. They also derived empirical EPOM values by aligning chamber depth-ionisation curves with a reference plane-parallel chamber.

The results show that ks varies significantly with depth, especially for the CC13 chamber and in FFF beams, producing PDD deviations up to 1.3% at deep depths in a 10 FFF beam. EPOM shifts for cylindrical chambers were consistently smaller than the commonly assumed 0.6×rcyl, with normalised values of 0.42 (SNC125) and 0.38 (CC13). Using the generic shift introduced a residual dose deviation of approximately −0.5% PDD.

Combined effects of uncorrected recombination and nominal EPOM assumptions produced systematic deviations approaching 0.8% at 10 cm depth, relevant for reference dosimetry and treatment-planning system (TPS) beam modelling.

The study concludes that detector-specific, depth-resolved ks corrections and empirically determined EPOM values significantly improve PDD accuracy, especially in FFF beams and should be incorporated into commissioning workflows and considered for inclusion in future ACPSEM guidelines.

b. Imaging dose

Radiological Physics and Technology (2025) 18:1258–1266
https://doi.org/10.1007/s12194-025-00975-2

RESEARCH ARTICLE

Check for updates

Quantitative evaluation of entrance skin dose from kV imaging in respiratory motion-tracking radiotherapy

Yosuke Miyauchi[1] · Shogo Tsunemine[1] · Tetsuya Tomida[1] · Masumi Numano[1] · Kazuaki Funamoto[1] · Shuichi Ozawa[2,3] · Satoru Sugimoto[4] · Hideyuki Harada[5]

Received: 29 June 2025 / Revised: 3 October 2025 / Accepted: 4 October 2025 / Published online: 11 October 2025

DOI: 10.1007/s12194-025-00975-2

This study by Miyauchi et al, published in Radiological Physics and Technology, evaluates the entrance skin dose (ESD) patients receive from frequent kV X-ray imaging during respiratory motion-tracking radiotherapy delivered on the Radixact Synchrony system. By analysing data from 108 patients, the authors found that imaging sessions involved an average of 1230 exposures, resulting in a mean cumulative ESD of 69.1 mGy, with individual cases reaching up to 367.2 mGy. After accounting for overlapping imaging fields and exit dose, the maximum estimated total imaging-related skin dose was approximately 952 mGy, equivalent to roughly 2% of the therapeutic skin dose in most patients. Even in scenarios with very high imaging frequency, these doses remained below guideline recommended safety thresholds.

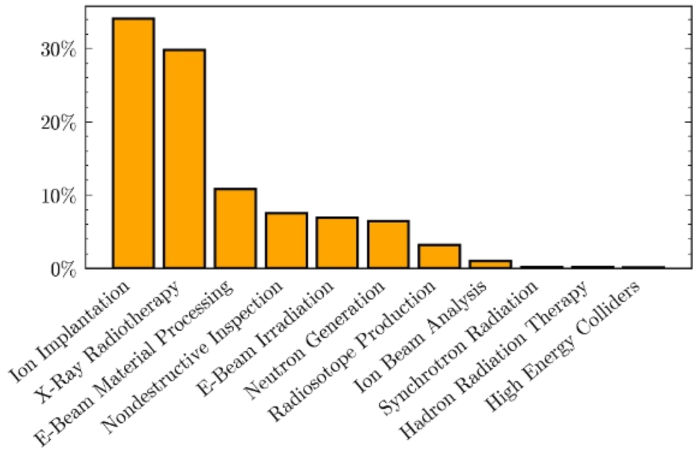
The study has several limitations: cumulative skin dose was estimated using simplified geometric assumptions rather than more precise methods such as Monte Carlo simulations; dose attenuation from the treatment couch was not considered, potentially resulting in slight overestimation; and the study did not evaluate optimisation strategies such as reducing imaging angles, adjusting imaging frequency, or implementing low-dose protocols. As a retrospective analysis, it was also subject to variability in patient anatomy, positioning, respiratory patterns, and tracking model behaviour, all of which may influence imaging dose.

Overall, the authors conclude that although kV imaging contributes additional radiation exposure, the associated skin dose is generally low, clinically acceptable, and consistent with previous findings, while emphasising the importance of continued monitoring and optimisation in cases requiring unusually frequent imaging.

Did you know ? Marvellous Science in Action
From Colliders to Clinics: The Accelerator Innovations Enabling Future Cancer Treatments

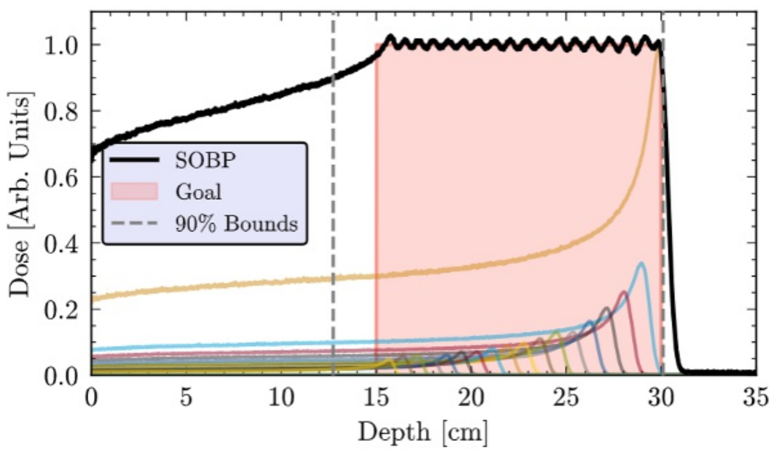
Sourced by A/Prof Vanessa Panettieri, Editor (Educational), AFOMP Pulse

When a ‘particle accelerator’ is mentioned, what springs to mind? For many, it’s the colossal colliders in Europe and America, famous for their immense scale and substantial budgets. However, the vast majority of accelerators worldwide are much smaller, discreetly operating in processing plants, factories, and even hospitals.



Worldwide, there are over 20,000 radiotherapy linear accelerators (or ‘linacs’) producing X-Ray beams that contribute to the successful treatment of approximately 40% of cancers. In recent decades, proton therapy – which also relies on accelerator technologies – has emerged as a promising alternative, offering advantages in certain scenarios.

The efficacy of proton therapy lies in its method of energy deposition. Imagine the contrast between ten-pin bowling and lawn bowls: akin to X-Rays, bowling balls in the ten-pin game carry on travelling even after hitting obstacles, whereas in lawn bowls, our proton analogue has a well-defined stopping distance. Extending this analogy further, the depth at which a proton stops, depositing most of the dose, is determined by the amount of energy it starts with. This allows for precise ‘dose painting’ of tumours, involving scanning the proton beam and modulating its energy to cover the treatment area. Consequently, in situations where X-Ray radiotherapy is unsuitable – due to the proximity of sensitive organs, or in treating childhood cancers – proton therapy becomes the preferred choice.
Despite these advantages, there about 100 times fewer proton therapy facilities than X-Ray linacs. Part of the cause of this discrepancy is due to the size of the machine: an X-Ray linac fits comfortably in a room



a few metres across, whereas a proton therapy facility requires a dedicated building. The corresponding price tag associated with proton therapy is accordingly far higher.

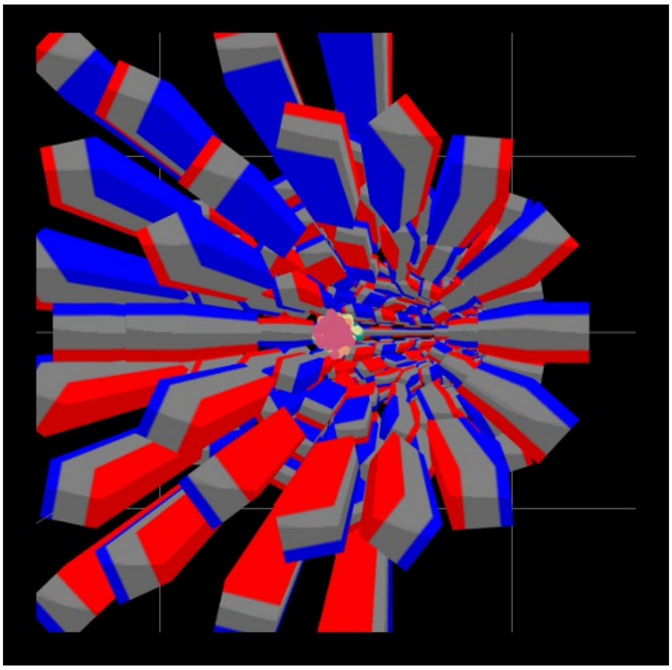
Moreover, there are still major bottlenecks with proton therapy to overcome. One of the most significant of these is the time taken to switch the beam energy, primarily limited by the magnets used in accelerators and beam delivery systems. The magnetic field strength must align with particle energy to effectively steer and focus the beam, typically achieved by varying the magnetic field over time. This process takes several seconds to span the full range of treatment energies, during which time any patient motion can severely deteriorate the treatment quality.

The benefits of downsizing the beam delivery system and speeding up the treatments are evident. Surprisingly, one technological advancement may be the key to solving both problems.

Rather than having magnetic fields that vary in time, researchers at the University of Melbourne are exploring the potential of magnets where the field varies in space. Project TURBO ('Technology for Ultra-Rapid Beam Operation') employs fixed field magnets to steer and focus a large range of beam energies concurrently, with each energy following a unique path through the beamline. This innovation promises treatments an order of magnitude faster than currently feasible, and as a bonus, stronger magnets can be used since there's no need to ramp the fields over time. This technological leap offers a pathway to reducing facility footprint while enabling ultra-rapid treatments.

Naturally, these claims require evidence. Although simulations suggest no major obstacles, an experimental demonstration is necessary. However, doing this at the energies required for proton therapy would be exceedingly costly, with no guarantee of success. Therefore, the Melbourne University team is constructing a scaled-down technology demonstrator, utilising a low energy 'Pelletron' particle accelerator made available as one of Australia's Heavy Ion Accelerators, under the National Collaborative Research Infrastructure Strategy.

Static magnetic fields have other advantages over conventional accelerators. As an example, rather than using more conventional electromagnets, the TURBO technology demonstrator uses permanent magnets.



These magnets are reminiscent of those holding up menus on your fridge, but they are about one hundred times stronger, and their fields must be finely tuned to accurately steer particle beams. To generate the necessary magnetic fields, TURBO will utilise many identical blocks of permanent magnet material arranged in custom mounts, allowing for reconfiguration and reuse in various projects. While permanent magnets would not be suitable for full-scale beam delivery systems – superconducting magnets with stronger fields are preferred for reducing facility size – they are ideal for demonstrations at this scale.

Proton therapy is emerging as a vital weapon in the fight against cancer, yet its potential can only be fully realised through further innovation. Techniques like the ultra-rapid beam delivery offered by TURBO are paving the way for more effective and accessible treatments, but there is much more work to do before this makes it to the clinic.

So, next time you hear about particle accelerators, instead of picturing far-off colliders, consider the hundreds of proton therapy machines operating worldwide. Think about the cutting-edge science driving them and the innovations that promise to make this key technology even more widely available in the future.

Dr Adam Steinberg,
Research Fellow in Accelerator Science
The University of Melbourne

What's new? Key highlights from the editors

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

Development of federated learning neural networks with combined horizontal and vertical data partitioning

Amir Anees, Matthew Field, Lois Holloway, Applied Soft Computing, Volume 192, 2026, 114734, ISSN 1568-4946.

https://doi.org/10.1016/j.asoc.2026.114734

What inspired this study?

Federated learning has rapidly emerged as a key approach to training collaborative machine learning models without moving raw data from the devices or institutions that generate it. Although there is robust literature on horizontal (across many clients e.g. hospitals which each store multiple data items per patient and the patients only have data in a single hospital) and vertical (across feature sets e.g. registries or laboratories which store limited data items per patient and the patients have data items in multiple locations) federated learning separately, few works have tackled scenarios where data is simultaneously partitioned both horizontally and vertically. In real-world systems like distributed healthcare networks, financial institutions and cross-organisation analytics, data partitions often are not exclusively one type or the other. We were inspired by the need to bridge this gap and design frameworks that can handle combined partitioning while preserving privacy and maintaining performance, particularly considering the instance of data being split between hospitals and registries and/or laboratories.

What were the key challenges in this research?

The main challenge was designing a federated learning framework that could operate under simultaneous horizontal and vertical data partitioning. Most existing approaches assume only one partitioning type, so combining both required a fundamental redesign of how models are structured and how information flows between the clients and the server. Another major challenge was coordinating training across heterogeneous data holders while ensuring stable convergence. Finally, maintaining strong privacy guarantees in such a complex setting was important. We needed to ensure that intermediate outputs or gradients shared during training could not reveal sensitive information even under potential inference attacks.

What are the key takeaways from this study?

This study demonstrates that federated learning can be successfully extended to more realistic, mixed-partition data environments without sacrificing performance or privacy. We introduced two new frameworks: Horizontal-OutputFed and Vertical-OutputFed, that effectively support combined partitioning scenarios. Our experiments showed that these approaches achieve performance comparable to traditional horizontal federated learning and even centralized training in vertically partitioned settings. Most importantly, the work confirms that privacy-preserving collaborative learning remains feasible even when data distributions are significantly more complex than typically assumed in existing federated learning research. This has provided us with a framework to address the challenge of working with data stored in hospitals and registries.

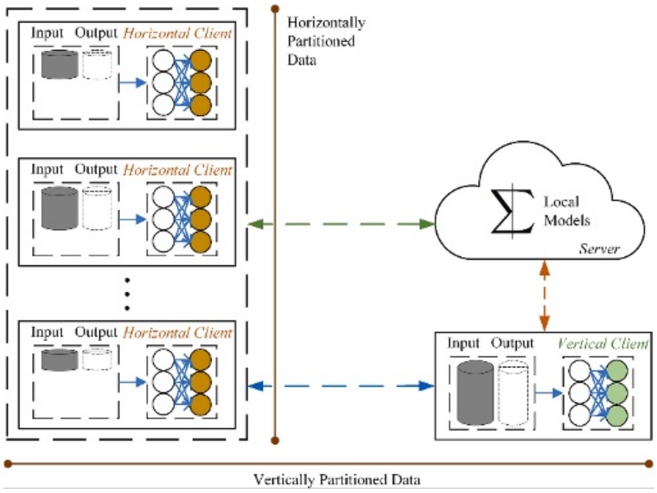
How does this research impact the future?

This work lays a foundation for more versatile and practical federated learning systems. Many emerging applications such as cross-institutional health analytics, multi-party financial forecasting and federated IoT networks involve datasets that cannot easily be classified as purely horizontal or vertical. Our frameworks offer a generalised and scalable solution for these environments enabling collaborative learning without sharing raw data. Looking ahead, these contributions could:

- Expand adoption of federated learning in regulated industries where data privacy is paramount.

• Inspire new research into hybrid privacy-preserving learning paradigms and optimisation techniques.

• Specifically for our area of interest this will enable federated learning across hospitals and registries and laboratories. This overcomes the challenges of sharing data across jurisdictions, particularly where there are strict requirements about how data is stored.



Interaction between horizontal clients, vertical client, and the server.

Dr Amir Anees, PostDoc Researcher
South Western Sydney Cancer Services, NSW Health and Ingham Institute, Liverpool, New South Wales, Australia;

South Western Sydney Clinical Campus, School of Clinical Medicine, UNSW, Warwick Farm, New South Wales, Australia.

PhD Abstract: Evaluation of radiotherapy doses during cancer treatment in Gabon

Beaud Conrad Mabika Ndjembidouma[1]
[1]Akanda Cancer Institute, Libreville, Gabon

Background: This research presents a comprehensive retrospective analysis (2013-2021) of clinical and dosimetric outcomes of 3D Conformal Radiation Therapy (3D-CRT) for prostate cancer at the Akanda Cancer Institute (Gabon). The objective was to identify risk factors for acute and late gastrointestinal (GI) and genitourinary (GU) toxicities, graded according to CTCAE v4.0.

Methods: Data from 46 patients (doses 66–80 Gy) were analyzed. The study utilized statistical tests (Mann-Whitney, Pearson/Spearman) and binary logistic regression models (univariate and multivariate) to correlate clinical parameters (age, comorbidities, history) and dosimetric parameters from Dose-Volume Histograms (DVH) with the occurrence of complications.

Key Results:

- **Genitourinary (GU) Toxicities**: Regression analysis identified prostate volume ($p = 0.0423$) and the clinical prostate volume irradiated at the prescribed dose ($p = 0.029$) as predictors of acute GU toxicity. Hypertension ($p = 0.039$) and the presence of acute toxicities were predictive of late GU toxicities.
- **Gastrointestinal (GI) Toxicities**: A significant correlation was established between late rectal toxicity and the rectal volume irradiated at the prescribed dose ($p = 0.02$).
- **Clinical Efficacy**: Despite high radiation doses, the protocol demonstrated exceptional oncological efficacy, with a 100% survival rate observed during the follow-up period (median 57.5 months).

Conclusion: This work validates the safety and efficacy of 3D-CRT in Gabon. It provides medical physicists with the first robust toxicity predictors adapted to the local context, enabling proactive monitoring and optimization of treatment planning in sub-Saharan Africa.

Published Articles related to this PhD:

1. **Assessment of rectal toxicities after radiation therapy for localized prostate cancer: experience of the Akanda Cancer Institute in Gabon**. Reports of Practical Oncology and Radiotherapy (2023). DOI: https://doi.org/10.5603/rpor.97507
2. **Risk factors for bladder adverse events following radiotherapy for localised and locally advanced prostate cancer in Gabon**. Journal of Radiotherapy in Practice (2025). DOI: https://doi.org/10.1017/S1460396925100265

1) Highest neutron flux in a therapy treatment room is produced by _____.

A. a Cobalt-60 source
B. a 10-MeV electron beam
C. a 10-MV photon beam
D. a 20-MV photon beam
E. a 20-MeV electron beam

2) In the treatment of Hodgkin s disease with a mantle field on a linac, patients may experience a skin reaction in the neck region. This could be due to which of the following?

A. Smaller thickness of tissue at neck than on the central beam axis.
B. Oblique incidence at sides of neck reduces skin sparing.
C. Use of a blocking tray and large field size tend to increase skin dose
D. All of the above

3) Parallel-opposed 18 MV photon beams (dmax = 3.5 cm) are used to treat an area which includes nodes at a minimum depth of 2.0 cm, If the nodes are to receive at least 90% of the midplane dose:

A. 3.5 cm bolus is needed.
B. More than 3.5 cm bolus is needed.
C. Between 2 and 3.5 cm bolus is needed
D. Bolus is not needed.
E. Less than 2cm

4) Which of the following could be used as a tissue compensator?

A. Shaped bolus.
B. A wedge.
C. Shaped CerrobendTM
D. Dynamic MLC.
E. All of the above

5) The formula used to calculate the gap on the skin between adjacent fields, matched at depth, relies on the fact that:

A. Both beams are treated with photons of the same energy.
B.The projection of the edge of the light field follows the 50% decrement line of the radiation field.
C. The angle of divergence of adjacent beams is the same
D.Both fields arc treated simultaneously.
E. The depth at the junction is less than 10 cm.

Answers: Page 69

Professional News & Updates: The first proton therapy clinical trial in South China has been successfully finished in the Cancer Hospital, Chinese Academy of Medical Sciences, Shenzhen Center

Jun Dang,
Cancer Hospital Chinese Academy of Medical Sciences, Shenzhen Center

On January 8, 2026, the Proton Therapy Center at Shenzhen Hospital of the Chinese Academy of Medical Sciences Cancer Hospital successfully enrolled its final clinical trial patient, marking a significant milestone in the first proton therapy clinical trial within the public hospital system in South China. The center has now completed enrollment of all 47 trial subjects, laying a solid foundation for the formal integration of proton therapy into routine clinical practice.

The clinical trial, designed as a prospective single-center study, commenced participant recruitment in May 2025 and completed all enrollment within eight months. Subjects included tumors in multiple locations such as intracranial, head and neck, thoracic and abdominal, pelvic, spinal, and extremities, comprehensively validating the safety and efficacy of proton therapy. As the first public proton therapy facility in South China, the center is equipped with the globally advanced IBA Proteus® PLUS proton therapy system, featuring five treatment rooms and 300 beds across a total floor area of 35,000 square meters.

Professor Jin Jing, Director of the Proton Therapy Center, stated that the clinical trial strictly adheres to the "patient-oriented" principle, customizing personalized treatment plans for each participant through a multidisciplinary team (MDT). Currently 29 patients have successfully completed treatment and been without any serious site effect, which preliminarily validated both of proton therapy's efficacy and safety.

It is noteworthy that the center has opened a free proton therapy consultation clinic, providing professional evaluations to thousands of cancer patients. According to the trial protocol, after completing the three-month short-term follow-up for all patients, the center will submit the research data to the National Medical Products Administration. Upon approval of the diagnostic and therapeutic license, proton therapy will be officially applied to routine clinical treatment, marking a "from zero to one" breakthrough for public hospitals in South China in this field. In the future, the center will continue to accumulate long-term follow-up data, strengthen medical collaboration, and promote the standardization as well as the accessibility of proton therapy technology, and transfer it to a broader caner patient population.

Professional News & Updates: Key IAEA educational resource being updated

Chris Boyd
Technical Editor – Diagnostic Radiology Physics: A Handbook for Teachers and Students

Radiology medical physics education will soon welcome an important update to one of its most widely used teaching resources. As part of a renewal of all of its' 'A Handbook for Teachers and Students' educational texts, the International Atomic Energy Agency (IAEA) is releasing a second edition of its textbook 'Diagnostic Radiology: A Handbook for Teachers and Students'. In addition to this, a new text 'Foundations of Medical Physics: A Handbook for Teachers and Students' will collate the introductory concepts from the first editions into a single resource, and free space for extended discussion of domain specifics in the other texts.

The diagnostic radiology handbook is a globally accessible foundation for medical physics students, registrars, and educators. Its' practical curriculum framework, modular teaching approach, and emphasis on the core principles of physics, safety, image interpretation, and clinical application have made it a staple of residency programs and postgraduate teaching worldwide. Over the past decade however, diagnostic radiology has evolved rapidly—driven by advances in detector technology, hybrid imaging, dose optimisation strategies, and the growing integration of artificial intelligence and quantitative imaging methods.

The forthcoming second edition reflects these changes. Planned additions include MR safety, guidance on commonly encountered professional topics, dedicated focus on anatomy and physiology for medical physics, equipment management, and an entire chapter of software considerations for radiology. Educational design has also been revisited, with clearer learning objectives, updated figures, practical examples, and teaching tools intended to support both classroom and self-directed learning. The goal remains consistent with the original mission: to provide a freely available, high-quality, and globally relevant resource that supports standardized training in diagnostic radiology. Guided by a technical editor from each of AAPM, AFOMP, EFOMP, ICTP, and IOMP, the final text incorporates contributions from 85 authors from 27 countries, including 15 authors from within AFOMP.

Readers interested in learning more about the project will have an opportunity to engage directly at the European Congress of Radiology 2026. A dedicated poster presentation and accompanying talk will outline the new structure, key additions, and implementation strategies for educators seeking to incorporate the handbook into their teaching programs.

Further details on release timelines and access will be shared as development progresses, with the final text being made available as a free download from the IAEA once complete. Educators, trainees, and program directors are encouraged to watch for updates through IAEA, IOMP, and AFOMP communication channels for what promises to be a timely and valuable revision of this trusted educational cornerstone.

Professional News & Updates: ICRP Publication 159 on Radiological Protection in Surface and Near-surface Disposal of Solid Radioactive Waste

Sourced by A/Prof Rafidah Zainon, Editor (Professional), AFOMP Pulse

The safe management of radioactive waste remains a cornerstone of radiological protection practice worldwide. The International Commission on Radiological Protection (ICRP) has long provided guidance on the application of its system of protection to waste disposal and Publication 159 represents a significant update in this area. It focuses specifically on the principles and approaches for surface and near-surface disposal facilities, which are commonly used for low- and very-low-level radioactive waste.

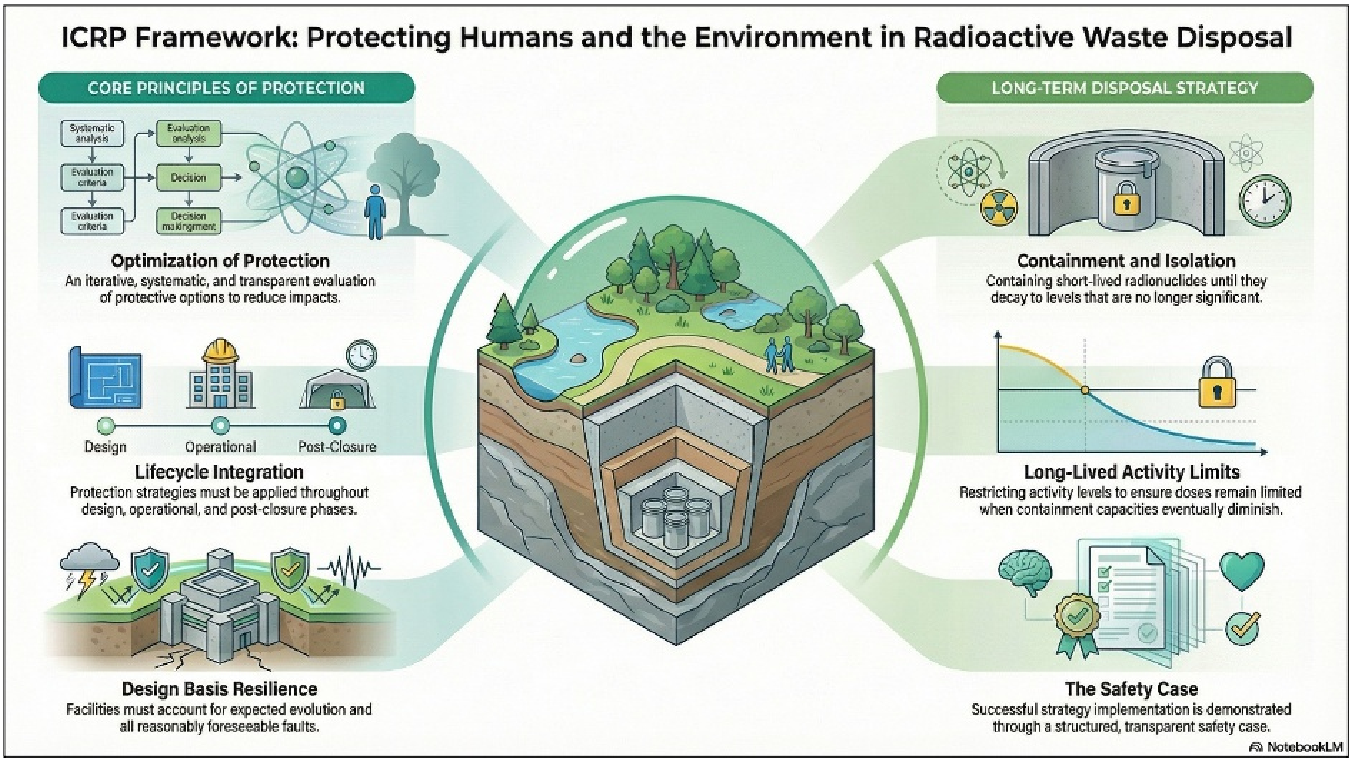


Figure 1: The ICRP framework for protecting humans and environment in radioactive waste disposal.

Fundamental Principles

ICRP Publication 159 reaffirms the application of the three pillars of radiological protection including justification, optimisation and dose limitation, to waste disposal practices.

- Justification ensures that the generation and disposal of radioactive waste is part of a practice that delivers net benefit to society.
- Optimisation requires a systematic, iterative and transparent evaluation of protective measures to reduce impacts to humans and the environment.
- Dose limitation ensures that exposures remain within internationally accepted thresholds.

Design Basis and Safety Considerations

The design of a disposal facility must anticipate its expected evolution and account for reasonably foreseeable faults. Optimisation is particularly critical during the design phase, as this determines the facility's long-term performance. To address uncertainties in distant future scenarios, the ICRP emphasises complementary strategies such as:

i. Robustness of engineered barriers
ii. Defence in depth to provide multiple layers of protection
iii. Structured safety cases to demonstrate compliance and confidence in long-term safety

Managing Different Exposure Situations

While disposal facilities are considered within the framework of planned exposure situations, the ICRP also provides guidance for existing exposure situations that may arise from severe natural events or human intrusion beyond the design basis. This dual approach ensures flexibility in protecting both present and future generations.

Strategic Approach for Low- and Very-low-level Waste

The fundamental strategy for these waste categories is twofold:

1. Contain and isolate waste until short-lived radionuclides decay to insignificant levels.
2. Limit activity content of longer-lived radionuclides to ensure doses and risks remain controlled even as containment capacity diminishes over time.

Stakeholder Engagement and Ethical Dimensions

Publication 159 highlights the importance of early dialogue among operators, regulators, and stakeholders. Ethical values such as fairness, sustainability and intergenerational responsibility are integral to building trust and promoting a shared understanding of radiological protection principles. This collaborative approach strengthens the legitimacy and acceptance of disposal strategies within society.

Professional Scope and Implications

For medical physicists, radiation protection professionals and waste management specialists, ICRP Publication 159 provides a clear framework to:

- Integrate radiological protection principles into facility design and operation
- Develop transparent safety cases that withstand regulatory and public scrutiny
- Engage meaningfully with stakeholders to ensure ethical and socially responsible outcomes

By reinforcing optimisation, defence in depth and stakeholder dialogue, the ICRP underscores that radiological protection is not only a technical discipline but also a societal commitment. The publication thus serves as a vital reference for professionals tasked with safeguarding both people and the environment in the context of radioactive waste disposal.

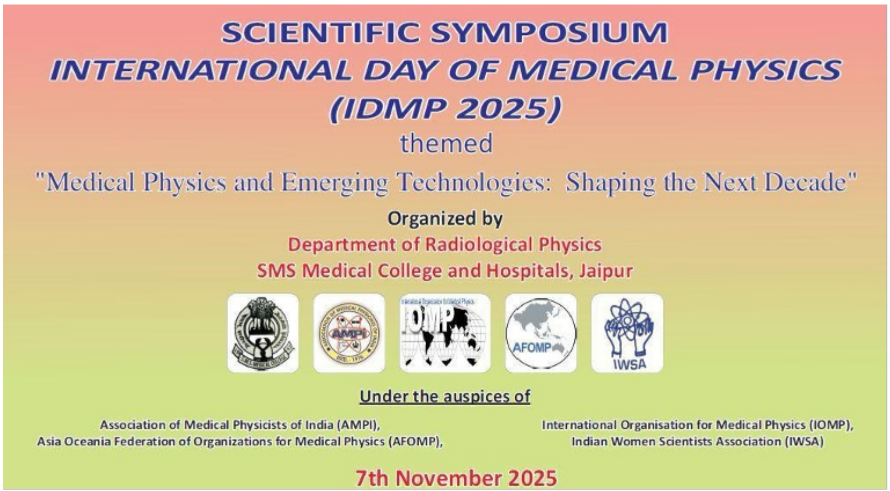
For further information, reader may browse and read the following reference:

- ICRP, 2024. Radiological protection in surface and near-surface disposal of solid radioactive waste. ICRP Publication 159. Ann. ICRP 53(6).

NMO Activity Report: International Day of Medical Physics (IDMP 2025) – Jaipur, India

Rajni Verma, PhD
Assistant Professor, Department of Radiological Physics, SMS Medical College and Hospital, Jaipur, India

The Department of Radiological Physics, SMS Medical College & Hospital, Jaipur, organized a **One-Day Scientific Symposium** on the occasion of the **International Day of Medical Physics (IDMP 2025)** on **7th November 2025** at the SMS Medical College Library Hall. The event was conducted **under the banner of the Association of Medical Physicists of India (AMPI)** and the **AMPI - Northern Chapter**, and was **endorsed by the International Organization for Medical Physics (IOMP)**, the **Asia-Oceania Federation of Organizations for Medical Physics (AFOMP)**, and the **Indian Women Scientists' Association (IWSA)**.



The IOMP theme for IDMP 2025, "Medical Physics and Emerging Technologies: Shaping the Next Decade," served as the guiding concept of the day. The symposium highlighted the vital contributions of medical physicists in advancing patient care through innovation, research, and adoption of emerging technologies in healthcare.The celebration began at 9:30 AM with a warm welcome by Dr. Rajni Verma, Organizing Secretary, IDMP 2025 Jaipur, who greeted all dignitaries, academicians, professionals, and students. The Chief Guest of the event was Prof. (Dr.) Deepak Maheshwari, Principal & Controller, SMS Medical College & Hospital, Jaipur. The Special Guest of Honourwas Dr. Mrinal Joshi, Medical Superintendent, SMS Hospital, Jaipur, and the Guest of Honour was Dr. V. Subramani, Vice President of AMPI and Professor of Medical Physics, AIIMS New Delhi. The function was presided over by Prof. (Dr.) Arun Chougule, Organizing Chairman, IDMP 2025 Jaipur & Ex-Head, Department of Radiological Physics

The event commenced with the Lighting of the Lamp and Saraswati Vandana, symbolizing the illumination of knowledge. The dignitaries were felicitated with floral greetings, and the audience was welcomed to the vibrant pink city of Jaipur. Prof. Arun Chougule delivered the Welcome Address, emphasizing the importance of interdisciplinary collaboration and the role of IDMP in uniting professionals worldwide.

In their special addresses, Dr. V. Subramani shared the global initiatives of AMPI and IOMP, Dr. Mrinal Joshi highlighted the integral role of medical physicists in clinical practice, and Prof. (Dr.) Deepak Maheshwari praised the organizers for hosting such an event aligned with the global IDMP 2025 theme. The release of the IDMP 2025 Poster was a key highlight, symbolizing the innovation and dedication of the medical physics fraternity. The dignitaries were then presented with mementos as a token of appreciation, and the session concluded with a group photograph and breakfast.

The scientific program began at 11:00 AM and featured a series of enriching lectures by distinguished speakers. Prof. Arun Chougule spoke on "Inter-Professional Collaboration for Innovation and Research in Medical Physics," underscoring teamwork and innovation. Prof. Devesh Gupta delivered a session on "Emerging Technologies in Medical Physics Radiotherapy," focusing on technological advancements in radiation oncology. Dr. V. Subramani presented a talk on "Shaping the Future of Cancer Care: Role of Medical Physics and Technology," highlighting how innovation and technology are driving improvements in cancer management and care.

A Panel Discussion on "The Role of Artificial Intelligence in Medical Physics" brought together expert panelists — Dr.Athiyman, Dr.Hemlatha, Dr. Gourav Jain, Dr. Ananth K., and Dr. Pawan K. Jangid — and was skillfully moderated by Dr. Rajni Verma. The discussion explored the applications of AI in treatment planning, imaging, and patient safety, sparking lively engagement among the participants.

दैनिक भास्कर | जयपुर

एसएमएस मेडिकल कॉलेज में मनाया अंतरराष्ट्रीय फिजिक्स दिवस

जयपुर | एसएमएस मेडिकल कॉलेज जयपुर के रेडियोलॉजिकल फिजिक्स विभाग की ओर से शुक्रवार को लाइब्रेरी सेमिनार हॉल में अंतरराष्ट्रीय फिजिक्स दिवस मनाया गया। आयोजन अध्यक्ष डॉ.ए.चौगले और सचिव डॉ.रजनी वर्मा के अनुसार इस साल की थीम 'कृत्रिम बुद्धिमता को अपनाना-मेडिकल फिजिक्स का भविष्य' है। डॉ. चौगले ने बताया कि एआई, रेडियोलोजी, रेडियोथैरेपी और न्यूक्लियर मेडिसिन में तेजी से बदलाव ला रही है, जिससे निदान और उपचार दोनों में सटीकता के साथ ही दक्षता बढ़ रही है। इस मौके पर एसएमएस मेडिकल कॉलेज के प्राचार्य डॉ. दीपक माहेश्वरी और एसएमएस अस्पताल अधीक्षक डॉ. मृणाल जोशी समेत अनेक डॉक्टर उपस्थित थे।

Following the lunch break, Dr. Rajni Verma delivered a special talk titled "Why, Where, and When to Find a Medical Physicist — Celebrating the Invisible Hands of Modern Medicine." The presentation paid tribute to the often-unseen but critical contributions of medical physicists in ensuring the precision, quality, and safety of medical technologies.

The event witnessed enthusiastic participation with around 145 attendees, including 139 registered participants comprising medical physicists, oncologists, academicians, and students from various institutions. The celebration was well covered by the local press, further enhancing public awareness about the contributions of medical physicists to healthcare and scientific advancement.

The event concluded with closing remarks from the organizing committee, expressing gratitude to all dignitaries, speakers, and delegates. The day ended with a high tea, celebrating the successful culmination of an intellectually rich and inspiring scientific gathering.

The Organizing Committee of IDMP 2025 Jaipur expresses its profound gratitude to the International Organization for Medical Physics (IOMP), Asia-Oceania Federation of Organizations for Medical Physics (AFOMP), Indian Women Scientists' Association (IWSA), Association of Medical Physicists of India (AMPI), and the AMPI–Northern Chapter for their kind endorsement, guidance, and support. Their collaboration and encouragement greatly contributed to the success and global visibility of this event.

The International Day of Medical Physics 2025 celebration at Jaipur successfully embodied the IOMP theme “Medical Physics and Emerging Technologies: Shaping the Next Decade.” The symposium brought together experts, researchers, and young professionals to share insights, strengthen networks, and celebrate the impact of medical physics in shaping the future of healthcare. The event stood as a testament to scientific excellence, teamwork, and the continuous pursuit of innovation for patient-centered care.

NMO Activity Report: MAMP Celebrates IDMP 2025: Shaping the Next Decade of Medical Physics in Malaysia

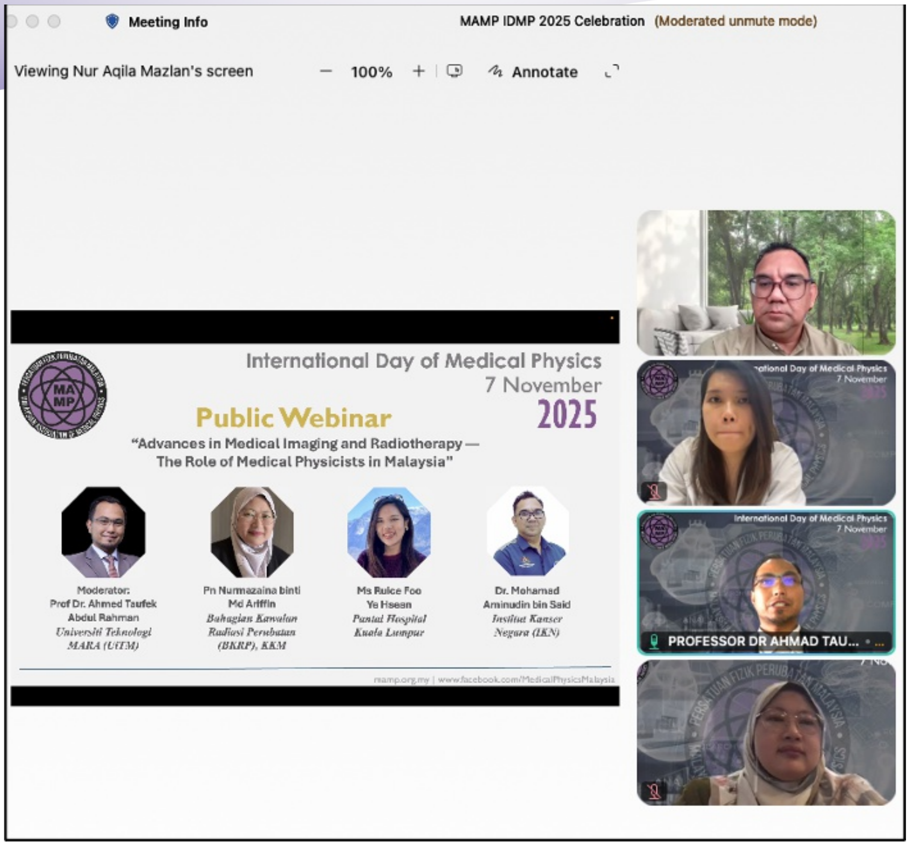
Sourced by A/Prof Rafidah Zainon, Editor (Professional), AFOMP Pulse

On 7 November 2025, the Malaysian Association of Medical Physics (MAMP) commemorated the International Day of Medical Physics (IDMP) 2025 through a national virtual celebration that brought together medical physicists, regulators, academics, students, industry partners, and members of the public from across Malaysia. The theme for IDMP 2025, "Medical Physics and Emerging Technologies: Shaping the Next Decade," reflects the profound transformation occurring in healthcare systems worldwide and the increasingly role of medical physicists in implementing these advances safely. Rapid development in artificial intelligence, adaptive and image-guided radiotherapy, molecular and functional imaging, data analytics and automation are reshaping clinical practice. In this evolving landscape, medical physicists are not only technical specialists but also leaders in quality assurance, safety governance, and technological validation. Their expertise ensures that innovation is safely integrated into patient care while maintaining the highest standards of safety and precision.

In Malaysia, this theme resonates strongly with ongoing national progress. Radiotherapy services have expanded to include advanced IMRT/VMAT and stereotactic techniques, and increasingly sophisticated image guidance systems. Diagnostic imaging optimisation and radiation dose management initiatives have strengthened nationwide, supported by regulatory oversight and structured quality assurance frameworks. Malaysian medical physicists have played central roles in commissioning new technologies, establishing local QA protocols, supporting accreditation processes, and contributing to research in dosimetry, imaging verification, and treatment validation. These developments demonstrate that Malaysia is actively shaping the safe clinical integration of emerging technologies. Aligned with the mission of the International Organization for Medical Physics (IOMP) and the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP), MAMP structured its IDMP 2025 celebration to reflect professional leadership, scientific advancement, and public engagement.

The event commenced with a welcome address by Assoc. Prof. Dr. Hafiz Mohd Zin, President of MAMP (2025–2026), who emphasised that preparing for the next decade requires strong governance and unified professional collaboration of the professions. This was followed by the official recorded IDMP 2025 message from Prof. John Damilakis, immediate past President of IOMP, reaffirming the global recognition of medical physicists as key contributors to safe and innovative healthcare systems.

A significant milestone during the celebration was the launch of the MAMP Membership Portal, a new digital platform designed to modernise membership management and strengthen connectivity among Malaysian medical physicists working in public hospitals, private centres, universities, and regulatory bodies. This initiative reflects the broader digital transformation taking place within Malaysia's healthcare ecosystem. Another important development highlighted during the celebration was the official launch of MAMP's journal, Physics and Technology in Medicine (PTM) under its new international publisher, Wolters Kluwer, accessible via https://journals.lww.com/ptm/. PTM welcomes submission of short format, original research articles, review articles, technical notes, quality assurance reports, feasibility and validation studies, clinical implementation reports, particularly work with strong clinical relevance, practical implementation value, and technical robustness in medical physics and related technologies. This transition is aimed to enhance the journal's visibility and editorial standards, reinforcing Malaysia's growing contribution to regional and international scientific discourse in medical physics.



A central component of the IDMP celebration programme was the public webinar entitled "Advances in Medical Imaging and Radiotherapy — The Role of Medical Physicists in Malaysia." The session was moderated by Prof. Dr. Ahmed Taufek Abdul Rahman from Universiti Teknologi MARA (UiTM), who facilitated discussion on emerging technologies and the evolving responsibilities of medical physicists. Dr. Mohamad Aminudin Said from Institut Kanser Negara (National Cancer Institute) spoke on developments in theranostics and the expanding role of medical physicists in personalised radionuclide therapy, highlighting dosimetry optimisation, safety considerations, and precision treatment delivery. His presentation illustrated how theranostics represents a significant advancement in precision oncology and reflects Malaysia's growing capabilities in nuclear medicine and targeted cancer therapy. Ms. Ruice Foo Ye Hsean from Pantai Hospital Kuala Lumpur discussed the implementation of advanced radiotherapy technologies within the private healthcare sector, emphasising multidisciplinary collaboration, workflow optimisation, and the importance of maintaining rigorous quality assurance standards in increasingly complex treatment environments. Ms. Nurmazaina Md Ariffin from the Medical Radiation Surveillance Division (MRSD), Ministry of Health Malaysia, presented the regulatory perspective, outlining national radiation protection frameworks, compliance mechanisms, and governance strategies that ensure emerging medical technologies are adopted safely and responsibly. Together, the webinar provided a comprehensive overview of clinical innovation, regulatory governance, and professional responsibility in Malaysia. By presenting complex topics in accessible language, the session strengthened public understanding and reinforced trust in radiation-based healthcare.

The celebration also featured the "My Physics, My Impact" social media initiative, which encouraged creative storytelling about the profession. The competition winner, Muhammad Hafiz Bin Hanafi from Universiti Putra Malaysia, demonstrated how digital platforms can effectively promote awareness of medical physics and engage younger audiences.

IDMP 2025 in Malaysia therefore served as both a celebration and a forward-looking reflection on the profession. The theme strongly mirrors Malaysia's trajectory toward technological advancement, strengthened regulatory frameworks, digital transformation, and growing scientific visibility. As emerging technologies continue to reshape healthcare, Malaysian medical physicists remain central to ensuring that innovation is implemented responsibly and safely.

MAMP reaffirms its commitment to working closely with AFOMP and IOMP in advancing professional standards, education, and regional collaboration, ensuring that the next decade of medical physics in Malaysia and across Asia-Oceania is defined by scientific excellence, technological leadership, and unwavering dedication to patient safety.

NMO Activity Report: PCMP 2025: Strengthening Leadership, Ethics, and Patient Safety in Medical Physics

The Philippine Conference on Medical Physics 2025 (PCMP 2025), organized by the Society of Medical Physicists in the Republic of the Philippines (SMPRP), was successfully held on 05-06 June 2025, at the Diamond Hotel Manila. With the theme “Filipino Medical Physicists as Leaders in Enhancing Patient Care,” the conference brought together medical physicists, healthcare professionals, researchers, regulators, and industry partners to celebrate the profession’s expanding role in advancing patient safety, radiological standards, and innovation in healthcare. The two-day event served as a dynamic platform for highlighting emerging research, sharing best practices, and reinforcing the collective commitment of Filipino medical physicists to excellence in clinical service and public health.

The conference opened with an inspiring keynote address by Prof. Chai Hong Yeong, President of the Southeast Asian Federation of Organizations for Medical Physics (SEAFOMP), who underscored the global contributions of Filipino medical physicists in shaping professional standards, mentoring future leaders, and driving improvements in patient-centered radiological care. A highlight of the first day was the lecture of Prof. Adam M. Cunha from the University of California, San Francisco, who presented innovative advances in high-dose-rate (HDR) brachytherapy and discussed strategies for translating cutting-edge technologies into practical applications, particularly in low-resource settings.

Regulatory perspectives were also prominently featured, with updates from Dr. Carlo A. Arcilla, Director of the Philippine Nuclear Research Institute (PNRI), and Dr. Valeriano Timbang of the Food and Drug Administration Center for Device Regulation, Radiation Health and Research (FDA-CDRRHR), who emphasized the importance of compliance, safety culture, and evolving regulatory frameworks in ensuring safe and effective radiological practices.

A defining milestone of PCMP 2025 was the roundtable discussion and ceremonial signing of the Joint Declaration on Patient Safety and Professional Ethics in Medical Radiological Practices. This landmark initiative convened key leaders and representatives, including Prof. Chai Hong Yeong (SEAFOMP President), Ramon Carlo L. Cruzpero (SMPRP President), Dr. James Delos Santos (Philippine College of Radiology President), Dr. Michele A. Duldulao-Ogbac (Philippine Society of Nuclear Medicine President), Dr. Maria Teresa Julieta U. Benedicto (Philippine Radiation Oncology Society President), Cesar P. Abundo (Philippine Association of Radiologic Technologists Treasurer), and John Michael Medina (Philippine Society of Nuclear Medicine Technologists President), alongside distinguished senior leaders and past presidents in the field. The Joint Declaration symbolized a unified, interdisciplinary commitment to strengthening patient safety standards, upholding the highest ethical principles, promoting responsible and evidence-based radiological practices, and fostering collaboration among medical physicists, physicians, technologists, and regulators. The ceremony underscored the shared recognition that leadership in medical physics extends beyond technical expertise and innovation, encompassing professional accountability, ethical stewardship, and a steadfast focus on patient welfare.

The second day of the conference featured parallel scientific and technical sessions, industry-led workshops, and in-depth discussions on MRI and CT quality assurance, nuclear medicine facility standards, and clinical best practices in radiological procedures. Prof. Cunha also provided further insights on bridging innovation with real-world clinical implementation. The event likewise hosted the SMPRP General Assembly and the leadership transition of the Philippine Board of Medical Physics (PBMP), honoring dedicated service while welcoming newly certified medical physicists into the profession. Research excellence was recognized through awards presented to outstanding presenters from institutions including UP Manila and PUP, highlighting the strength and vitality of local academic and clinical research.

The conference concluded with the announcement that the Philippines will host SEACOMP 2026, further affirming the country's growing influence and leadership within the regional medical physics community. PCMP 2025 ultimately stood as a defining event that reinforced the unwavering dedication of Filipino medical physicists to excellence, innovation, ethical practice, and collaborative leadership—ensuring that every technological advancement in radiological science remains firmly anchored in the goal of improving patient outcomes. (*ramcarcruz2026*)

Activity Report: SCMPCR E-Learning Program (ELP-10): Soft Skills for Medical Physicists and Scientists in Cancer Research

[1,2]*Mohamaad Ullah Shemanto*, [1]*Md. Jabidul Islam*

[1]South Asia Centre for Medical Physics & Cancer Research (SCMPCR)

[2]Evercare Hospital Chattogram

The South Asia Centre for Medical Physics and Cancer Research (SCMPCR) successfully conducted its 10th E-Learning Program (ELP-10) from 1 to 21 November 2025. Titled “Soft Skills for Medical Physicists and Scientists in Cancer Research,” the program integrated professional development with technically advanced topics essential for modern cancer care.

Accredited by the European Board for Accreditation in Medical Physics (EBAMP), the course awarded up to 35 Continuing Professional Development (CPD) points. The program achieved significant global reach, attracting 62 participants from 22 countries across South Asia, Southeast Asia, the Middle East, Europe, Africa, and Australia.

Figure 1. Official flyer of SCMPCR E-Learning Program (ELP-10)

Day 01: Monte Carlo Simulations for Dose Calculation

Speaker: Prof. Dr. Guenther Hartmann, German Cancer Research Center (DKFZ), Heidelberg, Germany.
Moderator: Mr. Suresh Poudel, Medical Physicist, BPKMCH, Bharatpur, Nepal.

Prof. Hartmann presented this session, which was moderated by Mr. Suresh Poudel. The lecture provided a strong conceptual and practical understanding of stochastic dose calculation methods while clarifying the limitations of analytical algorithms. Participants gained clinical insight into Monte Carlo methods for heterogeneous media and small-field dosimetry, improving their confidence in evaluating accuracy for advanced techniques.

Day 02: Three-Dimensional Printing in Radiotherapy

Speaker: Mr. Timothy Froese, Director of Commercial Strategy, Adaptive Medical Technologies, Halifax, Canada.
Moderator: Dr. Md. Akhtaruzzaman, Chief Medical Physicist and Radiation Safety Officer, Evercare Hospital Chattogram, Bangladesh.

Mr. Froese led the session, moderated by Dr. Md. Akhtaruzzaman. It demonstrated how additive manufacturing integrates into radiotherapy workflows for patient-specific bolus design, immobilization, and QA phantoms. The discussion highlighted innovative, cost-effective solutions applicable to resource-limited settings.

Day 03: Artificial Intelligence in Radiation Medicine

Speaker: Dr. Hannah Mary Thomas T, Staff Scientist and DBT–Welcome India Alliance Early Career Fellow, Biomedical Informatics Unit, Christian Medical College, Vellore, India.
Moderator: Mohammad Ullah Shemanto, Medical Physicist, Evercare Hospital Chattogram, Bangladesh.

Dr. Hannah delivered a comprehensive overview of AI applications, moderated by Mohammad Ullah Shemanto. The lecture covered image segmentation, outcome prediction, and workflow automation. Participants gained clarity on data requirements, validation, bias, and interpretability to better engage with research literature.

Day 04: Digital Medical Image Processing Techniques

Speaker: Prof. Dr. med. Thomas Schrader, Expert in Medical Informatics, Department of Informatics and Media, Brandenburg University of Applied Sciences, Germany.
Moderator: Md. Motiur Rahman (Mithu), Chief Medical Physicist & Assistant Project Director TMSS Cancer Centre (TCC).

Prof. Thomas Schrader focused on image filtering, feature extraction, and quantitative analysis, with Md. Motiur Rahman moderating. The session established clear links between digital processing, radiomics, adaptive radiotherapy, and imaging-based biomarkers in cancer research.

Day 05: Clinical Implementation of PSQA Software and SGRT Systems

Speakers: Mr. Maximilian Grohmann, Medical Physicist, Department of Radiotherapy and Radiation Oncology, University Medical Center Hamburg-Eppendorf, Germany &
Dr. Hui Khee Looe, Deputy Head, Department of Medical Physics, Pius-Hospital, Oldenburg, Germany.
Moderator: Dr. Anwarul Islam, Coordinator Medical Physicist, Square Hospitals Ltd, Dhaka, Bangladesh.

Mr. Maximilian Grohmann and Dr. Hui Khee Looe presented practical strategies for commissioning and workflow integration, moderated by Dr. Anwarul Islam. Participants reviewed early clinical experiences and safety considerations necessary for implementing patient-specific QA and surface-guided radiotherapy systems.

Day 06: Practical Leadership Skills for Junior Physicists

Speaker: Prof. Dr. Carmel J. Caruana, Head, Department of Medical Physics, University of Malta, Msida, Malta.
Moderator: Meher Nigar Sharmin, Medical Physicist, Khwaja Yunus Ali Medical College and Hospital (KYAMCH Cancer Center), Enayetpur, Sirajganj, Bangladesh.

Prof. Caruana addressed leadership, communication, and career development, with Meher Nigar Sharmin moderating. The session emphasized the growth of soft skills alongside technical expertise within clinical and academic environments.

Day 07: From Submission to Publication

Speaker: Prof. Dr. Iuliana Toma-Dasu, Head of Medical Radiation Physics, Department of Physics, Stockholm University, Sweden, and Chief Editor of Physica Medica.
Moderator: Ms. Bushra Intakhab, Department of Physics, Florida Atlantic University, USA.

Prof. Toma-Dasu provided practical insights into manuscript preparation and peer review expectations, moderated by Ms. Bushra Intakhab. The discussion covered common rejection reasons and ethical reporting to support participants' research and publication efforts.

Day 08: Optimization and Score Functions in Radiotherapy

Speaker: Dr. Phil W. Koken, Medical Physicist, Department of Radiation Oncology, Amsterdam UMC, Netherlands.
Moderator: Dr. Md. Alamgir Kabir, Associate Professor, Department of Physics, Jahangirnagar University, Savar, Dhaka.

Dr. Phil explored objective functions and trade-offs in inverse planning, moderated by Dr. Md. Alamgir Kabir. The session strengthened participants' ability to critically interpret treatment plans by highlighting the limitations of automated optimization.

Day 09: Group Discussion and Interactive Exchange

The program concluded with a dynamic forum moderated by Dr. Raju Srivastava and Dr. Mary Joan, who also serves as Co-Editor-in-Chief of the SCMPCR Newsletter. This session allowed for direct, enthusiastic dialogue between participants, faculty, and a representative from LAP regarding vendor-specific inquiries. By addressing clinical challenges and research barriers in real-time, the exchange fostered peer learning and international collaboration, effectively bridging the gap between theoretical knowledge and practical professional growth.

Participant Evaluation and Feedback

Evaluations indicated high satisfaction with the program's organization and its balance between technical depth and professional development. Participants specifically noted increased confidence in utilizing Monte Carlo methods, AI, and modern QA systems. While the leadership and publication-focused sessions were highly valued for addressing professional challenges, constructive feedback suggested adding more hands-on components and case-based discussions in future iterations to further enhance the learning experience.

Examination Outcomes and Recognition of Excellence

A formal online examination on 21 November 2025 resulted in an impressive average score of 84.7%

(33/40). Top honors with a score of 38/40 were awarded to Ayesha Nur, Bushra Intakhab, and Sakhi Sara. Second-place honors (37/40) went to Morium Akter, Ahlam Azalmad, Saloni Chawla, Sheikh Faysal, Haritha Karunarathne, Suresh Poudel, and Sumaya Sumaya. Third-place (36/40) was shared by Safwan Araf Alvey, Jose Luis Paolo Domingo, and Md. Mokhlesur Rahman. These results confirm effective knowledge transfer across the diverse global cohort.

Mentorship and Ongoing Engagement

To foster future leadership, top-ranked participants have been invited to serve as SCMPCR Moderators and Ambassadors. A dedicated mentorship group has been established to provide ongoing academic guidance and pathways for active involvement in research and outreach. This initiative aims to transform academic success into long-term professional contributions, ensuring a sustained global network of skilled medical physicists.

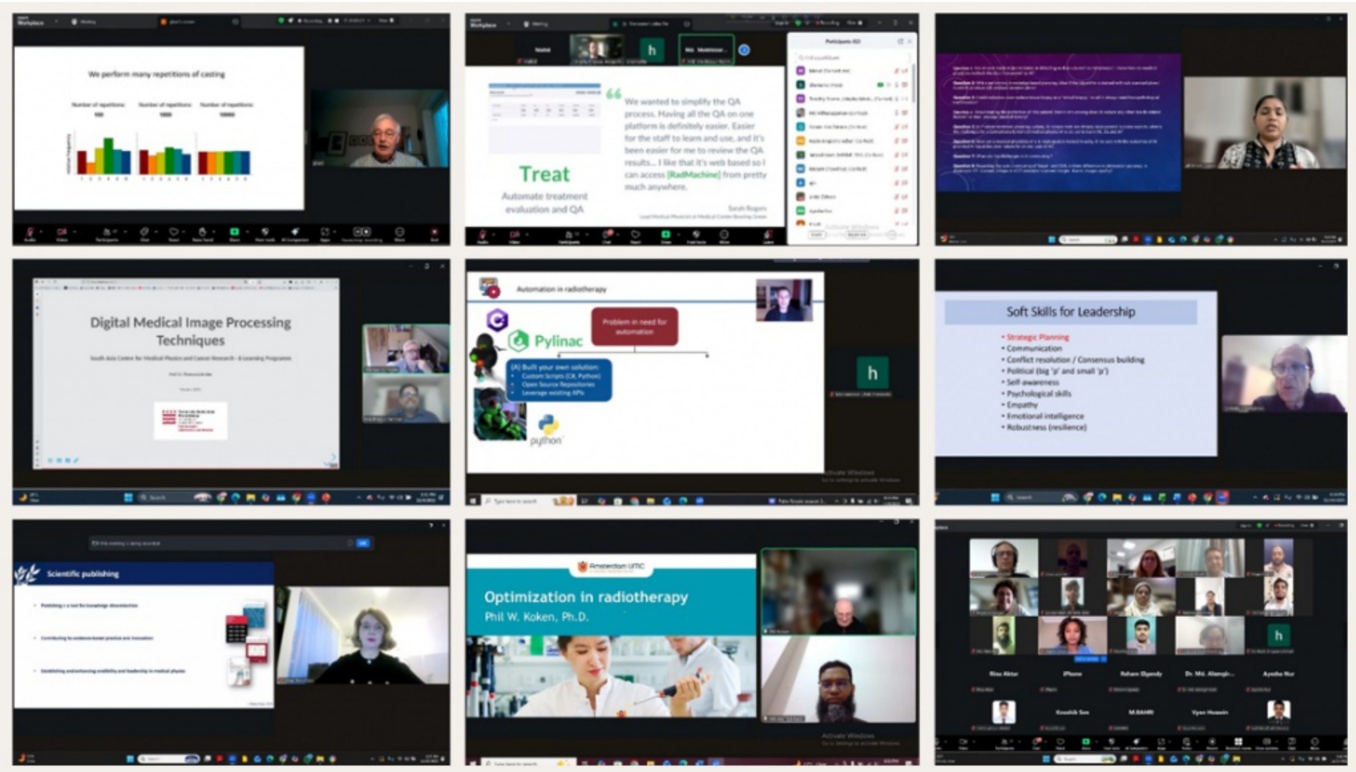


Figure 1. Sessions of SCMPCR E-Learning Program (ELP-10)

Conclusion

ELP-10 successfully integrated advanced technical training with essential soft skills, supporting the professional readiness of medical physicists worldwide. SCMPCR remains committed to providing inclusive, high-quality education that empowers scientists to lead innovation and ensure safe clinical practice in global cancer care.

ChartCheck Adaptive™: Enabling Zero-Click Offline Adaptive Assessment in Clinical Practice

The Platform: ChartCheck

ChartCheck actively monitors patient data to ensure quality and safety for ongoing treatments. Using data pulled directly from ARIA, weekly check results are displayed on a single page in an intuitive, easily-digestible format. ChartCheck spots treatment discrepancies as they occur, making routine weekly checks proactive and simple while facilitating compliance with AAPM TG-275. Critical patient treatment information is available on-demand to confirm the accuracy of treatment delivery. With automatic notifications for failing checks, plan errors can be investigated and resolved faster, resulting in higher quality patient care.

Building on the seamless integration of ChartCheck with ARIA, Radformation has released ChartCheck Adaptive™: a zero-click automated offline adaptive assessment solution designed to help radiotherapy clinics consistently evaluate anatomy changes and dose delivery (daily and accumulated) using the daily CBCT images acquired during treatment.

Offline Adaptive and Replanning Decisions

Offline adaptive radiotherapy is gaining traction as clinics recognize the clinical value of responding to anatomical changes during treatment. However, current decision-making relies heavily on subjective visual assessment of daily CBCT images and institution-specific protocols that vary widely in their criteria and implementation.

Even the best treatment plan is only as good as a patient's anatomical match on any given day. Over the course of therapy, trends such as patient weight loss, mask fit, or tumor regression can alter dose distribution and compromise the original plan's accuracy. Determining if a replan is appropriate often remains limited to visual review of daily CBCTs to identify deviations—a process with an inherent degree of subjectivity.

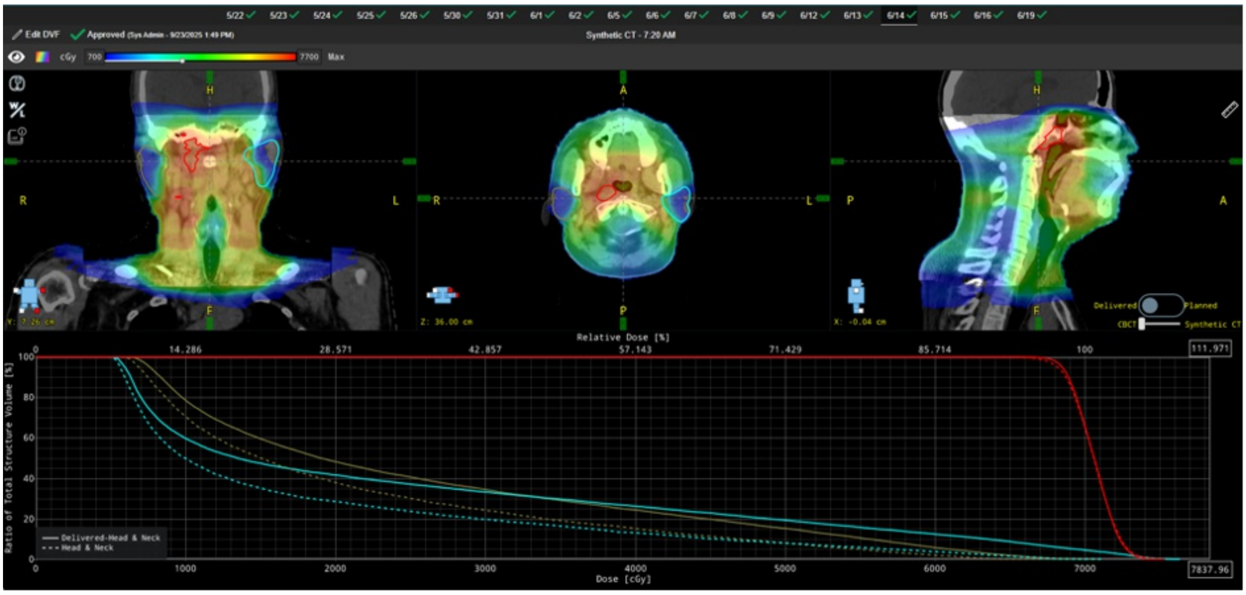
Establishing a more quantitative picture of plan fit requires considerably more time and resources: exporting image sets, generating deformed structures, recalculating dose distributions, and analyzing new DVHs. This process demands time and expertise, depends heavily on data quality and workflow consistency, and is impractical to perform routinely for every patient at every fraction.

Introducing ChartCheck Adaptive™

Radformation's answer is ChartCheck Adaptive, an addition to the existing ChartCheck platform designed to make automated adaptive radiotherapy assessment a reality. This offline adaptive decision support tool monitors daily CBCT data and evaluates treatment delivery on each fraction, applying quantitative dose-volume histogram (DVH) and volumetric assessment criteria to calculate how well the delivered dose aligns with the original plan.

The zero-click process operates in the background without interrupting clinical throughput. The system leverages data acquired during standard treatment like pre-treatment imaging, daily CBCTs, and optional machine log files, eliminating the need for additional simulations or manual setup. By integrating automated contouring, Monte Carlo dose calculation, and constraint checking into a unified workflow, ChartCheck Adaptive provides the comprehensive quantitative picture that has historically been too time-intensive to obtain routinely.

The result: systematic decision support based on objective dosimetric criteria rather than subjective visual assessment alone. Clinicians receive a complete view of both fractional and cumulative dose assessment, enabling confident, data-driven replanning decisions while maintaining clinical efficiency throughout the treatment course.



Cumulative dose from individual treatment fractions can be compared directly against planned values to provide insights on treatment progression, informing smart decisions for offline adaptation

Fraction-by-fraction dose and volume changes are automatically assessed against predefined tolerance thresholds for selected OARs, with the ability to track longitudinal trends across all contoured structures using customizable templates

Putting the Pieces Together

This new adaptive assessment functionality leverages existing Radformation solutions, working behind the scenes within the ChartCheck platform to provide a crisp dosimetric assessment of each treatment fraction delivery.

AutoContour	The first step of the process uses AutoContour's deformable image registration algorithm to adapt existing target and OAR contours to daily cone-beam CT (CBCT) images. As CBCTs can vary in quality, AutoContour generates a synthetic CT for Hounsfield Unit mapping and accurate calculation results.
RadMonteCarlo	Using the original treatment plan and optional daily machine log files, RadMonteCarlo performs a full Monte Carlo recalculation of dose on the synthetic CT, providing a highly accurate dose distribution to assess against benchmark values.
ClearCheck	To relate the recalculated dose to clinical goals, dose constraint templates are automatically applied to evaluate key metrics—DVH curves, target coverage, OAR constraints, and volume changes—delivering a complete quantitative assessment without additional user input.
ChartCheck	Originally a platform for efficient, high-quality physics weekly review, ChartCheck now brings key functionality from these existing solutions to create an offline adaptive assessment workflow that delivers dosimetric insights for key decision making during a course of treatment.

Together, these components enable departments to track the true delivered dose throughout the treatment course and to identify when anatomical or positional changes begin to impact plan quality.

EverChartCheck Adaptive intelligently leverages individual solutions already trusted by thousands of clinicians worldwide to provide an efficient offline adaptive assessment workflow

Every patient's anatomy changes over the course of treatment. Traditionally, evaluating these changes offline has been complex, slow, and hard to scale: relying on subjective visual assessment or labor-intensive manual workflows that are impractical to perform routinely.

ChartCheck Adaptive™ changes this. With a zero-click workflow that automatically recalculates dose, verifies constraints, and flags when adaptation may be needed, offline adaptive assessment becomes a seamless, daily process rather than an occasional burden. Continuous patient monitoring with automated notifications ensures clinicians can intervene precisely when it matters.

The result is a shift from reactive, experience-based decisions to proactive, data-driven patient monitoring. ChartCheck Adaptive provides the dosimetric insights needed to make confident replan decisions while maintaining clinical efficiency, making quantitative adaptive assessment a practical reality for every patient, every fraction.

To get more information about our approach to offline adaptive assessment with ChartCheck, schedule a demo to learn more.

ChartCheck 1.6 is CE Marked and available now where CE Mark is recognised. US FDA 510(k) cleared.

Sara La Civita, MS, MPE, is a Medical Physicist at Radformation, where she serves as a Clinical Research Coordinator, helping bridge the gap between industry innovation and clinical practice. Prior to joining Radformation, she practiced as a clinical medical physicist in Italy before transitioning to industry. Over the past 15 years, she has held diverse roles spanning sales, clinical applications, and research collaboration, bringing both clinical and commercial insight to her work.

Introducing the Mako Display: App-powered. Wireless. Future ready

A revolution in X-ray testing and QA

Figure 1: The App-powered Mako Display connects wirelessly to the Mako Meter

RTI Group proudly presents the Mako Display, a cutting-edge App designed to redefine the user experience of the RTI Mako X-ray Meter. With the power of wireless connectivity, ultimate speed and usability, Mako Display marks a revolution in X-ray testing.

Radiation Data Made Mobile – A New Era of Measurement Freedom

The Mako X-ray meter launch set new standards in X-ray testing, with its groundbreaking new detector design it boasts the best accuracy on the market, together with the broadest application range. Now, with the new **Mako Display**, accuracy just met speed, boasting the fastest and most intuitive experience of an X-ray meter. Delivering a completely wireless experience and unmatched speed, the Mako App transforms how X-ray testing is performed. No laptop required.

Figure 2: Fast real-time data and smooth touchscreen control

App-Powered Precision

Not only is the Mako Display lightning fast and convenient, it also builds on the market-leading capabilities of the Mako meter itself. Unlike other sensors built on outdated technology and requiring long cables, Mako offers a more accurate, modern and seamless experience:

- **Fully wireless**
  Powerful wireless capability means there is no need for long cables and unstable probes, eliminating uncertainty and messy setups.
- **No selections required**
  Simply place in the X-ray beam and measure. No selections are required.
- **Orientation independent**
  No need to worry about directional placement, the Mako detector can be placed in any orientation and is insensitive to the heel effect.
- **Unmatched accuracy**
  Groundbreaking detector technology provides the market-leading accuracy, outperforming other meters across diagnostic X-ray modalities.

Real users, real pain points, real results

The Mako Display is a culmination of years working together with X-ray manufacturers, service groups, engineers, physicists and QA professionals, establishing RTI Group's position as innovation leaders in X-ray testing. The Mako with App-powered display delivers on the 3 most requested features of an X-ray meter: Accuracy, Speed, and Simplicity.

During beta-testing of the display, Mako Display proved overwhelmingly to outperform competitor meters. Mako starts faster, is more intuitive, has a better testing experience with full wireless capability and produces more accurate results. Users preferred the Mako Display App to older models which have outdated displays, and proved that Mako "is easier", "feels more modern" and that users "prefer the Mako interface".

During testing, the display App delivers the smoothest workflow, with instant connection and the most accurate data. Users were happy to get rid of long cables and wobbly/instable probes, in addition to having a meter that handles the latest X-ray systems, where competitor models struggle.

Future Ready Functionality

Figure 3: Mako X-ray Meter with Mako Display

RTI's vision for Mako Display extends beyond measurement. The App's architecture is future-ready, built to integrate with cloud-based services, digital QA workflows, and data analytics.

Together with RTI Ocean software, RTI offers the broadest range of software capabilities and flexibility in testing, and your chosen display can be wherever your phone, tablet or laptop is. The Mako Display App is available as a **free download to your personal phone**, with no restrictions, no user limits, no license and no cost. X-ray testing has never been easier.

With Mako Display, you're not just adopting a new App; you're investing in the next generation of X-ray test and QA intelligence.

The Future of X-ray QA is Here

The Mako Display embodies RTI's ongoing commitment to innovation and setting the standard for X-ray QA. More than just an X-ray meter, RTI offers industry-leading calibration cycles, fast calibration turnaround times (10 days TaT), dedicated Support & Training teams well as free access to myRTI Customer Portal, for online access to a wealth of knowledge.

Wireless. App-powered. Future ready.

Discover the future of X-ray QA today, with the Mako Display from RTI.

Michael Olding, PhD, is Vice President Solutions at RTI Group. Michael works on the interface between product development at RTI and global end users of RTI's products & solutions (physicists, engineers and medical professionals), and is passionate about ensuring user needs are at the forefront of new product development at RTI Group.

Tackling the Real Problem: The Dosimetric Unknowns in Patient Setup

Treatment planning is performed on a static CT dataset, capturing a single snapshot. The resulting plan is then delivered to the patient over multiple weeks, relying on efforts to recreate that initial anatomy and setup for every fraction.

Surface Guided Radiation Therapy (SGRT) technologies have become invaluable in helping position patients consistently, using surface metrics to guide alignment. Yet, typical SGRT tolerances — often set generically at 3–5 mm and 3 degrees — are rarely customized to individual patients or specific anatomical sites. These thresholds don't reflect the actual dosimetric consequences of deviations for a given patient. Patients with limited mobility introduce additional challenges in reproducibility. Even with careful setup, small positional inconsistencies can result in subtle, unintended dose shifts. In some cases, evidence of excessive or misplaced dose to normal tissues is only discovered after treatment has been delivered, when the opportunity to intervene has passed.

Patients, after all, are not phantoms, and Patient Specific Quality Assurance (PSQA) activities lose clinical meaning when a surrogate phantom stands in for the patient for independent secondary calculations and IMRT QA process. After all the checks and approvals are done and a patient is prepared for the start of treatment, their anatomy has already changed, and it continues to change throughout the course of treatment. Breast tissue can swell or develop seromas. Abdominal organs fluctuate with varying gas or solid content. The pelvis undergoes daily shifts with bladder or rectal filling. Even with Image Guided Radiation Therapy (IGRT) to align to internal anatomy and minimize gross setup errors, the insight into how day-to-day anatomical changes impact the actual dose delivered is still lacking. So the question remains:

- How do we adapt and personalize our SGRT and IGRT setup tolerances based on the true dosimetric situation for each patient?
- How does moving to more individualized tolerances help clinicians decide when it's safe to treat versus when to adapt or replan?

The Challenge Is Recognized — But Not Universally Solved

Unseen dosimetric uncertainty is now acknowledged across the field. Sophisticated platforms like the Elekta Unity MR-linac offer online adaptive radiotherapy workflows such as Adapt to Position (ATP), which aligns the day's image to the reference via rigid registration and updates the plan accordingly. However, these solutions require significant infrastructure. Many clinics lack such technology, yet still face the same challenges of anatomy-driven dose variability.

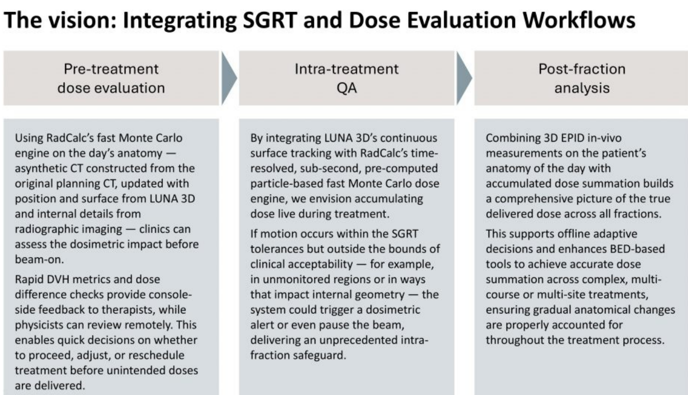


Figure 1. Integrating SGRT and Dose Evaluation Workflows

Where RadCalc Is Heading

At LAP, we're addressing this gap by building on our core strengths: precise alignment and independent dose verification. LAP lasers and LUNA 3D offer continuous, non-invasive surface tracking from simulation through delivery. Paired with RadCalc's 3D QA suite, we're creating an integrated workflow to make dosimetric insight patient-specific and actionable.

RadCalc's EPID dosimetry already allows clinics to assess the dose delivered retrospectively. However, proactive insight is needed before or during treatment, not just after.

Redefining QA: Integrated SGRT and Dose Evaluation Workflows

RadCalc's future centers on combining SGRT and adaptive QA through three key workflows, as shown in the vision presented in Figure 1.

A Smarter, Patient-Centric QA Standard

Together, these tools help clinics move from fixed tolerances to a personalized, dosimetrically grounded approach — no MR-linac required. With RadCalc, QA becomes dynamic, data-driven, and built around the patient, not the plan.

Let's connect and explore how this evolution in QA can support your clinic's vision!

Note: German Patent Application No. 10 2023 115 102.9, PCT Patent Application No. EP2024/065566, US Patent Application No. 19/144,366

Carlos Bohorquez, MS, D.A.B.R, is the Product Manager for RadCalc at LifeLine Software, Inc., a part of the LAP Group. An experienced board-certified Clinical Physicist with a proven history of working in the clinic and medical device industry, Carlos' passion for clinical quality assurance is demonstrated in the research and development of RadCalc into the future.

Synthetic CT Generation Inraystation for enhanced workflows in Adaptive Radiotherapy

Daily cone beam CTs (CBCTs) provide superior representation of patient anatomy at the time of treatment compared to the conventional planning CT. To assess the need for replanning, it should be possible to compute the dose based on the daily CBCT images. However, the quality of CBCT images is often sub-optimal in comparison to CT images.

CBCT images often suffer from artifacts and an unstable relationship between CBCT intensities and electron densities and therefore are not well-suited for dose computation. To overcome this challenge, RayStation* utilizes two advanced algorithms to create synthetic CTs, using the daily CBCT and the planning CT as input. This results in increased dose computation accuracy, which is crucial for establishing more reliable adaptive workflows in radiation therapy.

BENEFITS:

- Provides representation of the patient anatomy at the time of treatment as opposed to the planning CT
- Enhances CBCT-based dose computation accuracy
- CBCT based synthetic CT dose calculation has the potential to increase efficiency of the adaptive radiotherapy (ART) pathway while removing subjectivity

Figure 1. Comparison between the planned dose (left) and the daily fraction dose computed on the Corrected CBCT (middle) and Virtual CT (right). Both synthetic CT algorithms indicate that the plan may need to be adapted, as can be seen in the DVH and dose statistics.

TWO ADVANCED ALGORITHMS

Two algorithms were introduced in RayStation 11B, which create a synthetic CT from the daily CBCT, making it possible to accurately compute dose using HU values instead of using bulk densities. These are included with a rayTracker license, further strengthening the dose tracking and adaptive replanning workflows

The **Corrected CBCT** algorithm works in an iterative manner with two main stages; conversion, and correction. These stages are alternated until convergence. The initial stage finds a conversion from the CBCT intensity scale to the planning CT HU intensity scale, and the second finds a correction map that (for each CBCT voxel) removes low frequency artifacts.

This method works for all CBCTs, with no calibration needed and no possibility of changes to the CBCT geometry. In case of limited FOV, parts outside the FOV are copied from the deformed planning CT to the CBCT.

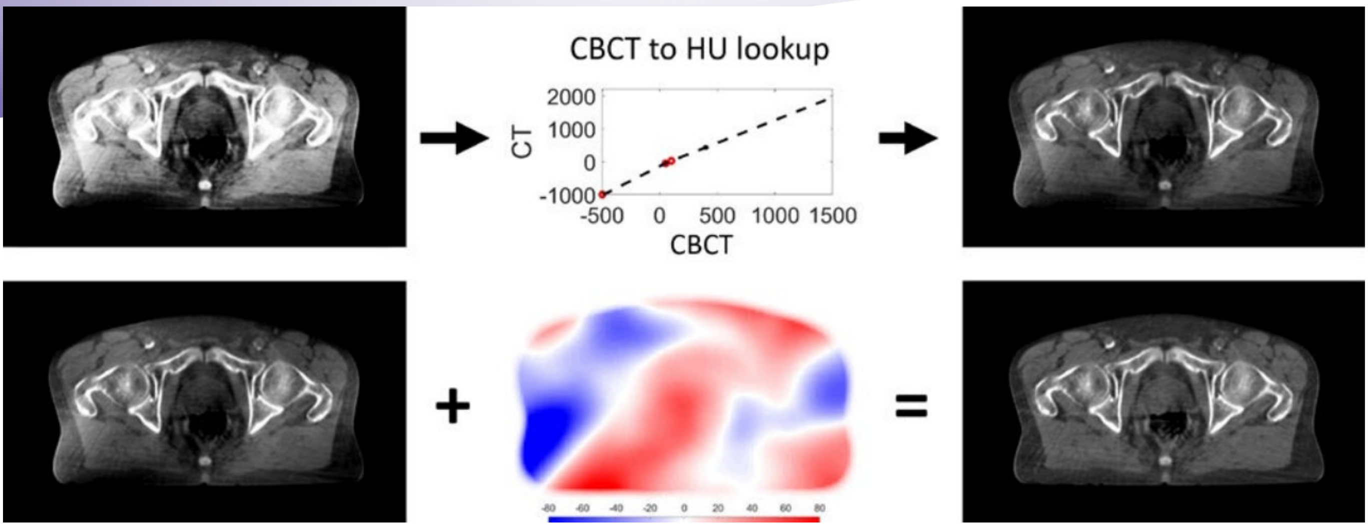


Figure 2. The CBCT is improved iteratively in two stages, none of which alters the patient's anatomy. In each iteration, a patient specific voxel-vise CBCT value to HU look up table is applied, as well as low frequency (smooth) shading correction map

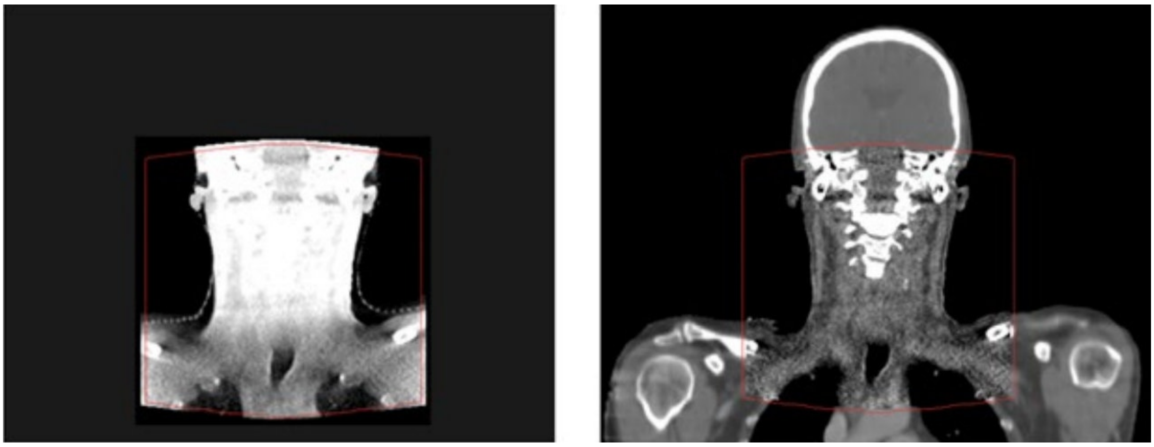


Figure 3. Regions outside of the field-of-view ROI of the CBCT are mapped from the planning CT to the Corrected CBCT using the deformable registration.

The Virtual CT method is a hybrid between a deformed CT and the CBCT correction method. The planning CT is deformed to the CBCT geometry and mismatching low density tissues (air/lung) either in the planning CT or the CBCT, are replaced with values from the corrected CBCT.

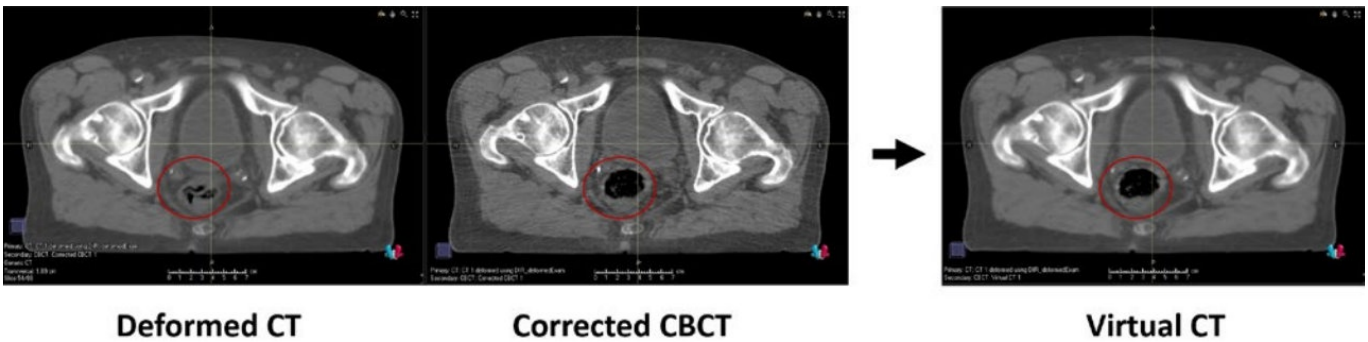


Figure 4. The Virtual CT is created by combining a deformed planning CT and the Corrected CBCT. It takes most of the image from the deformed CT, apart from low density regions such as air or lung that are taken from the corrected CBCT (circled in red).

Why two different algorithms?

Corrected CBCT:

\+ **No anatomical changes -> No dose errors from incorrect anatomy. Contouring can be safely performed, even easier than on original.**

\+ **Fairly robust to errors in the deformable registration.**

– If the original CBCT is of poor quality, some artifacts may remain.

Virtual CT:

\+ **Mostly a deformed CT and will therefore have CT-quality, no/very small additional dose errors from image quality.**

– As it mostly is a deformed CT, accuracy is highly dependent on the deformable registration

– Deformed CT   Contouring should not be done on this image. Use the original CBCT or (preferably) corrected CBCT.

If the image quality of the CBCT is sufficient, the corrected CBCT is the preferred option.

Rune Slot Thing, Medical Physics Expert, PhD, Vejle Hospital, Denmark

"Corrected CBCTs have allowed us to evaluate the dosimetric consequences of anatomical changes for all patient groups, faster and more accurately than before. Using scripting, we can create a corrected CBCT, propagate contours and calculate an evaluation dose on the Corrected CBCT within 2 minutes from CBCT import. This workflow allows us to focus our time on the patients where treatment adaptation makes a difference."

VALIDATION

The Corrected CBCT and Virtual CT methods have been validated for photons and ions at multiple clinics with good results.[1]

In a study by Thing et al.,[2] the Corrected CBCT and Virtual CT images show excellent dosimetric agreement with the ground truth CT images. Gamma 2%/2mm pass rates >98% were found for 58/60 thoracic and pelvic patients. DVH similarity to CT within 1% was demonstrated for all pelvic cases, and similarity within +/- 1Gy was shown for all cases. Zhou et al.,[3] looked at the feasibility of this method for online evaluation in proton therapy.

Apart from showing good dosimetric agreement, they concluded that online evaluation (from image import to calculated dose) can be achieved within 2 minutes for most clinical proton cases.

SUMMARY/CONCLUSION

CBCT-based synthetic CTs generated by the algorithms in RayStation provide high accuracy in dose computation, a key factor for more reliable and automated workflows for adaptive radiotherapy.

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First published: 31 October 2022

[3] J. Zhou et al., "Cone Beam CT-Based Online Evaluation in Two Minutes Using a Commercial Treatment Planning Software for Proton Therapy," Int. J. Radiat. Oncol., vol. 111, no. 3, p. e153, Nov. 2021, doi: 10.1016/j.ijrobp.2021.07.614.

*Subject to regulatory clearance in some markets.

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Time & Venue	Day 1 - Main Room (500 seats)	Day 1 - Session Room 1 (150 seats)	Day 2 - Main Room (500 seats)	Day 2 - Session Room 1 (150 seats)	Day 3 - Main Room (500 seats)	Day 3 - Session Room 1 (150 seats)
	RT (Photon RT & AI)	Brachytherapy & Radiation Protection	Imaging & AI	Nuclear Medicine	RT (Particle Therapy)	Mini-Symposium
08:00 – 09:00	Registration					
09:00 – 09:50	Opening - AFOMP / KSMP	⇒ Screen Sharing	Kiyonari Inamura Memorial Lecture	⇒ Screen Sharing	Multidisciplinary Session (Begin at 8:50)	⇒ Screen Sharing
09:50 – 10:40	Keynote 1 (Radiation Therapy + AI)	⇒ Screen Sharing	Keynote 2 (Imaging + AI)	⇒ Screen Sharing	Keynote 3 (Particle Therapy)	⇒ Screen Sharing
10:40 – 11:00	Exhibition Booth Tour & Coffee Break		Exhibition Booth Tour & Coffee Break		Exhibition Booth Tour & Coffee Break	
11:00 – 11:30	Plenary RT1 - Invited (25 min +5 min)	Plenary BT1 - Invited	Plenary IM1- Invited	Plenary NM1- Invited	Plenary PT1- Invited (Proton)	Mini-Symposium 1
11:30 – 12:00	Plenary RT2 - Invited (25 min +5 min)	Plenary BT2 - Invited	Plenary IM2- Invited	Plenary NM2- Invited	Plenary PT2- Invited (Carbon)	Radiation Biology
12:00 – 12:40	Luncheon 1-1	Luncheon 1-2 (Parallel)	Luncheon 2-1	Luncheon 2-2 (Parallel)	Lunch	Lunch
12:40 – 13:00	Exhibition Booth Tour		Exhibition Booth Tour		Exhibition Booth Tour	
13:00 – 13:30	Plenary RT3 - Invited (25 min +5 min)	Plenary RP1 - Invited	Plenary IM3- Invited	Plenary NM3- Invited	Plenary PT3- Invited (Proton)	
13:30 – 14:00	Plenary RT4 - Invited (25 min +5 min)	Plenary RP2 - Invited	Plenary IM4- Invited	Plenary NM4- Invited	Plenary PT4- Invited (Carbon)	Mini-Symposium 2
14:00 – 14:30	Young Investigator Competition (at Kiosk) / Exhibition Booth Tour & Coffee Break		Selected Poster Presenatation(at Kiosk) / Exhibition Booth Tour & Coffee Break		Exhibition Booth & Coffee Break	Synchrotron Radiation
14:30 – 15:00	Oral Presentation(Selected, 8min+2min)	Oral Presentation(Selected, 8 min+2min)	Oral Presentation (Selected)	Oral Presentation (Selected)	Oral Presentation (Selected)	
15:00 – 15:30	Oral Presentation(Selected, 8min+2min)	Oral Presentation(Selected, 8 min+2min)	Oral Presentation (Selected)	Oral Presentation (Selected)	Oral Presentation (Selected)	Exhibition Booth & Coffee Break
15:30 – 16:00	Young Investigator Competition (at Kiosk) / Exhibition Booth Tour & Coffee Break		Selected Poster Presenatation(at Kiosk) / Exhibition Booth Tour & Coffee Break		Exhibition Booth & Coffee Break	
16:00 – 16:30	Advanced Technology - RT1	Advanced Technology - BT1	Advanced Technology - IM1	Advanced Technology - NM1	Advanced Technology - PT1	Mini-Symposium 3
16:30 – 17:00	Advanced Technology - RT2	Advanced Technology - BT2	Advanced Technology - IM2	Advanced Technology - NM2	Advanced Technology - PT2	Dosimetry & QA
17:00 – 17:30	Advanced Technology - RT3 (Dosimetry)	Advanced Technology - RP1			Advanced Technology - PT3	
17:30 – 18:00	Advanced Technology - RT4 (QA)	Advanced Technology - RP2	Gala dinner		Awards Ceremony	
18:00 – 18:30					Closing	
18:30 – 19:00	Welcome Reception					
19:00 – 19:30						
19:30 – 20:00						
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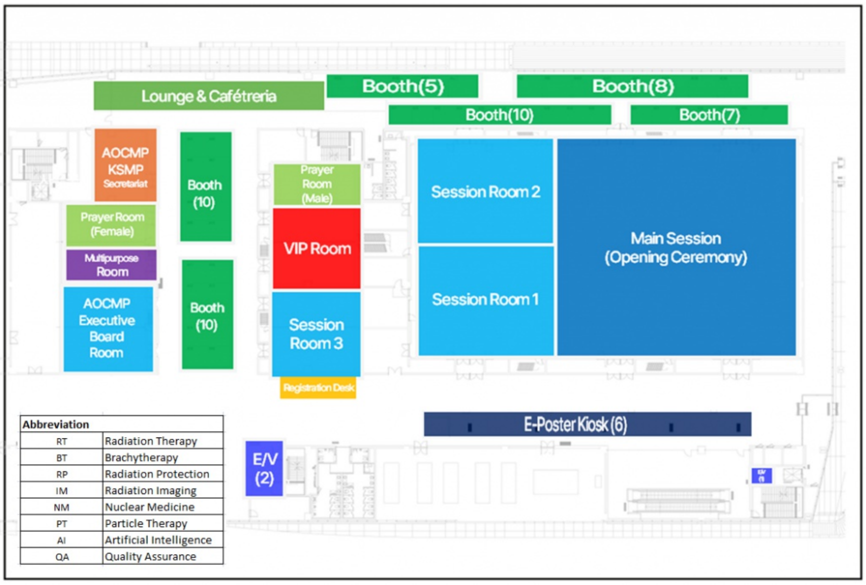

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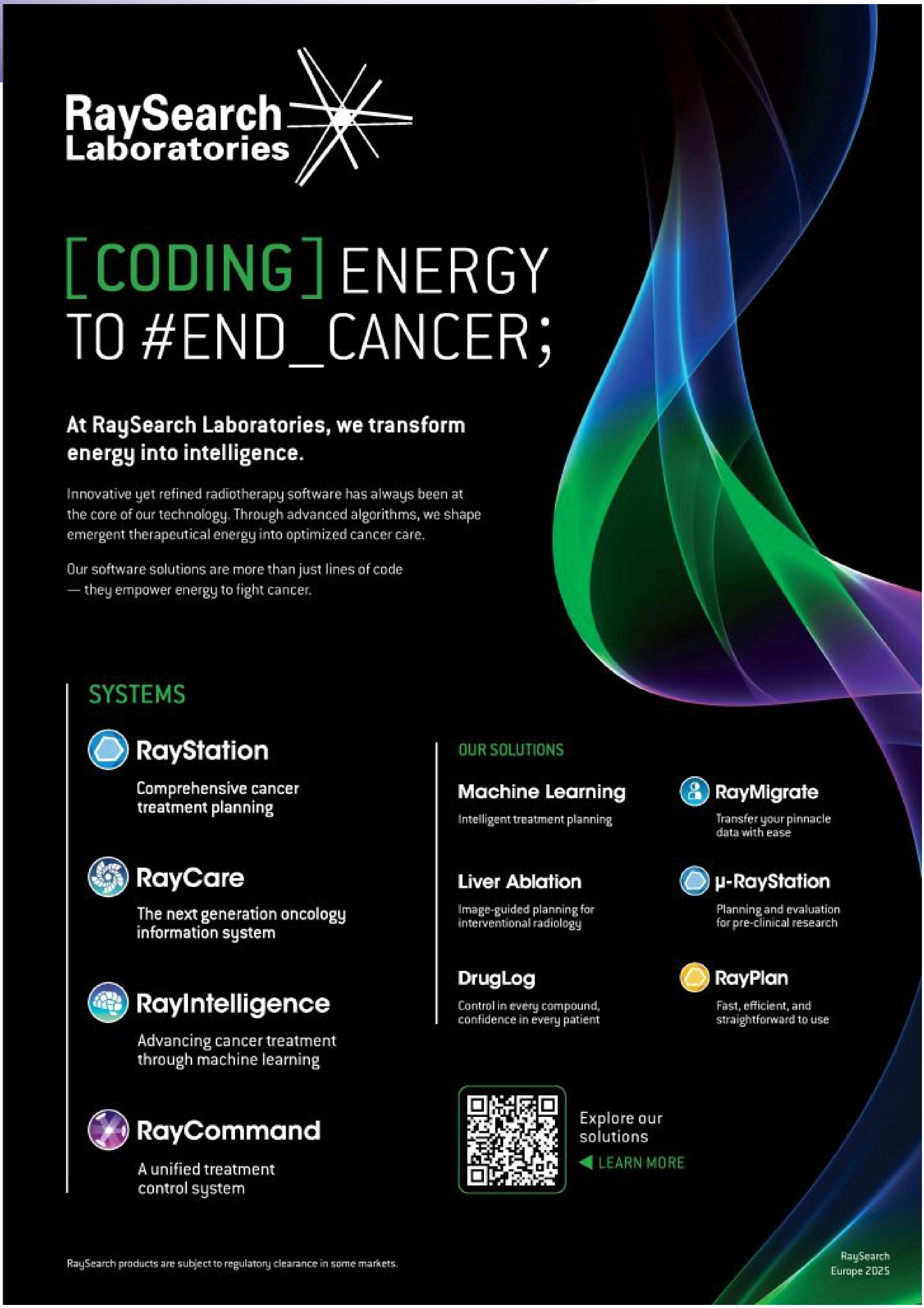

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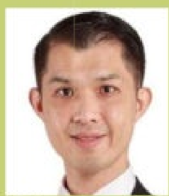

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Answers for MCQ Quiz

1) Highest neutron flux in a therapy treatment room is produced by _____.

ANSWER: D a 20-MV photon beam

2) In the treatment of Hodgkin s disease with a mantle field on a linac, patients may experience a skin reaction in the neck region. This could be due to which of the following?

ANSWER: D All of the above

3) Parallel-opposed 18 MV photon beams (dmax = 3.5 cm) are used to treat an area which includes nodes at a minimum depth of 2.0 cm, If the nodes are to receive at least 90% of the midplane dose:

ANSWER: D Bolus is not needed.

4) Which of the following could be used as a tissue compensator?

ANSWER: E All of the above

5) The formula used to calculate the gap on the skin between adjacent fields, matched at depth, relies on the fact that:

ANSWER: B The projection of the edge of the light field follows the 50% decrement line of the radiation field.

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