AFOMP

宙時魂

AFOMP Pulse

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

Highlights

Did you know ? Marvellous Science in Action: From Pixels to Patients...

Featured papers in Journals: Editor’s Choice - Revolutionizing cancer treatment in India...

AFOMP Photography Competition

Upright diagnostic imaging and proton therapy for upstanding patient care

How can we benefit from AI in the current renaissance?

Volume 16, No. 1, March 2024

Table of Contents

Editorial

Call for IMPW2024 Celebration across the AFOMP Region

Dear Readers,

Warm Greetings!

On behalf of the editorial board, I am delighted to present you, the year 2024 first edition of AFOMP PULSE, an official newsletter of Asia-Oceania Federations of organization for Medical Physics, Volume.16: 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 IDMP2023 celebrations, professional news and updates and many other common interesting news on Medical Physics profession for the last six months in the AFOMP regions.

We are happy to announce the upcoming celebration of the International Medical Physics Week (IMPW2024) from April 22-26, 2024. Due to the enthusiastic reception of the IDMP celebration by our members and stakeholders, in 2020, the IOMP has chosen to dedicate a week to highlight the invaluable contributions of medical physicists to healthcare. This special week will be celebrated as International Medical Physics Week (IMPW). In 2024, IMPW2024 is scheduled to take place from Monday to Friday, April 22-26, 2024.

We encourage you to organize and participate in local events, workshops, webinars, and other activities that highlight the impact of medical physics in various aspects of healthcare. Share your knowledge, experiences, and innovations with fellow professionals and the broader community.

This is an AFOMP call to come together and emphasize the progress and accomplishments in medical physics, showcasing them as our collective contribution to health authorities, medical institutions, and safety and research organizations throughout the AFOMP region.

I would like to express my sincere thanks to the editorial board members, Prof. Eva Bezak, President AFOMP, Dr. Aik Hao Ng, AFOMP Secretary-General, Dr.M. Akhtaruzzman, Scientific Editor (Bangladesh), Dr. Leyla Madagossi, Educational Editor (Australia), and Dr. Zulaikha, Professional Editor (Malaysia) for their valuable contributions.

I would like to extend my special thanks to Dr. Rajni Verma (India) for her invaluable role as a Technical Editor, playing a significant part in shaping our newsletter and bringing forth this issue.

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

Hope you enjoy in reading this issue of AFOMP Pulse

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

AFOMP President's Message

Dear AFOMP Colleagues,

Happy New Year 2024. I am delighted to share with you the first 2024 issue of AFOMP Pulse newsletter, summarizing the notable activities and accomplishments of the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) organization and its national members.

We ended 2023 on a high, meeting in December in Mumbai, attending the combined International Conference of Medical Physics (ICMP) that was jointly organized by Association of Medical Physicists of India (AMPI), IOMP, AFOMP, and South-East Asia Federation of Organizations for Medical Physics (SEAFOMP). The ICMP was attended by over 1400 delegates and I would like to congratulate and thank the organizers, namely the convener Dr Sharma, on their efforts and hospitality, providing an excellent educational program and ample opportunities for networking. It was excellent to attend the meeting in person, after several years of online meetings during Covid Pandemic.

During the ICMP/AOCMP 2023 we also held AFOMP ExCom and Council meetings. These were held in hybrid forms (face-to-face and zoom) and I would like to thank all NMOs for their participation and contribution.

In 2023 numerous AFOMP awards and honors were awarded and presented in Mumbai. More details about the awards can be found in the Vice-President's report (Prof Anupama Azhari). However, I would like to highlight the Kiyonari Inamura Memorial AFFOMP Oration 2023 that was awarded to Prof. Agnette DP Peralta – and we are very grateful to Japan Society of Medical Physics (JSMP) for continued support of this oration.

Prof Peralta dedicated 42 years to the Department of Health (DOH) in Philippines, before retiring in 2017 and reaching the esteemed position of Assistant Secretary of Health. Prof. Peralta's global impact is underscored by her 12-year service as the only Filipino member in the Main Commission of the International Commission on Non-Ionizing Radiation Protection. She is the only Filipino elected as a Fellow of the International Organization for Medical Physics and the founding president of the Philippine Organization of Medical Physicists, which is now known as the Society of Medical Physicists in the Republic of the Philippines. She served as the president of the South-East Asian Federation of Organizations for Medical Physics (SEAFOMP), being the only Filipino to hold this position. In 2020, the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) honoured her as one of the 21 "Outstanding Medical Physicists from the AFOMP Region," marking the first time in its 20-year history that such an award was bestowed. She also co-founded SEAFOMP and AFOMP.

On other matters, our members have been involved in a paper titled "Science Diplomacy in Medical Physics – An International Perspective" that was published in the Health and Technology Journal reflecting our commitment to international collaboration (https://doi.org/10.1007/s12553-023-00756-0).

Last year, I also represented IOMP at the IAEA Technical Meeting on Advisory Services for Radiation Protection and Safety for Medical Exposures. This participation underlines our commitment to global initiatives in radiation protection. I was also engaged in the 74th Session of the WHO Regional Committee for the Western Pacific. Themes around sustainable healthcare and climate-resilient health systems were discussed, aligning with the UN's declaration of 2024-2033 as the International Decade of Sciences for Sustainable Development. In 2024 I will be working with ICRP as an observer on ICRP Task Group (128) on Individualization and Stratification in Radiological Protection: Implications and Areas of Application.

I am also proud to share that Adelaide, South Australia will host the IAEA radiology training in Adelaide, focusing on CT, Mammography, and X-rays, fostering collaboration in the Oceania region.

The 24th Asia-Oceania Congress of Medical Physics (AOCMP) 22nd Southeast Asia Congress of Medical Physics (SEACOMP) will be held in Penang, Malaysia (https://www.aocmp2024.com/) from 10 to 13 October, with preparations we under way. It will be an excellent congress and I hope many of you will participate.

In conclusion, I would like to express my gratitude for your continued support as we strive to advance our mission. Here is to building on these achievements and making further strides in the months to come.

With best wishes,

Eva Bezak
President, AFOMP

AFOMP Vice President's Message

Dear AFOMP Members and Colleagues,

I trust this message finds you all in good health and high spirits. As we embark on another year filled with opportunities and challenges, it is my honor to address you as the Vice President of the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP).

The AFOMP Pulse, our esteemed newsletter, has been a vital platform for sharing knowledge, fostering collaboration, and promoting advancements in medical physics. I am delighted to witness the continuous growth of our community and the remarkable contributions made by our members.

As we gear up for the first edition of AFOMP Pulse in 2024, I invite and encourage each one of you to actively participate by submitting your medical physics science and research-related articles, reports, educational materials, and information on scientific activities, workshops, and conferences. Your valuable insights and experiences play a crucial role in shaping the landscape of medical physics in our region.

In the spirit of collaboration, let us strive to make AFOMP Pulse a comprehensive and dynamic source of information that reflects the diverse expertise within our community. Your contributions will not only enrich the content of the newsletter but also inspire and educate fellow members across the Asia-Oceania region.

I extend my heartfelt gratitude to all those who have been instrumental in the success of AFOMP, and I am confident that, together, we will continue to achieve new milestones in the field of medical physics.

Looking forward to your active participation and the collective success of AFOMP Pulse.
Best regards,

Prof. Dr. Hasin Anupama Azhari
Vice President, AFOMP

AFOMP Immediate Past President's Message

Dear Readers,

Wish you a very happy, healthy, and productive New Year 2024

*"**Every sunset is an opportunity to reset. Every sunrise begins with new eyes**."*

Richie Norton

I hope your start to New Year was hopeful and enthusiastic as new time brings new opportunities to make progress both professionally and personally. Medical physics today is like a giant tree with innumerable branches with ever growing applications to health care. The great part of this subject is that there's always room for something new and unlike pure physics its quite exciting and challenging to see the practical applications of every new development, invention, and innovation. However, with such a dynamic nature of the subject there is always a challenge to conquer with constant updating, a need for continuous education, skill development and acquiring competencies. The only way to achieve this is close communication in community through academic & educational events and multi-dimensional research.

AFOMP, as a vibrant regional organization of national medical physics associations from Asia-Pacific region, provides an excellent platform and opportunity to full fill the need of the updation in our profession. AFOMP team has taken this challenge and working very passionately to full fill its objectives of professional developments and academic excellence. Various programs like educational web series i.e. AFOMP webinars, schools, periodic newsletter, meet the expert series are some of the excellent efforts. Your active participation and involvement in various AFOMP academic and professional activities will surely help to achieve your professional goals.

*Last year, AOCMP2023 was concluded successfully in Mumbai, India along with ICMP2023. It was a mega event with an overwhelming participation of over 1100 registered delegates. I must congratulate the organizers and hope that every participant is benefitted greatly. This year's AOCMP2024 will be organized in conjunction with SEACOMP2024 in Penang, Malaysia during 10-13 October 2024 with the theme "**Revolutionising patient care through Medical Physics**" [https://www.aocmp2024.com/] . The abstract submission has already started on the 10th of January. I hope we will receive a very warm and encouraging participation, especially from students and young professionals.*

I also take this opportunity to request you get familiarized with the IOMP Accreditation activities reflecting the IOMP's ongoing commitment to endorsing and promoting high-quality educational programs that contribute to the advancement and dissemination of knowledge in medical physics. https://www.iomp.org/accreditation/

At last, but not the least I congratulate the whole editorial team of AFOMP newsletter for their efforts and excellent publication. This is AFOMP's official means of communication with each of you. Now it comes as an online magazine, which is a great step towards the sustainability.

I hope you all enjoy reading it.

Prof. Arun Chougule Immediate Past President AFOMP
Chairman IOMP Accreditation Board and Chair ETC IOMP

AFOMP Secretary-General's Message

Dear colleagues,

As we reflect on the past year, I am honoured to have worked with the AFOMP family and grateful for the unwavering support from the Executive Committee and the cooperation from our national member organizations (NMOs). Together, we have achieved significant milestones, particularly in elevating our professional standards through educational activities and enhancing our visibility and engagement via our website and social media platforms. I extend my heartfelt congratulations to all for your dedication and accomplishments.

I am delighted to announce the addition of the Sri Lanka Medical Physics Society as our newest affiliated member, bringing the total number of NMOs under AFOMP to 21. This expansion signifies a stronger and wider network, poised to collaborate for the professional development of medical physics.

The successful organisation of the International Conference on Medical Physics (ICMP-2023) in Mumbai, India, from 6th to 9th December, expands our collaborative networks with the global medical physics community. I extend my sincere gratitude to the International Organizations for Medical Physics (IOMP) and Southeast Asia Federation of Organizations for Medical Physics (SEAFOMP) for their partnership and to all participants for their invaluable contributions.

Looking ahead, we are committed to delivering more impactful initiatives. I eagerly anticipate our upcoming events, particularly the AOCMP 2024, scheduled to take place in Penang, Malaysia, from 10th to 13th October.

I urge all our members to actively engage with AFOMP activities and share your insights on how we can further enhance our organisation. Together, let us continue to strengthen our community and advance the field of medical physics.

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

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

Meet the Expert Interviews: Synopsis of interview with Prof Dr Arun Chougule

Interviewed by Associate Prof Dr Mary Joan

Synopsis

The Asia Oceania Federation of Organizations for Medical Physics (AFOMP) founded on 20 May 2000 is striving to promote medical physics in the Asia and Oceania by working in close association with national member organizations, International Organization for Medical Physics (IOMP) and other national and international organizations of similar interest. The federation has completed two decades of activities bringing forth new means to face the existing and new challenges in medical physics professional development with 21 national member organizations and a plethora of activities and opportunities for early career and expert medical physics professionals of the region. AFOMP offers a unique meet and chat with professor series where pioneers in medical physics from the region shares their experiences and vision for the profession and in this episode we have Prof Dr Arun Chougule.

View the Interview

Prof Chougule is serving as the Dean and Chief Academic Officer, Swasthya Kalyan Group, Jaipur after completing 38 years of long exemplary career as a medical physics teacher, researcher, mentor and leader in the department of Medical Education, Government of Rajasthan State, India. He is the immediate past President of AFOMP and Chair Education and Training Committee IOMP and Chairman IOMP acreditation board. He is also a member of the IMPCB Board of Directors. He held positions like Dean, Student Welfare, Rajasthan University of Health Sciences (RUHS), Member, Board of Management, RUHS, Member, Academic Council, RUHS, Chairman, Unfair Means Redressal Committee, RUHS, Ex-President, AMPI, Ex-Dean, Faculty of Paramedical Sciences, Ex-Pro-Vice Chancellor, RUHS and active involvement in the institutional administration as a member of the board of management, the clinical trial screening committee, the ethics committee, the research board and so on.

Prof Chougule has started his Medical Physics career in 1984 as an Assistant Professor at the Rabindranath Tagore Medical College Udaipur. It was the beginning of an exemplary academic and research career with great contributions to the domains of Radiobiology, LQ model and its application to radiotherapy, biochemical tumor markers, and patient and staff radiation dose measurement during radiology, nuclear medicine and radiotherapy procedures and TL dosimetry. Over the last 36 years, Prof. Chougule has contributed immensely to the medical physics education and training, research, professional development and recognition of the profession in the local, regional, national and international rostrums.

Dr. Chougule is the founding and fellow member of over 35 scientific, professional societies and accreditation boards. He is founder member of CMPI and has been awarded fellowship of Indian Society of Radiation Biology (ISRB) for outstanding contribution in the field of Radiobiology. As chair of ETC, IOMP, he has put tremendous efforts to advance medical physics practice worldwide by disseminating scientific and technical information, fostering the educational and professional development of medical physics and promoting the highest quality medical services for patients. As AFOMP President, he worked towards the expansion of the activities of AFOMP, strengthening financial resources and activating NMO's. During the time of COVID-19 pandemic, he facilitated the release of AFOMP documents for medical physicists.

He is a teacher par excellence with more than 100 publications in reputed peer reviewed national and international journals, more than 300 research presentations around the world, editor, associate editor, advisor and reviewer of many reputed national and international journals, research guide and co-guide to many Ph. D, MD and M. Sc students. He has been the principal investigator for many national and multination research projects. He is the recipient of various fellowships such as ICRETT, UICC, ESTRO, VLIR, ICTP, TWAS-UNESCO, TAWS–CAS, DAAD and regular Associateship of ICTP. He is the recipient of prestigious awards and honors for his outstanding contribution to profession, research and academic contribution, the most recent one being prestigious fellow of National Academy of Medical Sciences FNAMS 2021, AFOMP Outstanding Medical Physicist Award 2020, Outstanding Medical Faculty 2019, IOMP IDMP award 2016, the Prestigious Dr. Farukh Abdulla Sher—e-Kashmir best researcher award for 2011–12 and outstanding radiation safety officer award 2010 are a few from the very long list.

In addition to fulfilling his clinical, academic, research and educational responsibilities he takes care of his social responsibilities very seriously and his contributions toward the betterment of society in terms of cancer awareness, early detection, treatment and rehabilitation are outstanding garnering national and international acknowledgement. He is the co-founder and co-editor in chief of the Hindi magazine on cancer awareness Mrityunjay meaning conquering death published in Hindi. He was instrumental in developing paramedical sciences in the state of Rajasthan.

Dr. Chougule organizes national and international scientific meetings and teaching programmes in medical physics, radiation oncology, diagnostic and therapeutic radiation technology and other medical radiation applications regularly to disseminate basic/ advanced education of international best standards to young professionals in medical physics. 17 international scientific conferences in Jaipur are to his credit as a veteran organizer and the "International Conference on Radiological Emergency Management (ICONRADEM 2019)" and "AOCMP2017" under his chairmanship are the most recent and glittering examples. He organizes IDMP every year and IMPW celebrations at Jaipur to impart awareness about the medical physics profession among healthcare professionals and general public.

Prof Chougule' personal experiences as a medical physicist, his take on the various professional development activities going on in India, Asia Oceania and across the globe and his continuous work will open new avenues in clinical practice, education and research for medical physicists. This chat could be a pathfinder for many young medical physicists to transcend in their careers by refine and re-mould themselves to better medical physicists and above all compassionate human beings.

Prepared by Associate Prof Dr Mary Joan

Featured papers in Journals: Editor's Choice

Journal: Cancer: An International Interdisciplinary Journal of the American Cancer Society
First published: 19 February 2024
https://doi.org/10.1002/cncr.35233

Revolutionizing cancer treatment in India: Evaluating the unmet need, economics, and a roadmap for project implementation of particle therapy

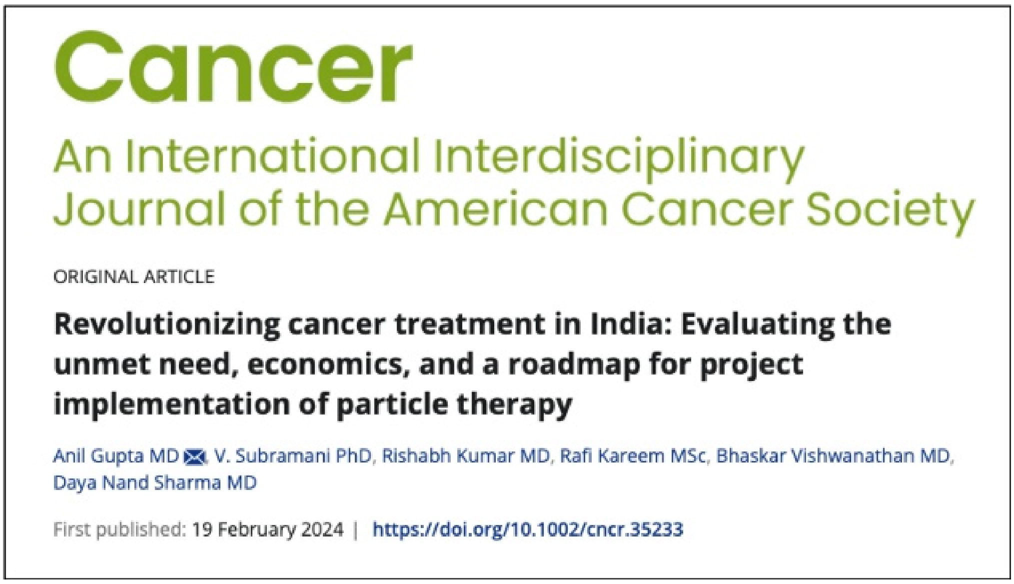
Anil Gupta MD[1], V.Subramani PhD[2],Rishabh Kumar MD[3], Rafi Kareem MSc[4],B. Vishwanathan MD[3], Daya Nand Sharma MD[2]

1. Department of Radiation Oncology, All India Institute of Medical Sciences, New Delhi, India
2. Department of Radiation Oncology, All India Institute of Medical Sciences, New Delhi & National Cancer Institute, Jhajjar, Haryana, India
3. Department of Radiation Oncology, Amrita Hospital, Faridabad, India
4. Department of Medical Physics, Heidelberg Ion Therapy Center, Heidelberg, Germany

Abstract

Introduction: This study aims to quantitatively assess eligible patients and project the demand for particle therapy facilities in India from 2020 to 2040. In addition, an economic analysis evaluates the financial feasibility of implementing this technology. The study also examines the prospective benefits and challenges of adopting this technology in India.

Methodology: Cancer incidence and projected trends were analyzed for pediatric patients using the Global Childhood Cancer microsimulation model and adult patients using the Globocan data. Economic cost evaluation is performed for large- scale combined particle (carbon and proton-three room fixed-beam), large-scale proton (one gantry and two fixed-beam), and small-scale proton (one gantry) facility. Results: By 2040, the estimated number of eligible patients for particle therapy is projected to reach 161,000, including approximately 14,000 pediatric cases. The demand for particle therapy facilities is projected to rise from 81 to 97 in 2020 to 121 to 146 by 2040. The capital expenditure is estimated to be only 3.7 times that of a standard photon linear accelerator over a 30-year period. Notably, the treatment cost can be reduced to USD 400 to 800 per fraction, substantially lower than that in high-income countries (USD 1000 to 3000 per fraction).


Cancer
An International Interdisciplinary Journal of the American Cancer Society
ORIGINAL ARTICLE
Revolutionizing cancer treatment in India: Evaluating the unmet need, economics, and a roadmap for project implementation of particle therapy
Anil Gupta MD, V. Subramani PhD, Rishabh Kumar MD, Rafi Kareem MSc, Bhaskar Vishwanathan MD, Daya Nand Sharma MD
First published: 19 February 2024 | https://doi.org/10.1002/cncr.35233

Conclusion: This study indicates that, in the Indian scenario, all particle therapy models are cost-beneficial and feasible, with large-scale proton therapy being the most suitable. Despite challenges such as limited resources, space, a skilled work- force, referral systems, and patient affordability, it offers substantial benefits. These include the potential to treat many patients and convenient construction and operational costs. An iterative phased implementation strategy can effectively overcome these challenges, paving the way for the successful adoption of particle therapy in India.

Plain Language Summary

In India, eligible patients benefiting from high-precision particle therapy technology projected to rise till 2040. Despite high upfront costs, our study finds the long-term feasibility of all particle therapy models, potentially offering a substantial reduction in treatment cost compared to high-income countries. Despite challenges, India can succeed with an iterative phased approach.

KEYWORDS

cost-benefit analysis, developing countries, health care economics and organizations, health services needs and demand, heavy ion radiotherapy, proton therapy.

AFOMP Photography Competition

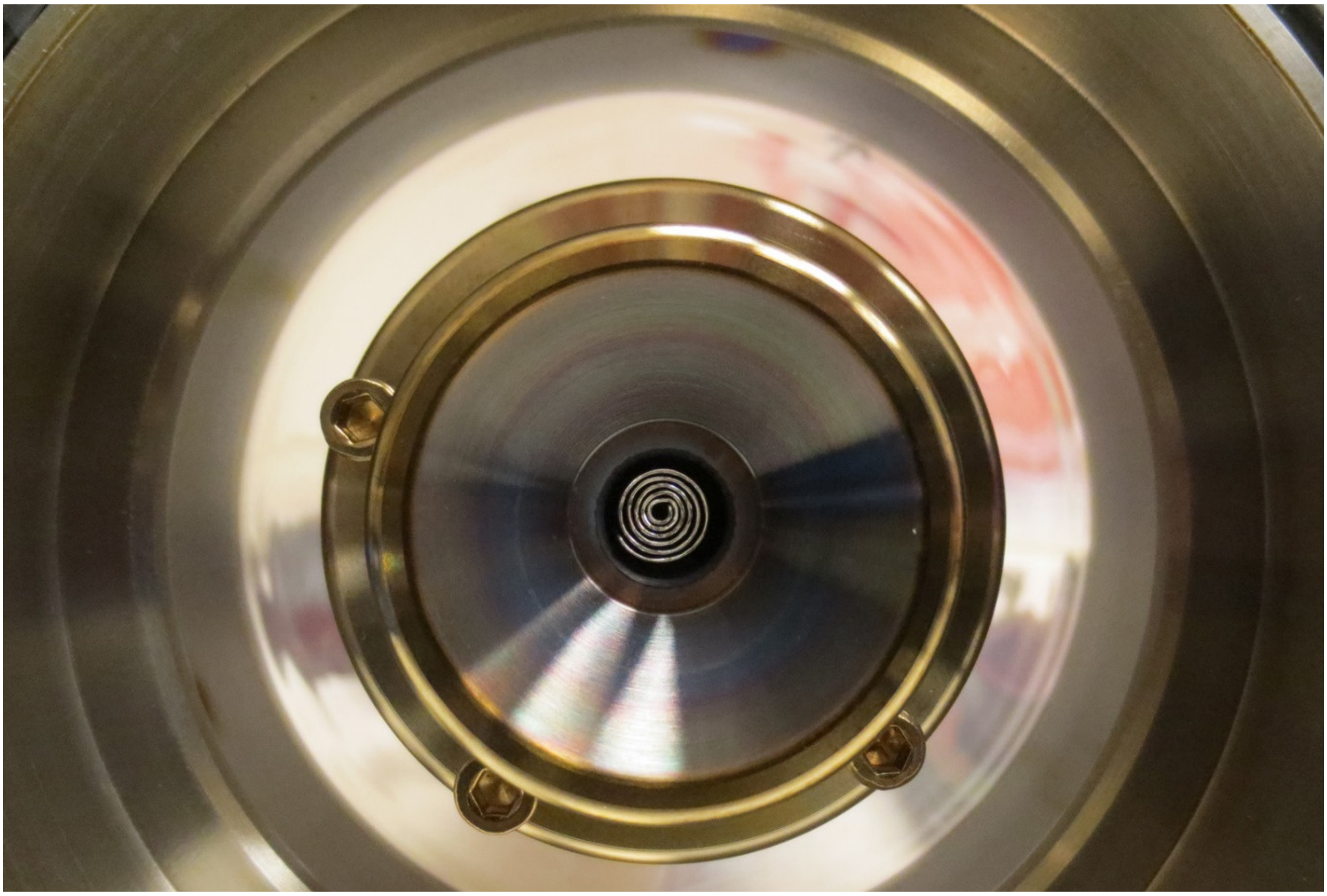
Dear Reader,

We are happy to announce the AFOMP medical physics photography competition. This competition is to encourage and celebrate the zeal of medical physics. This could give us a fun chance to understand various aspects of this amazing science.

To participate, please send your entries to afompulse2023@gmail.com. Selected entries will be published on the AFOMP website and in AFOMP Pulse, the official newsletter of AFOMP.

Picture sourced from Photography competition(PMP) From Australia and New Zealand

2014 Category: Marco – Get up close and personal with Medical Physics – 1st place – Katrina Biggerstaff "Electron gun"



Did you know ? Marvellous Science in Action

From Pixels to Patients: How developments in the gaming and smartphone industry are shaping Radiation Oncology

Dr. Michael Douglass, Principal Medical Physicist, Royal Adelaide Hospital, Australia

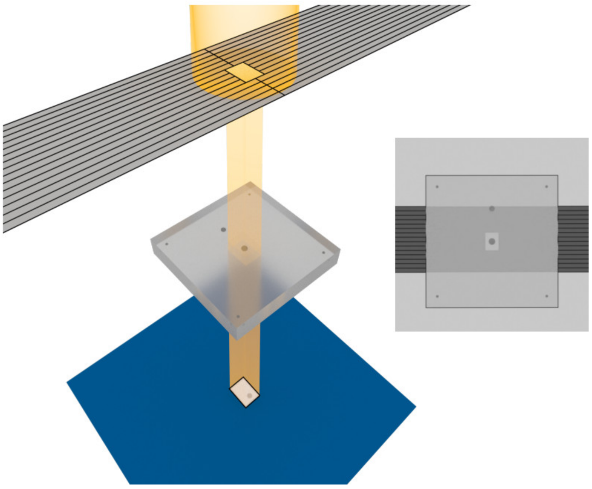
As a researcher in the field of medical physics, I have always been fascinated by the intersection of consumer technologies and radiation oncology. In a recent presentation to the International Organisation of Medical Physics (IOMP), I discussed the influence of developments in the gaming, movie, and smartphone industries on radiation oncology. These industries have pushed the development of GPUs and other specialised technologies, leading to various advancements that are now improving radiation oncology.

The history of video games is a fascinating one. Two iconic titles from the early era of arcade games were “Pong” and “Space Invaders”. Then home video game consoles, such as the Nintendo entertainment system and Sega Genesis started to appear in the 1980s. In the 1990s, 3D games consoles like the Nintendo® 64 and PlayStation® required more powerful graphics processing. By the 2000s, high-quality games demanded the introduction of dedicated graphics processing units, or GPUs, by manufacturers like Nvidia® and AMD®. By the 2010s, GPUs had become general-purpose high-performance processing tools for accelerating code performance, including scientific applications. GPU manufacturers then started optimising GPU cards specifically for machine learning applications, which enabled the rapid advancement of this field. The demand for high-quality graphics in games has driven the development of powerful and general-purpose GPUs. These GPUs have been optimised for AI and deep learning applications, leading to significant advances in these fields. By the 2020s, the GPU had become the heart of AI and machine learning, with specialised GPU architectures being developed for machine learning, such as the Nvidia® tensor core and Google® tensor Processing Unit.

Source: Microsoft Copilot

One example of how these advancements in GPU technology have improved radiation oncology is deep learning segmentation. This uses convolutional neural networks to automatically segment organs at risk and targets in treatment planning systems. This has led to more consistent and accurate contours for patient plans, saving radiation oncologists a significant amount of time. This type of application is likely to expand into more general-purpose segmentation models. The Meta® segment anything model (SAM) is an example of a general purpose, open-source machine learning model that can segment almost any image data, including medical data. This model has the potential to be a direction that radiation oncology heads in, where one general-purpose model can be used to segment various regions of the body, rather than having to train machine learning models specifically for cranial sites or abdominal sites, for example.

Another area where GPU technology has been beneficial is in dose calculations in treatment planning systems. Major vendors such as Electa®, Varian®, and Raysearch Laboratories® are now using GPU acceleration in their dose calculation engines, allowing for highly optimised treatment plans and accurate Monte Carlo dose calculations in seconds to minutes. This has led to rapid optimisation of treatment plans, meaning that more iterations or optimisation steps can be made in the same amount of time, leading to the ability to achieve a more optimal treatment plan in a shorter amount of time. In addition, being able to calculate predicted radiation dose distribution using Monte Carlo in a clinically acceptable time means there are fewer uncertainties in the delivered dose due to inhomogeneities. This is because Monte Carlo dose calculations are considered the gold standard for dose calculations, as they more accurately model the transport of radiation through matter.



Source: M. Douglass et. al., Physica Medica, Volume 89, September 2021, Pages 306-316

Clinical workflows can benefit from the assistance of large language models, which have become more prevalent in our everyday lives. For example, GitHub co-pilot, a variation of GPT trained on programming and scripting data, can aid in writing scripts for treatment planning systems resulting in more efficient planning workflows. Large language models may also help summarise vast amounts of patient medical data in various forms which may assist doctors make more informed clinical decisions.

In addition to GPU technology, the video game industry has also given us virtual reality technologies. These advances will lead to more intuitive methods of visualising medical data and be important for various clinical techniques, such as deep inspiration breath-hold and guiding the patient to reach the optimal inhalation limit. Virtual reality could also be important for education, both for staff and patients.

The movie industry has led to advancements in visual effects. Data synthesis using techniques adopted from the film and movie industry can be used to generate enormous amounts of training data automatically and rapidly. This allows machine learning models to be trained on large amounts of synthetic training data and then fine-tuned on real data to improve accuracy and robustness of predictions. This can be particularly useful in radiation oncology, where access to real clinical data may be limited or require ethics applications. Some examples of papers where synthetic training data have been used include for automotive applications (Alhaija et. al., 2017), synthetic glioblastomas generated in patient CT data (Birgit et. al., 2018), and automatically segmenting nanoparticle microscopy images (Mill et. al., 2020).

Smartphones, with their advanced sensors and 3D scanning technologies, have led to faster, high-quality, and more intuitive methods of collecting and visualising medical data. This could lead to new possibilities for 3D printing medical devices and boluses for radiation oncology. Smartphones have led to significant advancements in the field of 3D scanning, making it more cost-effective, radiation-free, and faster to reconstruct. These technologies can benefit patients through 3D printing of customised medical devices and bolus, radiation-free simulations for specialised treatments such as total body irradiation and total skin electron therapy without the need for a CT scan. This has the potential to improve patient care and make treatments more readily available.

Source: M. Douglass, J Med Radiat Sci. 69 (2022) 139–142

Developments in GPU, 3D modelling software, and scanning hardware, driven by the movie, smartphone, and gaming industries, have reduced costs and enabled access to various research and clinical tools for radiation oncology. These advancements are leading to rapid development and providing many opportunities to explore novel technologies as medical physicists and clinicians. The future is likely to see even faster and more powerful GPUs, real-time visualisation of patient treatments, and the incorporation of large language models into clinical workflows.

Article 1: Upright diagnostic imaging and proton therapy for upstanding patient care

Melissa McIntyre, University of South Australia

Upright Imaging & Radiotherapy

Historically, diagnostic imaging of patients is performed in the supine position, despite spending most of their lives standing or sitting upright. Research has revealed significant shifts in the physiology and behaviour of patient anatomy in an upright compared to a supine position. Despite this, there are limited systems available for diagnosing patient conditions in a standing position. While upright MRI exists, it has drawbacks such as longer acquisition times and diminished image quality due to a weaker magnetic field compared to supine MRI. In contrast, upright CT has emerged as a promising alternative, demonstrating comparable image quality to conventional supine CT.

Upright imaging modalities have shown promise in diagnosing conditions that are exacerbated when individuals are standing, such as musculoskeletal and spinal conditions [1, 2]. These modalities have the potential to provide valuable diagnostic information that may be overlooked in traditional supine imaging.

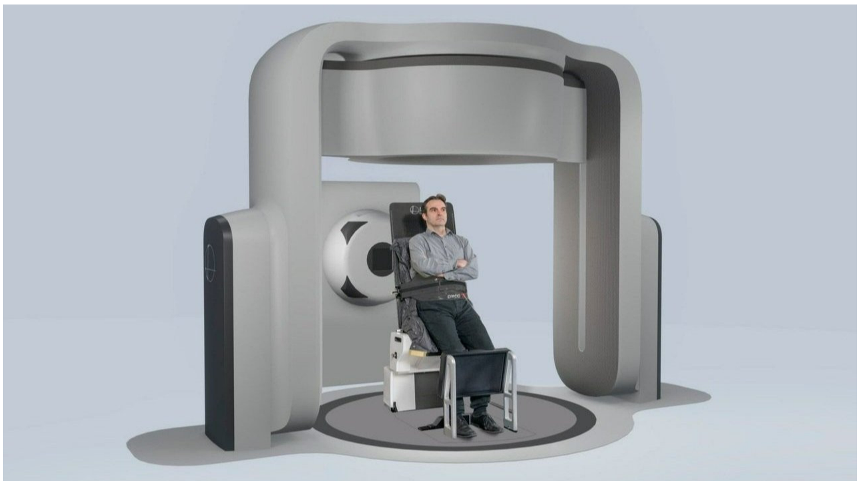


Image from [3]

Upright imaging can also play a crucial role in arranging anatomy to improve cancer treatment planning. Companies at the forefront of this transformative shift, including LEO Cancer Care [3] and P-Cure [4], are actively working to not only make upright imaging a reality, but also upright radiotherapy, and more specifically, proton therapy.

More cost-effective solution with improved patient comfort and throughput

Proton therapy, known for its conformal, high tumour doses, is an ideal treatment for cases involving abutting critical structures. Development of gantry-less proton therapy treatment systems in an upright position offers numerous advantages, ranging from more cost-effective installation and operation through to a smaller footprint and improved patient comfort [5, 6]. Such systems could even fit inside a generic LINAC suite – a vast improvement on the current footprint of the average proton therapy treatment system. It has been shown that patient comfort is improved, and anxiety lessened when treated in the upright position [5]. Additionally, studies have revealed a reduction in setup times and the magnitude of setup errors, thus improving the quality of treatments and patient throughput [6].

Research has also revealed specific sites for which treatment can be enhanced in the upright position. For instance, when upright, the lung volume increases, thus increasing the distance to surrounding critical structures making lung cancer a good candidate for upright treatment [8, 9]. Similarly, pelvic treatments can benefit in an upright position as shifting of the prostate is not affected by the bladder volume and breathing motion is minimised [6]. Other cancers being assessed for suitability of upright proton therapy treatments include breast, head & neck, and gastrointestinal cancers [4, 10].

Upright diagnostic imaging and proton therapy is an exciting avenue which may allow for better patient comfort during treatments, a reduction of inter-fraction uncertainties, enable lower uncertainty margins and reduced toxicities, higher patient throughput and increased financial accessibility to proton therapy.

Image from [3]

References

1. Wildermuth S, Zanetti M, Duewell S, et al. "Lumbar spine: quantitative and qualitative assessment of positional (upright flexion and extension) MR imaging and myelography". Radiology. (1998); 207: pp. 391–398.
2. Fielding JR, Griffiths DJ, Versi E, et al. "MR imaging of pelvic floor continence mechanisms in the supine and sitting positions". AJR Am J Roentgenol. (1998); 171: pp. 1607–1610.
3. Leo Cancer Care, https://www.leocancercare.com/ – accessed February 8th, 2024.
4. P-Cure, https://www.p-cure.com/ – accessed February 8th, 2024.
5. Mackie TR, Towe S, Schreuder N; "Is upright radiotherapy medically and financially better?". AIP Conf. Proc. (2021); 2348 (1); https://doi.org/10.1063/5.0051770
6. Boisbouvier S, Boucaud A, Tanguy R, Grégoire V, "Upright patient positioning for pelvic radiotherapy treatments". Technical Innovations & Patient Support in Radiation Oncology. (2022), 24: pp. 124-130; https://doi.org/10.1016/j.tipsro.2022.11.003.
7. Jinzaki, M et al. "Development of Upright Computed Tomography With Area Detector for Whole-Body Scans: Phantom Study, Efficacy on Workflow, Effect of Gravity on Human Body, and Potential Clinical Impact." Investigative radiology. (2020); 55(2): pp. 73-83. https://doi.org/ HYPERLINK https://doi.org/10.1097/RLI.0000000000000603″10.1097/RLI.0000000000000603.
8. Yang J, Chu D, Dong L, Court LE. "Advantages of simulating thoracic cancer patients in an upright position". Pract Radiat Oncol. (2014) 4(1): pp. 53-58, https://doi.org/10.1016/j.prro.2013.04.005.
9. Dellamonica J, Lerolle N, Sargentini C, Hubert S, Beduneau G, Di Marco F, Mercat A, Diehl JL, Richard JC, Bernardin G, Brochard L. "Effect of different seated positions on lung volume and oxygenation in acute respiratory distress syndrome". Intensive Care Med. (2013); 39(6): pp.1121-7 https://doi.org/ HYPERLINK https://doi.org/10.1007/s00134-013-2827-x"10.1007/s00134-013-2827-x.
10. Boisbouvier S, Underwood T, McNamara J, Probst H. "Upright patient positioning for gantry-free breast radiotherapy: feasibility tests using a robotic chair and specialised bras". Front Oncol. (2023); 13: pp. 1250678. https://doi.org/ HYPERLINK https://doi.org/10.3389/fonc.2023.1250678″10.3389/fonc.2023.1250678.

Article 2: How can we manage proton therapy treatments during a global pandemic? what we learned from COVID-19?

Lucy Wood BMedRad(RadTh)[1]

1. Allied Health and Human Performance, University of South Australia, Adelaide, South Australia, Australia

This piece is based on the scoping review: Proton radiation therapy patient selection and impacts of COVID-19 by Wood et al.

Proton therapy patient selection and prioritisation during covid-19

The process of patient selection is crucial in proton therapy (PT) due to resource constraints, with costs reportedly around four times higher than traditional radiation therapy (Wood et al.) Therefore, it is vital to prioritise and allocate resources to those patients who would gain the greatest benefit. This process of prioritisation and selection became even more important during the pandemic, as appointments were more limited due to additional safety requirements.

What happened to proton therapy during the pandemic?

Each PT centre was impacted in various ways by the pandemic, and to different extremes depending on multiple factors including geographical location, implementation of health restrictions and prevalence of the virus. By the time the first recommendations from experts and PT centres were published in late 2020, each clinic would have already implemented their own precautions to prevent the spread of the virus (McGovern et al., 2020; Mishra et al., 2020). Overall, reduction in patient visitors, screening procedures, remote work, rigorous cleaning protocols and telehealth consults were recommended and reported to be implemented. Some screening protocols required negative COVID-19 tests prior to each treatment, whereas others followed a checklist to declare any symptoms.

In some cases, proton therapy was preferred over other interventions such as surgery, as PT is non-invasive and could take place with appropriate personal protective equipment. But for others, the length of PT treatment courses and the risk of exposure due to the frequency of appointments was enough to suggest quicker treatment options. Continuation of some aspects of patient care was aided by the transfer of consultations and appointments to tele-health.

Which patients were prioritised?

As could be expected, from the published literature it was most commonly reported that patients with benign or low risk conditions were frequently deferred. It was also reported patients with head and neck cancer, paediatric patients or patients for re-irradiation would often proceed or be recommended to complete PT. Patients that tested positive to COVID-19 during their course of treatment received various responses. The reported responses to infectious patients ranged between deferral of treatment until patient recovery or negative test result, continue treatment, and defer if possible, but to treat if urgent PT was required. Patient decision not to attend treatment due to risk of travel or exposure to COVID-19 also contributed to deferrals and cancellations.

It was ultimately up to each centre to decide how to prioritise their patient base, potentially being guided by the risk and staging systems already utilised for patients.

What happened to those without local access to proton therapy?

In an effort to contain COVID-19, travel between countries was limited and borders were closed to minimise spreading the virus. Patients referred for PT that did not have access to treatment locally were now much more restricted in where they could access treatment, if at all. Alternatively, these patients were offered other treatment such as conventional radiation therapy or surgery.

Referrals declined for PT during the pandemic, and it can be assumed countries without local access to PT centres contributed to this decrease as travel was restricted globally.

Considering the pandemic had varying impacts across the world, it can be said that each centre had a potentially unique response to managing treatment of patients whilst maintaining expert recommendations to prevent the spread of the virus. This response may also be guided by promptness and level of government action in implementing health restrictions. During the COVID-19 pandemic, implementing workflows to triage patients and for managing staff prior to experiencing big waves of infections was key in upholding treatment centres.

References:
- McGovern, S. L., Wages, C., Dimmitt, A., Sanders, C., Martin, D., Ning, M. S., Manning, R., Amin, M., Zhu, X. R., Frank, S. J., & Gunn, G. B. (2020). Proton Therapy in a Pandemic: An Operational Response to the COVID-19 Crisis. International Journal of Particle Therapy, 7(1), 54-57. https://doi.org/https://dx.doi.org/10.14338/IJPT-20-00027
- Mishra, K. K., Afshar, A., Thariat, J., Shih, H. A., Scholey, J. E., Daftari, I. K., Kacperek, A., Pica, A., Hrbacek, J., Dendale, R., Mazal, A., Heufelder, J., Char, D. H., Sauerwein, W. A. G., Weber, D. C., & Damato, B. E. (2020). Practice Considerations for Proton Beam Radiation Therapy of Uveal Melanoma During the Coronavirus Disease Pandemic: Particle Therapy Co-Operative Group Ocular Experience. Advances in radiation oncology, 5(4), 682-686. https://doi.org/https://dx.doi.org/10.1016/j.adro.2020.04.010
- Wood, L., Giles, E., Cunningham, L., Le, H., Zientara, N., & Short, M. Proton radiation therapy patient selection and impacts of COVID-19: A scoping review. Journal of Medical Radiation Sciences, n/a(n/a). https://doi.org/https://doi.org/10.1002/jmrs.706

Article 3: Medical Physics Education – Time to transform to produce clinically competent medical physicists to take on the challenging profession

Prof. Arun Chougule
Chair ETC IOMP
Chairman IOMP Accreditation Board
Member Board of Directors IMPCB
Immediate past President AFOMP
arunchougule11@gmail.com

Dr. Mary Joan
Chair PRC-AFOMP,
Member SC-IOMP

“**Education is not the learning of facts, but the training of the mind to think.**”

Albert Einstein

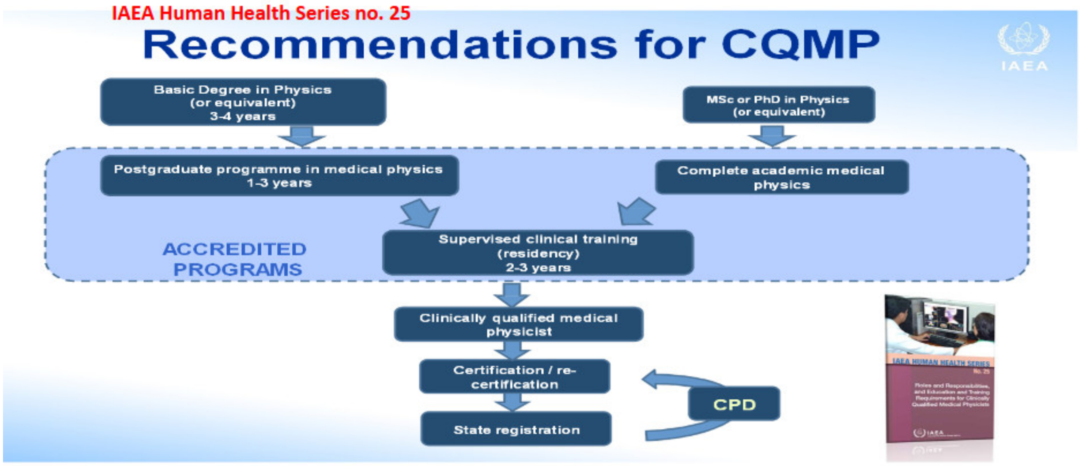
Medical physics is a dynamic field that plays a vital role in the convergence of medicine and technology. The field of Medical Physics is growing rapidly and requires a high degree of knowledge and professional competency owing to the rise in complexity of treatment procedures, increasing access to medical technology, and the need for coordination between the disciplines of medicine, physics and biomedical engineering. As modalities specialized in physics-intensive procedures such as particle therapy, image-guided and intra-operative radiotherapy, advanced imaging, and nuclear medicine techniques continues to advance, the quantity of qualified medical physicists needs to be in consonance with the competency needed as many medical physicists work in clinical positions where their work can directly influence the quality of patient care. Further, health care across the world is undergoing a period of rapid transformation because of economical, technological, and regulatory forces and the demand for clinically competent medical physicists is more significant today than ever which brings both great opportunities and great challenges for the discipline of medical physics. To ensure the sustainable and impactful contribution of medical physics to human health, it is integral that the field should meet these challenges head on. To meet the growing demand, it is essential to ensure that medical physics education programs are designed to produce professionals with the knowledge, skills, and practical experience required in clinical settings. To acquire the knowledge, skills, and competency [KSC], medical physicists must undergo structured education program and fulltime residency under an experienced medical physicist from a recognized institution. To prepare medical physicists for the future, education and training should be properly adjusted to include more basic non-physical sciences, particularly biology; more imaging, especially molecular imaging; and more interdisciplinary and translational research components. The outcome of the academic programme is to provide the students with a thorough grounding in medical physics, critical thinking, scientific rigor, and adequate professional ethicswhere the benefit of the patient is at the center of all the activities.

According to **IAEA – HHS25** the structure of medical physics education should be,

A clinically qualified medical physicist [CQMP] must have

A university degree in physics, engineering, or equivalent physical science
Appropriate academic qualifications in medical physics (or equivalent) at the postgraduate level,
At least two years (full time equivalent) structured clinical in-service training undertaken in a hospital.

However, for Latin America and Africa region, so as to facilitate to cope up with the grave shortage of CQMP in the region one year fulltime structured clinical residency is enough to be considered clinically qualified Medical Physicist. [African Regional Co-Operative Agreement for Research, Development and Training Related to Nuclear Science and Technology – academic and clinical training programmes and portfolios for the regional training in medical physics, Minimum Requirements for Medical Physics Education in AFRA Member States https://humanhealth.iaea.org/HHW/MedicalPhysics/TheMedicalPhysicist/EducationandTrainingRequirements/Educationalrequirements/Harmonized_syllabus_for_Medical_Physicists_training_in_Africa.pdf] and [Guías de Formación Académica y Entrenamiento Clínico para Físicos Médicos en América Latina- ALFIM- IAEA [Academic Education and Clinical Training Guides for Medical Physicists in Latin America https://humanhealth.iaea.org/HHW/MedicalPhysics/TheMedicalPhysicist/IDMP/2021/Guias_LA_Region_E&T_MedicalPhysics_ARCAL_ALFIM.pdf



IAEA HHS 25, endorsed by IOMP and AAPM, defines the roles and responsibilities of CQMP in the different specialties of medical physics and recommends minimum requirements for their academic education and clinical training, including recommendations for their accreditation, certification and registration along with continuing professional development

The holder of a university degree in medical physics without the required hospital training cannot be considered clinically qualified Medical Physicist. Further this education and training should be recognized by a national accreditation body.

As per IOMP Policy Statement No. 1 – Medical physicists working in the clinical environment are health professionals [https://www.iomp.org/ wp-content/uploads/2019/02/iomp policy_ statement_no_1.pdf] and IOMP Policy Statement No. 2- prescribes a basic requirements for Education and Training of Medical Physicists https://www.iomp.org/wp–content/uploads/2019/02/iomp_policy_statement_no_2_0.pdf

To cope with the growing demand of medical physicists, many medical education programs are started across the globe. Education and Training committee [ETC] of IOMP has compiled the data on medical physics education programs around the world and at present approximately MORE THAN 390 Medical Physics Undergraduates / Postgraduates and Research programme are available with the distribution in various regions as follows,

ALFIM [Latin America] – 46 programmes i.e. 0.076 programs/million population
MEFOMP [Middle east] – 21 programmes i.e. 0.08 programs/million population
AFOMP [Asia Oceania] – 119 programmes i.e. 0.03 programs/million population
USA – 42 programmes i.e. 0.127 programs/million population
EFOMP [Europe] -105 programmes i.e. 0.141 programs/million population
FAMPO [Africa] – 37 programmes i.e. 0.026 programs/million population

CANADA – 18 programmes i.e. 0.49 programs/million population

The details are available at https://www.iomp.org/education-training-resources/

We find a huge diversity and therefore the task of homogenising the medical Physics education and profession is quite challenging because of heterogeneity in terms of socioeconomic and educational standards. Further there is a big gap in availability of CQMP in various regions and, therefore a great potential to ramp up the structured education and training of medical physicists to cope with the growing need of not only today but also of future.

IOMP is dedicated to improving medical physics worldwide by disseminating systemized knowledge through education and training of medical physicists, to advance the practice of physics in medicine by fostering the education, training and professional development of medical physicists.

The IOMP Accreditation Board accredits medical physics educational programs, medical physics education and training institutions/centers, medical physics residency programs and education and training events. The IOMP Accreditation Board ensures that the standards are met by the institute/University imparting the Medical Physics education covering all the aspects.
IOMP Accreditation of program brings the visibility, standardization and improvement in the quality of program.

Benefits of IOMP accreditation

- Enhanced reputation of accredited programs and courses which will result in more demand for these education and training activities.
- Provision of an international dimension to an education event that will attract participants from other countries.
- Evidence of the highest teaching standards and best preparation of medical physicists for the work environment.
- Publication of accredited programs and courses on the IOMP website.

The manual, application forms and relevant details can be found on IOMP website

https://www.iomp.org/accreditation/

The foundation of a successful medical physics education program lies in a well-structured curriculum. The curriculum should cover core theoretical concepts, such as radiation physics, radiobiology, and medical imaging, while also incorporating practical applications relevant to clinical practice. Integration of clinical experience through internships or hands-on training is crucial in bridging the gap between theory and real-world scenarios. Given the rapid evolution of medical technologies, educational programs must stay contemporary. Incorporating the latest advancements in medical imaging, radiation therapy, and diagnostic equipment ensures that graduates are well-versed in the state-of-the-art tools they will encounter in clinical practice. Exposure to emerging technologies, such as artificial intelligence and molecular medical imaging further enhances the adaptability of medical physicists in a rapidly changing healthcare landscape.

Interdisciplinary Collaboration: Medical physicists often work collaboratively with clinicians, radiologists, radiation oncologists, nuclear medicine physicians and other healthcare professionals. Therefore, medical physics education programs should emphasize interdisciplinary collaboration, fostering effective communication, leadership and teamwork. This ensures that medical physicists can seamlessly integrate into healthcare teams, contribute to clinical decision-making, and effectively address patient care challenges. The transition from theoretical knowledge to practical application is facilitated through clinical internships and residencies. These hands-on experiences take place in healthcare institutions, enabling students to work alongside experienced professionals, observe clinical workflows, and actively participate in patient care. Clinical training is invaluable in bridging the gap between academic theory and the real-world challenges encountered in healthcare settings. Furthermore, the medical physics education programs should instil a strong sense of responsibility for implementing and maintaining quality control measures, ensuring that medical physicists prioritize the well-being and safety of patients throughout their careers as integral members of healthcare teams, applying their expertise in physics to ensure the safe and effective use of radiation and imaging technologies.

The present question is whether all the medical physicists trained by various universities/ institutions fulfil these expectations? Whether the medical physicists trained by different universities/ institutions are competent enough to discharge the duty of unsupervised clinical medical physicists?

To assess and standardise the medical physics education and profession, IOMP has started accreditation of medical physics education programs. The details about the IOMP accreditation programmes [Manual, program standards, and accredited programs] are available at https://www.iomp.org/accreditation/

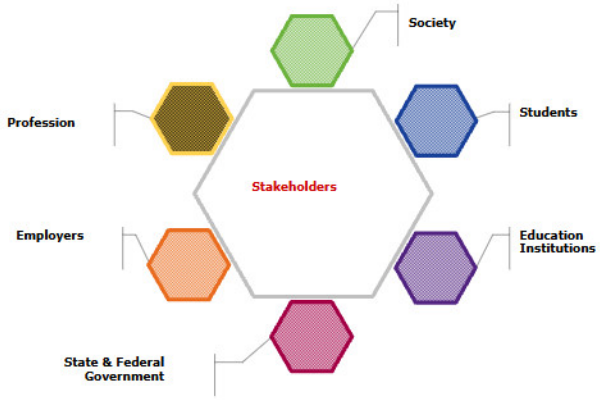
Accreditation of medical physics education programs plays a pivotal role in maintaining and enhancing the quality and relevance of these programs. Accreditation is a process by which educational programs undergo rigorous evaluation to ensure that they meet predetermined standards of quality and effectiveness. In the context of medical physics education, accreditation serves as a benchmark, indicating that a program adheres to established criteria, providing students with a robust foundation for their careers. Accreditation sets and upholds standards that define the quality and content of medical physics education programs. These standards cover various aspects, including curriculum design, faculty qualifications, clinical training, and resources, ensuring a comprehensive and well-rounded educational experience. There are many stakeholders and beneficiaries of the accreditation. Accreditation serves as an assurance of quality for students, educators, and the broader healthcare community. Prospective students can confidently choose accredited programs, knowing that they meet health industry-recognized standards. Employers, in turn, can trust that graduates from accredited programs are well-prepared and possess the necessary competencies for their roles as medical physicists. **The presence of accreditation adds validity to the profession's claims to quality, increasing consumer confidence at all levels**.

The major advantages of IOMP accreditations are

Accreditation enhances the global recognition of medical physics education programs Graduates from accredited programs are more likely to have their qualifications accepted internationally, fostering mobility and collaboration among professionals across borders.
Global recognition contributes to the standardization of education and practice, promoting consistency and quality on a global scale.

Stakeholders

Stakeholders in the accreditation process of Medical physics education programs The quality of educational programs, the safety and competence of the graduates, and the integrity of the accreditation process is important



Society – Accreditation improves educational programs and graduates from these programs provide better quality health care.
Students - they can expect their institution to meet a level of quality that is worthy of their money, time and efforts.
Educational institutions - competitive in today's student recruitment market.
Accreditation also means that institutions, especially when accepting undergraduate students as transfer students, or when giving advance credit to graduate students, can place reliance on the integrity of the originating institution.**Many accrediting programs in health care education, including medical physics, require that the program be in an institution that has an institutional accreditation status.**

- The health care **employers** can assume that **graduates of accredited programs have similar skills and that they have met requirements expected of all entrylevel practitioners.**
- Accreditation offers many positive features to disciplines and occupations. The presence of **accreditation adds validity to the profession's claims to quality, increasing consumer confidence at all levels.**

Accreditation is not a one-time achievement but an ongoing commitment to continuous improvement. Accredited programs are expected to engage in self-assessment, regular evaluations, and updates to stay contemporary with evolving educational practices, emerging technologies, and advancements in the field. This commitment ensures that graduates are equipped with the latest knowledge and skills relevant to contemporary healthcare needs.

Accreditation of medical physics education programs is a cornerstone in the pursuit of excellence in the field. By establishing and upholding standards, assuring quality, fostering continuous improvement, gaining global recognition, and aligning with professional certifications, accreditation plays a crucial role in shaping the next generation of competent and highly skilled medical physicists. As the landscape of healthcare evolves, the commitment to accreditation ensures that education programs remain adaptive, relevant, and dedicated to producing professionals who can effectively contribute to the dynamic and ever-changing field of medical physics.

Professional Certification: Medical Physicists are health professionals and therefore to guarantee a high standard of competence, medical physicists should pursue professional certifications, an additional layer of validation for their clinical competence. Certification contributes significantly to the elevation of professional standards within the field of medical physics. By establishing specific criteria and assessments, certification boards ensure that individuals seeking certification possess a comprehensive understanding of the scientific principles, technologies, and ethical considerations essential for their roles. Certification is a means of verifying the competence of medical physicists. It requires candidates to undergo thorough examinations, practical assessments, and evaluations of their education and training. This rigorous process ensures that certified professionals have the necessary skills and knowledge to navigate complex clinical scenarios, make informed decisions, and contribute effectively to patient care. This commitment to excellence strengthens the overall quality of medical physics practice. Certification also promotes ongoing professional development and adherence to ethical standards. Professional certifications are a hallmark of competency in the field of medical physics. Many countries have established certification boards that assess the qualifications and capabilities of aspiring medical physicists. For accreditation of national certification boards and individual certification of medical physicists, **International Medical Physics Certification Board [IMPCB]** has started accreditation of certification boards and certification of individual medical physicists [https://www.impcbdb.org/]. To help Member States to establish the certification and registration of medical physicists as health professional IAEA has brought out **Training Course Series TCS 71** document in 2021 "Guidelines on certification of Clinically Qualified Medical Physicists", this document is endorsed by IOMP and IMPCB [https://www.iaea.org/publications/14746/guidelines-for-the-certification-of-clinically-qualified-medical-physicists].

CONTRIBUTORS TO DRAFTING AND REVIEW

Azangwe, G.	National University of Science and Technology, Zimbabwe
Borrás, C.	Retired, Spain
Chougule, A.	SMS Medical College & Hospital, India
Christaki, K.	International Atomic Energy Agency
De Almeida, C.E.	Retired, Brazil
Kron, T.	Peter MacCallum Cancer Centre, Australia
Lammertsma, A.	VU University Medical Center, Netherlands
Loreti, G.	International Atomic Energy Agency
Meghzifene, A.	International Atomic Energy Agency
Padovani, R.	International Centre for Theoretical Physics, Italy
Ravindran, P.	Christian Medical College, India
van der Merwe, D.	International Atomic Energy Agency

Certification for medical physicists involves a rigorous process through which individuals demonstrate their proficiency, knowledge, and adherence to established standards within the field.

Earning certifications demonstrates a commitment to excellence and adherence to established standards, enhancing the credibility and marketability of professionals in the field. Certification offers international recognition of an individual's qualifications. Certification opens doors to enhanced career opportunities and advancement. Many employers, healthcare institutions, and regulatory bodies prioritize hiring or recognizing medical physicists with certifications from reputable organizations. Certified individuals often have a competitive edge in the job market and are better positioned for leadership roles within their organizations. Certification is a testament to an individual's commitment to these fundamental principles. Certified medical physicists are more likely to adhere to best practices, implement quality assurance measures, and contribute to a culture of safety, ultimately benefiting the patients they serve. As the healthcare landscape evolves, the certification of medical physicists remains an essential element in ensuring that these professionals contribute effectively to the advancements and challenges of modern healthcare. Furthermore, Medical physics is a dynamic field, and ongoing learning is crucial for staying up to date with advancements and best practices.

Continuing education, workshops, and participation in conferences contribute to the continuous professional development of medical physicists. Keeping engaged with evolving technologies and research ensures that practitioners remain at the forefront of their field throughout their careers. Maintaining certification requires individuals to participate in continuing education, stay abreast of advancements in the field, and adhere to ethical standards. This commitment ensures that certified medical physicists remain at the forefront of their discipline throughout their careers.

What do patients and society expect from medical physicist as Health Professionals?

- Professional Competence
- Educational qualifications/Certification
- Problem solving- finding solutions.
- Independence of decisions and execution
- Practical skills, Clarity in communication, Integrity, confidentiality
- Humanity- compassion

Therefore, medical physics education programs must be accredited, and the individual medical physicist must get certified so as to work as CQMP in healthcare

Conclusion: A robust medical physics education program is the cornerstone of producing clinically competent medical physics professionals who can navigate the complex landscape of modern healthcare. By focusing on a well-rounded curriculum, clinical exposure, embracing advanced technologies, promoting interdisciplinary collaboration, encouraging professional certification, and emphasizing quality assurance, medical physics education can effectively prepare individuals to meet the challenges of the ever-evolving healthcare environment. By focusing on academic excellence, specialized tracks, clinical internships, interdisciplinary collaboration, technology integration, professional certifications, and continuous professional development, education programs can shape individuals into adept and adaptable medical physicists. As the field continues to evolve, a well-rounded education and training framework will empower medical physics professionals to meet the challenges and opportunities presented by the dynamic landscape of medical physics.

It is important that:

- Medical physicists get certified.
- Medical physics education and training programs get accredited.
- Medical physicists in countries that do not currently have certification/accreditation programs develop their own national programs.
- The IOMP and the IMPCB continue to develop and expand their certification/accreditation activities

For further read:

- Ibbott GS, Chougule A, Damilakis J, Tabakov S, Wu RK, Orton CG, Kron T. Medical physicist certification and training program accreditation. Health Technol (Berl). 2022; 12(3):663-670. doi: 10.1007/s12553-022-00666-7. Epub 2022 Apr 29. PMID: 35505794; PMCID: PMC9050347.
- Chougule A. Status of medical physics education and training in AFOMP region. Phys Eng Sci Med. 2021 Jun; 44(2):357-364. doi: 10.1007/s13246-021-00984-6. PMID: 33646476.
- Chougule A. Current Status of Medical Physics Education and Workforce in AFOMP Region. Iran J Med Phys 2022; 19: 167-174. 10.22038/IJMP.2021.56941.1956.
- Guidelines for the certification of clinically qualified medical physicists. IAEA, Vienna, 2021. IAEA-TCS-71. ISSN 1018–5518.

Article 4: How can we benefit from AI in the current renaissance?

The 22nd ASEAN College of Medical Physics (ACOMP) August 12, 2023 Lombok – Indonesia

Mohammad Haekal[1], Hidetaka Arimura[2], Kwan Hoong Ng[3]

1 Department of Informatics Engineering, University of Prof. Dr. HAMKA, Indonesia.

2 Department of Health Sciences, Faculty of Medical Sciences, Kyushu University, Japan

3 Department of Biomedical Imaging, Faculty of Medicine, Universiti Malaya, Malaysia

The 22nd ACOMP workshop 'How can we benefit from AI in the current renaissance?' was held on August 12, 2023, as a part of the 21st South-East Asian Congress on Medical Physics (SEACOMP) and the 6th Annual Scientific Gathering of Medical Physics and Biophysics (Pertemuan Ilmiah Tahunan – Fisika Medis dan Biofisika/PIT-FMB) in Lombok, Indonesia. This workshop was a follow-up of ACOMP's previous introductory workshops on AI. The workshop discussed various issues on the implementation of AI in medicine followed by a discussion on the impact of generative AI and its use in medicine. The session ended with an interactive discussions between the speakers and the panelists along with the audience on how can we make use of AI in our academic and clinical professions to create a better world.

The total number of participants is estimated to be 25-30 (based on the post-test response submitted by the participants).

The workshop was opened by Andreas Nainggolan as the MC for this workshop. He then introduced the chairman of the workshop, Prof. Kwan Hoong Ng.

Prof. Ng introduced the workshop objectives and then introduced the speakers.

A. Issues of Artificial Intelligence by Prof. Hidetaka Arimura

Prof. Arimura started his presentation by defining what is medicine, machine learning, and artificial intelligence. He also described the concept of how AI can learn from data and how AI system implementation was evaluated clinically.

Prof. Arimura then moved on to discuss issues on the implementation of AI, such as errors, overfitting problems, and the vulnerability of AI where AI is very dependent on the quality of the training data. There are also frame problems (AI understands problem limited to the "frame" of the training data) and symbol grounding problem, in which the AI system cannot make sense of an object nor understand the background of an object.

Prof. Arimura closed his session with a thought-provoking question of "Do human still need to learn when they can depend on AI for knowledge?" Prof. Arimura argued that, since AI is good at only one specific thing at a time, there are still a lot of subjects that AI will need to train for, and the training data came for human's understanding of a concept. Therefore, humans still need to strive for learning new and meaningful knowledge for further development of humankind.

B. Introduction to Generative AI and Its Issues by Dr. Mohammad Haekal

The second session presented by Dr. Mohammad Haekal from the University of Prof. Dr. HAMKA discussed the issues in generative AI in medicine and healthcare. He showed a few examples of generative AI and the definition of generative AI. He then explained the types of use cases in which generative AI is implemented, then asked: how can generative AI be implemented in medicine?

Dr. Haekal explained the types of generative AI currently implemented in medicine. He explained by separating it into several pre-defined cases. He then highlighted the issues in generative AI which concern data (especially training data), bias, and intellectual property. There were also other concerns about imperfect training concepts and ethical implications of using generative AI in medicine. Dr. Haekal concluded by stating that while generative AI will no doubt hold high future potential uses; currently, generative AI still needs a lot of improvement before it can be implemented in medicine.

C. How Could the Next Generations Drive AI in the Current Renaissance? (Panelist Session)

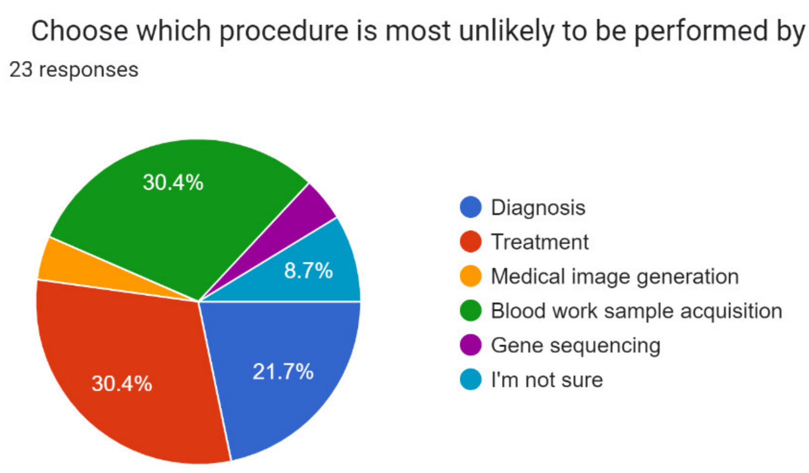
The final session focused on how young researchers can use and direct AI to enhance their work and research. Four young participants were invited, namely:

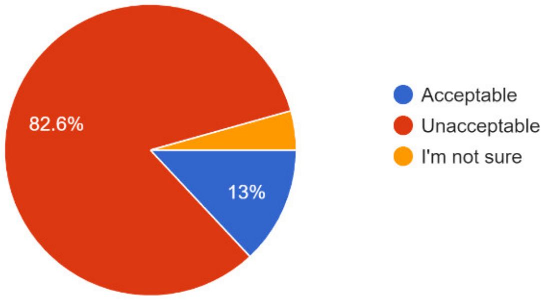
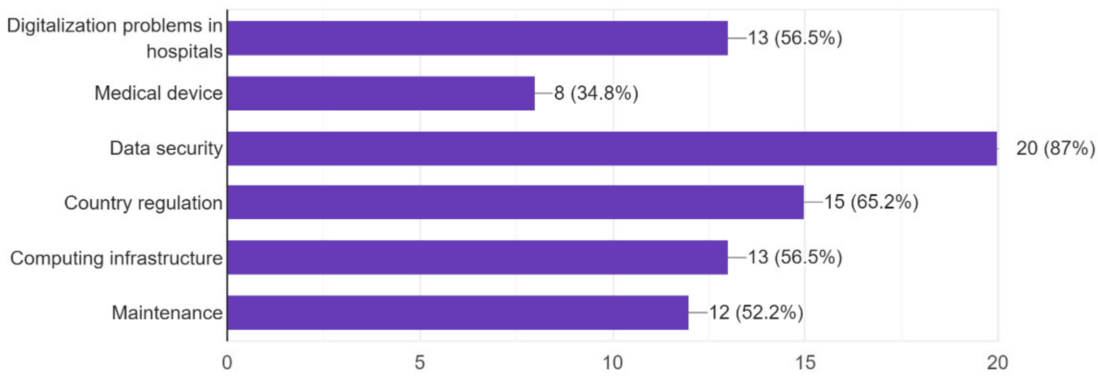
- Takumi Kodama, doctoral student from Graduate School of Medical Sciences, Kyushu University, Japan
- Nur Diyana Afrina Mohd Hizam, doctoral student from Universiti Malaya, Malaysia
- Siti Aishah Abdul Aziz, faculty member of School of Health Sciences, Universiti Sains Malaysia, Malaysia
- Dwi Seno Kuncoro Sihono, faculty member of the Department of Physics, Universitas Indonesia, Indonesia

An online survey was carried out prior to this workshop. Highlights of the questionnaire and responses are found in the Appendix.

This session discussed mainly the responses to the questions in the questionnaire, from the perspective of the panelists as young researchers. The three speakers also pitched in their views and hopes as to what kind of advance can be accomplished by implementing AI carefully in medicine. There were also several questions from the audience directed to the panelists and speakers on their concern regarding the implementation of AI. The session concluded with the statement of hope from each panelist as to how they can utilize AI fully in their work and research.

Q1.



Q2.	Will it be acceptable to diagnose or treatment a patient fully by using AI without any human intervention? 23 responses 
Q3.	In your opinion, what would be the factor(s) that will hinder the implementation of AI in healthcare in your country/region? 23 responses 
Q4.	How do you think the implementation of AI will revolutionize the healthcare/medical industry and what will be the risk of the implementation? (18 responses) 1) It will be easier in case.of workload, but it is hard to differentiate what's true and what's not 2) Better diagnosis, faster process 3) Output accuracy 4) It will be oke 5) It will improve it making faster diagnosis and assist health care workers …however the risk is due to bad maintenance and upgrading in several countries and locations it will cause the downfall of health care as well as full dependence on Ai will lead to issues of the healthy workers won't be able to work without it 6) I think it will help with automation 7) Generally it will help in some workflows but it means we hv to accept a higher risk

	8) Increase treatment accuracy and throughput 9) Risk- data security, deceiving as in how much cn we trust ai. May revolutionise in terms of assisting healthcare workers and systems 10) The accountability of the output. 11) Faster, better, increase accessibility, improve healthcare equity. Misdiagnosis, legal issue 12) Lack of knowledge and malicious issues 13) It would shorten waiting time in diagnostics 14) Speed up our work. More effective image generation 15) Continuous maintenance and quality control of the accuracy and reliability 16) Automation of everything 17) AI will aid in the automation of some of the processes in the medical industry. Some issues on the implementation will most likely emanate from the lack of manpower who can develop and implement AI in the hospital. With each patient having different characteristics and each cancer having its own kinetics and rate of growth, and AI models are trained based on previous data, implementing this on specialized cases should be exercised with caution. 18) AI will help to resolved the patient waiting time problems at all general hospitals in Indonesia, but in the other side, if we fully dependent on AI, the patient security dan safety will be in danger
Q5.	After hearing the presentation, according to your understanding, what does a generative AI means? (19 responses) 1) It means data input from human, and generate an answer based on the inputs 2) AI that can create and learn 3) Production of data based on our input(s) 4) AI generated through learning 5) I am still the beginner, so I'm still learning 6) AI that you give it instructions to create data or image from scratch 7) Learn to painting continuously and learn like kids (Mimicking) 8) Creating A using B which may belong to different groups of object 9) Output of AI Machine 10) Generating an output from a given input within the given input data 11) It can generate output without input, just need some simple direction 12) It generate New data 13) Predicting and presenting a solution or answer 14) Conversion data 15) Learning data then solution. Recheck to see if its acceptable. 16) Training the computer to assist in repetitive tasks 17) Producing anything that we want but in a controlled environment 18) Using existing data to generate required information 19) Not all process depend on AI, human still be the one to decide the final conclusion

Q6.	After hearing the presentation, what do you think is the biggest issues on the implementation of AI in medicine/healthcare? (19 responses) 1) Data security 2) Ethics 3) In clinical setting, AI training is scarce hindering the adoption of AI. 4) Training data set to ensure output accuracy 5) Fantastic 6) Peopel who generate AI are not form healthcare 7) Data 8) Checking, qc and qa of ai and understanding ai 9) Acceptance and readiness of user 10) Trustworthy to the output of AI 11) The ethics, the accuracy 12) Reliability. Trust 13) How do we QA and commission AI to ensure safety abd accuracy? 14) Privacy, misscomunication, missinterpretation 15) Validity of AI output. 16) Quality control and continuous improvement of the AI 17) A reliable and secured data 18) Confusion 19) Trust to AI systems
Q7.	Based on your opinion, do you think AI will replace medical physicist job? (13 responses) 1) No 2) Yes to some extent 3) No. Physicist will have to learn some form of AI 4) Not replacing, just reducing the burden 5) Nope…this is due critical thinking and adjustment that comes with experience and understanding..AI has limitations on what we triang it but cases can come and go that are not common 6) I don't think so 7) Maybe 8) No, but it can help the workload 9) Mainly no. Some aspects yes. 10) No, because data that used to training are come from diagnostics radiology/imaging 11) No. It will assist Med Physicist perform his work better 12) No. The basics and fundamental of physics & mathematics must be understand by Medical Physicist 13) Maybe the best word to describe was to help medical physicist job not replace

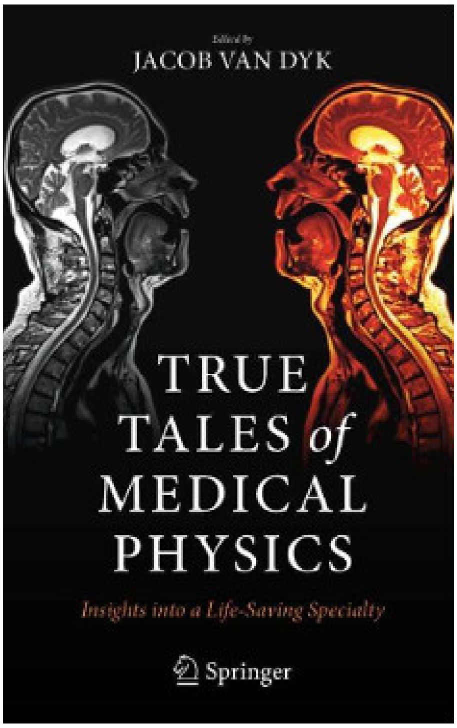
Q8.	As a researcher, how will you tackle the issues in AI implementation in medicine/healthcare? (15 responses) 1) Have to do regular training set 2) Continuity of the implementation 3) To think more like computer 4) I DON,T KNOW 5) Encourage and try to learn on working and using AI however insure no fill depending 6) No idea right now 7) Ai is just a tool to supplement never to replace. 8) Involve in research to understand the basic of AI 9) Data validation with the experts 10) Right implementation and knowing the limitations. 11) Not sure, need further research 12) One by one. Sensitise our hospital and staff. Eventually AI will improve and assist med/ healthcare. 13) Embrace it, learn it, use it and improve it 14) Not to use it freely but be learned as an applied tool to help our daily work 15) Deep understanding about the AI will help to expand the used of AI
Q9.	As a researcher, how far do you think we can use cloud to help us in AI implementation in medicine/healthcare? (14 responses) 1) Yes 2) To some extent 3) Database 4) It can help Medical Physicist 5) We can do trial and research to know that 6) Can 7) Wider application borderless 8) To some degree but not sensitive data 9) Limited for now, due to data security and lack of control issues. 10) It would benefit for patients 11) Help in data archival, safe manipulation, security 12) The potential is unlimited. It will foster a borderless collaboration and even the less resourceful country can achieve advanced care for their patients 13) I imagine that AI will aid in disease diagnosis and potentially help hospitals in treating more patients. 14) I cant really comment on this question, i m sorry

Book Review: True Tales of Medical Physics

Rajni Verma, Assistant Professor, Dept. of Radiological Physics, SMS Medical college & Hospital, India

This book is a literary journey of passion, thrills, adventures, wonders, and velour in medical physics. This will give you a true example of how one can feel all these emotions with the real-life stories of our pioneers in medical physics. It consists of twenty-two chapters divided into six major parts and also has a prologue and epilogue like a novel. In other words, it is a storybook of medical physics.

This book is edited by Jacob Van Dyk and has twenty-two contributors who have written the twenty-two chapters for this book. These chapters are about their real-life events, with an emphasis on their scientific significance and personal experiences around them. All contributors are starworts of medical physics. It's their personal experiences as individuals that make this book truly inspirational and fun to read at the same time.



Title: **True Tales of Medical Physics: Insights into a Life- Saving Specialty**

Edited by: **Jacob Van Dyk**

Publisher: **Springer Nature, Switzerland**

ISBN **978-3-030-91723-4**

ISBN **978-3-030-91724-1 (eBook)**

https://doi.org/10.1007/978-3-030-91724-1

One of the many facts that has amazed me is the cover picture of this book, the MRI scan of Jacob Van Dyk himself. The fun side is that the editor has gone the extra mile and volunteered for the scan to just be true about everything. He mentioned that the idea of this book evolved from a radio program that was about telling the stories of one's life for a better understanding of each other. Even the prologue of the book is spell-binding.

Whenever we talk about medical physics history, we always look at X-ray and radium discovery as starting points, but the interesting fact is that even before these events, there was someone who was already working in a job position as a medical physicist, a French physician named Jean Noel Halle. He was appointed professor of medical physics and hygiene at the Paris School of Health in 1794. Halle was instrumental in the development of the subject with the inclusion of medicine significant application of physics in the curriculum of medicine studies. David Thwaites has beautifully summarized the history of medical physics and given the answer to the most asked question to date "Medical Physicists, what exactly do they do?"

The editor has tried to cover a large geographical area with its contributors and their stories. This has increased its relevance to professionals from every part of the world. The contributors are David Thwaites, Jacob Van Dyk, Peter R. Almond, Gary T. Barnes, Arthur L. Boyer, James A. Purdy, John W. Wong, Paul L. Carson, C. Clifton Ling, Terry M. Peters, Stephen R. Thomas, Marcel Van Herk, Cari Borras, Carlos E. De Almeida, Arun Chougule, Jerry J. Battista, Tomas Kron, Martin Yaffe, Aaron Fenster, Maryellen L. Giger, Thomas Rock Mackie, and Radhe Mohan. All of them are well-known figures and leaders in the field of medical physics. Medical physics, as a subject, still strives for recognition in healthcare. Most of us faced this issue in our day-to-day professional lives; therefore, it was quite encouraging and motivating to read about the real-life struggles and challenges faced by our teachers and guides. Most importantly, they faced them and came out as winners.

There was a thrilling story shared by Cari Borras. She titled it "the scariest day of my life." As a young medical physicist, she was assigned to travel to El Salvador as part of an IAEA mission to investigate a radiation accident. The country was in the middle of a bloody civil war, and the surroundings felt very unsafe for travel and work. The investigation was difficult as the device was not a medical irradiator and the operators had received large radiation doses. Her journey to the airport was chilling with the sounds of gunfire, locked doors, and sounds of approaching troops. The story has given me goosebumps.

Another interesting event was shared by Peter R. Almond. Which is hilarious, and about the visit to Munich, Germany, along with his wife. They got lost in the city, very new to them, with no understanding of the local language, and at odd times. It's the early 1970s, when a few groups from the US and Europe were working on the development of electron beam therapy and tried to meet often to discuss results and their understanding with each other. In one of such meetings, they had this hilarious experience. He also shared a perfect example that emphasized the proverb, "Think before you speak.". It was quite interesting to read about the phase of commercial development of a dual-energy linear accelerator.

James A. Purdy, Gary T. Barnes, and John W. Wong, along with most of the contributors, shared their stories about how they came to medical physics. How they made their own way as professionals, researchers, and inventors. It's interesting to know how amazing their stories are. These stories themselves narrated the story of medical physics and its evolving process.

There is a noteworthy fact that out of twenty contributors, the majority are from developed countries, except for two or three from developing countries with more struggle and a lack of recognition. Establishing self and medical physics in these countries was a daunting task.

Another story of passion and positivity through a constant journey of hardship is shared by Arun Chougule, one of the most celebrated medical physicists in the Asian region, a developing region. As a medical physicist, teacher, academician, administrator, and social worker, he touched many hearts. As a young medical physicist, he faced numerous professional challenges when he was trying to start radiotherapy services in Udaipur, a city in Rajasthan state, India. It's really inspiring to know how he tackled those challenges in unconventional ways. A journey from young medical physicist to pro-vice chancellor of a state health university is full of ups and downs.

The story from Tomas Kron is something that is felt by every struggling student who is new to medical physics, with different magnitudes. He had explored various professional options, from being a basketball coach to a grape picker in vineyards, working at a local TV station, and tutoring high school students. To get settled with his wife, who's from Australia, he entered the field of medical physics in Australia in his thirties. After which a glorious career started, he had worked with Jake Van Dyk's group in Canada when Tomotherapy was just an idea and the group was looking forward to making it a reality. The whole chapter will make you realize that our pioneers were also met with struggles and challenges; however, it was their passion, patience, and undying spirit that made them different from others.

It's really difficult to touch every story in the book due to word limitations, but I should conclude that every story is spell-binding. It can be said clearly that it's not a science book; it is a book around science. It is a must-read for students, professionals, or anybody who wants to know about the journey of this amazing science and the people around it.

AFOMP Awards and Honors Committee Report

Introduction:

The Awards and Honors Committee (AHC) of the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) is responsible for evaluating and selecting the recipients of various AFOMP awards that recognize the achievements and contributions of medical physicists in the region. The committee has continued diligently evaluating nominations received for various AFOMP awards in 2023. Recognizing the immense workload and stringent timelines associated with the evaluation process, the AHC has maintained collaborative efforts with other pivotal AFOMP committees. Notably, the AFOMP Science Committee has been instrumental in evaluating nominations for the AFOMP Best Journal Award, while the Professional Relations Committee (PRC) has been actively involved in the assessment of travel awards. This strategic collaboration has ensured the comprehensive and timely evaluation of nominations, enhancing the efficiency and effectiveness of the award selection process.

AHC Committee Members:
Prof. Hasin Anupama Azhari (Bangladesh); Chair
Prof. Anchali Krisanachinda, Thailand (Female)
Prof. Hui-Yu Tsai, Taiwan (Female)
Dr. Shobha Jayaprakash, India (Female)
Dr. Nursakinah Suardi (Female)
Prof. Seungryong Cho, Korea (Male)
Prof. Nobuyuki Kanematsu, Japan (Male)
Dr. Mohammad Amin Mosleh-Shirazi, Iran (Male)

The following activities have been accomplished since the last report

1. Prof Kiyonari Inamura Memorial AFOMP Oration:

Prof. Agnette de Perio Peralta, Philippines

The 2023 Prof. Kiyonari Inamura Memorial AFOMP Oration received two noteworthy nominations—one from Iran and the other from the Republic of the Philippines. The committee, after careful consideration, selected Prof. Agnette de Perio Peralta as the distinguished orator for 2023. Prof. Peralta, Assistant Secretary of Health, Department of Health (DOH), Republic of The Philippines, possesses a remarkable academic background, holding an MS in Medical Physics from the University of Wisconsin-Madison and a Master's in Hospital Administration from St. Bernadette of Lourdes College in Quezon City. Her extensive service to AFOMP and the global medical physics community made her a fitting recipient of this prestigious oration

2. Lifetime achievement award:

Prof. Dr. Dai Jianrong Dai, China

The AFOMP Lifetime Achievement Award, a recognition of significant contributions to the medical physics profession and research, received three commendable nominations from China, Iran, and Indonesia. The deserving recipient of this distinguished honor is Prof. Dr. Dai Jianrong Dai from the Department of Radiation Oncology, National Cancer Center/National Clinical Research Center for Cancer/Cancer Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing. Prof. Dai's substantial contributions in China and the AFOMP region, coupled with his past role as the president of CSMP, exemplify a lifetime dedicated to advancing medical physics.

3. AFOMP Journal Prize for the Best Paper published in an AFOMP Journal

Dr Akihiro Nohtomi, Japan

In the realm of academic excellence, the AFOMP Journal Prize for the Best Paper published in an AFOMP Journal witnessed a substantial increase in nominations —from 8 in 2022 to 12 in 2023. Dr. Akihiro Nohtomi from Japan emerged victorious for his paper titled "First optical observation of 10B-neutron capture reactions using a boron added liquid scintillator for quality assurance in boron neutron capture therapy." The Science Committee of AFOMP played a pivotal role in evaluating the submissions, emphasizing the commitment to promoting groundbreaking research within the medical physics community.

4. PN Krishnamurthy Memorial AFOMP Young achiever award

Dr Lukmanda Evan Lubis, Indonesia

Eight commendable nominations were received for the PN Krishnamurthy Memorial AFOMP Young Achiever Award, reflecting the growing talent pool within the AFOMP region. Dr. Lukmanda Evan Lubis from Indonesia emerged as the distinguished winner, underscoring the promising trajectory of young professionals in the field.

5. The C.V. Saraswathi – A.N. Parameswaran Memorial AFOMP Best PhD

Recognizing outstanding contributions in the realm of doctoral research, the C.V. Saraswathi – A.N. Parameswaran Memorial AFOMP Best PhD Award received three nominations from India and Japan. Dr. Tomohiro Kajikawa from Japan was honored for his comprehensive research covering AI-based treatment planning, deformable image registration, CT ventilation, AI-based patient-specific QA. Dr. Dilson Lobo from India received an honorary mention for his thesis on "Skin Dose Estimates in Postmastectomy Chest Wall Radiotherapy."

Dr Tomohiro Kajikawa, Japan

Dr Dilson Lobo, India

6. Professor Sung Sil Chu AFOMP Best Student's Publication Award

Dr Abolfazl Kanani, Iran

The AFOMP continued to encourage and recognize the scholarly achievements of students with the Professor Sung Sil Chu AFOMP Best Student's Publication Award. Ten valid nominations were received from India, Iran, and Japan. The award was bestowed upon Dr. Abolfazl Kanani from Iran for his paper titled "Metal artifact reduction in cervix brachytherapy with titanium applicators using dual-energy CT through virtual monoenergetic images and an iterative algorithm: A phantom study," contributing valuable insights to the field.

7. Dr Udupi Madhvanath Memorial AFOMP Best PhD Award in Radiobiology

Dr Raizulnasuha Binti Ab Rashid, Malaysia

Radiobiology, a critical aspect of medical physics, was celebrated through the Dr. Udupi Madhvanath Memorial AFOMP Best PhD Award. Four commendable nominations were received, with Dr. Raizulnasuha Binti Ab Rashid from Malaysia earning the accolade for her thesis titled "Radiobiological modelling of gold nanoparticles radio sensitization effects in conventional and advanced radiotherapy techniques." This award underscores the importance of advancing understanding in radiobiology for the improvement of medical treatments.

8. Golam Abu Zakaria AFOMP Best Young Leadership Award

The committee received an impressive 13 nominations for the prestigious "Golam Abu Zakaria AFOMP Best Young Leadership Award." This accolade, designed to recognize and celebrate young medical physicists demonstrating exceptional leadership skills in the development of the medical physics profession within the AFOMP region, saw Dr. Noramaliza Mohd Noor from Malaysia and Dr. Md Akhtaruzzaman from Bangladesh being honoured. Their exemplary leadership in advancing the field reflects the bright future of medical physics in the AFOMP region.

Dr Noramaliza Mohd Noor, Malaysia

Dr Md Akhtaruzzaman, Bangladesh

9. Full AOCMP2022 travel awards

The AFOMP Professional Relations Committee oversaw the evaluation of the Full AOCMP2022 Travel Awards, receiving nine applications. Seven deserving individuals were awarded $300 each for their travel endeavors. The recipients Akbar Azzi (Indonesia), Alamgir Hossain (Bangladesh), Ji Shang (China), Md Jobairul Islam (Bangladesh), Nuttawut Yeenang (Thailand), Raizulnasuha Ab Rashid (Malaysia), and Ram Narayan Yadav (Nepal) represent the diverse and dynamic nature of the AFOMP community.

Acknowledgments and Conclusion

In concluding this comprehensive report, heartfelt congratulations are extended to all awardees for their exemplary work and significant contributions to the field of medical physics. Additionally, sincere gratitude is expressed to the members of the AHC and other collaborating committees for their tireless efforts in evaluating nominations with precision and diligence. The commitment of these professionals has undoubtedly elevated the standards and recognition of excellence within the AFOMP community.

Prof. Hasin Anupama Azhari
Chair, A&H committee, AFOMPDear AFOMP Members,

AFOMP Funding Committee Report

Dear AFOMP Members,

The Funding Committee is pleased to share our progress and achievements in securing vital resources for the Federation in 2023. Under the leadership of Chair Dr. Byung-Chul Cho (Korea), the Committee has worked diligently to expand our corporate partnerships and explore new fundraising opportunities.

Sustaining Support from Valued Partners:
We are grateful for the continued commitment of our corporate members, whose generous contributions enable AFOMP to fulfill its mission. We extend our sincere appreciation to

- PTW and SUN NUCLEAR, committed partners since 2020, whose unwavering support continues until 2024.
- ROSALINA, joining us in June 2020 and extending their partnership through May 2025.
- RTI, demonstrating their dedication through an initial partnership from 2021 to 2022 and now renewing their commitment for 2024.
- Radformation, newly joining us in 2024 with an exciting partnership that includes extra page advertisements in each newsletter.

Reaching Out to New Horizons:
The Committee actively pursued potential sponsors throughout the APAC region. We identified approximately 50 promising companies and initiated outreach efforts through personalized membership request emails. I also visited many exhibition booths during ICMP2023 along with SG Prof. Aik Hao to inform them about the corporate membership of AFOMP and encourage them join. We are confident that these efforts will result in fruitful partnerships in the near future.

Strengthening Collaborations:
We are proud to announce a Memorandum of Understanding (MOU) with the Japanese Society of Medical Physics (JSMP) regarding the "Prof. Inamura Oration Award." JSMP has generously pledged an annual $600 USD reward separate from membership fees. To ensure transparency and proper financial management, we will make a separate reporting of income and expenses related to this award. We look forward to finalizing this agreement and celebrating this collaborative initiative.

Looking Ahead:
The Funding Committee remains dedicated to securing sustainable financial resources for AFOMP. We plan to continue our outreach efforts, explore innovative fundraising initiatives, and cultivate strong relationships with existing and potential corporate partners. For this purpose FC explore new possibilities for sponsors to promote through AFOMP monthly webinar and industrial webinar. With your continued support, we are confident that AFOMP will continue to thrive and fulfill its mission of advancing medical physics in the Asia-Oceania region.

Thank you for your ongoing support.

Sincerely,
The AFOMP Funding Committee
Email: fc.afomp@goole.com

AFOMP Professional Relations Committee Report

Greetings from AFOMP PRC to one and all.

As we start a New Year, wish you all a very happy, healthy and blessed New Year, continued success in achieving professional and personal goals.

We had a successful 23rd AOCMP held in conjunction with the ICMP 2023 at Mumbai India during 6-9 December 2023. Delegates from many AFOMP National Member Organizations actively participated in the conference with oral and poster presentations, invited talks and special symposia. PRC could reach out to many and had invigorating discussions on professional challenges and development goals. 5 AFOMP Travel Award winners could successfully attend the conference. Congratulations to the winners.

The AFOMP monthly webinars and schools are continuing on a successful note with enthusiastic participation of members from AFOMP as well as outside the region. Thank you very much. Hearty welcome to the webinars of 2024 and looking forward to having your active participation in the upcoming webinars.

As we strive forward for excellence in medical physics and professional competiveness, AFOMP PRC is trying to reach out to all medical physicists in the region to support and collaborate for the betterment of each one's professional pursuits. Please feel free to reach out at prc.afomp@gmail.com.

AFOMP has LinkedIn and Twitter (X) profiles and a YouTube channel through which AFOMP activities, medical physics news etc. are shared. Follow the accounts to keep ourselves updated with the AFOMP educational and professional activities.

AFOMP Linkedin

AFOMP X (Twitter)

AFOMP Youtube

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

NMO Activity Report : IDMP Celebration, Bangladesh

Bangladesh Medical Physics Society (BMPS) celebrates International Day of Medical Physics (IDMP) 2023

Md. Jobairul Islam[1,2], Md. Akhtaruzzaman[1,3]

1. Bangladesh Medical Physics Society (BMPS).
2. Labaid Cancer Hospital and Super Speciality Centre, Bangladesh.
3. Evercare Hospital Chattogram, Bangladesh.

Introduction:

The Bangladesh Medical Physics Society (BMPS) celebrated the International Day of Medical Physics (IDMP) 2023 with great enthusiasm, commemorating the 60th anniversary under the theme "Standing on the Shoulders of Giants." As part of the celebration, BMPS organized various events aimed at promoting awareness and engagement in the field of medical physics.

Translation Initiative:

BMPS demonstrated its commitment to community engagement by translating the official IDMP poster into Bengali, the native language of the region. This initiative aimed to enhance accessibility and engagement within the local community, ensuring that crucial information about medical physics reaches a broader audience in their native language. The translated Bengali poster was made available on the International Organization for Medical Physics (IOMP) official website.

Webinar Programs:

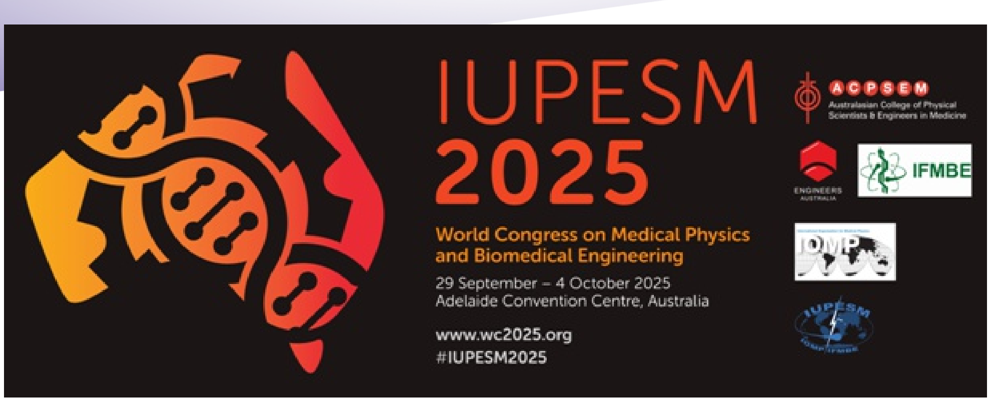
BMPS organized a series of webinar programs on the occasion of IDMP 2023, held on November 7th from 9:00 PM to 10:00 PM Bangladesh Time (3:00 PM Greenwich Mean Time). The webinar focused on the theme of “Advancement and Artificial Intelligence in Medical Physics” and featured Dr. Paul Ravindran, Ph.D., Dip.RP., FCCPM., Principal of North East Regional Multidisciplinary Paramedical Institute (NERMPI), Christian Institute of Health Sciences and Research (CIHSR), Dimapur, Nagaland, India, as the keynote speaker. The session was moderated by Dr. Md Akhtaruzzaman, Ph.D., President of BMPS and Chief Medical Physicist & RCO at Evercare Hospital Chattogram.

The IDMP 2023 webinar series witnessed an overwhelming response, with a total of 250 participants from 32 countries actively engaging in the sessions. Participants hailed from various regions across Asia, Africa, Europe, and North and South America, highlighting the global reach and impact of BMPS’s initiatives. The success of the webinar series was attributed to the insightful presentations by speakers, effective moderation, and the collaborative efforts of the organizing team.

Conclusion:

The celebration of IDMP 2023 by BMPS exemplified a dedication to promoting awareness, inclusivity, and advancement in the field of medical physics. Through initiatives such as poster translation and webinar programs, BMPS successfully engaged a diverse audience and fostered meaningful discussions on the latest advancements in the field. The organization expresses its gratitude to all participants, speakers, moderators, and organizers for their contributions to the success of the event.

NMO Activity Report : Australia & New Zealand, ACPSEM



Happy New Year from the Australasian College of Physical Scientists and Engineers in Medicine.

Kevin Hickson has been re-elected as President of ACPSEM for 2024, with Andrew Cousins continuing as Vice President, and Kym Rykers as Head of Specialties. This year we have also welcomed Di Robinson as CEO, following Sharon Flynn's retirement in December 2023.

EPSM 2024

Events are at the forefront of our mind as we settle into the new year. Preparation is now in full swing for our annual conference, Engineering Physical Sciences in Medicine. For the first time since 2011, we are joining forces with Engineers Australia and their Biomedical Engineering College, to combine our scientific meetings into one joint conference. Engineering and Physical Sciences in Medicine and Australian Biomedical Engineering Conference (EPSM-ABEC 2024) will run from 17 – 20 November at the Grand Hyatt, Melbourne. The program will boast a world-class line up of international and local speakers, and we extend a warm invite to you, our Asian Medical Physics Colleagues, to join us. You can subscribe to the EPSM mailing list via epsm.org.au to receive key updates around abstracts, program and registration.

IUPESM 2025

On behalf of Engineers Australia, the Australian College of Physical and Engineering Scientists in Medicine, the International Union for Physical and Engineering Sciences in Medicine, the International Organization for Medical Physics and the International Federation of Medical and Biological Engineering, we are excited to extend this invitation to an event that promises to be a milestone in the realms of Biomedical Engineering and Medical Physics. In the ever-evolving landscape of medicine and healthcare, the fusion of leading research and technological innovation is taking towards a future where the boundaries are beyond what any of us may have imagined just a few years ago. **The 2025 IUPSEM World Congress, in Adelaide, South Australia**, is your gateway to the opportunities with which we are presented. The Congress Theme is aligned with worldwide initiatives of equitable healthcare in a sustainable world: **Bridging the Gap: Science, Technology, and Clinical Practice for a Sustainable World**.

Join the brightest minds from around the world and network with scientists, engineers, researchers, innovators, and corporations in this fantastic opportunity to expand your endeavours. The conference will provide a unique opportunity to make new acquaintances in an environment where they will be sharing the very latest research, technologies and thinking that stands to collectively shape the future of healthcare delivery.

Mark your calendars and begin your preparations to join us in Adelaide between September 29th and October 4th 2025.

Please visit https://wc2025.org/ to register your interest.

DELIVERY AND DEVELOPMENT OF ADVANCED CERTIFICATION COURSES

ACPSEM's second ever MR Safety Expert (MRSE) Course began in October 2023, following a hiatus to refine the content of the 2020 pilot in accordance with participant feedback and trends in best practice online education. Interest was overwhelming and 19 candidates enrolled, including a radiologist and radiographer. The 12-month course combines pre-recorded lectures, live webinars, and assessments ranging from MCQs to practical tasks. This certification is an alternative to the American MRSE course and is the first in Australia.

Work is also underway on an Advanced Brachytherapy Certification, which will be launched in mid-2023. The ACPSEM Particle Therapy Working Group has also just approved the Learning Outcomes for a Level 3 Particle Therapy Certification Course. An online Level 1 Particle Therapy Certification Course, has been running since 2022 and is designed as an entry level course for Medical Physics Trainees and Professional Development tool for qualified Radiation Oncology Medical Physicists.

Our office and volunteers across our education and professional groups are hard at work putting together a calendar of specialty webinars. Keep an eye on our website and social media for these announcements.

Again, we wish all our colleagues a prosperous 2024 and look forward to another year of successful connection and collaboration.

ACPSEM
Australasian College of Physical Scientists & Engineers in Medicine

NMO Activity Report: Japan Society of Medical Physics (JSMP)

Naoki Hayashi[1,2], Shigekazu Fukuda[3, 4]

1. Division of Medical Physics, School of Medical Sciences, Fujita Health University
2. Chair of International Affairs Committee of JSMP
3. Radiation Quality Control Section, QST hospital, Quantum Medical Science Directorate, National Institutes for Quantum Science and Technology
4. President of JSMP

Introduction

The Japan Society of Medical Physics (JSMP) was established in March 2000 through a merger of the Japanese Association of Radiological Physicists (JARP) and the Japanese Association of Medical Physicists (JAMP). The origin of the JSMP can be traced back to March 1961, when it became a "physics subcommittee" under the Japan Society of Radiological Physics (JSMP). Figure 1 shows the number of JSMP members. The number of JSMP members has increased rapidly since the establishment of JSMP and now exceeds 2,500. This is because individuals must be JSMP members to be certified as medical physicists in Japan. For more information on the history of JSMP and the background of the increase in its numbers, please refer to an article in the Medical Physics International journal[1].

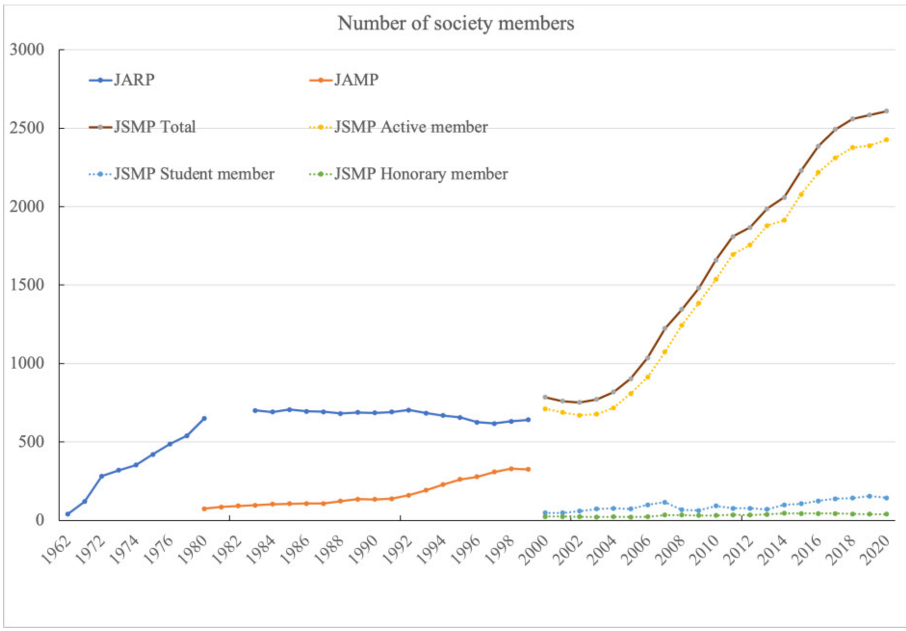


Figure 1. Number of JSMP members

JSMP activities includes as follows:1) Conference, 2) Journal publication, 3) Committee activities, 4) Collaboration with related organizations.

This paper describes these four topics.

1. Conferences

The JSMP has two congresses annually. The Spring Congress in April is part of the Japan Radiology Congress (JRC) and consists of the Japan Radiological Society (JRS), the Japanese Society of

Radiological Technology (JSRT), the Japan Industries Association of Radiological Systems (JIRA), and the International Technical Exhibition of Medical Systems (ITEM). The JRS and JSRT are societies of radiologists and radiological technologists, respectively. The JSMP is a society of medical physicists, making the JRC the largest joint conference in the field of radiology. During the JRC, there are symposia by radiologists, radiological technologists, and medical physicists to discuss various topics in radiology as well as research presentations in each organization. During the conference, the largest exhibition of medical systems in radiology in Japan (ITEM) is held at the same venue. The JRC is held annually in Yokohama. Please refer to the report by the President of the Scientific Meeting[2-6]. As the poster of JRC2024 in Figure 2, the 127th Scientific Meeting of the Japan Society of Medical Physics (JSMP127) will be held in conjunction with the JRC in April 2024. Although the abstract submission period has closed, AFOMP members can still attend the meeting at the same price as the JSMP members. Please check the website if detailed information is required. JSMP127 homepage: https://www.jsmp.org/conf/127/en

Figure 2. Posters of JRC2024 (Spring Meeting) and JKMP10 (Autumn Meeting).

The JRC is an international scientific conference that encourages presentations in English. By contrast, the Autumn Meeting, held in September, is a scientific conference for domestic members. We encourage young researchers to make presentations at the Autumn Meeting, and we try to create an environment that encourages discussions among young researchers. The Autumn Meeting is held somewhere in Japan and not in a fixed location like the JRC.[7, 8] This year's Autumn Meeting will be held in Nagoya in September as the 128th scientific meeting of JSMP (JSMP128), and JSMP128 will be held in conjunction with the 10th Japan-Korea Joint Congress on Medical Physics (JKMP10), which is held once every three years for the purpose of exchange between Japan and Korea. Therefore, this year's Autumn Meeting will be held as an international meeting, and attendees from the AFOMP region will be welcome. The poster of JKMP10 was published as Figure 2 and the homepage is opened: https://www.jkmp2024.com/

2. Journal publication

JSMP publishes the Japan Journal of Medical Physics, commonly known as "Igaku Butsuri," as an academic journal in Japanese. The main topics of Igaku Butsuri are the scientific papers of our members and reports of scientific conferences. JSMP also publishes the Radiological Physics and Technology (RPT) journal. The RPT journal is jointly published with the JSRT as the official journal of both societies. The RPT journal has become the official journal of the AFOMP since 2018. The RPT journal has also been an official publication of the International Organization of Medical Physics (IOMP) since 2020. The RPT journal was recently recognized as a scientific journal with an impact factor of 1.6 in 2022. Please submit your article. https://link.springer.com/journal/12194

3. Committee activities

The JSMP has 13 standing committees including radiation dosimetry, education and training publication, radiation protection, international affairs, quality assurance, promotion, terminology, general affairs, ethics, supporting conferences, interdisciplinary exchanges, and medical physicists. Each committee has 10-15 members and discusses radiation measurement standards, medical physics education, journal editing, and radiation protection. These committee activities resulted in scheduled educational seminars and publications. In addition, the results of the committee discussions are presented at scientific meetings. I belong to the international affairs committee, which supports international academic activities.

4. Collaboration with related organizations

JSMP collaborates with related scientific societies and organizations in Japan and abroad, including the Japanese Society for Radiation Oncology (JASTRO), JSRT, the Japanese Society for Medical and Biological Engineering (JSMBE), the Japanese Radioisotope Association (JRIA) and so on, as well as participation in IOMP and AFOMP. Cooperation with these organizations will expand the scope of activities in the field of medical physics and allow us to organize joint conferences. Collaboration with JSMBE will enable scientific exchanges in the fields of medical physics and biomedical engineering. In the future, we aim to organize international conferences, such as the World Congress. In addition, by exchanging with overseas societies, joint meetings such as AOCMP and JKMP can be held continuously. [9, 10] In addition, we support medical physics education in the Asia-Oceania region through our participation in the IAEA's RCA.[11]

JSMP, as the NMO of AFOMP, will continue to strive for academic activities for the progress of medical physics in the future.

References

1. Hayashi N, Mizuno H, Fukuda S. Medical Physicists in Japan: Past, Present and Future Medical Physics International 2021; 8(3) 426-429.
2. Oguchi H. [Report of the 115th Scientific Meeting of the Japan Society of Medical Physics]. Igaku Butsuri. 2018;38(2):100-105. Japanese. doi: 10.11323/jjmp.38.2_100. PMID: 30381706.
3. Minohara S. [Report of the 117th Scientific Meeting of the Japan Society of Medical Physics]. Igaku Butsuri. 2019;39(2):50-53. Japanese. doi: 10.11323/jjmp.39.2_50. PMID: 31474668.
4. Arimura H. [Report of the 119th Scientific Meeting of the Japan Society of Medical Physics]. Igaku Butsuri. 2021;41(1):40-43. Japanese. doi: 10.11323/jjmp.41.1_40. PMID: 33853983.

5. Kanematsu N. [Report of the 121st Scientific Meeting of the Japan Society of Medical Physics]. Igaku Butsuri. 2021;41(3):76-81. Japanese. doi: 10.11323/jjmp.41.3_76. PMID: 34744137.
6. Abe S. [Report of the 125th Scientific Meeting of Japan Society of Medical Physics]. Igaku Butsuri. 2023;43(3):81-83. Japanese. doi: 10.11323/jjmp.43.3_81. PMID: 37967967.
7. Sato E. [Report of the 116th Scientific Meeting of the Japan Society of Medical Physics]. Igaku Butsuri. 2019;38(4):188-190. Japanese. doi: 10.11323/jjmp.38.4_188. PMID: 30828056.
8. Kume K, Sasaki M. [Report of the 118th Scientific Meeting of the Japan Society of Medical Physics]. Igaku Butsuri. 2020;40(4):141-146. Japanese. doi: 10.11323/jjmp.40.4_141. PMID: 33390381.
9. Fukuda S. [Report of the 120th Scientific Meeting of Japan Society of Medical Physics]. Igaku Butsuri. 2021;41(2):59-63. Japanese. doi: 10.11323/jjmp.41.2_59. PMID: 34193759.
10. Fukuda S. [Report of the 9th Korea-Japan Joint Meeting on Medical Physics/122nd Scientific Meeting of Japan Society of Medical Physics]. Igaku Butsuri. 2022;42(1):48-51. Japanese. doi: 10.11323/jjmp.42.1_48. PMID: 35354737.
11. Fukuda S. [Introduction to IAEA/RCA RAS6087 Project "Enhancing Medical Physics Services in Developing Standards, Education and Training through Regional Cooperation (RCA)"]. Igaku Butsuri. 2022;42(3):170-172. Japanese. doi: 10.11323/jjmp.42.3_170. PMID: 36184428.

NMO Activity Report: Association of Medical Physicists of India (AMPI)

Sunil Dutt Sharma[1,2]

1 President, Association of Medical Physicists of India (AMPI)
2 Co-Chair, Conference Organizing Committee & Scientific Committee, ICMP-2023

I. INTRODUCTION

The 26th International Conference of the IOMP namely the "International Conference on Medical Physics 2023" (ICMP-2023) was jointly organized by Association of Medical Physicists of India (AMPI), International Organization for Medical Physics (IOMP), Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) and South-East Asian Federation of Organizations for Medical Physics (SEAFOMP) during 6 to 9 December 2023 at DAE Convention Centre, Anushaktinagar, Mumbai, India. The theme of the conference was Innovations in Radiation Technology & Medical Physics for Better Healthcare.

II. OPENING CEREMONY

The opening ceremony of the conference presented the mixture of Indian tradition (lamp lighting, welcome to dignitaries by flower bouquets, felicitation of guests) and global scientific culture. Dr. Sudeep Gupta, a renowned medical oncologist who is currently the Director of Tata Memorial Centre (a premier cancer institution of India), was the chief guest for this function. Figure 1 is the photograph of the opening ceremony of ICMP-2023 showing release of souvenir and book of abstracts of the conference.

Figure 1: Photograph of the opening ceremony of ICMP-2023 [From left to right: V Subramani, Sunil Dutt Sharma, Eva Bezak, Dinesh Kumar Aswal, Sudeep Gupta, John Damilakis, Balvinder Kaur Sapra, Chai Hong Yeong, Rajesh Kumar]

III. PARTICIPATION

ICMP-2023 brought together experts, researchers, and professionals from around the world to discuss the latest advancements and breakthroughs in the field of medical physics and associated disciplines. This conference was well attended by more than 1300 participants from 33 countries including 134 delegates/ invitees/experts from outside India. The participation of more than 325 medical physics students and about 200 medical physics senior citizens was the testimony of the larger medical physics community of India. We can proudly state that the ICMP-2023 has brought together the medical physics professionals of four generations (4G). Thus, ICMP-2023 was indeed the 4G conference. Figure 2 is a section of the participants.

IV. SCIENTIFIC PROGRAM

The scientific program of the conference was very comprehensive and it included almost all the topics of recent interests for deliberations such as artificial intelligence in medical physics, technology and techniques of radiation oncology, treatment planning, emerging and newer techniques of radiation therapy, imaging in radiation oncology, advanced technologies and techniques of medical imaging, emerging and newer techniques of medical imaging, radiation dosimetry and radiation safety, targeted therapy, radiation biology, modeling and simulation, translational research, education/training and certification in medical physics.

Figure 2: Section of participants at the ICMP-2023

The scientific schedule included 4 plenary sessions (6 talks), 2 joint sessions (IOMP-IAEA and IOMP-IRPA with 4 talks), 6 IOMP schools (including 2 CMPI teaching sessions), 14 special symposiums (46 talks), 36 scientific sessions (36 invited talks plus 102 oral paper presentations), 2 technical sessions (11 technical talks from the exhibitors), 359 poster presentations, 4 poster rapporteur sessions (15 reporters briefing on the poster presented at the conference), and one evening lecture. Scintillating debates (2 sessions), namely “Will AI replace clinical medical physicists?” and “Whether harmonization in certification of medical physicists is required?” and medical physics quiz competition (2 sessions) were the special attractions for many participants. Live telecast of the scientific deliberations was made through YouTube and links for all the deliberations are made available at the conference website www.icmp2023.org. In addition, links of all the presentations have also been communicated to IOMP, AMPI, AFOMP, and SEAFOMP for uploading at their websites.

V. SPECIAL INTERESTS

The inclusion of YOGA session (special thanks to Prof M. Mahesh for the proposal) on the mornings of 2nd, 3rd and 4th day of the conference was of special interests to many and it has been well appreciated. I am hopeful the Yoga session started from ICMP-2023 will be part of many other conferences in the world. The social aspects of the conference were equally attractive and have received wide appreciation from all. Cultural program in the evening of first day and complimentary dinners in the evenings of 1st, 2nd, and 3rd days, along with the arrangements for music and dancing was refreshing for all.

VI. SUMMARY

The total deliberations of the conference included 233 oral presentations and 359 poster presentations. To cover such a large number of oral presentations, it was inevitable to conduct three parallel sessions (please see the scientific program available at www.icmp2023.org). It is worth mentioning here that IOMP introduced four cash prizes (two for best oral presentations and two for best poster presentations) to encourage and enhance the quality of presentations in addition to quality of scientific work. Thanks to the panel of judges who evaluated the proffered oral and poster presentations which was indeed a herculean task.

VII. ACKNOWLEDGEMENT

I take this opportunity to thank IOMP, AMPI, AFOMP, SEAFOMP, trade exhibitors/supporters, invitees, experts, delegates, members/chairs/co-chairs of all the committees of ICMP-2023 including members of local organizing committee and all those who have supported me directly/indirectly in making the biggest ever international conference on medical physics (ICMP) of IOMP a satisfying and successful event. In fact, ICMP-2023 was the mega event of medical physics which has created a few records to serve as reference for organizers of future ICMPs.

VIII. REFERENCE

1. https://icmp2023.org/
2. https://www.iomp.org/icmp-2023-report/

Contacts of the corresponding author:
Author: S.D. Sharma
Institute: Association of Medical Physicists of India
Country: India
Email: sdsbarc@gmail.com

NMO Activity Report: Korean Society of Medical Physics (KSMP)

Inauguration of the 17th Executive Board of the Korean Society of Medical Physics (KSMP)

On January 1, 2024, the 17th Korean Society of Medical Physics (KSMP) officially launched. Prof. Kyo Chul Shin from Cheon-an Dankook University Hospital was elected as the president, leading the newly formed executive committee into a two-year term. 17th KSMP is ready to start a variety of activities in response to the evolving healthcare and research environments. With a commitment to contribute to the enhancement of medical safety, efforts will be directed towards establishing medical physics as a key field in advanced interdisciplinary research. Anticipating the continued interest and support of its members, the society looks forward to engaging in vibrant activities in the coming years.

The 17th KSMP Executive Board Workshop took place January 5-6, 2024

Executive workshop and Gala Night event

On January 5, 2024, the Executive Workshop and Gala Night event of the Korean Society of Medical Physics took place at the Daejeon Sunshine Hotel. On this day, representatives from collaborating companies and the 17th executive board gathered together for a meaningful occasion, wishing for the advancement of the Korean Society of Medical Physics.

A night of sponsors for the development of the KSMP, held on January 5, 2024

Newly Launched Legislation Committees and Standardization Committees

In an effort to establish the roles and functions of medical physicists in the domestic healthcare and make a legal foundation for their stable performance, a Legislation Committee has been established. Simultaneously, to ensure patient safety through consistent standards and procedures and to facilitate effective contributions to the improvement of future medical services, a Standardization Committee has been instituted. It is anticipated that these committees will play a crucial role in providing a reliable legal framework and standardized procedures, thus enhancing patient safety and contributing to the advancement of healthcare services in the future.

Report: Photography in Medical Physics 2014-2023, Australia and New Zealand

The Photography in Medical Physics (PMP) competition is held to celebrate our exciting profession and to show off visually stimulating aspects of the work of a Medical Physicist.

Starting in 2014 (and with only one year break in 2022), Australian and New Zealand medical physicists and their colleagues have been asked annually to submit their favorite images for a friendly competition. Images are invited in several categories which have evolved over the years and included "Professionals at work", "My favorite piece of Medical Physics gear", "Connect, Communicate, Collaborate" "Marco – Get up close and personal with Medical Physics". And in one year the competition even branched out into paintings and GPS maps.

Images are submitted digitally via a dedicated website. Artists always retain the copyrights to their work; they give permission for the organizers to use the images within outlined rules to promote the profession and the PMP competition.

The submitted images are assessed by a panel of judges based on their visual impact, storytelling aspects, and technical quality. The international panel of judges includes award winning professional photographers, well-known medical physicists and local gallery owners. The images are also presented to the public and all are invited for a public vote.

2014 Category Professionals at work – 1st place Duncan Butler "Alignment"

Winning images are generally presented at the annual meeting of the Australian and New Zealand Medical Physicists digitally and in print. In some years the best images were printed on High Gloss Aluminum and auctioned with 100% of all proceeds supporting a good cause, the Asia Pacific Special Interest Group (APSIG) of the Better Healthcare Technology Foundation, a registered charity of the ACPSEM. Recently, a calendar of the selected images has been created and made available for purchase, again 100% benefitting APSIG. Images from PMP have been used on the website of ACPSEM and in publications.

PMP is organized by Joerg Lehmann and Alannah Kejda as a social activity of the New South Wales / Australian Capital Territory branch of the ACPSEM. May Whitaker helped start the competition in 2014 and has been involved in the first three years before other commitments pulled her away. PMP is grateful for many supporters every year that help make the competition possible, for the staff at the ACPSEM office, and for generous financial support from commercial sponsors Gamma Gurus and DTect Innovation. And, of course, we very much appreciate all image submissions, without which PMP could literally not exist. Thank you and keep them coming!

Report: KU-UM Collaboration between Universiti Malaya and Kyushu University

Jeannie Hsiu Ding Wong, Kwan Hoong Ng, Hidetaka Arimura, Masatoshi Kondo
Department of Biomedical Imaging, Faculty of Medicine, Universiti Malaya, Kuala Lumpur, Malaysia.
Division of Medical Quantum Science, Kyushu University, Japan

Introduction

The 4th Symposium on Intelligent Data Science for Radiological Imaging (iDSRI) between Universiti Malaya and Kyushu University was successfully held on the March 7, 2023 at the Department of Biomedical Imaging, Faculty of Medicine, Universiti Malaya, Malaysia. The meeting was co-host by the Medical Physics Division of the Malaysian Institute of Physics and the Department of Biomedical Imaging, Universiti Malaya. The aim of this symposium is to enhance research and teaching collaboration between the two universities in medical physics.

Brief history

The symposium was a result of a long standing collaboration between the two universities, starting with the signing of the memorandum of understanding between Universiti Malaya and Kyushu University. Under this collaboration, we discussed student exchange programme, short-term visit and attachment.

This led to the first visit by Professor Arimura and his team in March 13-14, 2017 and subsequently in December 13 – 14, 2018. Since then, we had started a research collaboration on radiomics research in approach to the identification of EGFR mutations among patients with NSCLC and published a paper. However, due to the COVID-19 pandemic, the physical visits were halted for a couple of years. Then in March 2021, the first iDSRI was held to continue the collaborative relationship between the two universities in the new paradigm. This was followed by the subsequent iDSRI, held twice a year, with the two universities hosting it alternatively. Table 1 – 3 shows the list of presentations and speakers for the first three iDSRI held online over Zoom and Google Meet platforms. The presentations covered various disease domain, medical imaging modalities, from radiomics, artificial intelligence to radiological science and dosimetry research.

Table 1 : The 1st Symposium on Intelligent Data Science for Radiological Imaging held on September 13, 2021.

Talk title	**Speaker**
Genetic biomarker profiling in lung cancer and its role in treatment and prognosis	Prof. Chong Kin Liam
Imaging in COVID-19 : The challenges in radiology and artificial intelligence	Dr. Wai Yee Chan`
Response Assessment of Cancer Therapy	Assoc. Prof. Mohammad Nazri
Analysis of pulmonary blood flow using CT and MRI	Prof. Hidetake Yabuuchi
Radiological technology education utilizing virtual reality	Prof. Toshioh Fujibuchi
Radiomics-based imaging biopsy approaches for precision radiology	Prof. Hidetaka Arimura
New biomarkers for beta-thalassemia using MRI	Ms. Umi Nabilah Ismail
Magnetic Resonance Imaging Phenotypes of Breast Cancer Molecular Subtypes	Dr. Nazimah Mumin
Semi-supervised GAN-based Radiomics Model for Data Augmentation in Breast Ultrasound Mass Classification	Ms. Pang Ting
Accelerating magnetic resonance imaging with compressed SENSE of quasi-dynamic shoulder	Ms. Namie Asano
Proposal of a radiation protection education method using a x-reality visualization tool for scattered radiation behavior in a web browser	Mr. Kazuki Nishi
Radiomics analysis for prognostic prediction for time to progression in non-small cell lung cancer patients treated with stereotactic ablative radiotherapy	Mr. Takumi Kodama

Table 2 : The 2nd iDSRI held on March 16, 2022

Talk title	Speaker
Recent achievements of radiomics research	Prof Hidetaka Arimura
AI roles in Healthcare Applications	Dr Shier Nee Saw
Research in Radiation Dosimetry	Assoc Prof Dr Jeannie Wong
Research in radiation protection using monte carlo simulation and virtual reality	Prof Toshioh Fujibuchi

Table 3 : The 3rd iDSRI held online on September 20, 2022

Talk title	Speaker
Sustainable AI for sustainable development goals (SDGs)	Prof. Loo Chu Kiong
Overview of radiomics in breast cancer diagnosis and prognostication.	Prof. Kartini Rahmat
Correlating COVID-19 disease severity and pulmonary vascular manifestations on CT pulmonary angiography.	Dr Farhana Fadhli
Situations and reuse of dual-energy CT data	Assistant Professor (Lecturer) Masatoshi Kondo
Data science in clinical imaging: toward its application	Assistant Professor Masateru Kawakubo
Usefulness of recent image processing for digital radiography system	Assistant Professor Nobukazu Tanaka
A radiomics study: classification of breast lesions by textural features from mammography images	Miss Nishta Letchumanan
A Radiomics-Reporting Network with Text Attention for Interpretable deep learning in BI-RADS classification of mammographic calcification.	Miss Pang Ting
Automatic localization of anatomical landmarks in fluoroscopy images via deep learning	Mr Wilbur Fum
CycleGAN-based Synthesis of virtual contrast-enhanced MR Images for prostate cancer patients	Mr. Yuya Hirakawa
Evaluation of utility of MR spirometry using 4D FreeBreathing	Mr. Tomonori Matsushita
Development of a warning system for occupational exposure using body tracking with a depth camera and AR markers	Mr. Kenta Honiden

Table 4 : The 4th iDSRI held in hybrid mode on March 7, 2023

Talk title	Speaker
Achievements of radiomics AI research and its coming issues	Professor Dr Hidetaka Arimura
Embracing humanistic artificial intelligence in medicine	Emeritus Professor Dr Kwan Hoong Ng
Reuse of dual-energy CT data	Assistant Professor Dr Masatoshi Kondou
Generation of Digitally Reconstructed (Fluoroscopy-alike) Radiographs from Contrasted Computed Tomography Volumetric Data	Dr Li Kuo Tan
Improving 3D breast reconstruction using photogrammetry technique	Associate Professor Dr Mee Hoong See
PET-CT scan time optimisation	Associate Professor Dr Mohammad Nazri Md Shah
Topological radiomics prediction of cancer relapse in non-small cell lung cancer patients prior to stereotactic ablative radiotherapy	Mr Takumi Kodama

In March 2023, Professor Arimura led a 3-person team for the third visit to Malaysia. During this visit, the 4th iDSRI (Table 4) was held as a hybrid meeting at the Universiti Malaya. Seven speakers were invited, they were Professor Dr Hidetaka Arimura, Assistant Professor Dr Masatoshi Kondo, and Mr Takumi Kodama from Kyushu University and Emeritus Professor Dr Kwan Hoong Ng, Dr Li Kuo Tan, Associate Professor Dr Mee Hoong See, and Associate Professor Dr Mohammad Nazri Md Shah from the Universiti Malaya. The symposium was chaired by Dr Jeannie Wong and Dr Tan. The symposium was well attended with close to 60 attendees, including online and physical attendees.

Emeritus Prof Ng closed the symposium quoting from ‘The Little Prince’ “As for the future, your task is not to foresee it, but to enable it.” – Saint-Exupery. The visitors from Kyushu Universiti were also presented with souvenir as a token of appreciation from the International Unit of the Faculty of Medicine (IUFOM), Universiti Malaya. The symposium ended with a group photo taken (Figure 1).

During the visit, Prof Arimura and his team also met the Deputy Vice Chancellor (Academic & International), Prof Yvonne Lim at her office at the UM chancellery. At the Faculty of Medicine, they also met with the deputy dean of student affairs, Associate Professor Dr Tengku Ahmad Shahrizal Tengku Dato’ Omar, and the deputy dean of postgraduate studies, Professor Dr Shahrul Bahyah kamaruzzaman.

In the UM-KU collaboration, we explored activities such as student exchange and short-term attachment.

Figure 1: Meeting the Deputy Vice Chancellor (Academic & International), Prof Yvonne Lim

Figure 2: Meeting the deputy deans of the Faculty of Medicine. From left: Emeritus Professor Dr Ng Kwan Hoong, Deputy dean (Student affairs) Associate Professor Dr Tengku Ahmad Shahrizal Tengku Dato' Omar, Professor Dr Hidetaka Arimura, Deputy dean (Postgraduate) Professor Dr Shahrul Bahyah kamaruzzaman, Assistant Professor Dr Masatoshi Kondo, Mr Takumi Kodama, and Associate Professor Dr Jeannie Wong.

Figure 3: Group photo of the 4th iDSRI.

Report: Celebrating 25 years of excellence in the education of Medical Physics Report

Celebrating a quarter-century of excellence in the field of Medical Physics, the Master of Medical Physics program at Universiti Malaya marked its 25th anniversary on November 18, 2023, with a festive gathering at the Sri Kunyit Restaurant in Kuala Lumpur.

History:
Established in 1998 under the Faculty of Medicine at the University of Malaya, the Master of Medical Physics program was initiated in response to the growing demand for skilled medical physicists capable of overseeing and regulating the use of radiation in Malaysia's medical landscape. Over the years, the program has graduated more than 160 students, contributing significantly to the advancement of medical physics.

Program Overview:
Dedicated to postgraduate training in the clinical applications of physics in medicine and biology, the program focuses on medical imaging, nuclear medicine, and radiotherapy. Its overarching goal is to prepare students for professional roles in education, research, and service-oriented positions within hospitals, government agencies, laboratories, the medical industry, and the nuclear technology sector.

Accreditation and Evolution:
The program has undergone five cycles of curriculum reviews since its inception and has been accredited by the Institute of Physics and Engineering in Medicine (IPEM) since 2002. Notably, it stands as the sole master's program outside the British Isles to achieve this prestigious accreditation.

Anniversary Celebration:
The 25th-anniversary celebration dinner was graced by distinguished figures, including Professor Dr. Shahrul Bahyah Kamaruzzaman, the deputy dean of postgraduate studies, Associate Professor Dr. Khairul Azmi Abd Kadir, head of the Department of Biomedical Imaging, and Emeritus Professor Dr. Kwan Hoong Ng, a pioneer of the program. The event saw the participation of 67 alumni, students, lecturers, and clinical trainers (refer to Figure 1). During the festivities, tokens of appreciation were presented to various contributors of the program. A special alumni spotlight session allowed several alumni to share their experiences, complemented by short video clips and photos with heartfelt greetings from alumni and former external examiners, adding a personal touch to this significant milestone. (see https://medicalphysics.um.edu.my/25th-anniversary-celebration).

Figure 1: Group photo taken during the 25th anniversary celebration dinner.

Report: A brief overview of the development and current status of the utilization of radiotherapy technologies in Iran

Mohammad Amin Mosleh-Shirazi PhD CSci
President, Iranian Association of Medical Physicists
Head of Radiotherapy Physics Unit, Department of Radio-oncology, Namazi Teaching Hospital, Shiraz University of Medical Sciences, Shiraz, Iran (On behalf of the Executive Committee Members of the IAMP)

Being one of the main modalities for treatment of cancer, the status and quality of the radiation therapy (RT) service available in a country can be deemed as an important factor for the overall success of the battle against cancer in that country. In what follows, a brief history of the development of RT in Iran leading to the current status will be presented, emphasizing on the RT facilities and their use of equipment.

External-beam RT started in Iran in the 1950s. Through the first few decades, the equipment that were employed included cesium-137 and cobalt-60 machines as well as kilovoltage x-ray units. Then, a relatively small number of linear accelerators were gradually introduced at some centers. That included seven ZDAJ Neptun® machines in the mid-to-late 1990s. By the end of the first decade of the new millennium, due to a number of reasons, there were still a larger number of cobalt-60 units in use than linear accelerators.

Figure 1. An Accuray Radixact X9 helical tomotherapy unit pictured after a daily MVCT scan for online setup verification of a head-and-neck cancer patient, prior to the delivery of the treatment. A synchrony motion synchronization system will also be installed shortly on this unit. (Radio-oncology Department, Namazi Teaching Hospital, Shiraz, Iran)

Through efforts by the concerned professional bodies (including the IAMP) as well as various leading individuals, the start of a major 'sea change' happened around 2010 by means of purchasing 30 Elekta Compact® linear accelerators by the Iranian Ministry of Health, in one the largest single purchases in the history of RT worldwide in terms of the number of accelerators. These relatively simple, single-energy and single-modality machines replaced the cobalt-60 units or older linacs in existing centers, as well as being installed as the first machine at a number of newly established RT clinics.

Following this injection of resources, establishment of new RT centers has been increasing at pace, predominantly in the private sector. In 2010, the number of external-beam RT facilities in the country was around 35, which has more than doubled now. In this period, there has been an approximately six-fold increase in the number of existing or planned external-beam RT machines, which now exceeds 200. This means an increase in the number of machines per million population from about 0.5 to approximately 2.5. Importantly, the type and technological capabilities of the machines have also improved substantially. Most of the machines are equipped with (at least) multileaf collimators and electronic portal imaging devices. In addition to various brands of advanced C-arm linacs capable of delivering IMRT/VMAT/SRS/SBRT with IGRT, about 30 of the installed/planned machines are dedicated RT units (Radixact® tomotherapy with or without Synchrony®, Cyberknife® and GammaKnife®). Figure 1 shows the picture of one of the helical tomotherapy units in clinical use. Plans for a national ion therapy center are underway too.

As for brachytherapy units using afterloaders, a selected number of centers have been equipped through the years with increasingly advanced machines, from multi-cobalt-60-source Cathetron®, to multi-cesium-137-source Selectron®, single-source Iridium-based HDR and most recently, modern single-source cobalt-60-based HDR afterloaders. There are around 25 existing/planned brachytherapy afterloading machines in the country. CT/MRI/ultrasound guidance, radioactive seed implants, surface molds and/or ophthalmic applications are offered in specialist referral centers. There are also a few intraoperative RT units in clinical use.

Towards safeguarding the accuracy of the planned and delivered treatments along with the introduction of new technologies, a national independent dosimetric audit program has been carried out by the IAMP for the past 10 years. RT centers installing any new combinations of linear accelerator, treatment planning system or CT simulator are mandated by the national regulatory body to undergo the IAMP audit. This external dosimetric audit follows the methodology recommended by the IAEA-TECDOC-1583 and is applicable to 3D conformal external-beam RT. Plans for extending the audit to brachytherapy and IMRT/VMAT/tomotherapy are also underway.

To sum up, utilization of modern RT equipment in the country has happened at a relatively slow rate until fairly recently. The recent 10 years or so, however, have seen a sharp transformation in the number of RT centers as well as the number and quality of the equipment and emergence of advanced techniques. Of course, there is still a need for more widespread but safe use of state-of-the-art technologies and techniques, with better geographical distribution throughout the country.

In addition to substantial improvements in patient treatments, these advances have been reflected in the type of research carried out at the RT centers affiliated with universities and research centers, too. Similarly, the scientific contents of seminars, conferences and workshops in this country have been directed increasingly towards new technologies. For example, the main theme of the upcoming Iranian Conference of Medical Physics in August 2024 will be the artificial intelligence technologies.

LAP: Collaborative product innovation – Mapping the A to Z of the SGRT clinical opportunity

LAP's LUNA 3D is being billed as the 'New More' in surface-guided radiotherapy (SGRT), exploiting high-resolution stereoscopic cameras to position and monitor the patient's external surface throughout radiation treatment.

LUNA 3D is 510(k) pending (K232031) – not available for sale in the US. Availability of products, features and services may vary depending on customer location.

The LUNA 3D surface-guided radiotherapy (SGRT) system is designed to provide end-to-end patient positioning and monitoring from CT simulation through to the treatment delivery for bore-type and C-arm linacs. Developed by German laser and radiotherapy QA specialist LAP, and officially unveiled at the ASTRO Annual Meeting in San Diego, California, LUNA 3D exploits high-resolution CMOS stereoscopic cameras to support precise, dose-free patient set-up and monitoring for advanced radiotherapy modalities, ensuring that the patient remains in the planned position for the duration of the treatment workflow.

For context, SGRT represents a significant diversification and evolution of LAP's existing healthcare portfolio. That product offering, to date, spans patient positioning (for efficient surface marking of tumour position during CT/MR imaging and correct patient set-up ahead of treatment); RadCalc software for dosimetric verification in patient QA; a range of hardware phantoms to support MR imaging and radiotherapy QA; as well as multileaf collimators for precise beam-shaping and targeted tumour irradiation.

"What's just as significant," explains Thomas Speck, LAP's vice-president of new product solutions (healthcare), "is that LUNA 3D leans into – and directly benefits from – LAP's accumulated domain knowledge in laser projection and laser metrology serving industries as diverse as steel production, composite processing and concrete parts manufacturing."

With all those dots to join, the move into the SGRT market represents one of LAP's most ambitious product development initiatives yet. “Alongside all the technology innovation that’s gone into LUNA 3D,” notes Speck, “we have implemented a far-reaching transformation programme across core business functions – including sales and marketing, technical support and training, also our early-stage engagement with the clinical community and ‘lighthouse customers’. That realignment will ensure we are positioned to take full advantage of the commercial and clinical opportunities in SGRT.”

Delivering the clinical upside

Operationally, the LUNA 3D value proposition is all about ease-of-use for the radiation oncology team. That means intuitive and flexible browser-based user interfaces; pre-defined “treatment steps” for quick and easy selection of SGRT parameters; and synchronized data presentation across in-room displays (including tablet devices) and control-room workstations. Workflow support is also designed to be as friction-free as possible with a virtual laser for fast and easy patient set-up; automated import of patient and treatment data; and all SGRT data easily accessible by clinical staff for preparation, reporting and decision-making throughout the treatment cycle.

“Automation is hard-wired across the LUNA 3D workflow,” says Speck. “That’s because we simply can’t countenance any extension to the allocated treatment slots or additional requirement for specialized staffing. In this way, SGRT takes things to the next level, yielding new capabilities in that niche between laser-based patient positioning and patient QA.”

With more data points to guide patient set-up and alignment on the treatment couch, the expectation is that LUNA 3D will help clinical teams to fast-track the continuous improvement of their processes and treatment outcomes. At the same time, SGRT supports the online monitoring of patient position during treatment – a must-have for advanced treatment techniques like deep-inspiration breath-hold radiotherapy (which maximizes separation between the heart and lungs during radiation delivery to the latter) or stereotactic radiosurgery with couch rotation (for delivery of high-dose single fractions to small, precisely located tumour volumes).

Another notable feature of LUNA 3D is the system’s built-in scalability – essentially an SGRT solution that can be tailored to a range of user budgets for new CT and linac installations or upgrades (and without adversely impacting the time taken for linac installation, commissioning and QA). All of which is reinforced by a comprehensive SGRT training package, with classroom training to address workflow basics followed by hands-on experience and go-live support in the treatment room. After commissioning and acceptance, for example, it is envisaged that LAP application specialists will be in attendance while the clinic puts the LUNA 3D system through its paces on the initial cohort of patients.

Collaborative innovation

Zooming in on product development and technology innovation, it’s evident that LUNA 3D is very much the outcome of a collective and cross-disciplinary effort. “Throughout the journey from project initiation to finalized SGRT offering,” says Speck, “LAP’s R&D and product engineering teams worked hand-in-hand with a network of clinical partners at the sharp-end of treatment delivery. Our goal was to understand – in granular detail – how to design an SGRT clinical workflow that’s as easy to implement as the workflow for a positioning laser.”

It helps, in this regard, that LAP can tap into an established global consortium of clinical partners, with each site offering varying levels of engagement – whether that's clinical consultancy, participation in usability studies, or beta-testing of the early-stage SGRT product demonstrator in a preclinical setting. As a result, clinical feedback "from the field" informs all aspects of the LUNA 3D product design: from the hardware and optical profiling capabilities through software development, automated workflows, as well as the implementation of open data interfaces to ensure seamless integration of SGRT with other systems in the treatment room.

Right now, for example, LUNA 3D is being evaluated at several early-adopter sites around the world – among them Pius Hospital in Oldenburg, Germany; CCGM Clinique Clémentville in Montpellier, France; and Penn Medicine in Philadelphia, PA, US.

When it comes to the specifics of product roll-out, LAP is aiming to have LUNA 3D cleared for full commercial release in the US – pending 510(k) approval from the US Food and Drug Administration (FDA) – while the CE mark on the same timeframe will provide a green light for sales to clinical customers in the European Economic Area. Speck and his colleagues have also initiated the regulatory approval processes for priority markets in Asia, including Japan, Singapore and Korea.

LAP offers different LUNA 3D service packages to meet individual customer needs including, for example, annual maintenance, software/hardware upgrades, installation and training.

LUNA 3D is 510(k) pending (K232031) – not available for sale in the US. Availability of products, features and services may vary depending on customer location.

The article was first published on Physics World.

SGRT made easy

LUNA 3D represents an ambitious extension to LAP's patient positioning and QA portfolio for radiotherapy. Other key take-aways include:

- The SGRT system works independent of patient skin tone owing to blue-coloured speckle projection.
- Multiple displays (including tablet devices) in the treatment room ensure the clinical team has all key SGRT data in its line-of-sight (as well as remote data access via mobile devices).
- All necessary calibration and QA tools are supplied as standard, including expandable LAP EASY CUBE phantom.
- Site-specific installation is conducted by LAP room-planning experts and service personnel.

1. Which of the following is true for low-level radioactive wastes, such as tubing, and swabs contaminated with Tc-99m?

A. They can never be thrown away since some activity always remains.
B. They can be thrown away immediately since the amount of activity is generally harmless.
C. They can only be disposed of by a commercial rad-waste service,
D. They can be stored until reaching background levels and then disposed of with other medical trash.
E. None of the above.

2. A shielding design for a diagnostic or therapy installation (such as a Cyberknife), when there is no restriction on the beam direction, must:

A. Consider all walls as primary barriers.
B. Assign all walls a use factor (U) of 1.
C. Assign all areas adjacent to the installation an occupancy factor (T) of 1.
D. Shield all areas to a radiation level of 100 mrem per week.
E. Shield such that adjacent areas will not receive instantaneous dose rates greater than 2 mR/hr

3. Which of the following statements is true? A neutron _____.

A. Does not exist as a free particle.
B. Cat be accelerated by a linac.
C. Demonstrates a Bragg peak.
D. ls best shielded by high-Z materials.
E. Has a mass approximately equal to the proton mass.

4. Far which of the following particles can one observe a Bragg peak in the depth-dose curve?

A. Electrons.
B. Protons.
C. Positrons
D. Neutrons
E. Photons.

5. CT or Hounsfield numbers arc linearly related to:

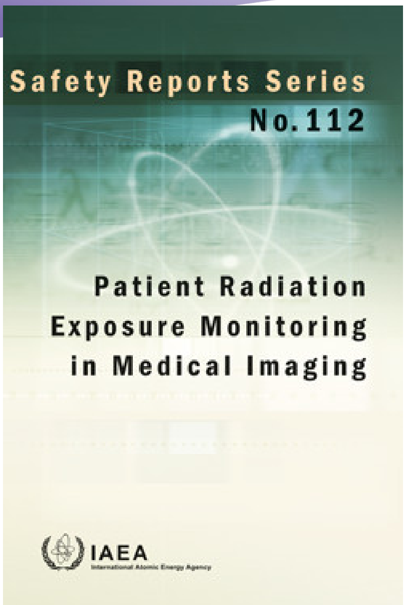
A. Mass density.
B. Electron density.
C. Linear attenuation coefficient
D. Mass absorption coefficient.
E. Effective atomic number.

6. A patient is treated with 6 MV photon fields of 15 and 30 cm height, respectively, at100 cm SSD. In order to match the fields at 5 cm depth, the gap on skin should be:

A. 1.1cm
B. 1.5cm
C. 1.9cm
D. 2.0cm
E. None of the above

Professional News & Updates: About IAEA Report Series 112

About IAEA Report Series 112



The expanded utilization of ionizing radiation in medical imaging has resulted in a notable increase in collective doses, highlighting the necessity for heightened oversight to ensure patient radiation protection. Despite the justified benefits of increased imaging, concerns arise from reports of unjustified and unoptimized use, often due to limited training in radiation protection among medical professionals and the growing complexity of imaging technologies. IAEA standards, such as the Fundamental Safety Principles and International Basic Safety Standards, establish requirements for patient dosimetry and diagnostic reference levels (DRLs), crucial for optimizing radiation protection. However, gaps persist in implementing these standards, prompting efforts to enhance exposure monitoring and communication, as evidenced by IAEA Technical Meetings.

As monitoring patient radiation exposure is vital for continuously improving radiation protection and patient care, IAEA published report series number 112 on 'Patient Radiation Exposure Monitoring in Medical Imaging'. The publication provides comprehensive guidance on implementing monitoring systems, addressing metrics characterizing patient exposure, mechanisms for data collection and analysis, and practical implementation considerations. It emphasizes the significance of systematic monitoring, whether manual or digital, with a preference for automatic digital systems due to their effectiveness. The guidance covers diagnostic radiology, interventional procedures, and nuclear medicine, with an emphasis on ensuring meaningful access to exposure data. While offering expert opinions on good practices, the publication acknowledges that specific recommendations may vary across imaging modalities and does not represent a consensus of Member States.

Inside the report

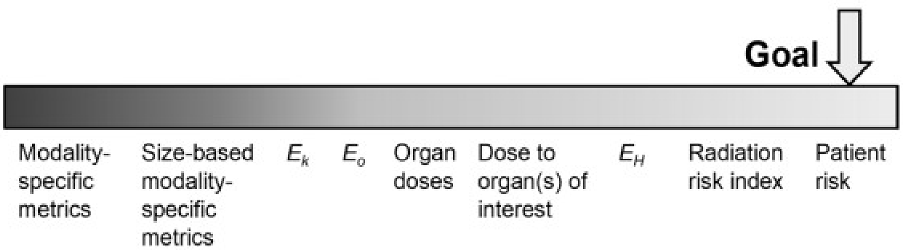


Figure 1.The spectrum of patient exposure metrics, ranging from modality-specific (left) to patient orientated (right) surrogates, shown by relevance hierarchy in terms of how well they can be related to the risk of the individual patient. E values represent various methods of calculating the effective dose: Ek is calculated from modality-specific standard conversion factors for a generic reference person: E0 uses organ doses calculated for a generic reference person; and EH uses organ doses calculated based on the anatomical definition of the actual patient

Exposure metrics stem from both image acquisition parameters and patient characteristics. Fundamentally, monitoring patient exposure is justified by its direct impact on patient well-being, as the entire process aims to identify and mitigate radiation risks to the patient. Ideally, the focus should be on measuring and managing patient risk directly. However, individual patient risk is often uncertain or inaccessible. As an alternative, various proxies, ranging from modality-specific measures to more patient-centred ones, are employed. Modality-specific metrics are typically easier to determine and assign to an imaging procedure. Yet, their relevance lies in their ability to be more closely linked to patient exposure. The guideline hence outline the exposure metrics spanning from modality-specific to patient-oriented perspectives.

Evaluating imaging based on image quality establishes a quantitative basis for appropriate exposure levels in which image quality metrics aid in this assessment. While metrics related to phantoms and specific modalities, as been shown in Figure 2, are easier to determine, their relevance lies in their correlation with clinical quality. In assessing imaging studies, it’s essential to recognize the variability in quantities across multiple series or views. While exposure values can be summed to determine total exposure, this isn’t feasible for image quality values. Balancing image quality and exposure must be done at the individual series level, often utilizing data-informed mathematical analyses for studies with multiple series or views.

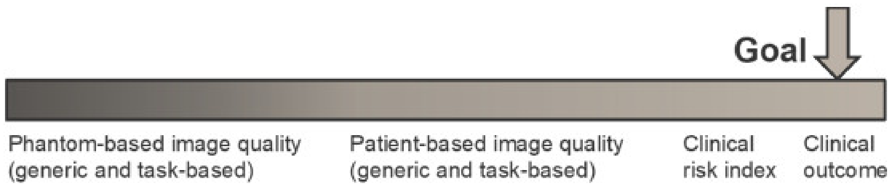


Figure 2.The spectrum of image quality metrics, ranging from phantom based, modality-specific surrogates (left) to patient orientated surrogates (right), shown by relevance hierarchy in terms of how well the quality of the images relates to a definitive clinical outcome for the patient.

The primary metrics of physical image quality, including resolution, contrast, and noise, are often derived from phantom-based measurements. However, these metrics offer limited insight into how specific aspects of image quality might affect diagnostic processes. While phantom measurements align well with certain attributes in clinical images, such as patient size, they fail to capture the variability present in patients’ characteristics. Furthermore, modern imaging systems adapt to individual patient attributes, yet these adaptations may not fully account for variations across patient data.

Image quality assessment can be approached through generic or task-based methods. Generic methods, akin to phantom-based metrics, lack specificity to particular tasks and rely on subjective preference studies by radiologists. In contrast, task-based assessments involve clinicians evaluating images based on specific imaging tasks, but are prone to significant variability between cases and observers, making statistical improvement challenging. Recent advancements enable the direct measurement of image quality from individual patient images, both in generic and task-specific contexts, without observer interpretation. Image quality measurement is crucial as it aims to ensure the clinical information provided is of high quality, thus mitigating the risk of suboptimal clinical outcomes. Similar to the radiation risk index, a clinical risk index reflects the actual clinical quality of an image for its intended purpose.

In addition, this report also underscored the importance of monitoring patient radiation exposure, alongside assessing patient exposure and image quality metrics. Monitoring patient radiation exposure involves several steps, the extent of which depends on available resources. These steps, depicted in Figure 3 being detailed further in this report, require systematic examination classification and coding systems to ensure consistent and comparable data. Recording patient exposure data in medical imaging entails documenting this information either manually or automatically, with modern digital X-ray tools automatically exporting radiation exposure details in DICOM format, capturing each irradiation event separately, such as CT scans or fluoroscopy sessions. Typically, a DICOM Radiation Dose Structured Report (RDSR) summarizes all events and includes patient demographics, study details, imaging technique, and dose metrics. Some systems output dose values in non-DICOM formats, which can still be archived and integrated using optical character recognition. However, systems lacking DICOM or non-DICOM outputs may require manual recording. Collecting this data involves aggregating it into a unified system, with data collected based on various schemes reflecting the collection's purpose, such as specific facilities or examination types, and stored according to analysis objectives, often classified into multiple categories. Collection methods can be digital or manual, occurring in real-time or at intervals, as needed.

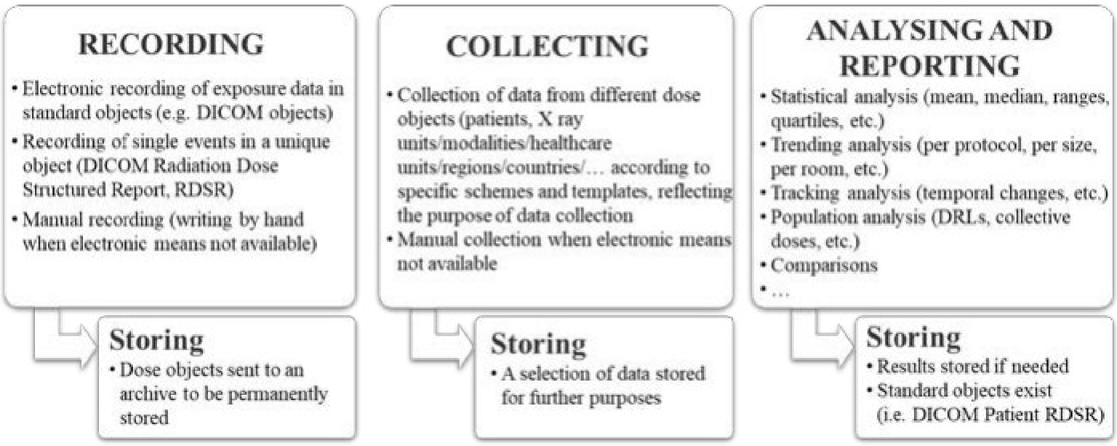


Figure 3. Steps in the process of radiation exposure monitoring.

Conclusions

Reviews of patients' radiation exposure in medical imaging are essential tools for optimizing radiation protection, analysing individual and population-based exposures, and justifying procedures. This is particularly informative for assessing trends in collective doses and supporting epidemiological studies on radiation effects. Technological advancements in medical imaging have enhanced access to patient exposure data, fostering analytical uses. The purpose of this publication is to address the lack of definitive guidelines and offer consolidated information on monitoring patient radiation exposure. It emphasizes the importance of automatic digital systems due to the ease of accessing digital data. The hope is that this guideline will encourage the future development and use of such systems, contributing to the improved implementation of patient radiation protection worldwide.

PhD Abstracts: Study on Quality Control Methods of Linear Accelerator

Min Ma[1], Ke Zhang[1], Pan Ma[1], Zhihui Hu[1], Hui Yan[1], Kuo Men[1], Jianrong Dai[1#]

1 National Cancer Center/National Clinical Research Center for Cancer/Cancer Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing 100021, China

Corresponding authors, Jianrong Dai, Email: dai_jianrong@cicams.ac.cn

The medical electron linear accelerator (Linac) is the widely used external radiotherapy equipment and can meet the needs of most patients. The Linac is the delivery equipment for radiotherapy, delivering radiation in a specific form to the tumor site while avoiding damage to the surrounding normal tissue. Its performance and correct operation have a direct impact on the outcome of tumor treatment. Quality control (QC) is an important means to ensure that the quality status of the Linac is essentially the same as the acceptance and commissioning; by defining the QC standards for the Linac and developing the QC methods; based on the actual situation, exploring the differences between actual and standard, and analyzing the causes; taking action where tolerances or action levels are exceeded. Studies have shown that the failure of Linac is an important source of radiotherapy errors and accidents; timely detection and correction of Linac failures during the deliver phase, prevents causing more patient errors during treatment and improves the safety and efficacy of patient treatment. As can be seen, QC of Linac is an indispensable step in radiotherapy.

The conventional method is to carry out periodic QC testing of Linacs based on QC guidelines/reports issued by national/international associations. This method aims to assess the status of the performance parameters and to detect failures through QC results. However, the QC items and frequency recommended by the conventional method are fixed and do not effectively reflect the status of a Linac; QC is ineffective, and most tests do not detect problems in a timely manner; the work time and workload required by physicists to complete QC is long. However, errors still occur, and various types of accidents are difficult to eliminate.

In recent years, the radiotherapy community has actively introduced new methods of QC from other industries. They hope that analyzing existing QC data is to gain a more accurate understanding of the operational status of radiotherapy equipment, determine the frequency and design tolerances of QC. The new methods based on the time of application on QC are divided into Statistical Process Control (SPC), Failure Mode and Effects Analysis (FMEA), Risk Matrix, Artificial Intelligence (AI), and Six-Sigma Methodology (SSM). The SPC is applied to the QC of Linac to monitor changes in QC data, identify the failures in a timely manner and design tolerance ranges for QC items; FMEA, as one of the currently popular quality management tools, determines the priority and frequency of QC items based on the Risk Priority Number (RPN); Risk matrix is used to determine the level of risk according to a two-dimensional matrix; AI continuously learn data characteristics and predict trends of QC data in Linac; SSM focuses on further process optimization in response to shortcomings in the process. However, there are still some shortcomings in these new methods: all of them are analyzed for a single quality control item, are focused on process application, and have less application for quality control of radiotherapy equipment; besides, the FMEA may be influenced by the subjective experience of experts when determining the scoring of failure modes, thus affecting the objectivity of the QC content; the AI is applied to the QC of radiotherapy equipment, the predictive effect still needs to be improved and it has not really been implemented into clinical applications. In addition, the radiotherapy community should actively introduce new QC methods from industries that do well in quality assurance, such as blood transfusion, anesthesia and clinical chemistry, aviation, and nuclear power plants.

This study proposes to introduce a patient risk model from the clinical chemistry and to improve the new methods already introduced in the radiotherapy. It aims to make QC methods of Linac more objective, quantitative, and more effective, and detecting failures in a timely manner. The main research covers the following four areas:

(1) Patient risk model to determine the QC frequency of Linac

This part of the study is the first to apply a patient risk model to radiotherapy. It aims to determine the QC frequency of the Tomotherapy system, to ensure that no patient outcomes are in error during the operation of the radiotherapy equipment. The patient risk model was divided into three main steps: (i) the power function graph was generated by program simulation to select the optimal QC rule and the number of times (n) each QC rule was evaluated. (ii) The new QC frequency was the smallest integer value of the number of patients treated between QC tests Nb(s). (iii) Prospectively collected QC test data and evaluated for new and traditional QC frequencies using individual control charts (I-Charts). Based on the power function graph, the 13s control rule and n = 5 was selected. Nb(s) decreased and then increased with increasing the systematic error (s). The smallest integer value of Nb(s) was 21, which was the new frequency of output constancy in the Tomotherapy system. In the I-Chart of the new frequency, the out-control point appears at the 29th. In the I-Chart for the conventional frequency, the out-control point appears at the 25th and 37th. Retrospective analysis of the records of failures of the Tomotherapy system during the evaluation period revealed that the new frequency found out-of-control appeared before the failure, while the conventional frequency found out-of-control appeared after the failure. The new frequencies could prioritize the detection of radiotherapy equipment failures over the conventional frequencies. The new frequency is not for individual patient outcomes, but for the average patient outcome treated on a Tomotherapy system.

(2) Risk matrix to determine the QC frequency of Linac

This part of the study applies the risk matrix for the first time to analyze the risk level of QC items and to quantify the frequency of QC. At the corresponding frequency, each QC item exceeding the tolerance corresponded to a failure mode. The failure modes contained three parameters: S, O and D. The S was determined by the impact corresponding to the percentage dose difference between the original plan and the error plan. O was calculated based on the frequency with which QC data exceeded the tolerance. D was the probability that QC data exceeded the tolerance but was not detected. The risk matrix is to apply a two-dimensional matrix of S and O values to visualize the risk areas of the failure modes. It is classified as low, medium, and high risk. In this study, the time corresponding to the first occurrence of medium risk was used as the new QC frequency. The E=O/D metric assessed the performance of the QC frequency. QC data were collected on three conventional Linacs: LN1 (Elekta VersaHD), LN2 (Varian Novalis) and LN3 (Varian Edge). They included 1 dosimetry parameter and 11 mechanical parameters: X-ray output constancy (QC1), Distance indicator @ iso (QC2), Laser localization (QC3), Treatment couch position (QC4), Gantry rotation isocenter (QC5), Couch rotation isocenter (QC6), Collimator angle indicators (QC7), Gantry angle indicators (QC8), Treatment couch position (QC9), Light field coincidence (QC10), MV/kV: imaging and treatment isocenter coincidence (QC11), and Leaf position accuracy (QC12). For LN1, the frequency of QC1 and QC3 was daily; QC2 and QC12 was weekly; QC8 and QC9 was biweekly; QC7 was monthly; QC11 was bi-monthly; and QC4, QC5 QC6 and QC10 had a frequency of annually. For LN2, the frequency was weekly for QC1, QC2, QC3, and QC12; biweekly for QC4; bimonthly for QC9 and QC11; and annual for QC5, QC6, QC7, QC8, and QC10. For LN3, the frequencies of QC1 and QC3 were daily; QC12 was weekly; QC7 and QC8 was bi-monthly; and QC2, QC4, QC5, QC6, QC9, QC10, and QC11 was annual. The E obtained at the new frequency are not lower than those obtained at the conventional frequency, indicating that QC testing at the new frequency can detect equipment failures in advance. The risk matrix was applied to the QC of the three conventional

Linacs to quantitatively determine the frequency of QC and provide an effective strategy for the risk level of QC items on radiotherapy equipment.

(3) Six-sigma methodology to design QC limits of Linac

This part of the study introduces that the six-sigma methodology (SSM) personalized design QC limits (tolerance limits and action limits). A framework is highlighted to clarify the various stage. In the define stage, the limits of the QC items need to be defined. In the measure stage, daily QC data were collected retrospectively in the Machine Performance Check (MPC) system. In the analysis stage, statistical analysis and process capability index presented the rationale for how to determine the limit values. In the improve stage, action limits were calculated using the process capability index; tolerance limits were determined using the larger control limits in the individual control chart. In the control stage, daily QC data was prospectively collected; the effect of action limits and tolerance limits were monitored using the I-Charts. Collimation Rotation offset had minimum the process capability index, that is the minimum Cp, minimum Cpk, minimum Pp and minimum Ppk values for 2.53, 1.99, 1.59 and 1.25, respectively. CouchRtn had maximum the process capability index, that is the maximum Cp, maximum Cpk, maximum Pp and maximum Ppk values for 31.5, 29.9, 23.4 and 22.2, respectively. The action limits for the three QCs were higher than the recommended tolerance values, i.e., ISO Center Size, MLC Max OffsetA, and Rotation Induced Couch Shift. The new tolerance limits for all QC items were lower than the original. Some of the data on the I-Charts for Beam Output Change, ISO KV, and JawX1 exceeded the lower control limit and action limit, indicating that systematic errors occurred and reminding the physicist to take action to improve process performance. The process capability index is an important tool that provides quantitative information used to determine QC limits.

(4) Stacked LSTM models to predict QC records and trends of Linac

This part of the study presents that the stacked LSTM model predict to the QC records and trends of two Linacs. First, the dataset is divided into three sets: the training set was used to train models with different hyperparameter combinations and to combine different sets of hyperparameters using greedy coordinate descent; the validation set was used to determine the best hyperparameters; and the test set was used to evaluate the accuracy under the best hyperparameter combinations. The evaluation criteria included mean absolute error (MAE), root mean square error (RMSE) and coefficient of determination (R2). Also, the classical time series model ARIMA was applied to compare the performance of stacked LSTM on the same data set. The stacked LSTM and ARIMA models were also used to predict the daily QC data records of another Linac under the same combination of hyperparameters. In the data records, the mean values of MAE, RMSE, and R2 were 0.013, 0.020, and 0.853, respectively, in the stacked LSTM, compared with 0.021, 0.030, and 0.618, respectively, in the ARIMA. The stacked LSTM outperformed the ARIMA for all 23 QC items, with the best prediction was couch rotation (LSTM: MAE = 0.001, RMSE = 0.001 and R2 = 0.975; ARIMA: MAE = 0.002, RMSE = 0.004 and R2 = 0.436); the worst prediction was gantry relative (LSTM: MAE = 0.006, RMSE = 0.007 and R2 = 0.095; ARIMA: MAE = 0.004, RMSE = 0.006 and R2 = 0.383). Overall, the stacked LSTM had better predictive performance than the ARIMA. The trend line lies within the tolerance. The physicist can perform preventive maintenance on the Linac in advance. The stacked LSTM can accurately predict QC records and trends, which is robust.

The methodology used in this study covers only some of the QC items for Linacs, but the methodology can be used as a reference for determining other QC items for Linac, and for determining QC items for other radiotherapy equipment.

[Keywords] linear accelerator; quality control; frequency; limits; failure.

Welcome to Malaysia: 24th AOCMP 2024

24th Asia-Oceania Congress of Medical Physics (AOCMP) and 22nd South-East Asia Congress of Medical Physics (SEACOMP)

Venue: The Wembley – A St Giles Hotel, Penang, Malaysia
Date: 10th to 13th October 2024

By Chai Hong YEONG and Jeannie WONG, Malaysia

The 24th Asia-Oceania Congress of Medical Physics (AOCMP) in conjunction with 22nd South-East Asia Congress of Medical Physics (SEACOMP) will be held at The Wembley – A St Giles Hotel, Penang, Malaysia from 10th to 13th October 2024.

AOCMP and SEACOMP are both important annual events of medical physics in the region. The objective is to gather the medical physics and allied health professionals in the region for the sharing of knowledge, expertise, scientific discussions, cultural exchange and medical technologies updates. The theme of this congress is "***Revolutionising Patient Care Through Medical Physics***".

We have curated a comprehensive scientific program featuring orations, presentations by eminent speakers, oral paper presentations, poster sessions, lunch symposiums, panel discussions, and pre-congress workshops. This program spans across various disciplines in medical physics, including diagnostic and interventional radiology, nuclear medicine, radiotherapy, radiation protection, radiobiology, artificial intelligence, and emerging techniques. Participants will also have ample opportunities to engage with diverse industrial partners through a trade exhibition held throughout the congress.

Nestled on the northwest coast of Malaysia, Penang, often referred to as the "Pearl of the Orient," is a captivating blend of rich cultural heritage, historical significance, and modern vibrancy. Renowned for its UNESCO-listed George Town, the capital city, Penang seamlessly intertwines traditional charm with contemporary urban life. The island's natural beauty is equally enchanting, with pristine beaches, lush hills, and a welcoming atmosphere that make Penang a truly unique and captivating destination for both locals and international visitors. The island is easily accessible through air travel, road trips and ferry rides. The Penang International Airport serves as a major gateway, connecting to various global destinations and ensuring a seamless and well-connected travel experience for visitors from across the globe.

For further details of the Congress, please visit www.aocmp2024.com

Congress Info:

Title of Congress	24th Asia-Oceania Congress of Medical Physics (AOCMP) In Conjunction with 22nd Southeast Asia Congress of Medical Physics (SEACOMP)
Theme of Congress	*Revolutionising Patient Care Through Medical Physics*
Pre-Congress Workshops	10 October 2024
Date of Congress	11 – 13 October 2024
Congress Venue	The Wembley – A St Giles Hotel, Penang 183, Jalan Magazine, George Town, 10300 George Town, Pulau Pinang, MALAYSIA
Regional Organizers	Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) Southeast Asia Federation of Organizations for Medical Physics (SEAFOMP)
Local Organizers	Division of Medical Physics, Institute of Physics, Malaysia (IFM) Malaysian Association of Medical Physics (MAMP) Persatuan Pegawai Sains Fizik Malaysia (PERFEKS)
Target Audiences	Medical Physicists, biomedical engineers, radiologists, oncologists, nuclear medicine physicians, radiographers, medical lab technologists, medical scientists, researchers, trainees, students, etc.

Attractions in Penang

Advertisements: PTW – Beams you up to a new era in 3D Water Scanning

Advertisements: RTI Mako – Meter and a milestone


DORADOnova Bridge
THALES 3D SCANNER
APOLLO
THETIS
LUNA 3D
RadCalc
AQUARIUS
EASY SLAB
EASY CUBE


Precise
Reliable
India Made
ROSALINA INSTRUMENTS
Compact design
Light weight
Customisable
The SureDos-E is a high-precision, secondary standard Universal Dosemeter combined with modern features. This unique dosemeter offers high quality, reliability and precision comparable to the best performance dosemeter on the Medical Physics market.
When combined with the FAR 65 GB Graphite, rugged ion chamber assembly, the SureDos-E becomes an economical device for performing Absolute Dosimetry, daily beam output, etc.
DOSE - nC
RESET
HOLD
ZERO
HIGH VOLTAGE
POLARITY
VOLTAGE ADJUST
ROSALINA INSTRUMENTS
SUREDOS - E
• Absolute Dosimetry
• Relative Dosimetry
• INVIVO Dosimetry
• VMAT Dosimetry
SURE DOSE
• Farmer type ionisation chambers
• Electro Meters
• Specialized phantoms
• IGRT Dosimetry

Officers and Council of AFOMP

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

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

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

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

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

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

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

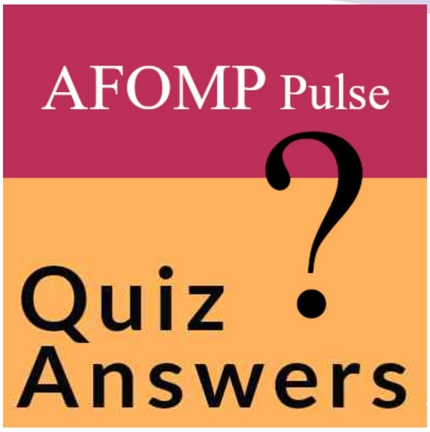
Chair, Professional Relations Committee
Dr. Mary Joan
Associate Professor and Radiological Safety Officer,
Department of Radiation Oncology
Christian Medical College and Hospital,
Ludhiana Punjab, India 141008
Email: mary.joan@cmcludhiana.in

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

AFOMP Website Manager
Asst. Prof. Rajni Verma
Department of Radiological Physics
SMS Medical College and Hospitals, Jaipur, India.302004
Member, IOMP Women Group
Executive Member (EC), AMPI-NC
Email: 1989vermarajni@gmail.com

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

Answer for MCQ Quiz !



1. Which of the following is true for low-level radioactive wastes, such as tubing, and swabs contaminated with Tc-99m?

ANSWER: D – They can be stored until reaching background levels and then disposed of with other medical trash.

2. **A shielding design for a diagnostic or therapy installation (such as a Cyberknife), when there is no restriction on the beam direction, must:**

ANSWER: A – Consider all walls as primary barriers.

3. Which of the following statements is true? A neutron _____.

ANSWER: E – Has a mass approximately equal to the proton mass.

4. Far which of the following particles can one observe a Bragg peak in the depth-dose curve?

ANSWER: B – Protons.

5. CT or Hounsfield numbers arc linearly related to:

ANSWER: C – Linear attenuation coefficient

6. A patient is treated with 6 MV photon fields of 15 and 30 cm height, respectively, at100 cm SSD. In order to match the fields at 5 cm depth, the gap on skin should be:

ANSWER: A – 1.1cm

afompnewsletter@gmail.com

www.afomp.org