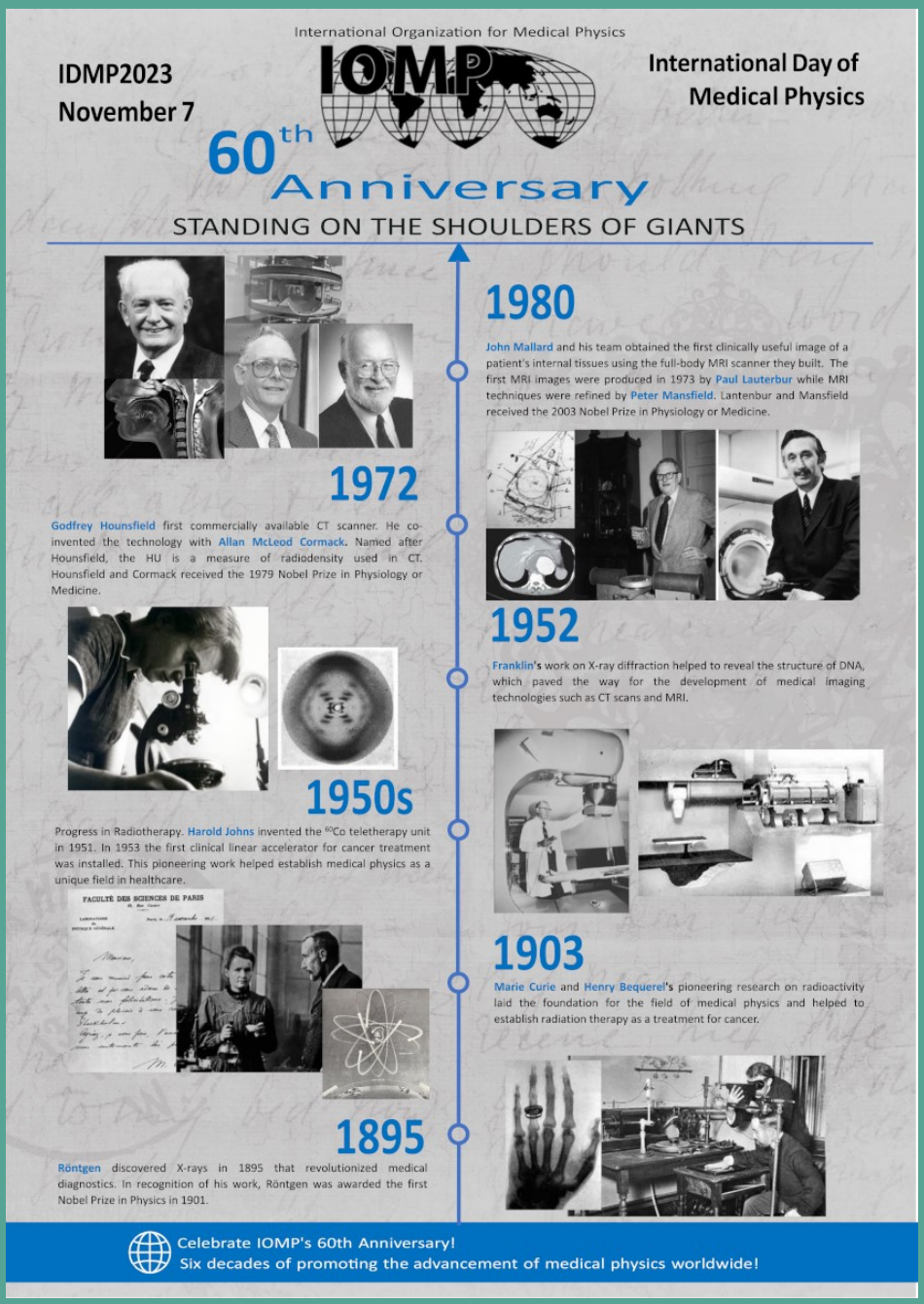
AFOMP Pulse

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



Volume 15 No. 2, September 2023

Table of Contents

Editorial

AFOMP Call for Celebration of IDMP2023 theme on "IOMP's 60th Anniversary: Standing on the Shoulders of Giants"

Dear Readers,

Warm Greetings to all,

On behalf of the editorial board, I am delighted to present you all this year second edition of AFOMP PULSE, an official newsletter of Asia-Oceania Federations of organization for Medical Physics, Volume.15 issue.2.

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, Editor's choice articles in AFOMP journals, PhD abstracts, MCQs, NMO activities and IMPW2023 celebrations, professional news and updates and many other common interesting news on Medical Physics profession for the last six months in the AFOMP regions.

As we stand together in organizing our triennial conference of IOMP, annual conferences of AFOMP, SEAFOMP and AMPI, the International Organization for Medical Physics (IOMP) is planned to celebrate the International Day of Medical Physics (IDMP2023) by setting a theme on "IOMP's 60th Anniversary: Standing on the Shoulders of Giants" to commemorate its diamond jubilee anniversary. It is an ambitious journey and indeed gratifying moment to mark the 60th year of our global Medical Physics organization establishment during ICMP2023 in India.

The phrase "**standing on the shoulders of giants**" is a metaphor which means "using the understanding gained by major thinkers who have gone before in order to make intellectual progress. By standing on the shoulders of our physics giant's Roentgen, Marie Curie and Henry Becquerel discoveries and pioneer's Harold Johns, Franklin, Hounsfield and Cormack and John Mallard inventions in Medical Physics and Radiation Technology have transformed us from traditional scientists to translational clinical specialists for contributing for well-being of human across the global healthcare.

"When we honour the past, and embrace the future; then the present becomes a celebration"- Let us all celebrate IDMP2023. Also, we welcome all our Medical Physics colleagues across the globe to IOMP 25th ICMP2023 along with 23rd AOCMP, 44th AMPICON and ISEACOMP to be held at financial capital of India, at BARC, Mumbai during 06-09th December, 2023 to witness the medical physics scientific feast and unity in diversity of Indian cultural events.

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

I hope you enjoy reading this edition.

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

AFOMP President's Message

Dear Friends and Colleagues,

Welcome to the September issue of the AFOMP PULSE brought to you by the wonderful editorial team led by Dr. Subramani. I hope that you will enjoy offerings in the newsletter informing you on medical physics happenings around the region as well as on other interesting scientific discoveries. You may have heard of the recent announcement by the scientists from South Korea about a compound, known as LK-99, that acts as a superconductor at ambient temperatures and pressure. This could potentially have an impact on medical physics and MRI diagnostic technology, perhaps leading to smaller MRI units (and may be even transportable ones (?) that could be used in remote and rural areas).

More and more we hear about ChatGPT (a large language model-based chatbot) and other AI software that can impact on original writing, learning, etc and many universities are discussing how to create "authentic" assessments that would truly examine students' competencies and knowledge rather than assessing written work/essays prepared with the help of AI. Will this also impact our medical physics education and training? In this space, I am sure that you all might have attended the recently held joint IOMP-IUPESM-ISC (International Science Council) webinar discussed how the most popular tool – ChatGPT – can be used in our everyday work, titled: Practical Deep-Dive on ChatGPT. Please find a recording of the webinar of 29th August on the IOMP website https://www.iomp.org/iomp-school-webinars-2023/.

The ExCom has kept very busy in the first half of the year, holding 3-monthly ExCom meetings, preparing monthly webinars and AFOMP school sessions, running the awards program (with a number of awards to be announced in near future), being involved in the scientific program preparation for ICMP 2023 (abstracts closed on 31 July and the AFOMP Science Committee will work on abstract evaluation). As you can read elsewhere in the newsletter, the ICMP preparations are well under way (https://icmp2023.org/) and we hope to see as many of you as possible in Mumbai, India from 6th to 9th December. Please beware that e-visa will not be accepted for the venue where the congress is organised, and participants will require business hard copy visa to be inserted in their passports – so please kindly plan sufficient time for visa organisation prior to the meeting. Also, please note that AFOMP will be offering travel awards to 5-8 participants from LMI countries. The call for travel ward applications will be sent to NMOs in near future.

The ExCom has also worked on development of policies and procedures and established social media handles. You are very welcome to follow us at: @AFOMP1 (Twitter) and AFOMP (LinkedIn).

Last, but not least, please visit the AFOMP website, the Meet the Expert section to watch the recently uploaded interview with Prof Kwan Hoong Ng from Malaysia (https://afomp.org/category/interviews/) on his recollections on medical physics growth in Malaysia and in the AFOMP region. The AFOMP Meet the Expert Interview Series started in 2023 and aims to celebrate the contributions of our regional medical physicists.

Enjoy reading the current issue of the AFOMP PULSE
Prof Eva Bezak
President, AFOMP

AFOMP Vice President's Message

Dear Esteemed Colleagues and Medical Physics Enthusiasts,

Welcome to the latest edition of the AFOMP Pulse Newsletter, where we embark on an exciting journey of exploration and discovery in the realm of medical physics. As Vice President of the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP), I am thrilled to connect with each one of you through this dynamic platform.

Medical physics is a captivating field that touches the lives of countless patients and contributes significantly to the advancement of healthcare. Our region, spanning across Asia and Oceania, is home to a diverse and vibrant community of medical physics professionals who are at the forefront of innovation, research, and excellence in their respective domains.

Our core objectives at AFOMP remain steadfast: promoting co-operation and communication, advocating for medical physics, elevating professional standards, and fostering collaborations with other scientific organizations. These objectives not only define our mission but also drive us to push the boundaries of what is possible in medical physics.

Beyond the confines of our objectives, there lies a vast and ever-expanding world of possibilities for each one of us. Within the pages of this newsletter, we aim to ignite your curiosity and inspire you to delve deeper into the fascinating aspects of our field.

In this edition, discover cutting-edge research and technological advancements shaping medical physics. Real-life stories from diverse clinical settings offer valuable insights into the impact on patient care. Explore a treasure trove of educational resources and learn about successful regional collaborations among medical physics organizations. Get to know the achievements of exceptional AFOMP members making a difference in the field.

As you immerse yourself in the diverse array of articles and features, I encourage you to engage, share, and collaborate. Let this newsletter be a catalyst for new ideas, connections, and inspirations. Each one of you plays a vital role in the progress of medical physics in our region, and your unique perspectives are invaluable.

I extend my heartfelt gratitude to the dedicated team at the AFOMP Pulse Editorial Board for their unwavering commitment to curating this enriching experience for all of us.

Together, let us continue to explore the depths of medical physics, embrace innovation, and make a positive impact on patient care and the broader healthcare landscape.

Wishing you an enjoyable and enlightening read!

With warm regards,

Prof. Dr. Hasin Anupama Azhari
Vice President
Asia-Oceania Federation of Organizations for Medical Physics (AFOMP)

AFOMP Immediate Past President's Message

Dear Reader,

Greetings to all of you.

"**Intellectual growth should commence at birth and cease only at death.**"
- Albert Einstein

Medical Physicists as health professionals need to keep updated with recent knowledge and skills so as to maintain the professional competency in the rapidly changing health professional dynamics. In the last 2-3 decades there is rapid technological innovations in diagnostic and treatment modalities employing ionising radiation. Further the surge in applications of artificial intelligence and large data mining in health care for diagnosis and treatment of various ailments, complexity of the procedures has put on enormous pressure on the medical physicists to acquire added skills to remain relevant in the profession. The medical physics education and training curriculum is undergoing revisions to include many advanced and relevant topics. Similarly medical physicists working in health care need to participate in academic and training activities and acquire continuation profession development. AFOMP is trying hard to full fill its objectives of professional developments and academic excellence. Your active participation and involvement in various AFOMP academic and professional activities has encouraged the AFOMP team.

The triennial international conference of medical physics ICMP2023 of IOMP is being held along with AOCMP2023 [AFOMP annual conference] and AMPICON2023 in Mumbai, India during 6 – 9 December 2023. [www.icmp2023.org]. This is going to be a mega event with participation of national and international faculty and delegates. The theme of the conference is event is" **Innovation in radiation technology & medical physics for better healthcare"**. This clearly indicates that the focus will be on newer technologies such as artificial intelligence, large data mining, machine learning, molecular imaging in radiotherapy and virtual simulations as a future to all technical and professional developments. These fields have opened the whole new dimensions of research in medical physics which ought to impact on the medical physics profession.

So, I welcome you all to ICMP2023 & AOCMP 2023 in "city of dreams" i.e., Mumbai, India. In addition to academics a great opportunity to explore the rich Indian culture and heritage. Mumbai is very well connected to every part of India and the world. I am sure warm Indian hospitality will win your hearts. I am looking forward to seeing you all there.

I want to congratulate the editorial team of AFOMP Pulse newsletter for this wonderful publication. This is the official mouthpiece of AFOMP to communicate with you all. Now it comes as an online newsletter, which is a great step towards sustainability. I hope you all will enjoy reading it.

Finally, I wish you great health and happiness.

Looking forward to meeting you all in Mumbai during ICMP2023 in December 2023

Prof. Arun Chougule
Immediate Past President AFOMP

AFOMP Secretary-General's Message

Dear colleagues,

Good day! I hope all's well. It is my great pleasure to share my thoughts, as we continue to move forward with our shared vision for the advancement of medical physics in the Asia-Oceania region.

1. Operational Alignment and Solidarity

As we align the operational framework of the AFOMP and its strategic plans with the executive committee (ExCom), I encourage all of you to actively engage with us and to provide invaluable feedback for continuous improvement. The dedication from our ExCom has been solidifying the portfolios of our committee members. We have been working together to achieve our collective goals.

2. Network Strengthening

Mutual communication among AFOMP and its national member organizations (NMOs) is important. AFOMP has been actively reach out and engage with the respective NMOs' leadership. These connections foster a collaborative environment and keep us informed about the latest developments at the respective country. Moreover, updating the NMOs' delegates to AFOMP ensures that our representation remains strong and dynamic.

3. Educational Enrichment

The AFOMP School Webinars and AFOMP Monthly Webinars 2023 have been providing invaluable platforms for knowledge sharing and professional growth. I urge all members to actively participate in these webinars, both as attendees and potential speakers. Our commitment to improve medical physics services and to advance the practice of physics in medicine will be able to promise the highest quality medical services for patients in the regions.

4. AFOMP Awards

We have announced that several AFOMP Awards 2023 are open for nominations. These awards recognise outstanding contributions to medical physicists and honour those who have made a lasting impact. I eagerly await the announcement of the successful awardees and look forward to celebrating their achievements.

5. ICMP-AOCMP-ISEACOMP-AMPICON 2023

I wish to welcome all of you to participate in the upcoming ICMP 2023! With the theme "Innovations in Radiation Technology & Medical Physics for Better Healthcare", we wish this congress will bring plenty of great ideas to promote the advancement in status and standard of practice in our region.

Let us continue to foster a culture of collaboration, innovation and excellence within AFOMP. Together we learn, serve and contribute!

Thank you.

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

Meet the Expert Interviews: Synopsis Prof. kwan Hoong Ng

We are honoured to interview one of the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) founding members, Emeritus Professor Dr Kwan Hoong Ng, for the AFOMP Meet the Expert Interview Series. Professor Ng is an Emeritus Professor at the Faculty of Medicine, Universiti Malaya and a renowned figure in the field of medical physics. He has played a pivotal role in the development of the profession in Malaysia and the Asia Oceania region, not only as an educator, but also as a researcher, leader and as a mentor in sowing the seeds of young and aspiring medical physics leaders worldwide.

Professor Ng's dedication to education and training is evident through his extensive involvement in academic institutions worldwide. He has served as a professor, mentor, and supervisor for numerous students and researchers, shaping the future of medical physics through his commitment to nurturing talent and knowledge transfer. Professor Ng has published over 210 papers in peer-reviewed journals, 25 book chapters, and co-edited five books throughout his career. He has presented over 500 scientific papers.

His leadership has extended to various professional organisations he has served in the past as the President of the AFOMP and South East Asian Federation of Organizations for Medical Physics (SEAFOMP) and was the founding chairman of the ASEAN College of Medical Physics (ACOMP). Through these roles, Professor Ng has actively promoted collaboration, knowledge exchange, and professional development in medical physics.

Professor Ng's contributions to medical physics have been recognised with numerous prestigious awards and honours locally and internationally, for example, the Marie Sklodowska-Curie Award and the World's top 50 medical physicists by the International Organization of Medical Physics (IOMP) in 2018 and 2013 respectively.

The AFOMP Meet the Expert Interview Series, started in 2023, aims to celebrate the contributions of our regional medical physicists. It is important to look back and draw inspiration, because the tireless efforts of every member contribute to the strength and success of any organisation or community. These interviews will be presented and documented on the AFOMP website and in the AFOMP Newsletter “AFOMP PULSE”. This will also create historical archives of AFOMP.

Prepared by: Associate Professor Dr Jeannie Wong Hsiu Ding and Dr Ng Aik Hao

Visit https://afomp.org/2023/08/01/meet-the-expert-emeritus-professor-dr-kwan-hoong-ng-faculty-of-medicine-universiti-malaya-interviewed-by-associate-professor-dr-jeannie-wong-hsiu-ding/

Hot off the press:

1. Levitating trains, Portable MRI Scanners & Efficient Electricity - A world with Room-Temperature Superconductors

Melissa McIntyre, University of South Australia

Superconductors have widespread use in the modern world. CERN's Large Hadron Collider in Geneva, Switzerland uses superconducting magnets to guide and focus the colliding proton beams. Superconducting quantum interference devices (SQUIDs) allow measurements of extremely weak magnetic fields, such as neurological signals in the brain. In medical physics, the use of a superconducting electromagnet is responsible for the rapid image enhancement and feasibility of MRI. Their ability to conduct electricity without loss of energy through heat makes superconductors a highly efficient option for power supply.

Currently, the phenomenon of superconductivity is, for now, only achievable by cooling the material below its critical temperature (T_c), often less than -100˚C. The requirement of advanced cooling systems of superconducting materials makes their application expensive to operate and maintain. As such, the discovery of a room-temperature superconductor is widely considered the "holy grail" for condensed matter and material physicists.

Recent developments

At the end of July 2023, two pre-print articles [1, 2] appeared on arXiv claiming synthesis of the world's first room-temperature superconductor, LK-99, a copper-doped lead-apatite material. The work was met with both careful optimism and scepticism following a controversy in September 2022, where the very

same claim was made of a different material in an article published in *Nature* in 2020. Following allegations of data falsification, an independent inquiry resulted in the 2020 article being retracted [3].

How can we validate the findings?

So, the question must be asked, "how do we know these recent findings are reliable?". The story is still rapidly developing as groups rush to replicate and validate the experiment, some methods are scientifically rigorous, others less so. More arXiv pre-prints surfaced after the original articles were uploaded from groups at the Berkley National Laboratory in the United States and the Shenyang National Laboratory for Materials Science in China [4, 5]. Both articles aimed to explain the high-T_c superconducting behaviour of LK-99 through first-principals calculations and computer simulations. On August 1st, 2023, a group at the Huazhong University of Science and Technology in China posted a video on social media claiming to have synthesised LK-99 and successfully demonstrated the Meissner effect (a behaviour exhibited by diamag-

netic materials, i.e. superconductors, where an applied magnetic field is pushed out of the material) [6]. Although replication efforts thus far are not definitive, it is a highly developing story and, if successfully replicated, the results will be a massive turning point for humankind.

What would a world with room-temperature superconductors look like?

If, with time, the results are replicated and industrial scale production is achieved, the world around us could change as we know it. Room-temperature superconductors would enable lossless energy transfer, whilst abolishing the need for large, heavy and expensive cooling systems. It could pave the way for frictionless travel, such as levitating or Maglev trains, and faster, more efficient computing systems.

For the medical community, room-temperature superconductors could enable cheaper and lighter medical treatment and diagnostic systems, such as superconducting particle accelerators and portable MRI systems, thus improving healthcare accessibility for low to middle income countries, as well as rural and remote communities. We remain cautiously optimistic that a world with room-temperature superconductors is on the horizon, but for now, only time will tell.

References

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[5] J. Lai, J. Li, P. Liu, Y. San, X.-Q. Chen, arXiv preprint arXiv:2307.16040 (2023).
[6] https://twitter.com/Andercot/status/1686286684424691712?fbclid=IwAR3Ax0TXkVEvPSvMeVQFuq6hpUFPOQH778UxbIEA23duopv0B-LSOnNcAxo

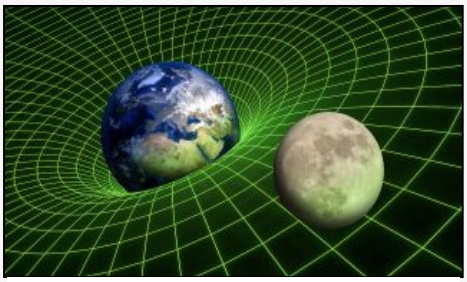
2. Gravitational Waves – Einstein was right again.

Stephen Tronchin, University of Adelaide

Almost 100 years ago Einstein predicted the existence of gravitational waves in his Theory of General Relativity. Scientists began the search in the 1960s, and in 2015 gravitational waves were detected for the first time.

What is gravity?

Gravity is one of the four fundamental forces of nature. The gravitational force is described by Einstein's General Theory of Relativity, the accepted theory for gravity. According to Einstein, gravity is not a force in the traditional sense, but rather the curvature of spacetime caused by mass and energy. Massive objects create curvature in the fabric of spacetime around them, and this curvature is what we perceive as gravity. If we consider the Moon rotating around the Earth, the Earth does not exert a force on the Moon, instead the Earth bends the fabric of space surrounding it and the Moon is moving through this bent space. Think of placing a heavy ball on a sheet – the sheet bends and other objects placed on the sheet will move toward the heavy ball.

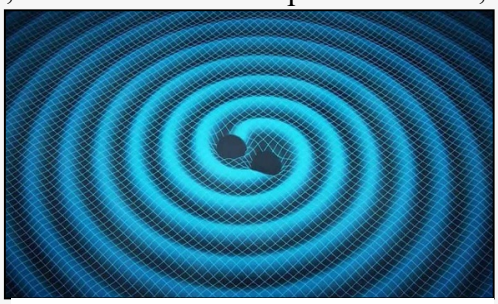


The Earth causes a curvature in spacetime. Credit: Shutterstock.

So where do gravitational waves come from?

According to Einstein's theory, when a mass accelerates it is changing the curvature of spacetime in its vicinity. These alterations in the curvature of spacetime spread out as waves through the fabric of spacetime. Think of swirling your finger on the surface of water, as you slow down or speed up the motion, ripples of water propagate outward from your finger. But in the case of gravity, these are waves of spacetime itself, not water.

The greater the mass and acceleration, the stronger the gravitational waves. When two super massive objects, such as black holes or neutron stars, orbit each other and eventually collide, they undergo rapid acceleration and emit strong gravitational waves in the process, strong enough to be detected on earth.



Gravitation waves from two black holes. Credit: NASA.

First detection of gravitational waves!

Over a billion years ago in a distant galaxy, two black holes were orbiting each other. As they orbited, they emitted gravitational waves which carried energy away from the system. Over millions of years, this caused the black holes to orbit closer and closer. As they got closer, they orbited faster, emitting stronger gravitational waves, causing more energy to be lost from the system, causing the black holes to get even closer. The two black holes were locked in an accelerating spiral. Lose energy, get closer, orbit faster, lose energy. Then, around 1.3 billion years ago, the two black holes collided head on. The acceleration in the last moment was so great the impact occurred as the two were approaching the speed of light. The explosive merger formed a new black hole with a powerful gravitational field, sending out ripples in space time as the new object was formed. Think of the moment of merging like dropping a large rock into a pond. In our case, the ripples propagate through spacetime.

The effects of gravitational waves are small, and the strength of gravitational waves decrease as they propagate from their source, making them difficult to detect. The development of very sensitive laser interfer-

ometers at LIGO made it possible to detect the gravitational waves from the black hole merger. Because light travels through space, any distortion in space will affect the path of the light. LIGO's instruments are designed to detect gravitational waves emitted in the last few orbits before two objects collide, as these signals have the largest frequency and are easier to pick up over background noise. By very carefully analysing beams of laser light, scientists at LIGO were able to detect the distortion of laser light as the gravitational waves from the black hole merger passed through earth, winning LIGO researchers the 2017 Nobel prize in physics.

It is an exciting time!

Detecting gravitational waves allows scientists to study and learn more about super massive objects like black holes and neutron stars. We can listen in to the cosmos like never before.

The Need for Cure: Pancreatic Cancer

Maram El Sabri, PhD candidate at the University of South Australia

Pancreatic cancer is highly aggressive and malignant, ranking as the seventh leading cause of cancer-related deaths globally (1). In 2020, it was the 12th most common cancer worldwide, with over 495,000 new cases and 466,000 deaths (accounting for 4.5% of all cancer-related deaths) (1). The survival rates for pancreatic cancer are notably low, with a global five-year relative survival rate of only 9% (2). The disease is categorised into four stages, ranging from I to IV: Stage I (localized and resectable) involves cancer limited to the pancreas, either < 2 cm (IA) or > 2 cm and < 4 cm (IB). Stage II (locally spread or borderline resectable) includes tumours > 4 cm confined to the pancreas or with local spread to nearby lymph nodes. Stage III (wider spread or unresectable) suggests possible involvement with nearby blood vessels or nerves, though no distant metastasis has occurred. In Stage IV (metastatic), cancer has spread to distant organs (2). Unfortunately, due to the asymptomatic nature of early stages, up to 80% of patients are diagnosed at advanced stages (III or IV), contributing to the challenging treatment landscape and the low survival rate (2). Treatment approaches include surgery, radio- and chemotherapy, with the goal of extending survival and alleviating symptoms. However, patients diagnosed at late stages (III or IV) currently lack curative options. This emphasises the urgent need for further research and innovative treatment strategies to address this issue.

Radiotherapy has evolved significantly in treating pancreatic cancer in past few years, driven by advances in computational modelling and medical imaging (3). The therapeutic index of radiotherapy in pancreatic cancer is narrow, and even minor deviations in treatment plans can have a substantial impact on patient outcomes (3). Challenges arise from the pancreas' critical location, necessitating careful consideration of normal tissue toxicity, particularly in the gastrointestinal tract. Organs such as the duodenum, jejunum, and stomach are radiosensitive, making careful dosage planning essential (4). Proton radiotherapy, which uses accelerated hydrogen atom nuclei, has been pursued to improve the therapeutic ratio for pancreatic cancer (5). Proton radiotherapy has unique characteristics (Bragg peak) that enable focused delivery of radiation dose to the target while minimising radiation dose deposition to surrounding normal tissue (**Figure 1**). Dosimetric studies, single-institutional retrospective series, and single-arm prospective studies have shown that proton radiotherapy combined with chemotherapy is well-tolerated and allows for dose escalation (5). Continued trials and advancements in proton planning and delivery techniques are expected to unlock proton radiotherapy's full potential for treating pancreatic cancer.

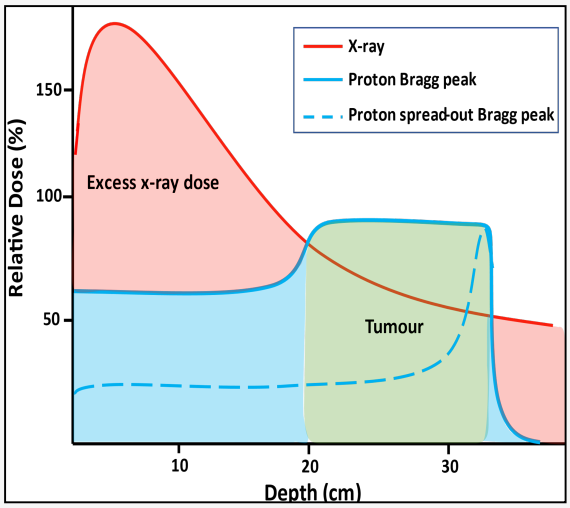


***Figure 1**. Radiation dose deposited in the body at a certain depth by x-ray photon beam (red) and the Bragg peak of an individual proton beam (dashed lines) and a spread-out peak combing multiple beam*

To forge a more optimistic future for pancreatic cancer patients, future studies and clinical trials should focus on neoadjuvant therapeutic strategies, novel radiation delivery techniques, and improved patient selection. As radiation therapy advances, it holds greater potential to enhance outcomes in this devastating malignancy.

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A Journey Through Time: The History of the Education and Training Committee of IOMP Since its Inception on the occasion of 60 th Anniversary of IOMP

Prof Arun Chougule, PhD, FIOMP, FAMS
Chair ETC IOMP
Chairman IOMP Accreditation Board
Immediate Past President of AFOMP
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In the early 1960s a group of passionate medical physicists envisioned an international organization that would transcend borders and foster collaboration among professionals across the globe. Recognizing the immense potential of medical physics in revolutionizing healthcare, these pioneers sought to create a platform that would facilitate knowledge exchange, research, and the establishment of best practices. Founded in January 1963, initially with 4 affiliated national member organizations, the IOMP emerged from a visionary endeavour to unite medical physicists worldwide and advance the understanding and application of physics in medicine. IOMP is the world's largest professional organization in the field of medical physics and has official non-governmental organization status with the World Health Organization (WHO) and the International Atomic Energy Agency (IAEA). Since its inception, IOMP has embarked on a remarkable journey, dedicated to the welfare of medical physics professionals and the enhancement of healthcare globally and is on its extraordinary path towards fostering excellence and innovation in medical physics. The founding members laid the foundation for an organization that would shape the future of medical physics and its role in modern medicine.

In its initial years, IOMP focused on establishing a strong network of medical physicists, creating a framework for collaboration and knowledge sharing. The organization encouraged the formation of national and regional medical physics societies, forging connections between professionals from diverse backgrounds and cultures. The Council is the ultimate authority of the IOMP and is guided in all its decisions by the tradition of free international scientific cooperation. The IOMP Council consists of delegates appointed by the national organizations, the officers, the immediate past Secretary-General, representatives of the Regional Organizations, IOMP Committee chairs, the Editor of Medical Physics World, non-voting representatives of the corporate members and non-voting observers. The IOMP Executive Committee (ExCom) is responsible for implementing the decisions of the council, for performing the operational business and consists of the Officers and the Chairs of Committees and is chaired by the IOMP President.

Over the period, IOMP also initiated efforts to standardize education and training in medical physics. Through the development of curricula and the establishment of educational guidelines, the organization aimed to ensure consistent and high-quality training for medical physicists worldwide. Further as the field of medical physics progressed, IOMP assumed a leading role in promoting research and scientific advancements. The organization facilitated international conferences, workshops, and symposia, providing platforms for researchers to present their work and exchange ideas. Through these events, IOMP fostered a culture of continuous learning, innovation, and collaboration. IOMP actively engaged with policymakers and regulatory bodies to promote the importance of medical physics in healthcare systems. It advocated for the establishment of standardized guidelines and regulations that ensure patient safety and quality assurance in medical procedures. IOMP's influence reached far beyond the confines of medical physics as it contributed to international efforts in radiation protection, imaging, and oncology. By col-

laborating with organizations like the World Health Organization (WHO), International Labour Organisation [ILO] and the International Atomic Energy Agency (IAEA), IOMP played a vital role in shaping global policies and standards in medical radiation applications.ILO in 2010 has classified medical physicists as a health profession in the International Standard Classification of Occupations-08 (ICSO-08), which is an important reference document for governments for recognition and classification of occupations. IOMP also collaborates with professional bodies such as IRPA and ICRP. To provide guidance on education, training, and professional development of medical physicists, IOMP is publishing some policy documents on such issues. The mission of IOMP is to advance medical physics practice worldwide by disseminating scientific and technical information, fostering the educational and professional development of medical physicists, and promoting the highest quality medical services for patients. 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, and to promote internationally sponsored education and training programs sponsored or endorsed by IOMP, National Member Organizations and Regional Organizations. IOMP sponsors and endorses a number of educational events worldwide and also organizes the widely recognized IOMP school as a major tool to support education and professional development of medical physicists.

Furthermore, IOMP initiated various research projects and supported scientists through grants and awards, encouraging groundbreaking discoveries and novel applications of medical physics in healthcare. The International Organization for Medical Physics (IOMP) stands tall as a beacon of collaboration, research, and progress in the field of medical physics. IOMP is celebrating is Golden Jubilee, 60 th Anniversary and today organization has a membership of 88 national member organizations, 2 affiliate and 6 regional organizations, represents over 30000 medical physicists across the globe.

The current Regional Federations of IOMP are,

- European Federation of Organizations for Medical Physics (EFOMP) - formed in 1980.
- Latin American Medical Physics Association (ALFIM) - formed in 1984.
- Asian-Oceania Federation of Organizations for Medical Physics (AFOMP) - formed in 2000.
- Southeast Asian Federation for Medical Physics (SEAFOMP) - formed in 2006.
- Middle East Federation of Organizations for Medical Physics (MEFOMP) - formed in 2008.
- Federation of African Medical Physics Organizations (FAMPO) - formed in 2009.

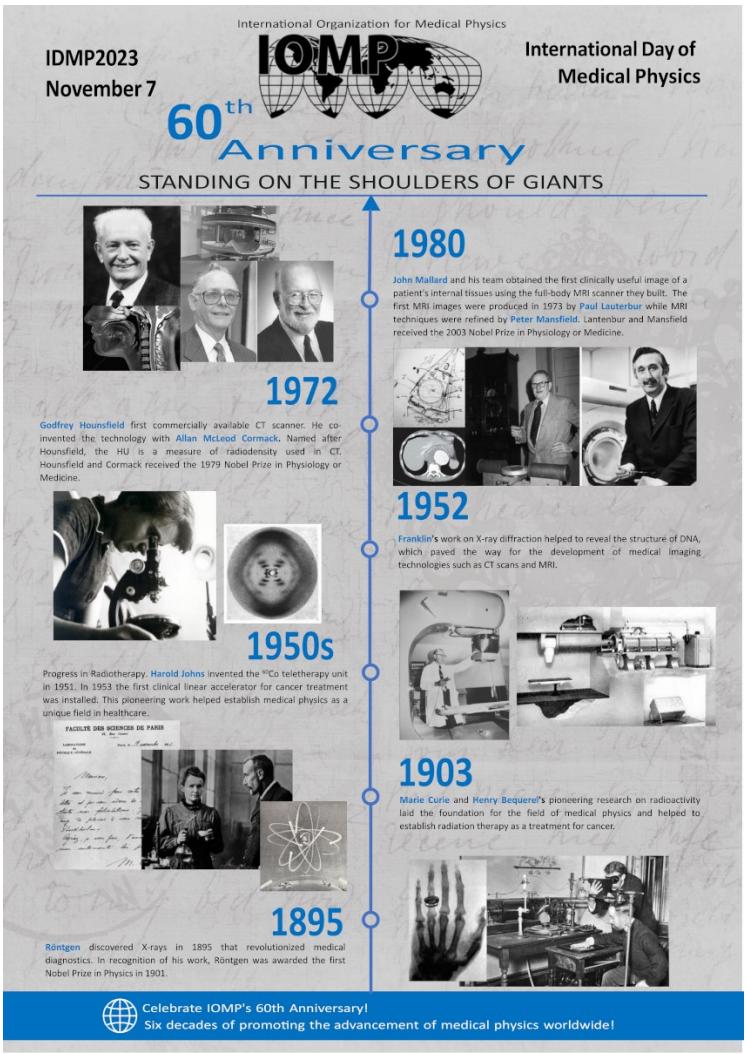
IOMP is affiliated to International Union for Physical and Engineering Sciences in Medicine [**IUPESM],** International Union of Pure and Applied Physics [**IUPAP] and** International Council for Science [ICSU]and is officially connected to International Federation of Medical and Biological Engineering **[IFMBE].** IOMP is charged with a mission 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. Information on IOMP activities, development priorities, and external relations are given in strategic policy document. The IOMP website www.iomp.org provided the updated information about various activities of IOMP.

The International Day of Medical Physics (IDMP) is celebrated every year on 7th November, the birthday of Marie Skłodowska–Curie. It was established in 2013 and celebrated every year since then. It unites medical physicists throughout the world under different activities related to our profession. This year

IOMP is celebrating its 60th Anniversary/*Diamond Jubilee]and *theme of IDMP2023 isvery appropriately chosen as

"Standing on the Shoulders of Giants".

A poster to celebrate IDMP2023 is selected from 23 competitive entries received from IOMP members and released.



Education and Training Committee [ETC] of IOMP

As the field of medical physics rapidly expanded in the following years, it became evident that a standardized approach to education and training was essential to ensure the competence and professionalism of medical physicists worldwide. Recognizing the significance of education and training, IOMP established committees and initiatives to enhance the skills and knowledge of medical physicists. In 1985, the IOMP Education and Training Committee (ETC) was established at the 7th ICMP, at Espoo, near Helsinki, Finland. The intent was to develop task oriented educational and training programs and to organize short refresher courses, seminars, and workshops to improve medical physics education, to advance the practice of medical physicists worldwide, to support on matters relating to education and training, and development of training materials. ETC developed a system for assessment, endorsement, and funding of such activities. ETC set out to develop guidelines and recommendations that would ensure the highest standards of educa-

tion and training for future medical physicists. One of the primary objectives of the ETC was to establish uniformity in the educational curricula for medical physicists. By collaborating with leading educational institutions and professionals, the committee developed guidelines that addressed core competencies, knowledge areas, and practical skills required for medical physics practice. These guidelines have since become the backbone of many academic programs worldwide.

Over the years, ETC faced various challenges, some of which were intrinsic to the rapidly evolving field of medical physics. Technological advancements, such as the introduction of advanced imaging techniques and treatment modalities, necessitated continuous updates to the training curricula. Moreover, the committee encountered difficulties in accommodating diverse cultural, social, and economic backgrounds of its members, making it a challenge to design inclusive and effective educational programs.Despite the constraints and challenges, the Education and Training Committee of IOMP demonstrated resilience by implementing adaptive strategies and embracing innovations.

The Education and Training Committee, in particular, worked tirelessly to develop standardized curricula, e-learning platforms, and mentorship programs, enabling access to quality education regardless of geographical boundaries. As a result, IOMP's efforts have empowered generations of medical physics professionals, ensuring the continuous advancement of the field and the delivery of safe and effective healthcare services.The field of medical physics owes much of its progress and success to the dedicated efforts of the Education and Training Committee (ETC). For several decades, this committee has been at the forefront of shaping the education, training, and professional development of medical physicists worldwide. In this article, we explore the history and enduring contributions of the ETC to the medical physics profession.

The ETC Chairs who established and stabilised ETC since its inception in 1985 are,

- Carlos E. de Almeida (1985-1989),
- Norman Baily (1990- 1992),
- Nagalingam Suntharalingam (1993-1997),
- Azam Niroomand-Rad (1997-2000),
- Slavik Tabakov (2000-2006),
- Anchali Krisanachinda (2006-2009),
- Maria do Carmo Lopes (2009-2012l),
- John Damilakis (2012-2015)
- John Damilakis (2015-2018)
- Arun Chougule [2018-2022]

The aims and objectives of ETC are,

- To improve medical physics worldwide by disseminating systemized knowledge through education and training of medical physicists especially in developing countries.
- To advance the practice of physics in medicine by fostering the education, training and professional development of medical physicists, and by promoting highest quality medical services for patients worldwide.
- To promote internationally sponsored education and training programs sponsored or endorsed by IOMP, National Member Organizations and Regional Organizations.

- To identify the need for international education and training activities, prioritizes and assesses the applications, and recommends to the IOMP EXCOM the method of support. The ETC can also assist with the organization of the event and suggest suitable changes in the curriculum and faculty of the activity.
- To consider applications from national and regional organisations for sponsoring or endorsing meetings. Applications to be considered in accordance with the document 'IOMP policy on Scientific, Educational and Professional Meetings'.
- To consider requests for review, comment or endorsement of documents in accordance with the policy and procedure document 'Documents Submitted to IOMP by External Organisations for Review, Comment or Endorsement'.
- To work on evaluation and promotion of medical physics education and training programs and on any alternative mechanisms supporting international cooperation addressing the education/training needs of medical physicists.
- To stimulate the foundation of regional centres for education and training in collaboration with IAEA, WHO and other agencies.
- To compile and update listings of medical physics educational opportunities worldwide for posting on the IOMP web page.
- To support and collaborate with the education and training committees of Regional Organizations on matters relating to education and training, including development of training materials and training methodology.

The IOMP ETC members for 2022-25 are,

1. **Prof. Arun Chougule, India – Chair**
2. Prof. Ana Maria Marques da Silva, Brazil
3. Prof. Eva Bezak, Australia
4. Prof. Franco Milano, Italy
5. Prof. Hasin Anupama Azhari, Bangladesh
6. Prof. Hayashi Naoki, Japan
7. Dr. Jaydev Dave, USA
8. Prof. Jin Xiance, China
9. Prof. Loredana Marcu, Romania
10. Prof. Renato Padovani, Italy
11. Dr. Riad Shweikan, Syria
12. Dr. Stephen Inkoom, Ghana
13. Dr. Supriyanto Ardjo Pawiro, Indonesia
14. Dr. V. Subramani, India

Accreditation and Certification

Another significant contribution of the ETC was the establishment of accreditation and certification processes. IOMP Accreditation Board [AB] was set up in 2016 to ensure that accredited medical physics programs satisfy the highest standards established by IOMP in collaboration with other international organizations.Working in conjunction with relevant authorities, the committee devised rigorous evaluation criteria

to assess the quality and effectiveness of educational programs. Accreditation is the means by which IOMP assesses the quality of medical physics postgraduate degree programs, residency programmes, CPD courses and keeps the medical physics community informed. Accredited programs ensure that aspiring medical physicists receive comprehensive training and preparation to excel in their careers, while certifications authenticate their competency and professionalism.

The IOMP Accreditation Board accredits medical physics postgraduate degree programs, residency programs, medical physics education and training institutions/centres and education and training events. Since 2016, the IOMP Accreditation Board has accredited/ reaccredited medical physics postgraduate programmes, residency programmes and CPD accreditation of conferences and other education and training events. the ETC played a crucial role in promoting accreditation and certification processes for medical physics educational programs. The IOMP Accreditation Board ensures the standards are met by the institute/University imparting the Medical Physics education covering all the aspects. Resources alone are not sufficient to assure quality. Evidence must be obtained that assures that the educational institution and specifically the Medical Physics education program monitor the performances of the graduate, postgraduate and that they are indeed able to demonstrate successful achievement of the program goals. By collaborating with regional and national authorities, the ETC helped establish evaluation criteria that ensured accredited programs met the required standards, fostering excellence and consistency in education. The details regarding the accreditation program, manuals, forms, and the list of accredited programmes is available at https://www.iomp.org/accreditation/

The IOMP accreditation board members for 2022-25 are,
Prof. Arun Chougule, India – Chair
Prof. Golam Abu Zakaria – Vice Chair
Prof. Rodolfo Alfonso, Cuba
Dr. Huda Al Naami, Qatar
Dr. Christoph Trauernicht, S. Africa
Prof. Shinji Kawamura, Japan
Dr. S.D Sharma, India
Prof. Laura Padilla, USA

The very first MPE program accredited by IOMP accreditation Board [AB] was master's Medical Physics [MMP] program of ICTP- Trieste University, Trieste, Italy for 3 years from 1 November 2016 and process continued. IOMP AB has accredited and re-accredited the following MPE programs.

Masters in medical physics Program accreditation by IOMP Accreditation Board till 31 July 2023 are,

1. The Catholic University of Korea – Full Accreditation
2. KAIST University – Full Accreditation
3. Yonsei University – Full Accreditation
4. ICTP-Trieste University joint Master of Advanced Studies in Medical Physics-Full Accreditation
5. Fundación Médica de Río Negro y Neuquén (FMdeRNyN), and Facultad de Ciencias Médicas de la Universidad Nacional del Comahue (UNCo), Río Negro, ARGENTINA- The postgraduate program (3 years) in Medical Physics specialized in Radiotherapy, Nuclear Medicine, and Diagnostic/

Interventional Radiology- Full accreditation.

Master's in medical physics Program Re-accreditation by IOMP Accreditation Board

1. ICTP & Trieste University joint Master of Advanced Studies in Medical Physics, Trieste, Italy. Re-accredited for 5 years (1 August 2022 – 31 July 2027)
2. The Catholic University of Korea, Seoul Republic of Korea – Re-accredited for 5 years (1 January 2023 – 31 December 2027)
3. KAIST University, Daejeon, Republic of Korea – Re-accredited for 5 years (1 January 2023 – 31 December 2027)
4. Yonsei University, Wonju, Republic of Korea – Re-accredited for 5 years (1January 2023 – 31 December 2027)

IOMP accreditation of Medical physics residency Programs

The objective of the medical physics residency program is to develop human resources as a professional medical physicist (Clinically Qualified Medical Physicists - CQMP) who is competent to participate actively in the individual clinical field independently. To accomplish this goal, adequate organization, facilities, staff, patient, and educational environments should be provided. The major outcome of the residency program should be to provide residents with clinical training in a hospital under certified/qualified medical physicists so as to acquire the required practical skills and professionalism. The medical physics residency programme should be conducted in a clinical environment, having adequate infrastructure and the facilities to support resident education and training. The staff involved in teaching and training should have adequate training and experience. Further the equipment and instruments specific to the specialty concerned should be available. The duration of clinical training should be as per IAEA guidelines for various regions specified in IOMP accreditation manual available at IOMP website [https://www.iomp.org/accreditation/]. The training should be carried out under the direct supervision of a qualified/certified and well experienced medical physicist in the area of specialty who can be designated as clinical training supervisor of the resident.

Residency Program accreditation by IOMP Accreditation Board

1. The Residency program (1 year) in Radiotherapy Physics at Fundación Médica de Río Negro y Neuquén (FMdeRNyN), and Facultad de Ciencias Médicas de la Universidad Nacional del Comahue (UNCo), Río Negro, ARGENTINA- Full accreditation
2. The Residency program (1 year) in NM&DIR Physics at Fundación Médica de Río Negro y Neuquén (FMdeRNyN), and Facultad de Ciencias Médicas de la Universidad Nacional del Comahue (UNCo), Río Negro, ARGENTINA- Initial accreditation

Continuing Professional Development (CPD):

Over the time, ETC expanded its scope to encompass various aspects of professional development, beyond initial education and training. Continuing Professional Development (CPD) became a key focus area, encouraging medical physicists to engage in lifelong learning, attend conferences, workshops, and stay updated with the latest advancements in the field. Recognizing the dynamic nature of medical physics and the rapid advancements in technology, the ETC played a pivotal role in promoting Continuing Professional Development (CPD). This emphasis on CPD was vital in keeping medical physicists at the forefront of tech-

nology and best practices, ensuring the highest standard of patient care. ETC ensured that professionals stay up to date with the latest developments and best practices, enhancing the quality of patient care.As per IOMP policy statement 1, Medical Physicists working in healthcare environment are health professionals and need to be certified as Clinically Qualified Medical Physicists [CQMP] according to IAEA HHS 25 guidelines endorsed by IOMP. To maintain and enhance the professional competence, and the ability to work independently, practising medical physicists should undertake a continuing professional development (CPD) programme which should include attendance at national and/or international conferences and courses on topics related to their field of specialization. They should also regularly consult relevant scientific journals and literature. To maintain the certification/licence as CQMP, medical physicists need to acquire certain CPD points by attending/participating in educational/training programmes. CPD is one of the essential measures in maintaining professional competency, particularly for certified CQMPs. Its goal is to keep professional knowledge and skills up to date. The educational /training programmes awarding CPD points needs to be accredited by authorised/recognised accreditation board. Formal CPD programmes should include an evaluation mechanism, such as a credit-based system, where CQMPs are awarded CPD points for each activity they participate in.

To encourage CQMP's to acquire the CPD points through Continuing Professional Development events by acquiring the CME/CPD points, IOMP has started in 2019 the accreditation of CPD events provided by educational institutions, professional and scientific associations, hospital departments, units or divisions, research organizations and other scientific organizations. IOMP does not accredit CPD events organized by the industry. The concept of CPD is related to **knowledge, skill and competence acquired during life-long learning.** The outcome of CPD should lead to an improvement in professional practice.

List of CPD accreditation by IOMP Accreditation Board

1. CPD: Dosimetry of Small Fields in External Beam Therapy: Reference and Relative Dose Determination 2nd – 4th October 2019, SCMPCR Training Room and National Institute of Cancer Research and Hospital (NICRH), Dhaka, Bangladesh
2. ICMP 2019 (ALFIM), Santiago, Chile, 8 – 11 September 2019
3. CPD: Hands-on Workshop: Commissioning, Planning and Quality Control for the IMRT/VMAT Treatment Techniques. 25th – 27th April 2020, University of Colombo, Sri Lanka and National Cancer, Institute, Maharagama, Sri Lanka
4. Universität Heidelberg (Germany) Online Teaching Course: Particle Therapy, September 2020
5. CPD: SCMPCR E-learning Program (ELP-03): Basic Principles and Advanced Clinical Applications (webinar platform) 5-26 Feb 2021
6. MEFOMP virtual conference, 5 -7 April 2021.
7. Virtual Summer School 2021: Image Guided Radiation Therapy (IGRT) and Advanced Treatment Techniques during Sept. 20th – Nov. 14th, 2021, German Cancer Research Center (DKFZ)
8. Online Teaching Course Particle Therapy- program during 22- 26 November 2021. German cancer Research Center (DKFZ)
9. SCMPCR E-learning Program (ELP-05): Advanced Techniques in Radiotherapy 1st October 2021 – 22nd October 2021, Dhaka, Bangladesh.
10. 4th Summer School in Medical Physics: Radiobiology and Biological Modelling for Radiotherapy, German Cancer Research Center (DKFZ) 5 – 30 Sept 2022
11. Course type 3: Online teaching course "Particle Therapy" online phase Oct. 17 -Nov 20, 2022, online

phase Nov. 21-Nov. 25, 2022, German Cancer Research Center (DKFZ)

12. SCMPCR E-learning Program (ELP-06): Clinical Medical Physics in Modern Radiotherapy Date:01 July 2022 – 22 July 2022
13. SCMPCR Hands-on Workshop (HW-06): Modern Quality Assurance in Modern Radiotherapy during 15th – 18th February 2023
14. MEFOMP2023 Medical Physics conference, 19–22 May 2023, Muscat, Oman
15. Online Teaching Course "Particle Therapy", OCT. 09 – NOV. 19, 2023, German cancer Research Center (DKFZ)

As IOMP continues to champion excellence and innovation, its legacy lives on in the dedication and passion of medical physicists across the globe. The organization's commitment to unity and progress remains the driving force behind the advancement of medical physics and its unwavering pursuit of a healthier, safer, and more technologically advanced world.

Conclusion:

The Education and Training Committee has been an integral force in the evolution and advancement of the medical physics profession. Through its dedication to standardizing education, fostering professional development, and encouraging global collaboration, the ETC has raised the bar for medical physicists worldwide. As the field continues to grow and adapt, the enduring contributions of the ETC will continue to shape the future of medical physics, ensuring excellence in patient care and radiation safety for generations to come.

Over the years, the Education and Training Committee of IOMP has continuously adapted to the evolving needs of the field. By collaborating with regional organizations, national societies, and educational institutions, the ETC has become a global force in advancing the profession of medical physics. Its dedication to fostering excellence in education, promoting professional development, and encouraging international collaboration has been instrumental in shaping the future of medical physics and enhancing patient care worldwide.

The history of the Education and Training Committee of IOMP is a testament to its dedication, perseverance, and adaptability in advancing the field of medical physics. From its modest beginnings in 1985, the committee has grown to be a globally recognized authority of IOMP in medical physics education, leaving an indelible mark on the profession's growth and development. As the field continues to evolve, the committee's commitment to excellence and innovation promises an exciting and promising future for medical physicists around the world.

I thank all the committee members of ETC and accreditation board for actively participating in the activities and tasks. I also take this opportunity to thank, John Damilakis, President IOMP, IOMP EXCOM and the IOMP NMO's for the support in fulfilling the aims and objectives of ETC as well as IOMP.

Creation, evolution and future challenges of ion beam therapy from a medical physicist's view point (part 1&2)

Sourced by Dr. Leyla Madagossi, Editor (Educational), AFOMP Pulse

Ion beam therapy, also known as particle therapy, is a specialised form of radiation therapy used to treat certain types of cancer. It involves using high-energy ions, such as protons or heavier ions like carbon, to precisely target and destroy cancerous cells while minimising damage to surrounding healthy tissue. This precision arises from the unique physical properties of ions, known as the Bragg peak, which allows them to deposit most of their energy at a specific depth within the body. This is particularly useful for treating tumours near critical structures or in paediatric patients. The basic concept of ion beam therapy emerged in the mid-20th century, but it wasn't until technological advancements in particle accelerators and imaging techniques that it became a practical and clinically useful treatment option.

Prof. Masahiro Endo from the Association for Nuclear Technology in Medicine, Japan, has shared invaluable insights into the creation, evolution, and future challenges of ion beam therapy in a two-part publication in *Radiological Physics and Technology.*

Part 1: Accelerator & beam delivery system


Radiological Physics and Technology (2023) 16:137–159
https://doi.org/10.1007/s12194-023-00722-5

REVIEW ARTICLE

Creation, evolution, and future challenges of ion beam therapy from a medical physicist's viewpoint (Part 2). Chapter 2. Biophysical model, treatment planning system and image guided radiotherapy

Masahiro Endo[1]

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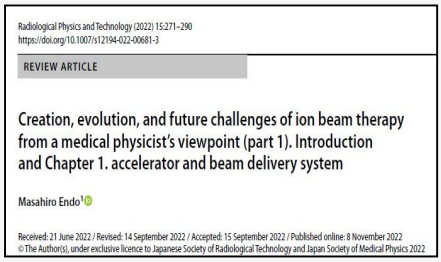
https://doi.org/10.1007/s12194-022-00681-3

Take the journey from the conceptualisation of the use of Bragg Peak for cancer treatment in 1946 to the inception of particle therapy using Cyclotrons, the establishment of High LET Radiation Therapy in the US-Japan Cooperative Cancer Research in the '70s, the transition to synchrotron-generated beams and compact synchrotrons to the current status of developments. A very impressive evolution has been the development of respiratory-gated methods as early as 1996 in the HIMAC facility in Japan.

Ion beam therapy has come a long way since its inception and holds significant promise for improving cancer treatment outcomes. Continued research, technological advancements, and efforts to make it more accessible will play a crucial role in shaping its future in radiation oncology.

Part 2: Biophysical model, TPS and IGRT

https://doi.org/10.1007/s12194-023-00722-5


Radiological Physics and Technology (2022) 15:271–290
https://doi.org/10.1007/s12194-022-00681-3

REVIEW ARTICLE

Creation, evolution, and future challenges of ion beam therapy from a medical physicist's viewpoint (part 1). Introduction and Chapter 1. accelerator and beam delivery system

Masahiro Endo[1]

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This paper builds on the previous part and dives into how the physical dose is translated to a radiobiological endpoint in the realm of ion beam therapy. Biological damage depends on the method of dose deposition and the density of ionisation tracks and that is where the potential of ion beam therapy manifests. Dose deposition is fundamentally different for high LET particles; the damage increases as the particles slow down. A physical dose distribution results in a different biological dose distribution and therefore, biophysical models are integral components of ion beam planning. Please read on the birth of ion beam treatment planning systems and biophysical models in the National Institute of Radiological Sciences (NIRS) and Gesellshaft fur Schwerionenforschung (Societyfor Heavy Ion Research) and its evolution to the Local Effect Model (LEM) and the modified Microdosimetric Kinetic Model (MKM) which are currently used

Workshop on Brachytherapy Treatment Techniques: Procedures and Planning

On 28th & 29th April 2023, a workshop on **'Brachytherapy Treatment Techniques: Procedures and Planning'** was organized by the **Department of Radiation Oncology, Christian Medical College & Hospital, Ludhiana**. It was organized in collaboration with the **Indian Brachytherapy Society (IBS)** and was also financially supported by **NAMS** and **AERB**. The workshop was endorsed by AFOMP, AMPI, ESTRO, IOMP, NZAROI, SCMPCR and accredited with 8 credit hours by the Punjab Medical Council. The entire workshop proceedings were held in the Department of Medical Education Conference Hall, Christian Medical College Ludhiana.

The faculty included renowned radiation oncologists and medical physicists from various reputed hospitals of India. Dr. Bhavna Rai from PGIMER, Chandigarh was the course director, and Dr. DN Sharma from AIIMS New Delhi and Dr Rakesh Kapoor from PGI Chandigarh were the radiation oncology faculty while Dr Arun Chougule from Jaipur, Dr. Arun Oinam from PGI Chandigarh, Dr Seema Sharma from AIIMS, New Delhi, Dr. Frank Hensley from Germany were Medical Physics faculty of the workshop. The workshop was attended by 54 delegates including consultant oncologists, resident doctors, medical physicists and intern medical physicists from various hospitals across North India.

The workshop aimed at highlighting the role and importance of brachytherapy in various cancers, especially the gynecological cancers, head and neck cancers, breast cancer and sarcomas in addition to introduction to rare treatment sites where brachytherapy could be beneficial and provided practical knowledge to the young radiation oncologists and medical physicists about the various types of brachytherapy procedures practiced. The two-day workshop had sessions catering to all the basic requisites that one needs to practice brachytherapy in their department and gave them the confidence to take initiatives in the field of brachytherapy.

The workshop started with the inaugural ceremony, which was graced by Dr Jeyaraj Pandian, Principal Christian Medical College Ludhiana, Dr Allen Joseph, Medical Superintendent, CMC Hospital, Prof Arun Chougule, Observer NAMS, Dr Karamvir Goyal, Observer PMC and all the faculty of the workshop. Dr Pamela Jeyaraj, Prof and Head Department of Radiation Oncology and the Organizing Chairperson of the Workshop formally welcomed all the guests and delegates and threw light on the objectives of the workshop. Dr. Jeyaraj Pandian highlighted the importance of Brachytherapy and shared insights for dealing with the cancer and non-communicable disease burden of the country. He also appreciated the efforts of the Department of Radiation Oncology for organizing this workshop in a very relevant field of expertise for cancer treatment- brachytherapy. Dr. Allen Joseph spoke on the need of keeping everyone updated with advanced treatment options and developing necessary skills. The inaugural ceremony ended with Dr. Mary Joan, Associate Professor and RSO and the Organizing Secretary of the Workshop extending a vote of thanks to the entire invited faculty, delegates and the team of support persons.

The two day workshop had various sessions which included lectures from the faculty, videos for giving the audience a near-live experience of the OT procedures, live treatment planning and contouring sessions, lectures on the physics & planning of brachytherapy procedures and need of QA/QC, optimization methods, radiobiology of brachytherapy etc. Each teaching session held its own importance and gave the delegates an opportunity to explore each aspect of brachytherapy. Each teaching session ended with dis-

cussion and questions and the participants asked their doubts without any apprehension. The discussions continued till the breaks as well and the delegates got ample opportunity to interact with the expert faculty.

The objectives of the workshop were successfully met with the lectures and training sessions. Dr DN Sharma led a session on "Indications of Brachytherapy in the precision RT era" to highlight the role and importance of brachytherapy in the treatment of cancer. Dr. Frank Hensley led a session on "Advanced techniques in Brachytherapy – current status and future scopes" to project the versatility and the benefits of brachytherapy as a radiation therapy modality. Dr. Bhavna Rai led a session on "Imaging and contouring" to bring to light, various advancements in imaging techniques in brachytherapy. To assist delegates to build a conceptual basis for the use of brachytherapy Dr. Arun Chougule led a session on "Radiobiology of Brachytherapy", Dr Seema Sharma led a session on "Physical principles and calculation algorithms for brachytherapy planning" and Dr Rakesh Kapoor led a session on "Principles of Interstitial Brachytherapy". Dr DN Sharma led a session on "Indications of Brachytherapy in the precision RT era" and 3 sessions where video demonstration of brachytherapy procedures in various sites were taken by Dr. DN Sharma, Dr. Rakesh Kapoor and Dr. Bhavna Rai to create awareness among Radiation Oncology team about various types of applications and accessible primary sites suitable for brachytherapy procedure. To familiarize the basics of contouring and tumor delineation in brachytherapy, Dr. Bhavna Rai led a session on "Imaging and contouring", 3 sessions where video demonstration of brachytherapy procedures in various sites were taken by Dr. DN Sharma, Dr. Rakesh Kapoor and Dr. Bhavna Rai and sessions where participants were guided in the art of contouring and planning in brachytherapy by the faculty. To explain the reconstruction and planning techniques to the physicists, Dr Arun S Oinam, Dr Arun Chougule and Dr Seema Sharma led the sessions on "Image guidance - reconstruction and planning". Dr Arun S Oinam led a session on "Applicator commissioning and Quality Assurance in brachytherapy" to reinstate the importance of QA/ QC for equipment as well as procedures. All Faculty monitored a session on "Planning, plan evaluation and dose reporting" to understand the process of optimization and highlight the role of Radiation Oncologist and Medical Physicist. To equip the Radiation Oncologists and Medical Physicists with knowledge and skills so as to establish a brachytherapy facilities in their respective centers there were 3 sessions where video demonstration of brachytherapy procedures in various sites were taken by Dr. DN Sharma, Dr. Rakesh Kapoor and Dr. Bhavna Rai, sessions where participants were guided in the art of contouring and planning in brachytherapy and principles of planning, plan evaluation and dose reporting.

Abstracts on topics related to brachytherapy were invited and the participants were given an opportunity to present their research work and have a discussion with the esteemed faculty of the workshop on prospects of research in brachytherapy and guidance and continued support to carry on with their areas of interests in brachytherapy research.

The workshop concluded with the valedictory session in which feedback was taken from the delegates and the invited faculty. The delegates were satisfied with the workshop and asked for more such training sessions and workshops to be held in future. The faculty was happy with the arrangements too and looked forward to teach more in future through such programs. The invited faculty was given token of appreciation by members of the organizing team and the certificates were distributed to all delegated by the faculty.

A pre workshop survey was conducted among the registered delegates prior to the workshop to get to know about the facilities available and their expectations on the workshop. An online pre and post workshop questionnaire evaluation was conducted on the first day and at the end of the workshop to assess the effec-

tiveness of the workshop and seek the feedback from the delegates. A word finding cross word was conducted to make the learning enjoyable.

The 2-day workshop on ‘Brachytherapy Treatment Techniques: Procedures and Planning’ organized by the Department of Radiation Oncology, Christian Medical College & Hospital, Ludhiana was completed on a successful note concluding the international medical Physics Week celebrations 2023.

Gallery








Emphasizing the Vital Role of Medical Physicists in Modern Medicine

Md. Jobairul Islam, Md. Akhtaruzzaman

International Medical Physics Week:

The International Organization for Medical Physics (IOMP) celebrated International Medical Physics Week (IMPW) from 24th to 28th April 2023, with the aim of promoting and fostering activities that advance medical physics globally. The Bangladesh Medical Physics Society (BMPS) actively participated in this momentous event by organizing a series of online webinars. The webinars brought together medical physicists, researchers, and professionals from around the world to share insights and knowledge on cutting-edge topics in the field of medical physics.

The BMPS organized an enriching online webinar series that spanned five days, covering a diverse range of topics in medical physics. Each webinar, comprising a one-hour presentation followed by a 15-minute interactive Q&A session, provided valuable insights into the critical role of medical physicists in various aspects of healthcare and radiation treatment.

In the opening webinar of International Medical Physics Week 2023, Md. Jobairul Islam, Secretary of BMPS, delivered impactful introductory remarks that ignited passion and commitment among participants. Emphasizing the pivotal role of research and academics, his words resonated with the audience, setting the stage for an enlightening series of webinars. He announced BMPS's commitment to organizing future scientific sessions, further fueling excitement and dedication to advancing the field of Medical Physics. The inspirational address laid a strong foundation for subsequent webinars, reinforcing BMPS's dedication to promoting medical physics both nationally and internationally.

Webinar 1: Role of Medical Physicists in Radiation Protection

The inaugural webinar, titled "Role of Medical Physicists in Radiation Protection," was presented by the esteemed Dr. Pradip Deb, a Senior Researcher in Medical Radiation and RSO at RMIT University, Australia. Dr. Deb emphasized the vital responsibilities and expertise of medical physicists in implementing effective radiation protection measures. He highlighted the significance of ongoing education and training to keep medical physicists up-to-date with the latest advancements in radiation protection techniques. The webinar underscored the indispensable contributions of medical physicists in safeguarding patients, healthcare professionals, and the public from unnecessary radiation exposure during medical procedures. The session was moderated by Dr. Md. Anwarul Islam, Medical Physicist Co-Ordinator from Square Hospital Limited, Bangladesh.

Webinar 2: Surface Guided Radiotherapy - Implementation and Experience

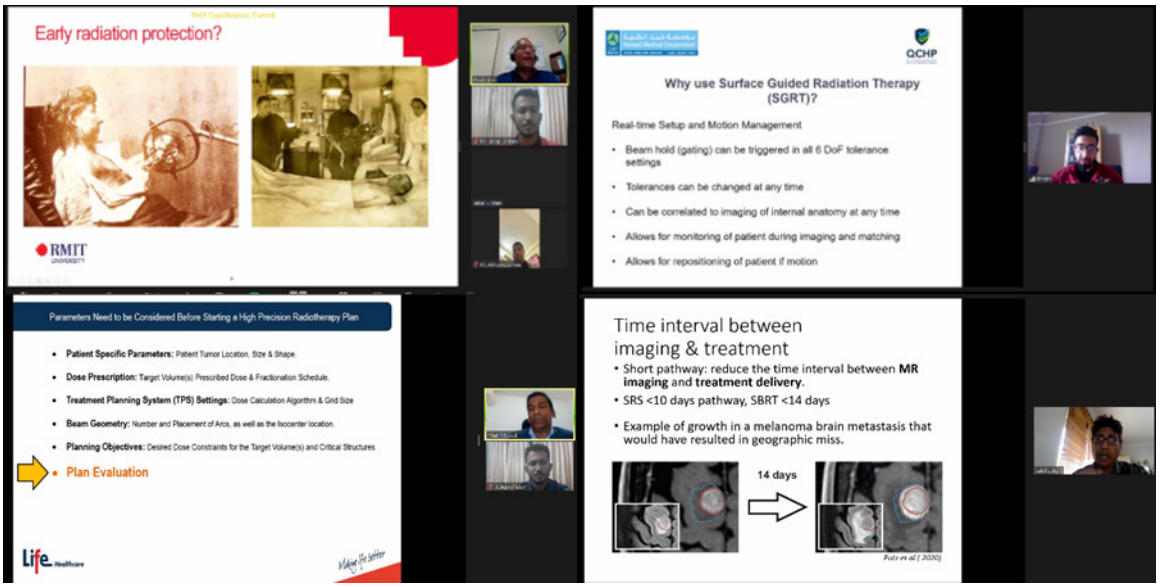
The second webinar focused on "Surface Guided Radiotherapy" and was presented by Abdul Sattar Khalid, a Medical Physicist at the National Center for Cancer Care and Research (NCCR), Qatar. The

presentation showcased the practical application and benefits of SGRT technology in guiding radiation treatment delivery. Real-world experiences were shared, demonstrating how SGRT has positively impacted patient care and treatment outcomes in radiation therapy centers. The session was moderated by Sadia Afrin Sarah, Medical Physicist from Delta Hospital Limited.

Webinar 3: Plan Evaluation for High Precision Radiotherapy Treatment

K. M. Masud Rana, a Senior Medical Physicist cum RSO at Life Gaborone Private Hospital, Botswana, delivered the third webinar. The presentation focused on methodologies and techniques used to assess the quality and accuracy of treatment plans, ensuring optimal radiation delivery to target areas while sparing healthy tissues. The webinar provided valuable insights into the latest advancements in plan evaluation methods, aiming to enhance the overall quality of radiotherapy treatments and improve patient outcomes. The webinar was effectively moderated by Kamanzi Jean D'amour from Rwanda Cancer Centre (RCC), Rwanda.

Webinar 4: Establishing an Image-Guided SRS and SBRT Program



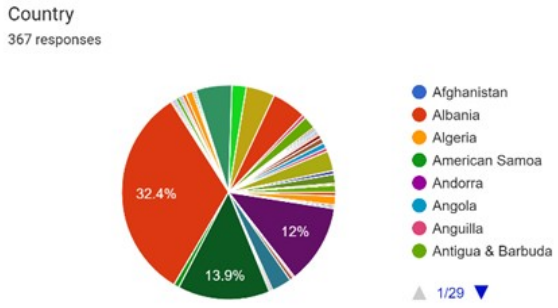
The fourth webinar, presented by Dr. Sakil Zuberi, a Senior Clinical Scientist at The Royal Marsden NHS Foundation Trust, UK, delved into the implementation of advanced image-guided techniques in Stereotactic Radiosurgery (SRS) and Stereotactic Body Radiation Therapy (SBRT). The session highlighted the intricacies and challenges involved in setting up such programs, emphasizing the importance of state-of-the-art imaging technology and precise treatment planning. Image-guided SRS and SBRT were showcased as effective approaches to deliver highly targeted doses to tumors with increased accuracy, while minimizing the impact on surrounding healthy tissues, leading to improved patient outcomes and quality of life. The webinar, moderated by Dr. Md. Akhtaruzzaman from Evercare Hospital Chattogram, Bangladesh.

Global Participation and Acknowledgments

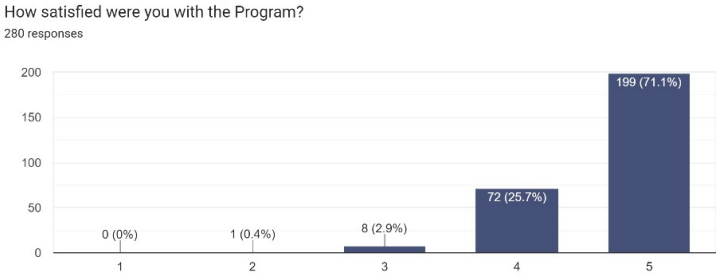
The success of the IMPW 2023 webinar series was evident from the overwhelming response it received. A total of 367 participants from 43 countries, spanning Asia, Africa, Europe, North and South America, actively engaged in the sessions. The organizers express their deepest gratitude to all participants, including speakers, moderators, and the entire team responsible for organizing these enlightening webinars.

Webinar Evaluation Reports

After each webinar session, participants were encouraged to provide feedback through evaluation reports. These reports allowed attendees to express their thoughts on various aspects of the webinar, including the content, presentation, and overall organization. The valuable feedback gathered through these reports will play an essential role in refining future events, ensuring they cater to the specific needs and expectations of the global medical physics community.



The impact of these webinars is expected to resonate beyond the event, influencing advancements in medical physics globally and ultimately benefiting patients and healthcare systems worldwide. As the week-long celebration drew to a close, participants were left inspired and motivated to continue their pursuit of excellence in medical physics, shaping a brighter and healthier future for humanity. The IOMP and BMPS look forward to future editions of IMPW, further elevating the prominence of medical physics in the international healthcare community.



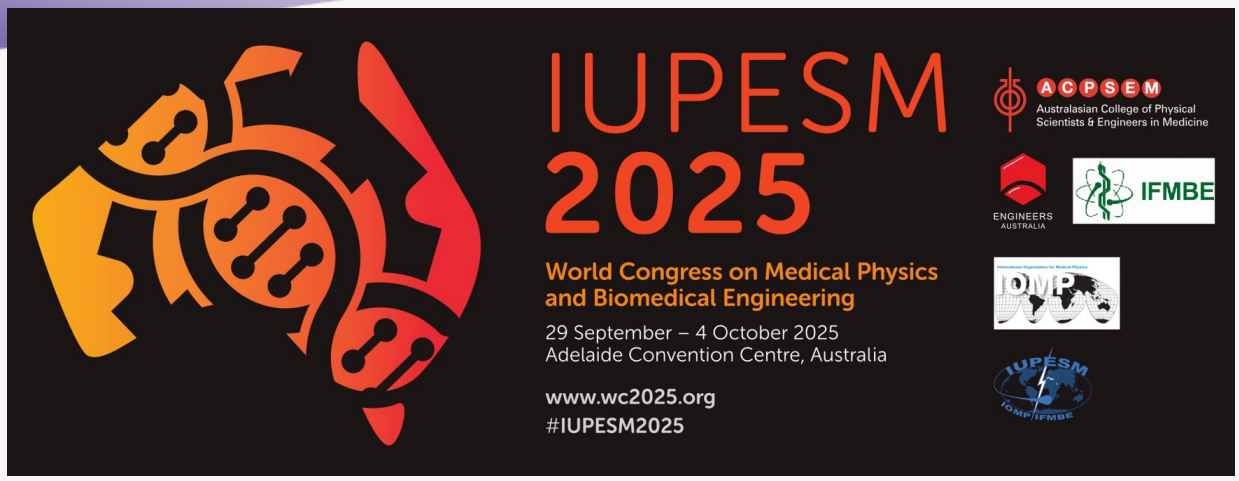
Certificates of Achievement

In recognition of the participants' commitment to learning and professional development, BMPS awarded certificates of achievement to all attendees who completed the evaluation report for each webinar they attended. These certificates serve as a testament to their active involvement in the enriching discussions and their dedication to advancing their knowledge in medical physics.

Conclusion:

The impact of these webinars is expected to resonate beyond the event, influencing advancements in medical physics globally and ultimately benefiting patients and healthcare systems worldwide. As the week-long celebration drew to a close, participants were left inspired and motivated to continue their pursuit of excellence in medical physics, shaping a brighter and healthier future for humanity. The IOMP and BMPS look forward to future editions of IMPW, further elevating the prominence of medical physics in the international healthcare community.

IUPESM 2025 ADELAIDE, AUSTRALIA

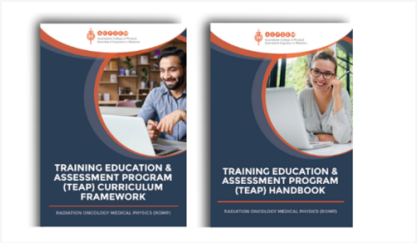


IUPESM 2025 ADELAIDE, AUSTRALIA

The Local Organizing Committee is hard at work and already well on the way to delivering an amazing experience in Adelaide in 2025, See https://wc2025.org/

NEW CURRICULA

The ACPSEM has had a busy 2022/2023 already with the introduction of new curricula for all its medical physics and radiopharmaceutical science courses.



Reach out us if you want to look more closely at the Frameworks as part of something you are doing. The key has been investing time in the development of desired program outcomes and matching Learning Outcomes to these.

MOBILE AND MICRO LEARNING

ACPSEM has also increased its use of a mobile app called Forget Me Not, for the delivery of multiple-choice questions to course participants. This combines the concepts of micro learning and spaced learning along with the principle of encouraging mastery of a subject. Participants can choose to get a question a day or all questions in a series (10-14) all at once. If you get the question wrong you are sent it again until you get it right, and if you get it wrong you are given the reference to read. Certificates are issued by the app when series of questions are complete. License fees are charged per person per course. Also reports show where individuals learning gaps are and what areas groups of learners find more easy or difficult to grasp. Because the design is based on "mastery" you can also observe learners or groups of learners who take longer to grasp concepts and focus assistance accordingly. Licensing is per learner per course.

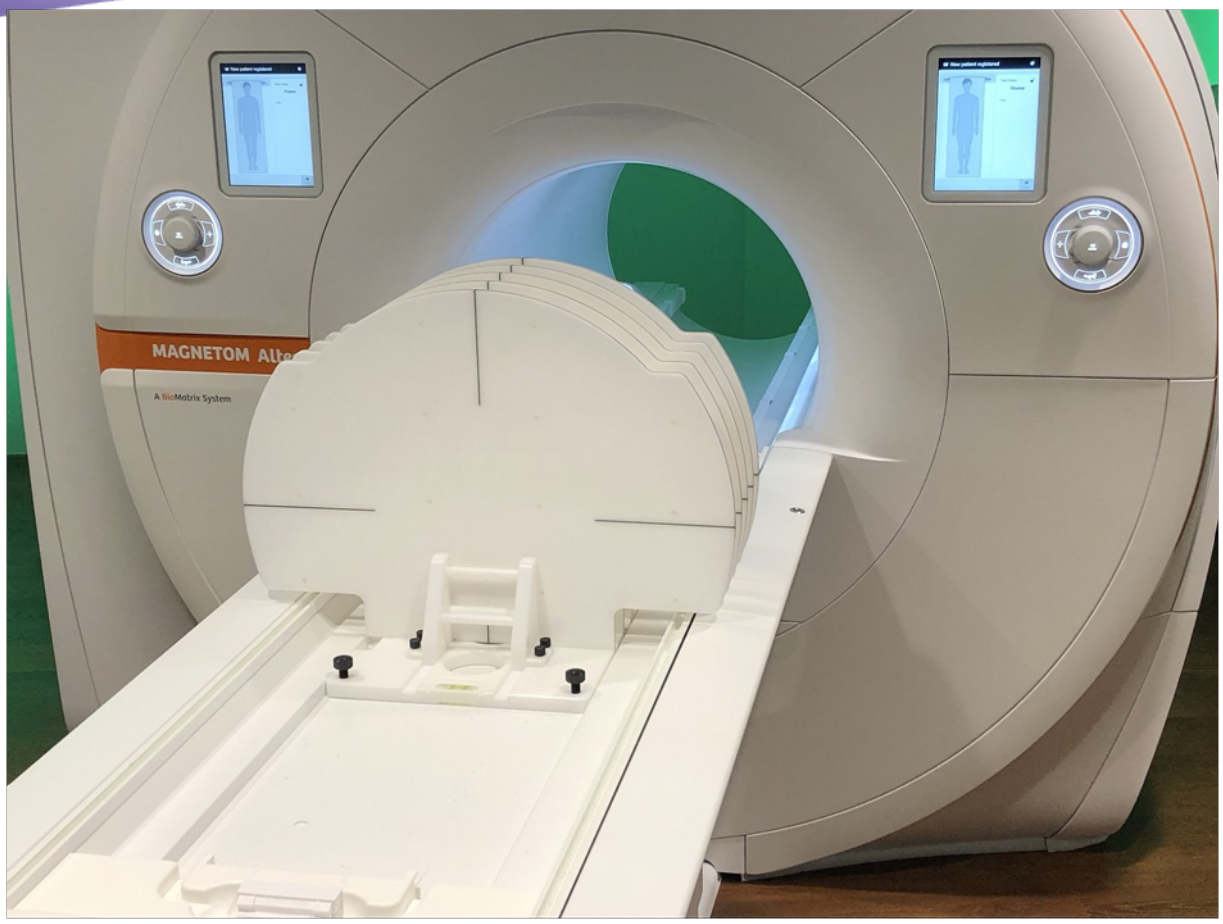
THE AUSTRALIAN MR SAFETY EXPERT COURSE (MRSE)

ACPSEM's second ever MR Safety Expert (MRSE) Course begins in September 2023 and will run until September 2024. Course Director Donald McRobbie and our General Manager Education Andrew Campbell have refined the 2021 course based on feedback and trends in best practice online education. This course combines the idea of a flipped classroom – participants watching high quality videos over a period of weeks before going online in a webinar to discuss and ask questions – with other live webinars, and assessments ranging from MCQs to practical tasks. Successful completion leads to certification as and MRSE. This course was developed as an alternative to the American exam based expert course.

Once again, the focus on creating clear learning outcomes has helped us deliver this great course. Interested in more information that may help you out, just reach out to education@acpsem.org.au

THETIS phantom detects image distortions to support MR-based treatment planning

German QA specialist LAP and Siemens Healthineers have co-developed a versatile phantom to counter the effects of MR image distortion in radiotherapy treatment planning.



Enhanced imaging, enhanced outcomes: the THETIS 3D MR Distortion Phantom enables streamlined QA workflows for the safe deployment of MRI systems in a radiotherapy setting.

The THETIS 3D MR Distortion Phantom helps medical physicists to quantify, as well as track over time, potential distortions that can arise in MR images used for radiotherapy treatment planning. Developed by laser and radiotherapy QA specialist LAP, the THETIS phantom enables the multidisciplinary care team to deploy MRI systems safely in a radiotherapy context and, in so doing, maximize clinical effectiveness through the precision targeting of diseased tissue.

In the treatment suite, MRI delivers clinical upsides along multiple coordinates, not least its superior soft-tissue contrast (versus CT) and the ability to visualize a matrix of functional information – including diffusion processes, blood volume and oxygenation, and localized metabolic activity within tumour sites. Equally compelling is the fact that MRI interrogates the patient using non-ionizing radio waves – a major plus when treating children and in cases where serial imaging scans are needed to track tumour response through multiple radiation fractions.

“Because of those upsides, the adoption of MRI and MR-Linac systems in radiation therapy has grown massively in recent years,” explains Torsten Hartmann, director of product management for healthcare at LAP. “We developed THETIS to enable the radiation oncology team to generate MR images of the highest geometrical accuracy – detecting possible distortions of the MR images reliably and quickly.”

Such potential distortions have their origins in tiny perturbations to the uniformity of the MRI scanner's magnetic field and the field gradients used to image the patient. By extension, when the MRI scanner's imaging sequences are not optimized, problems can occur downstream and introduce errors in the patient's treatment plan. "THETIS makes it easy to determine where distortions are affecting the image and whether the scanner's magnetic field has changed over a period of time," Hartmann adds.

Enabling independent QA

In terms of specifics, the THETIS phantom exploits a square grid of embedded silicon markers, each of which provides a strong, localized MR signal (and with 258 signal sources per measurement plate). The phantom – which is aligned to the isocentre or the image centre of the MRI scanner using LAP's MRI laser systems and its integrated levelling aids – can detect residual image distortions from gradient nonlinearities or main-magnet inhomogeneities to ensure they are within acceptable limits. In this way, the silicon markers help the medical physicist to visualize the loss of geometric fidelity with distance from the magnet isocentre, preventing a potentially inaccurate view of organs located in the outer areas of the MR image.

"Of course, all MRI system vendors provide methods and algorithms for distortion correction," notes Hartmann. "While that's as it should be, a large-field phantom like THETIS underpins those all-important independent QA checks to ensure safe deployment of MRI systems in the radiotherapy setting." Those QA checks begin with the commissioning of a new MRI scanner and characterization of the machine's baseline imaging performance versus manufacturer specifications. Equally important, THETIS offers streamlined workflows when it comes to systematic QA of MR image distortions over the lifetime of the MRI scanner – ensuring, for example, the geometric fidelity of MR images after major hardware and software upgrades to the imaging system.

"Clinical teams need a granular view of how such upgrades affect MR image quality," adds Hartmann. "At the same time, THETIS supports the regular QA monitoring of MR image quality – for example, as part of the monthly or quarterly checks of image distortion and how it changes over time."

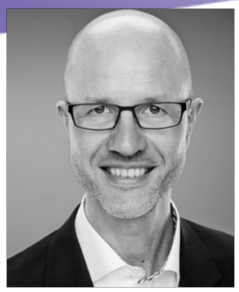
Collaborative innovation

Operationally, the clinical and commercial release of the THETIS phantom is the outcome of an R&D collaboration between the LAP product development team and the MRI technology division at Siemens Healthineers, Germany. The latter is increasingly providing dedicated MRI systems into the radiotherapy clinic and, as such, wants to offer a reliable and affordable image distortion phantom tailor-made for its MRI equipment portfolio.

"We moved quickly from prototyping and evaluation into product development and construction – just six months in all before we entered beta-testing," explains Hartmann. Geographical proximity certainly helped to streamline the product innovation cycle, with LAP's Nuremberg manufacturing facility just 20 km or so from the Siemens Healthineers MRI technology hub in Erlangen. "Key to successful delivery was being able to jointly test, iterate and optimize the THETIS phantom with our colleagues in the MRI R&D team at Siemens Healthineers," Hartmann adds.

Worth noting, though, that the commercial phantom is vendor-agnostic, being optimized on Siemens Healthineers' MRI systems, but also compatible with a range of open-bore scanners from other manufacturers. In the radiotherapy clinic, meanwhile, the phantom is equally versatile. According to Hartmann, THETIS is compatible with emerging MR-only treatment planning workflows as well as the established

standard-of-care in which a fused CT-MRI dataset provides the MR information needed to outline the tumour volume and organs at risk, while the CT is used for dose calculation.



Torsten Hartmann: “THETIS underpins those all-important independent QA checks.”

THETIS in brief

- The THETIS 3D MR Distortion Phantom is designed for QA of MR images in radiation therapy and diagnostic settings. Key features include:
- Modularity: expansion stages allow optimal adaptation to different system and workflow requirements.
- MR-safety: the phantom contains no ferromagnetic components and, as such, is ideally suited to the MRI environment.
- Easy handling: integrated levelling aids streamline alignment, while intuitive handling of the phantom simplifies 3D examination of the entire MRI space.
- Figures of merit: 10 plates (maximum expansion stage); three extension modules; 3 T MRI-tested; 258 signal sources per measurement plate.

1. The loss of contrast in a therapy verification image compared with a simulator radiographic image is mostly a result of _____.

A. an increased number of pair productions
B. an increased number of Compton interactions
C. an increased number of photoelectric interactions
D. a decreased number of photoelectric interactions

Answer: D

2. A 4-MV linac beam, 10 cm x 10 cm with a 45° wedge, is used to deliver 200 cGy to a tumor located at the isocenter (100 cm SAD) at 10-cm depth. Given the following:

1. output at 100 cm SSD at d max 1.2 cm is 1.04 cGy/MU
2. wedge factor 0.70
3. back-scatter-factor 1.03
4. percent depth dose 60% tissue-air-ratio 0.75

What is the number of monitor units (MU) required for this treatment?

A. 206
B. 258
C. 296
D. 366

Answer: D

3. AAPM' Report 85 on "Tissue Inhomogeneity Corrections For Megavoltage Photon Beams" (2004) draws some general conclusions. All of the following are true statements except:

A. The widespread availability of CT and 3-D planning systems makes inhomogeneity corrections more accurate than was previously possible.
B. Inhomogeneity corrections should account for changes in the electron densities of tissues traversed.
C. Because different treatment planning systems use different inhomogeneity algorithms, making such corrections will introduce even larger errors in dose reporting than were previously made without them.
D. Monte Carlo dose calculations can calculate the effects of inhomogeneities on scatter radiation, whereas analytical dose calculations only correct for changes in effective depth

Answer: C

4. After 10 half-lives the activity A of a radionuclide is reduced to approximately:

A. A/10
B. $Ae^{1/10}$
C. A/1000
D. Zero

Answer: C

5.Which of the following is true, regarding patients scanned on a PET-CT unit?

A. Patients should remain in a shielded room after the scan for the rest of the day, and are then released with specific radiation precautions.

B. When the dose rate at 1 meter is less than 5 mR/hr, patients can be released with no radiation precautions.
C. Patients can be released immediately after the scan, but must not share a bathroom with other people for 1 week.
D. Patients are released when the dose rate at 1 meter is less than 2mR/hr, but must avoid contact with children for l week.

Answer: B

6. In pair production, _____.

A. the electrons and positrons are emitted at 180° to each other
B. positrons and antineutrinos are produced when the interactions occur
C. photons with energies greater than 2.04 MeV are necessary for the interactions to occur
D. the annihilation of the positron produces two photons that travel in approximately opposite directions

Answer: D

7. A neutral atom has 6 electrons and a mass number of t3. The number of neutrons in the nucleus is _____.

A. 13
B. 6
C. 7
D. 19

Answer: C

8. Activity can be expressed as:

A. $\Delta N/\Delta t$
B. $0.693/T_{1/2}$
C. 0.693/HVL
D. $1.44/T_{1/2}$

Answer: A

9. 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.

Answer: D

10. According to NCRP Repot 93. the average annual dose from man-made and natural radiation in the United States is 360 mrem. The largest contributor to this value is:

A. Radon and its daughters.

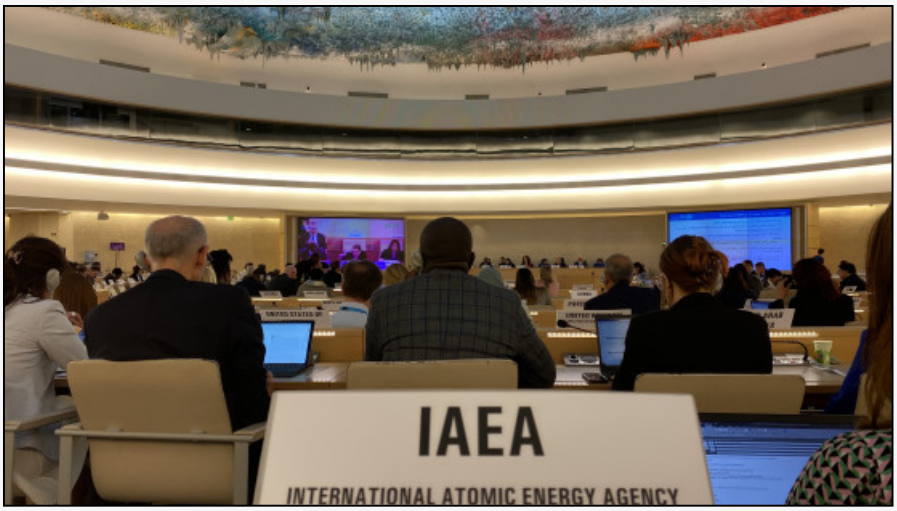
B. Nuclear weapons testing.
C. Medical X-rays.
D. Natural radiation sources excluding radon.

Answer: A

76th World Health Assembly: IAEA highlights Role in Cancer Control and other Non-Communicable Diseases

Sourced by Dr. Zulaikha, Editor (Professional), AFOMP Pulse

The IAEA is playing an active role in assisting countries to increase access to cancer care, as well as the many other beneficial applications of nuclear science and technology in key health areas. Addressing the 76th World Health Assembly (WHA) which convened in Geneva at the end of May, May Abdel-Wahab, Director of the IAEA Division of Human Health and Meena Singelee, Head of the IAEA Liaison Office in Geneva, spoke about the IAEA and WHO's longstanding and close partnership. They highlighted the organizations' close cooperation in key areas such as cancer care, nutrition, vector-borne diseases and on improving radiation protection and the safety of patients and health workers.



The World Health Assembly was held from 21 to 30 May in Geneva. (Photo: IAEA)

Cancer Control and other **Non-Communicable Diseases**

Around half of all cancer patients need radiotherapy, but in low-income countries, only one in ten can access treatment. As the global annual cancer burden is expected to grow, the IAEA is assisting countries in setting up facilities for treating and diagnosing cancer through its Rays of Hope initiative.

Delivering the IAEA Statement on Prevention and Control of Non-Communicable Diseases, Singelee said: "The IAEA Rays of Hope flagship initiative, which has the strong support of the WHO, is an example of how the IAEA contributes to improvements in people's lives by supporting low and middle income countries (LMICs) to establish and improve access to radiation-based medical technologies such as diagnostic radiology, nuclear medicine and radiotherapy services through needs assessments, training, expert advice and procurement of equipment."

An essential element to ensure the sustainability of the Rays of Hope intervention is having Anchor Centres, strong regional cancer centres of excellence which will provide support to training and education, quality assurance, research and innovation in the region", said Abdel-Wahab. "Cancer centres are a major resource in ensuring a comprehensive approach to multidisciplinary cancer care and its planning. IAEA,

together with the WHO, developed technical specifications for radiotherapy and a framework for setting up a cancer centre, taking into consideration the local context and resources," she added.

The IAEA also enables countries to set up policies concerning radiotherapy in cancer management. In 2022, the IAEA partnered with the WHO and International Agency for Research on Cancer (IARC) to support Colombia, Lao People's Democratic Republic, the Syrian Arab Republic and Uzbekistan in integrating radiation medicine services into their national cancer care plans. A further ten countries: Cambodia, Comoros, El Salvador, Ethiopia, Fiji, Guinea, Jordan, Papua New Guinea, Sudan and Venezuela will receive cancer control assessments this year, which will be used to inform planning and resource mobilization of large -scale cancer control projects. For example, last year, the IAEA, working with the WHO, the IARC and the lslamic Development Bank, Helped Uzbekistan plan and resource a large-scale cancer control project.

In addition to increasing access to cancer treatment in LMICs, the IAEA is also strengthening its close partnership with the WHO in a joint project aimed at eliminating cancers, which affect women and children. Every year, around 400 000 children and adolescents, and 8.8 million women develop cancer. Out of these numbers, fewer than 30 percent of children with cancer are cured in LMICs. Cervical cancer kills 300 000 women in LMICs every year, despite being preventable and curable when detected early and managed effectively. According to the WHO, reasons impacting the likelihood of survival include delay or inaccuracy in diagnosis, inaccessible therapy, and abandonment of treatment.

"The IAEA has been focusing on assisting countries in improving cancer care for women and children, particularly in developing countries where there are significant difficulties in accessing services," Singelee said. "Rays of Hope is helping in this regard by providing greater access to timely diagnosis and life-saving treatment — including diagnostic imaging and radiotherapy."

In partnership with WHO, the IAEA has helped countries formulate national policies relating to cancer, build capacity in radiation medicine and mobilize resources for cancer care under the framework of the Global Programme to Eliminate Cervical Cancer and the Global Initiative on Childhood Cancer.

At the WHA, the IAEA highlighted the importance of medical imaging for cancer diagnosis and management. The IAEA promotes the safe and secure uses of medical imaging around the world and supports the WHO Global Breast Cancer initiative (GBCI), established in 2021. "IAEA technical officers co-led two GBCI working groups on rapid diagnostics and cancer management. Joint efforts are necessary if we want to reduce the impact of breast cancer and improve the quality of care for those affected by this disease worldwide," Abdel-Wahab said.

The IAEA is also collaborating with the WHO on research into the possible links between early life nutrition and long-term health outcomes. This study will provide guidance to LMICs on the relationship between nutrition in the first years of life and later childhood health, contributing to better understanding of non-communicable disease risk factors. It should also reveal information on the effectiveness of early life nutrition interventions to reduce later childhood obesity.

Collaboration with other UN and intergovernmental organizations

In addition to the WHO, the IAEA works with the UN Population Fund in the area of women's cancer, with the United Nations Children's Fund (UNICEF) in primary prevention and treatment for childhood cancer and with the United Nations on Drugs and Crime (UNODC) on palliative care. The IAEA is also working closely with the World Bank, and development banks such as the Islamic Development Bank, to ex-

plore opportunities for countries to increase financing for cancer care resources.

Delivering the IAEA statement on collaboration with other UN and intergovernmental organizations, Singelee and Abdel-Wahab highlighted how IAEA flagship initiatives, such as Zoonotic Disease Integrated Action (ZODIAC) are contributing to pandemic preparedness and response through close collaboration with the Food and Agricultural Organization (FAO), World Organization for Animal Health (OIE), the WHO and other partners. Through ZODIAC, the IAEA held training activities on Mpox and Lassa Fever with the WHO in Africa and Asia last year.

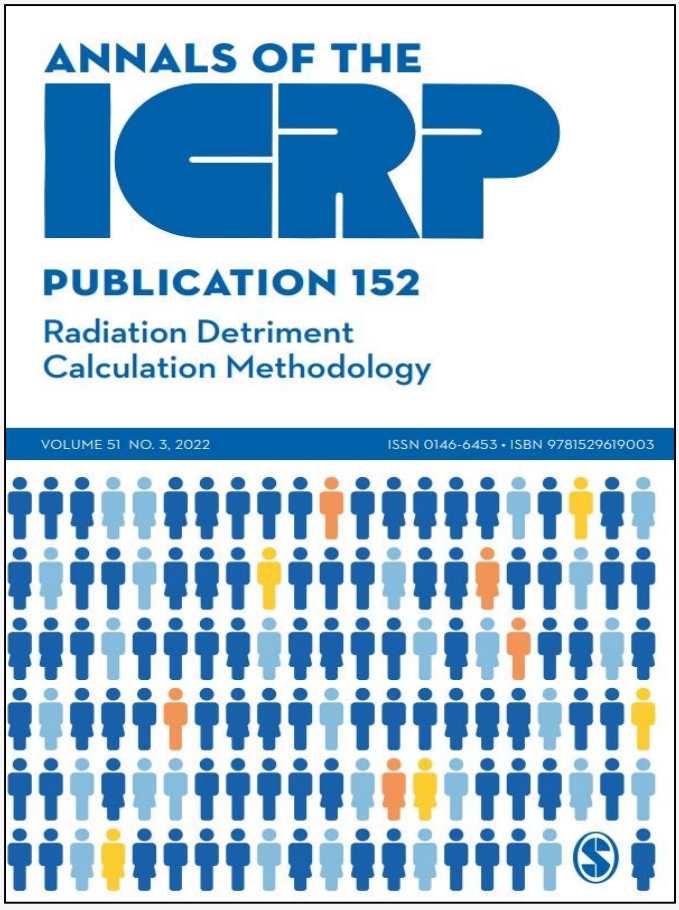
The IAEA also works closely with UN partners on the Joint Radiation Emergency Plan of the International Organizations, which facilitates the coordinated response of relevant international organizations in case of a nuclear or radiological emergency.

During the week, Abdel-Wahab and Singelee met with national ministries of health and partner organizations to discuss collaboration and technical cooperation activities in areas of cancer and the IAEA's flagship initiatives such as Rays of Hope, ZODIAC, the Marie Skłodowska-Curie Fellowship Programme and NUTEC Plastics. The IAEA, WHO and IARC delegations also discussed opportunities to strengthen collaboration through the Rays of Hope initiative.

Introducing ICRP Publication 152: Radiation Detriment Calculation Methodology

Sourced by Dr.Zulaikha, Editor (Professional), AFOMP Pulse

Radiation detriment is a concept developed by the International Commission on Radiological Protection (ICRP) to quantify the burden of stochastic effects from low-dose and/or low-dose-rate exposures to the human population. It is determined from the lifetime risks of cancer for a set of organs and tissues and the risk of heritable effects, considering the severity of the consequences. As part of a thorough review of the system of radiological protection to assess the needs for update, the Commission established Task Group 102 on Detriment Calculation Methodology in 2016. The report of the Task Group was approved in November 2021 and has just been released as ICRP Publication 152.



This publication provides a historical review of detriment calculation methodology since ICRP Publication 26, with details of the procedure developed in ICRP Publication 103, which clarifies data sources, risk models, computational methods, and rationale for the choice of parameter values. A selected sensitivity analysis was conducted to identify the parameters and calculation conditions that can be major sources of variation and uncertainty in the calculation of radiation detriment. It has demonstrated that sex, age at exposure, dose and dose-rate effectiveness factor, dose assumption in the calculation of lifetime risk, and lethality fraction have a substantial impact on radiation detriment values. Although the current scheme of radiation detriment calculation is well established, it needs to evolve to better reflect changes in population health statistics and progress in scientific understanding of radiation health effects. In this regard, some key parameters require updating, such as the reference population data and cancer severity. There is also room for improvement in cancer risk models based on the accumulation of recent epidemiological findings.

Finally, the importance of improving the comprehensibility of the detriment concept and the transparency of its calculation process is emphasized. A webinar on ICRP Publication 152 has been made available on YouTube and can be accessed from the following link: https://youtu.be/tnzFIg0zq74. The webinar will give an outline of Publication 152. It will help understanding of the detriment concept and provide the basis for discussions toward the future Recommendations.

Ph.D Abstract : 1

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

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The goal of radiotherapy is to deliver optimum dose to the target and minimum dose to the critical structures. It requires fast and accurate methods of dose measurement to achieve this goal. The dose distribution to the tumor depends on the correct dose measurement. Experimental dose measurement is very complex, time consuming and needs a lot of attention including very many factors. A few percentage of error is always considered for the experimental measurement. Monte Carlo methods are well known and considered as gold standard for dose calculation in radiotherapy. To calculate the dose in heterogeneous media and in the regions of electronic disequilibrium, the Monte Carlo method is rooted by the fundamental laws of the particle Physics interactions is used.

The purpose of this study was to simulate dose calculation of external photon beam using EGSnrc Monte Carlo (MC) code and compare them with the measured doses in homogenous and inhomogeneous medium. The complete geometry of the Elekta Synergy and Varian Clinac 2300CD linear accelerator (Linac) treatment head were designed using BEAMnrc MC Code and calculate dose by using DOSXYZnrc MC Code which are user codes of the EGSnrc. All the physical and technical parameters were tracked by the manufacturer's specifications for designing the module. The Elekta Synergy was simulated to compare the MC Simulated data with experimental measurement data in homogeneous medium. Due to unavailability of Elekta data based commercial TPS, a Varian Clinac 2300CD was also designed to compare MC and commercial TPS data.

The MC simulated data of Varian model were compared with the commercial TPS algorithm of AAA and Acuros XB in homogeneous and inhomogeneous media. The water, air, lung and bone have been used as inhomogeneous media. A wide ranges of beam energy and Field with Half Maximum (FWHM) were investigated for 6 MV beam to match the realistic clinical measured data. A number of relative data and a single absolute data have been investigated. The relative data were PDD, Off Axis Beam Profile and Output Factor for the field size of 5 x 5 cm, 10 x 10 cm, 30 x 30 and 5 x 30 cm. The PDD of inhomogeneous media has been calculated with AAA and AXB algorithm in TPS and compared with MC code at 10 x 10 cm.

The absolute data were investigated for a standard field size of 10 x 10 cm. The gamma criteria of 3%/3mm has been used to evaluate the difference between the measured and MC data. Other two criteria of 2%/2 and 1%/1mm also have been used to see the difference in extreme conditions. In homogeneous media, the average gamma pass rate of PDD for 3%/3mm, 2%/2mm and 1%/1mm for all field sizes were 100%, 100 % and 98.75% respectively. The results of Off Axis Beam Profile were 100%, 98.79% and 85.23% respectively for the same gamma criteria and field sizes.

The results showed a very good agreement between measured and MC simulated data in homogeneous media. In inhomogeneous water-air media, the gamma pass rate for 3%/3mm, 2%/2mm and 1%/1mm of

AAA VS MC and AXB VS MC were 68.1, 63.8, 40.4 and 85.1,83.0 72.3 respectively. Here MC data have comparatively good agreement with AXB algorithm in water-air media. In water-lung media the pass rate were 78.7, 72.3, 55.3 and 97.9, 97.9, 89.4 respectively. Here MC data have very good agreement with AXB data in all criteria. In water-bone media, the gamma pass rate were 97.9, 66.0, 19.1 and 97.9, 97.9, 91.5 respectively. In water-bone media gamma pass rate have good agreement at 3%/3mm with MC data where as in other two conditions were not meet. MC data have very good agreement with AXB data in all gamma pass rate criteria. The results showed MC simulated data have very good agreement with AXB calculated data in all media. In case of air and lung media the AAA data have showed less pass rate. AXB calculation algorithm adopted MC simulation method and our results also showed good agreement with AXB. So the MC module has been correctly designed in this study.

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

Ph.D Abstract :2

Investigation on the use of cone beam CT image sets for treatment planning in radiation therapy

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ABSTRACT

Clinical studies have emphasized the significance of image guided adaptive radiotherapy (IGART) to enhance the therapeutic ratio. In general, acquisition of repeat CT (re-CT) is the key requisite to implement IGART in the routine clinical setting. Several attempts were made to address the practical concerns and challenges associated with re-CT based IGART, majority of them employed daily cone beam CT (CBCT) image information either directly or indirectly for customization of treatment plans within the planned course of treatment. However, there are no standard and comprehensive guidelines dealing with effective utilization of this in-room imaging for IGART. In most of clinical scenarios, longitudinal field-of-view is found to be clinically inadequate for localizing the large and complex targets (with regional nodes) encountered in high precision radiotherapy. More specifically, there is no protocol in the literature for localization of the entire craniospinal axis and adaptive plan evaluation methods with CBCT. In addition, inaccuracies in Hounsfield units (HU) in CBCT image restrict its potential use in IGART. Therefore, a need arises to formulate comprehensive IGART approaches and guidelines with in-room CBCT to reduce the uncertainties related to treatment geometry and patient deformation.

The research presented in this thesis describes the potential use of the CBCT-based IGART in several aspects, including specific planning guidelines with custom-developed software, coded in MatLab. The protocol acquires two or more CBCT images with a linear translation of treatment couch in the patient plane, allowing 1 cm penumbral overlap (i.e. cone beam abutment) and fused as a single DICOM data set ($CBCT_{eLFOV}$) for extended localization. In order to improve the dose calculation accuracy with CBCT, optimum HU correction (in the high density regions) and HU mapping (from deformed initial CT) methods were also coded in our software. Possible misalignment arising out of uncertainties in treatment setup, table co-ordinates, and minor difference in reconstruction diameter are effectively managed using rigid registration and mutual intensity metric based misalignment management algorithm. New quality assurance approaches are described for comprehensive validation of $CBCT_{eLFOV}$ image sets with combined geometry of Catphan 504 and 604 phantoms. Few case studies are used to illustrate the $CBCT_{eLFOV}$ -based IGART workflow in terms of dosimetric and clinical perspective. Moreover, dynamic (rotational) dosimetry specific to CBCT imaging and new practical beam quality index for kV cone beams are also described.

CBCT images yielded incorrect HU values, especially in the regions of high density under high scatter conditions. The dosimetric difference between conventional CT and CBCT was found to be more if CBCT images are directly utilized for dose calculation. CBCT image sets acquired and processed according our protocol found to provide accurate HU values and could therefore be used for dose calculation, including for extended localization of large target volumes. Dosimetric evaluation of the protocol demonstrated that the dual- and multi-scan CBCT fusion and HU modification strategies are reliable and more

practical. The comparable dosimetric outcome observed between conventional CT and $CBCT_{eLFOV}$ validates the use of the latter as a viable alternative for IGART. The standardization of online imaging protocols and incorporation of CBCT imaging dose in the therapeutic plan would facilitate frequent $CBCT_{eLFOV}$ guided adaptive radiotherapy while circumventing the need for re-planning CT.

Ph.D Abstract :3

LINAC Machine Quality Assurance for Volumetric Modulated Arc Therapy

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We developed new LINAC machine quality assurance (QA), which is based on volumetric modulated arc therapy (VMAT). The new machine QA overcomes the shortcomings of current intensity modulated radiation therapy (IMRT) based LINAC machine QA. American Association of Physicists in Medicine (AAPM) task group (TG) 142 report is one of the most used LINAC machine QA guidelines. This report suggested periodic QA of multileaf collimator (MLC) of LINACs that are used for IMRT delivery, because IMRT modulates only MLC movement for beam modulation. However, VMAT modulates beam by simultaneous modulation of MLC movement, gantry movement and dose rate. Machine QA as recommended in other LINAC machine QA guidelines like International Commission on Radiation Units and Measurements (ICRU) report 83, European Society for Radiotherapy and Oncology (ESTRO) booklet 9, Institute of Physics and Engineering in Medicine (IPEM) report 81 (2nd edition) etc. are similar to that in AAPM TG 142 report. Also, in current clinical practice, plan QA for any VMAT treatment plan is performed once before the first treatment session. Such plan QA leaves a chance of missing VMAT delivery error in any VMAT treatment session of the full course of treatment. Though it is ideal to perform plan QA before every treatment day, this is unrealistic because of unbearable workload. Therefore, new machine QA is needed for LINACs such that it can evaluate the LINAC performance in delivering VMAT and it can supplement the requirement of daily plan QA. In this research, we investigated, how to evaluate the short- and medium-term performance of the medical LINAC in delivering real VMAT treatment plans and how daily treatment results are changed by performing QA over the entire treatment period in the case of actual VMAT treatment. Also, the effect of gantry rotation angle on the overall dose difference was evaluated from segmented delivery of full arcs of the VMAT. Based on result of these studies, we developed a treatment plan for QA of medical linear accelerators, dedicated to VMAT delivery. We named this as plan-class specific reference (pcsr) QA plan.

We divided the human body into five anatomical sites that define VMAT plan classes and we selected one real VMAT treatment plan per plan class to adopt VMAT plan in computational human phantom such that it can be used as representative VMAT treatment plan to surrogate the actual treatment plans of the plan class. These five pcsr QA plans was found effective for VMAT QA of the treatment unit. The QA, developed in this research is planned to be used for routine machine QA, while the current IMRT-related QA is performed only once a month as a monthly and the VMAT plan QA is performed only once before the treatment, and. Thus, pcsr QA would be useful to check the daily performance of the LINAC in implementing VMAT plans of different plan class. In this research, we introduced a LINAC machine QA for VMAT. This is the first attempt of this research and some quality management contents have not been done in depth. If in the near future, pcsr QA would be dealt in more detail, we think that the optimal machine quality assurance for VMAT can be achieved.

Introduction and background

A newsletter is a periodical publication containing written information in the form of printed or electronic news concerning of a business or an organization. The newsletter is the main communication medium between organization and to its members and is used to inform readers about news, events, or other information related to a particular organization activities. In the first ExCom meeting of AFOMP 2023-2025, it has resolved and approved the new editorial team and also the new name of the newsletter, AFOMP Pulse. In an effort to make the effective newsletter, the editorial board is working for better content, design and value of the newsletter towards fulfilling the objectives of the organization and member's needs and expectation.

Purpose and Scope

The purpose of this document is to provide the editorial board the written operating procedure manual of the Newsletter of Asia Oceania Federation of organization for Medical Physics (AFOMP) Pulse. The scope of this document is to cover the membership, responsibilities, policies of the meetings, publications, implementation and review of the SOP document.

Membership

The membership of editorial board is constituted as follows:

i. AFOMP Ex-Officio: President
ii. AFOMP Ex-Officio: Secretary-General
iii. Chief Editor
iv. Editor (Scientific)
v. Editor (Educational)
vi. Editor (Professional)
vii. Editor (Technical)

Roles and responsibilities

The Ex-officio Members: AFOMP President & Secretary-General

i. Advisors and Publisher of the newsletter
ii. Establishing editorial board
iii. Provide resources and support for the publications
iv. Oversee the activities of the editorial process
v. Final acceptance and approval before the publication of newsletter

Chief Editor

i. Strategies for developing, planning and improving the content
ii. Final decision of content of the newsletter
iii. Ensure the quality and timely production and publication
iv. Setting and enforcing deadline and managing the editorial work

v. Communication with Officers and Chairs for messages
vi. Arrangement for the advertisement of standing industry partners
vii. Coordinating with Editors and Ex-officio AFOMP for approval
viii. Provide final draft copy to AFOMP Ex-officio members for approval
ix. Report to the President & ExCom of AFOMP
x. Finalise the call to invite articles/materials submission for the next issue of Newsletter (at least two months before the publication date).
xi. Coordinate the documentation system of the editorial board in the AFOMP shared folder

Editor (Scientific)

i. Scientific articles
ii. PhD abstracts
iii. Authors guidelines and formatting
iv. Conduct periodic readership feedback survey
v. Congress Reports of AFOMP and NMOs
vi. Book Reviews
vii. MCQs
viii. Communication with NMOs and their activities
ix. Review the final draft of the newsletter
x. Reporting to the Editorial Board

Editor (Educational)

i. Did you know-Marvellous science in action
ii. Editor's choice- important articles published in AFOMP journals
iii. Education and Training related news
iv. Interview with students and mid-career researchers
v. Connecting for collaborations and networking
vi. Review the final draft of the newsletter
vii. Reporting to the Editorial Board

Editor (Professional)

i. Professional development activities related news
ii. News from IAEA, WHO, ICRP, IRPA, ICTP
iii. News and activities of NMOs
iv. Review the final draft of the newsletter
v. Reporting to the Editorial Board

Editor (Technical)

i. In-house designing of newsletter
ii. Coordinating with Chief Editor for compilation of all content

iii. Short form of newsletter/online magazine
iv. Coordinating the editorial board meetings and minutes
v. Creating and handling email id: Afompulse2023@gmail.com
vi. Coordinating with PRC chair for social media (twitter & Linkedin)
vii. Outreach to members of AFOMP through website
viii. All documentation relevant to Newsletter
ix. Reporting to the Editorial Board

Meeting policy

i. The editorial board meeting will be held two times in the period of one issue of newsletter publication (preparatory and finalization meeting).
ii. In general, this meeting is in the form of electronic online, however, during the congress time the in-person meeting can be arranged.
iii. The minimum attendance should be of 50% members of the board. If the quorum is not met, the meeting should be adjourned for few minutes and the same meeting can be conducted.
iv. The meetings arrangement is the responsibility of the chief editor with consent of the President of AFOMP.
v. The technical Editor with consent of Secretary-General of AFOMP is responsible for setting-up the meetings.
vi. The Technical editor is responsible for communicating with all board members and circulating agenda notice, draft minutes of the meetings and all documentations relevant to the newsletter activities.
vii. The agenda will be circulated a week before the meeting and the draft minutes will be sent to members within a week after the meeting.

Publication policy

i. AFOMP Pulse is an E-newsletter and sends out through emails, website and appropriate social media by the organization.
ii. The first edition of the newsletter is schedule for publication on 01st March and the second edition of the newsletter is schedule for publication on 01st September of the same year.
iii. The size of the scientific article should be limited to maximum 4 pages having calibre format in 12 font sizes with 1.15 spacing.
iv. Industry product advertisement size sale price vary for half page and full page and will be decided by Treasurer and ExCom of AFOMP.
v. The last date for the submission of news, messages, articles and all other items is on 31st January for the first edition and 31st July for the second edition of newsletter in every year.

Implementation and review process

i. The SOP document should be made for effective implementation only after the due approval of editorial board and further approval of ExCom of AFOMP, if desired by ex officio members.
ii. The SOP document will be reviewed by the editorial board once in three years at time of start of new tenure of AFOMP ExCom.
iii. The appointment of the Chief Editor needs the approval of the ExCom on basis of the recommendation of President, AFOMP or through electoral process.

Date approved: 03rd August, 2023

#	Revision Description	Date revised	Date approved	Approved by
1	Revision 1.0	-	03rd August, 2023	AFOMP Excom

Prepared by: Dr.V.Subramani, Chief Editor
Reviewed by: All Editorial Board Members
Approved by: Prof.Eva Bezak, President, AFOMP and ExCom

AFOMP PULSE NEWSLETTER

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(2023-2025)

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Welcome to India: ICMP 2023

ICMP-AOCMP-AMPICON-ISEACOMP 2023

Dear colleagues and friends,

As you are aware, the 25th International Conference on Medical Physics (ICMP-2023) of IOMP, is being jointly organised by IOMP, AMPI, AFOMP and SEAFOMP during 6th to 9th December 2023 at DAE Convention Centre in Mumbai, India. The 23rd AOCMP, the 44th AMPICON and International SEA-COMP (ISEACOMP) are also being organized along with ICMP-2023 (https://www.icmp2023.org). We have received overwhelming response for participation in the conference from all over the globe. The abstracts submitted for presentation in the conference have been evaluated and the communication to the authors are being sent.

We invited proposals for special symposia and received more than 25 proposals from different parts of the world. The special symposia will present the overview of the state-of-the-art as well as highlight the most promising research directions, trends, and challenges in the field of medical physics. In addition, experts of different sub-fields of medical physics are being invited from all over the globe to deliberate on topics of practical and recent interest. The IOMP schools are also being organised. Trade exhibitions and technical presentations by trade representatives have been arranged. Cultural and social programs, as per Indian traditions, have also been organized. In essence, the conference has a lot of ingredients for every participants. We believe that this event will be a memorable mega event of medical physics and your participation is important for the grand success of the conference.

The registration (https://icmp2023.org/Registration.html) with regular registration fee is open till 30th September 2023. Please register before the deadline of the registration period. December is the perfect month for excursion in Mumbai and other parts of India.

Please feel free to contact the conference organising team for any assistance through the emails secretariat@icmp2023.org or icmp2023@gmail.com.

Sunil Dutt Sharma
President, Association of Medical Physicists of India (AMPI)
on behalf of Congress Organizing Committee and Local Organizing Team


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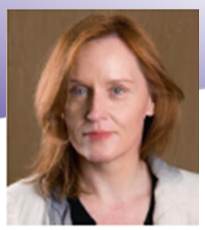

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