SCMPCR
South Asia Centre for Medical Physics and Cancer Research
SCMPCR Newsletter
Quality Education and Health Science for Patient Benefit
Feb 2025/ Volume 7 / Issue 1

Dear Readers

It is a great honor and privilege for me to take over as the Editor-in-Chief of the South Asia Centre for Medical Physics and Cancer Research (SCMPCR) Newsletter. During the short period of its existence for over three years, the newsletter has rightfully carved out a space for itself as a promising platform for all the medical physicists working in this part of the world to showcase their works, research, talent and skills through a variety of publications. It wouldn't be wrong to say that it has truly served as a launching pad for many young scientists in their publication journey.

The present mission of the Editorial Team of the SCMPCR Newsletter is to move ahead steadily and work hard toward achieving the long term goal of converting it into a full-fledged scientific journal. This task is not an easy one and it is certainly not going to happen overnight. Everyone has to contribute, and contribute significantly! We need valuable contributions rich in scientific content, ideas to improvise and constructive criticisms to realize this dream.

I am immensely happy that at this crucial juncture, the Editorial Team has picked me for me this prestigious position. While I feel happy, I also fully understand the responsibilities the position brings with it and I promise to one and all that I would strive my best to contribute along with all others. On behalf of all the current Editorial Board Members, I would like to wholeheartedly thank all the outgoing Members for the standards they have set in for the newsletter over the years.

This exciting issue has a spectrum of scientific contributions from different areas in medical physics: from nuclear medicine to MRI to nano-particles to artificial intelligence applications! I am sure readers would feel happy and be benefited with the rich content in the News and Events section. We have also introduced a new column for young medical physicists and active students: "Take the Challenge", where a challenging question would be posed in every issue. Young readers can send their answers to the Editorial Board. The best answer would find a place in the subsequent issue along with the details of the winner.

I take upon this opportunity to invite all my seniors, fellow colleagues, energetic and enthusiastic young medical physicists to bring out the best in them and make this newsletter a grand success story! It is only through your valuable contributions, we can uplift this newsletter to new level. I also request all of you to get in touch with your friends and colleagues in USA, UK, European nations, Australia, New Zealand inviting them to write timely editorials, interesting review articles and valuable scientific manuscripts.

I look forward for an interesting journey in the coming years!

Tharmarnadar Ganesh, Ph.D, DABR Former Chief Medical Physicist Manipal Hospitals Dwarka, New Delhi – 110075

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Shriram A. Rajurkar, PhD Scholar (DHR-ICMR, SRF),
Department of Radiotherapy, KGMU , UP India.

The South Asia Centre for Medical Physics and Cancer Research (SCMPCR), established on July 3, 2018, is a pioneering initiative aimed at advancing cancer care and education across South Asia. As a project under the Alo Bhubon Trust, SCMPCR addresses the critical gaps in cancer treatment and medical physics within this populous and diverse region, which includes countries such as Bangladesh, India, Bhutan, Maldives, Nepal, Sri Lanka, Pakistan, and Afghanistan. By focusing on education, training, and awareness, SCMPCR aspires to improve health outcomes and empower healthcare professionals to meet the growing demand for high-quality cancer care.

Vision and Mission

SCMPCR envisions a future where South Asia possesses the expertise and infrastructure necessary to deliver world-class cancer treatment and preventive care, aligning its mission with the United Nations Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being) and SDG 4 (Quality Education). To achieve this, SCMPCR focuses on training skilled professionals in medical physics and oncology, fostering awareness about cancer prevention and treatment, and enhancing healthcare infrastructure through innovative research and collaborations. Its objectives include addressing gaps in cancer care standards across South Asia, equipping healthcare providers with advanced knowledge through workshops and e-learning, building a sustainable workforce of trained medical physicists and oncology specialists, organizing public campaigns on cancer prevention and treatment, and establishing support networks to aid the mental and physical well-being of cancer patients and their families.

Current Initiatives

Training and Workshops

SCMPCR conducts internationally accredited training programs, including workshops endorsed by the International Organization of Medical Physics (IOMP) and the European Board for Accreditation in Medical Physics (EBAMP). These hands-on workshops and in-service training sessions are held in collaboration with global institutions, enabling healthcare professionals to enhance their practical skills and knowledge.

E-Learning Programs

The organization's e-learning initiatives, developed in partnership with institutions like Harvard University and the Mannheim Medical Centre, provide accessible and comprehensive training for medical physicists. Since its inception, these programs have reached participants from over 50 countries, making SCMPCR a global leader in online education for cancer care professionals.

Cancer Awareness Campaigns

Recognizing that prevention is key, SCMPCR organizes regular awareness programs targeting communities, schools, and workplaces. These campaigns focus on educating the public about lifestyle changes and early detection techniques that can significantly reduce cancer mortality rates.

Research and Innovation

SCMPCR is actively involved in cutting-edge research, including projects on the application of 3D printing and artificial intelligence in cancer treatment. Collaborating with renowned international institutions, the organization aims to integrate innovative technologies into South Asia's healthcare systems.

Health Education and Community Support

SCMPCR's outreach programs extend to rural and urban areas, promoting healthy living and disease prevention. Additionally, its self-help groups for cancer patients foster peer support and shared experiences, enhancing the quality of life for those battling the disease.

Achievements

Since its establishment, SCMPCR has made significant strides in advancing cancer care in South Asia by training hundreds of healthcare professionals through hands-on workshops and online courses, hosting international conferences and seminars to connect global experts, publishing biannual newsletters to share insights and updates, and initiating community-based programs that have directly benefited thousands of individuals.

Future Goals

SCMPCR aims to expand its impact through several key initiatives, including increasing the frequency and accessibility of training programs such as workshops, webinars, and certifications to reach participants from underrepresented areas. It seeks to strengthen research collaborations by partnering with global institutions to drive innovations in cancer diagnostics and treatment. The organization also envisions building comprehensive cancer centres equipped with advanced technology and skilled professionals to deliver holistic care. Enhancing public engagement through scaled-up awareness campaigns is a priority to emphasize the importance of early detection and preventive measures. Additionally, SCMPCR is committed to empowering local communities by developing localized solutions tailored to the unique challenges faced by different countries in the region.

The organization calls upon individuals, organizations, and governments to join its mission to combat cancer and enhance healthcare standards across the region, emphasizing that participation, collaboration, and support are vital to building a future where quality cancer care is accessible to all.

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Reflections and insights gained from the SCMPCR E-Learning Program (ELP-09) on Brachytherapy Practices for Medical Physicists and Radiation Oncologists - Intracavitary and Interstitial Procedures

By **Ms Shayori Bhattacharjee**
Medical Physicist & Radiological Safety Officer
Assam Medical College & Hospital, India

It is my absolute delight to have witnessed the highly successful E-learning program (ELP-09), 2024 on Brachytherapy Practices for Medical Physicists and Radiation Oncologists, conducted by South Asia Centre for Medical Physics and Cancer Research (SCMPCR). Even more overwhelming is that I feel deeply honoured to have been among the privileged nine moderators selected for this esteemed event.

As an Academic in the field of Medical Physics from India, I am eager to share my thoughts and insights about the E- Learning Program (ELP-09). This Program has not only showcased the centre's commitment to excellence in Medical Physics education but has also demonstrated the power of collaborative learning in the digital age..

As we all aware that Gynaecologic carcinomas, including cervical cancer, present a significant burden on low- and middle-income countries (LMICs). Brachytherapy plays an integral role in the treatment of gynaecologic carcinomas, as it is essential for both curative and palliative treatment. Brachytherapy delivers almost half the target dose while relatively sparing the normal tissues compared to external beam therapy. Not only is brachytherapy an essential component of the treatment of cervical carcinoma but also precise well-timed delivery is vital for tumour eradication. However, there are numerous geographic and economic barriers for providing brachytherapy to cancer patients in LMICs.

According to the World Health Organization (WHO) 528,000 women are diagnosed each year with cervical carcinoma and 266,000 women succumb to the disease each year, 90% of them in low- to middle-income countries.[1] In these areas the incidence: mortality ratio exceeds 50% which is the equivalent to 1 life lost every 2 minutes. Even more alarming is that although incidence and death rates are decreasing in high-income countries, cervical cancer deaths are projected to increase by 25% over the next 10 years in low-income countries. The highest rates are in Central and Southern America, East Africa, South and Southeast Asia, and the Western Pacific.

Recent advances in radiation technologies have opened the field to new and promising radiation strategies. However, Training is a critical and often neglected step in implementing such new technology. Most of the errors in brachytherapy treatment delivery are the result of human error, miscommunications, or misunderstanding of equipment operation rather than failure of devices. Therefore, it is imperative that all members of the brachytherapy team are adequately trained. Brachytherapy personnel team training, including problem-oriented/practical learning initiatives and development of standard operating procedures and roadmaps for successful implementation of brachytherapy program is vital.

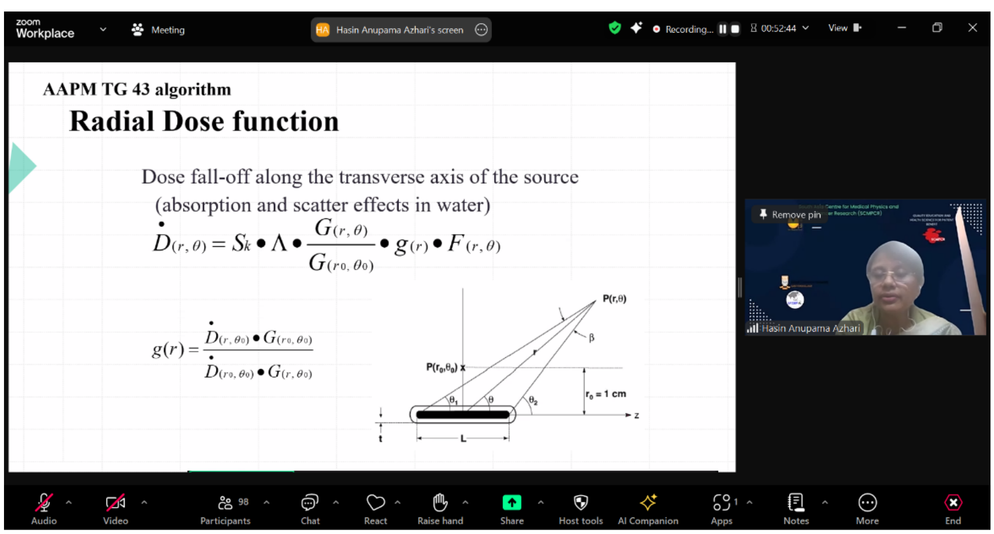
Recognizing this imperative and to acquaint adequate Theoretical and Practical Knowledge on Brachytherapy Practices, SCMPCR despite physical limitations has created a virtual gateway for Medical Physics education through its E-learning Program (ELP-09) on critical topic **"Brachytherapy Practices for Medical Physicists and Radiation Oncologists - Intracavitary and Interstitial Procedures"** was from November 1st , 2024 to November 22nd , 2024 to enriched with the knowledge and skills in order to move towards efficient techniques and utilize in the clinic for improved cancer treatment. This course included a series of lectures on the specific discipline on Brachytherapy and its recent developments followed by group discussions, and online examinations.

Experienced International faculties from various regions of the world generously shared their expertise and insights in this program. More than 100 participants has been joined to this program from different nations. As the accreditation and certification of Medical physicists are essential for producing a qualified medical physicist (QMP), Keeping this under consideration, SCMPCR E-learning program (ELP-09) provided the participants with 16 continuous professional development (CPD) credits points **accredited by the International Organization for Medical Physics (IOMP).**

On 1st November, 2024, the E-learning session has started with a keynote address delivered by a visionary Leader Prof. Dr Golam Abu Zakaria, the Chairman of SCMPCR, setting the tone for the event, speaking about the importance of E-learning programs along with addressing the pressing challenges facing by the Medical Physics Society and reaffirming the belief in the transformative potential to shape a more sustainable and equitable world. In the following paragraphs, I will reflect on my experiences thereby highlighting the programs strengths, challenges and key takeaways

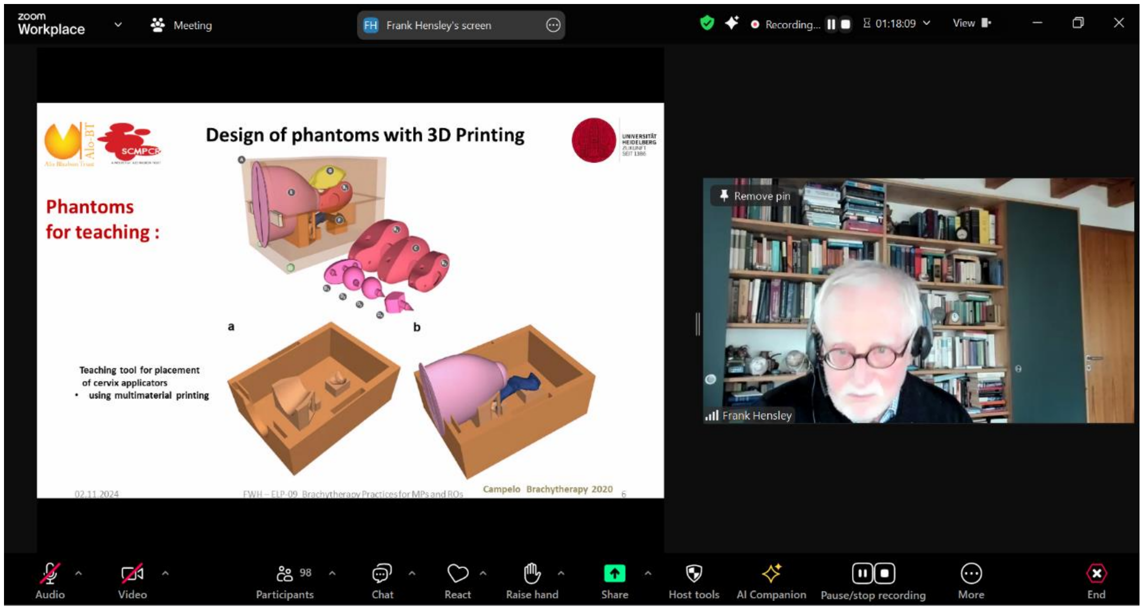
Key topics Covered:

Lecture 1: The very first lecture of the session was being delivered on 1st Nov, 2024 by renowned **Prof. Dr. Hasin Anupama Azhari**, Director of SCMPCR and Professor at Centre for Biomedical Science and Engineering, United International University, Bangladesh on the topic **"Introduction of Dosimetric terms & Quantities for Brachytherapy Procedure"** covering the basics of Brachytherapy and its quantities, TG-43 Dose calculation protocols, 3D Dosimetry and its Uncertainties, QA in accurate dose delivery and patient safety that provides a structured methodology to optimize patient safety and treatment outcomes thereby mitigating errors in the workflow.

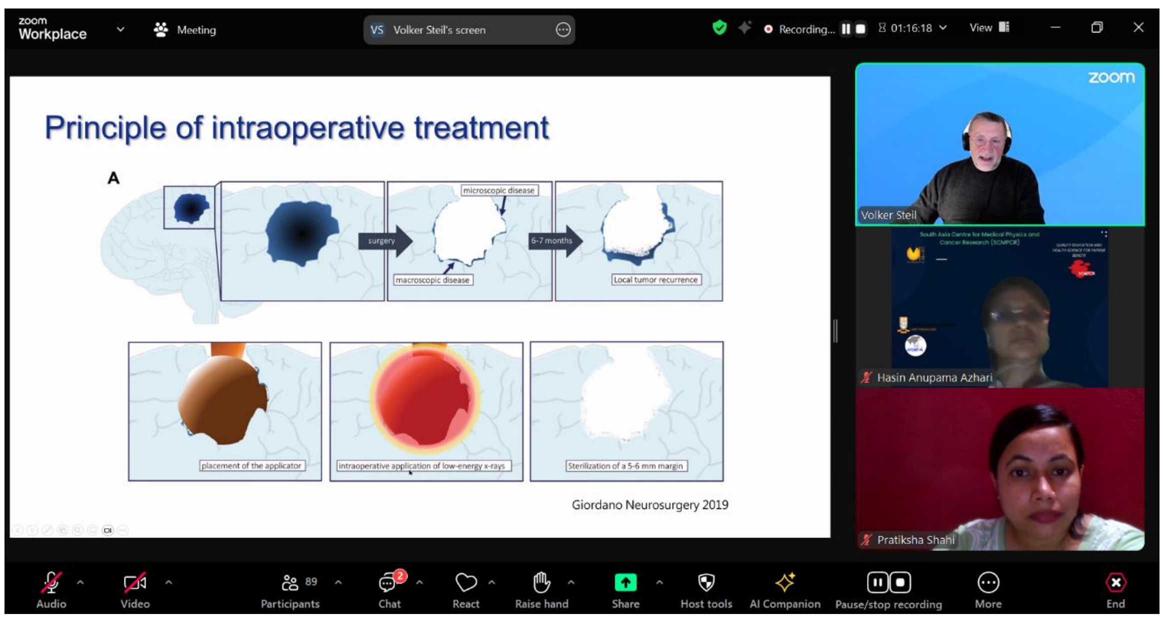


Lecture 2: The second lecture was focused on **"Advanced Technique in Brachytherapy"** by **Dr Frank W Hensley**, Retired Medical Physicist from University of Heidelberg on 2nd Nov, 2024, provided an insightful presentation and shedding light on techniques such as combination Intracavitary and interstitial (Hybrid Applicator), Design of individual applicators with 3D Printing, Directionally Modulated Brachytherapy and

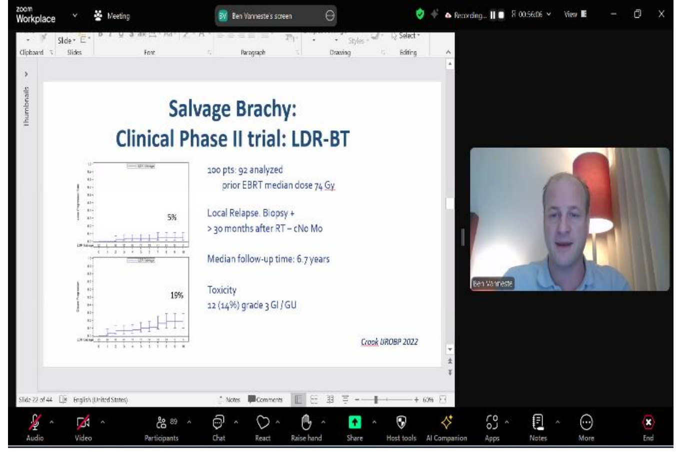
Electromagnetic Tracking in Brachytherapy. The integration of advanced modalities further enhances treatment efficacy.



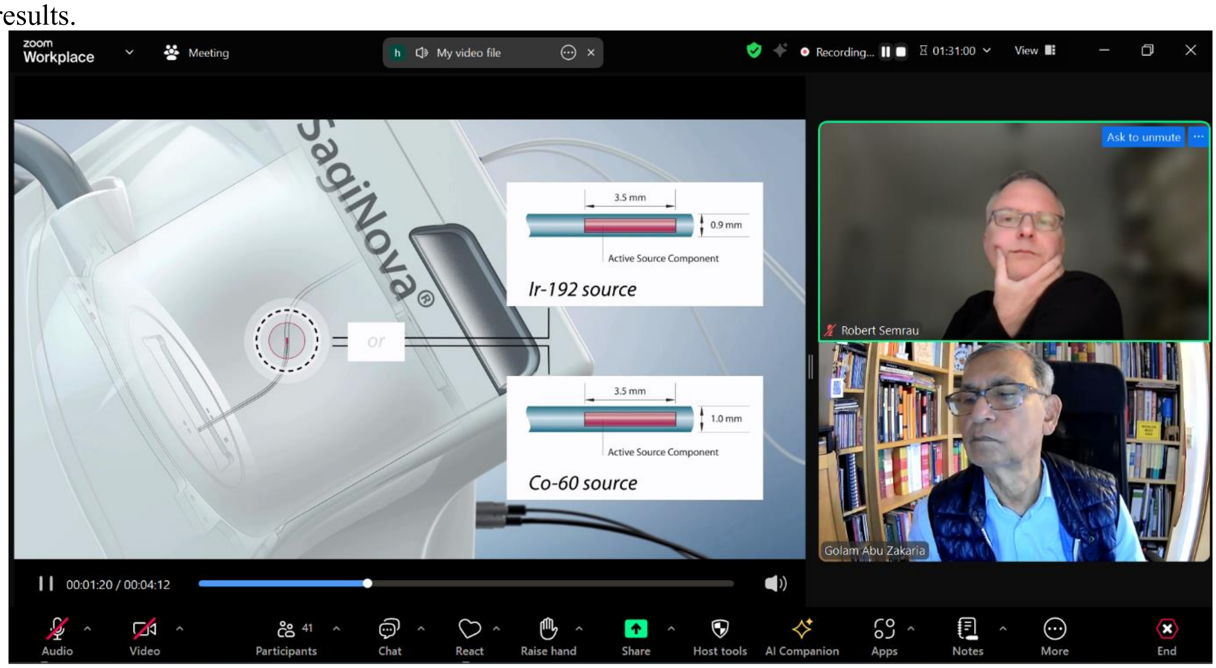
Lecture 3: The third lecture of the session explored on **"Electronic Brachytherapy: Physical Basics and Medical Applications"** by **Dipl-Ing, Volker Steil,** Former Chief Medical Physicist at University Medical Centre, Mannheim on 3rd Nov, 2024 highlighting the advancements in Intraoperative Irradiation with Brachytherapy, Treatment planning System like Kypho IORT and also discuss elaborately about IORT for Brain metastases.



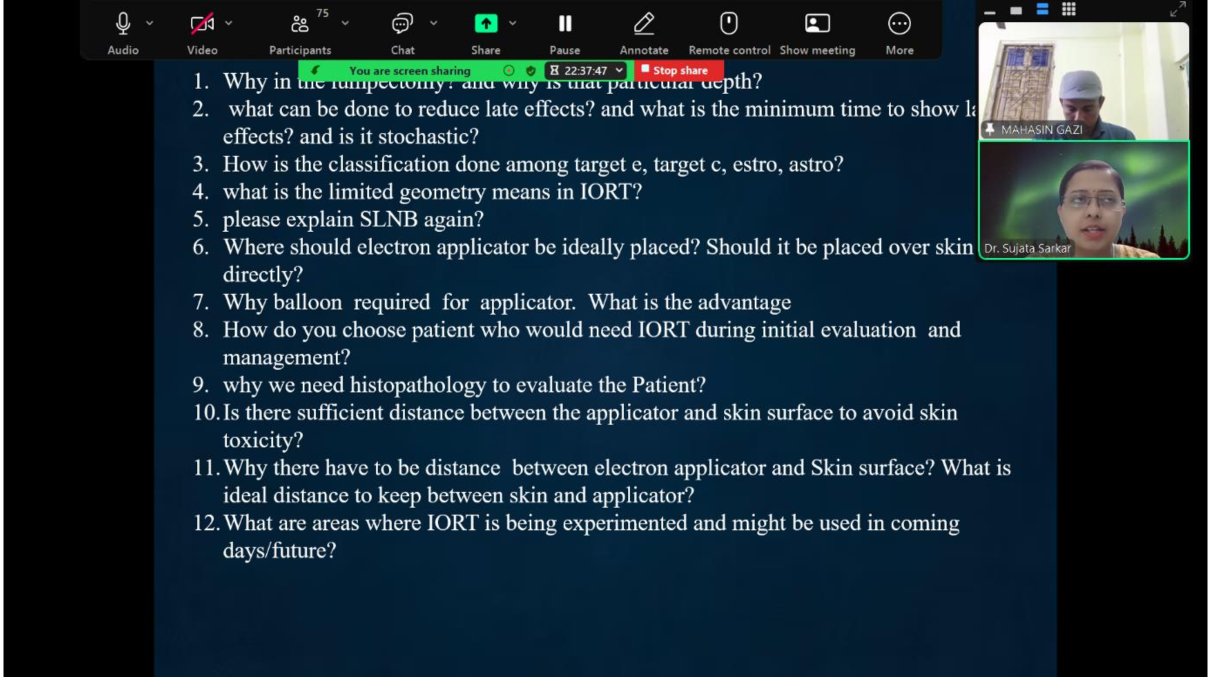
Lecture 4: The fourth lecture of the session delved into the **"Prostate Brachytherapy"** by **Dr Ben Vanneste**, Radiation Oncologist at UZ Ghent, Belgium on 8th Nov, 2024 shared his valuable expertise on Brachytherapy procedure, indications and its clinical results. Overall, this lecture provided valuable insights about the landscape of Prostate Brachytherapy and highlighted the potential to enhance the treatment quality and outcomes.



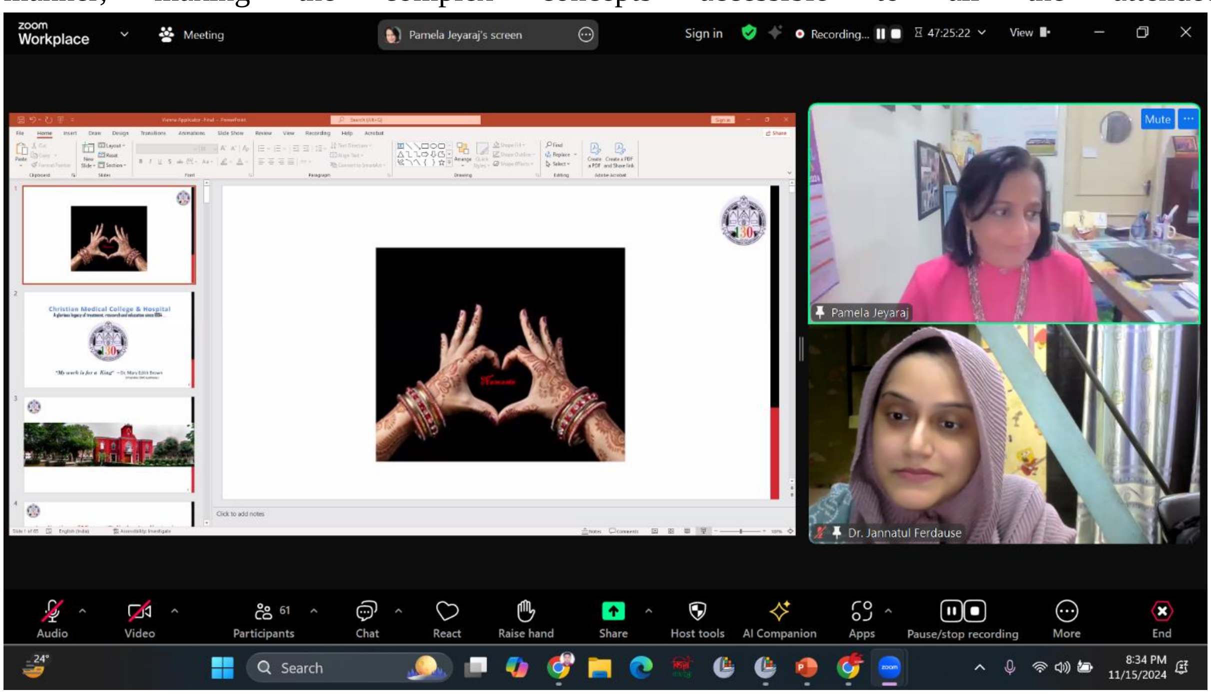
Lecture 5: The fifth lecture of the session provided insights into **"Brachytherapy in Gynaecological Cancer Treatment"** on 10th Nov, 2024 by **Dr Robert Semrau** from Strahlen therapie Bonn-Rhein-Sieg, Germany. The lecture has basically started with the classification of both cervical cancer as well as the Endometrium cancer, treatment methodologies along with chemotherapy and challenges associated with it. Also discussed about the different brachytherapy applicators like Ring tandem, Hybrid applicators for both interstitial and intracavitary ensuring accuracy and safety in delivering radiation, thereby offering thorough knowledge for improved precision. Moreover, the presentation showcased the initial clinical results.



Lecture 6: The sixth lecture of the session was focused on **"Intraoperative Breast Brachytherapy: Implementation and Clinical Considerations"** on 12th Nov, 2024 by **Dr Sujata Sarkar**, Radiation Oncologist and **Mr. Mahasin Gazi,** Medical Physicist from Apollo Hospital, India. The lecture has provided a comprehensive overview of IORT, Clinical procedure, surgical techniques, forward and inverse technique of dose optimization and has also explained on its applications as well as advantages in modern radiotherapy practice for accurate delivery.

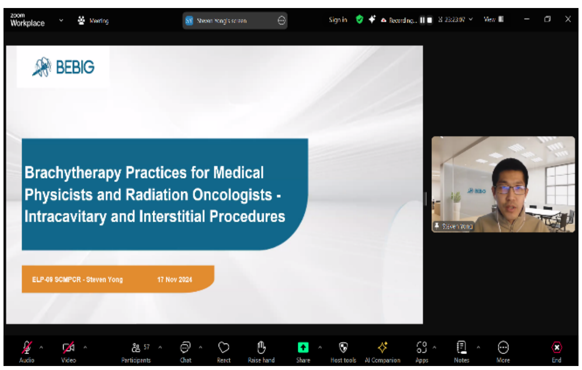


Lecture 7: The seventh lecture of the session explored on **"Application of Vienna/Cylinder applicator in Gynaecological Brachytherapy"** delivered on 15th Nov, 2024 by **Dr Pamela Alice Jeyaraj**, Prof and Head in Christian Medical College, India. The session was thoroughly informative and engaging. The speaker provided comprehensive overview on evolution of Brachytherapy applicators and adeptly outlined the different templates of Interstitial Brachytherapy, Syed-Niblett Template, MUPIT, image guided Brachytherapy and Vienna applicator highlighting how these applicators can be utilized to allow for precise targeting of tumours. Moreover, the technical requirements were explained in a clear and understandable manner, making the complex concepts accessible to all the attendees.



Lecture 8: The eighth lecture of the session was on **"MRI Based adoptive Gynaecological Brachytherapy"** presented by **Dr Raju Srivastava**, Medical Physicist, University Hospital of Ghent, Belgium on 16th Nov, 2024 was informative and impactful. The presenter adeptly navigated through the Target volume Concept, Applicator selection - its capabilities and the advantages offers in Brachytherapy Treatment. The lecture effectively communicated the ICRU 89/GEC-ESTRO recommendation along with some case presentation which allows for precise dose delivery. Through detailed case studies and data analysis, the attendees gained valuable insights into the practical applications and benefits.

Lecture 9: The ninth lecture of the session was being delivered on the topic **"Brachytherapy-Interstitial and intercavitary procedures"** by Industrial Partners both **BEBIG AND VARIAN** on 17th Nov, 2024 provided a comprehensive overview of different the HDR products, Brachytherapy CT/MR Applicator portfolio, Brachytherapy software's, Treatment Planning Systems and detailing the steps involved and the challenges encountered. Overall, the lecture served a compelling testament to the significance of Brachytherapy procedures in modern radiotherapy practice.



As a participant, I had a great privilege of participating in the SCMPCR E-learning program (ELP-09) 2024, which offered a comprehensive exploration of Brachytherapy principles, specifically tailored for precision radiotherapy techniques. The program's theoretical sessions provided an in-depth examination of Brachytherapy processes, covering both conceptual and practical aspects.

This experience has been invaluable. Each moment of the program contributed significantly to my professional growth, and I appreciate the opportunity to reflect on the knowledge and expertise gained through this enriching experience. As reviewer, it's evident that the knowledge and skills gained here will not only enhance our individual capabilities but also empower us to drive positive change within our respective field.

In conclusion of this comprehensive report, I would like to express my sincere gratitude to all the esteemed facilitators and the faculty members for sharing their expertise, guidance, and insights throughout the program. A special thanks to all the co-ordinators especially for Prof. Dr Golam Abu Zakaria, Prof. Dr Hasin Anupama Azhari, Md. Anwarul Islam and other associated members for their tireless efforts, their passion and undying spirit, whose generous support made this E-learning program possible.

Your commitment to professional Development and education is deeply appreciated and has had significant impact on the success of this event. This initiative has demonstrated its commitment to community to enhance accessibility and engagement within the community. Significant efforts are being made to combat the global disparity in access to brachytherapy. International initiatives have been established to provide training and expertise to professionals in LMICs. It is essential to maintain these relationships and continually assess the shifting needs in cancer treatment. Although major human and financial resources are ultimately needed to solve these disparities, these efforts begin at the local level, both here and abroad.

As wrapping up, I want to extend my deepest appreciation to Prof. Dr Hasin Anupama Azhari madam for this incredible opportunity to share my insights and perspectives about the SCMPCR E-learning Program (ELP-09), 2024. This opportunity not only allows me to reflect on my own journey and learnings but also reinforces the importance of collaboration and knowledge sharing within our professional community. As we continue our journey of professional development, looking forward to being part of this community in future again.

South Asia Centre for Medical Physics and Cancer Research

SCMPCR **Newsletter**

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SCMPCR HW-08 at BPKMCH: A true blend of learning opportunity and exploring the eternal beauty of Chitwan, Nepal

Surendra Bahadur Chand[1], Ranjanbhakta Bhandari[1], Shivji Poudel[1], Suresh Poudel[1], Hasin Anupama Azhari[2], Golam Abu Zakaria[2]

BP Koirala Memorial Cancer Hospital, Bharatpur, Chitwan

South Asia Center for Medical Physics and Cancer Research, Dhaka, Bangladesh

This time SCMPCR hands-on workshop (SCMPCR-HW08) is going to be held between 13th to 16th March, 2025 at BP Koirala Memorial Cancer Hospital (BPKMCH), Bharatpur, Chitwan, Nepal. BPKMCH is excited to host and welcome both international and national participants and trainers for the program. The title of the workshop is **"Clinical Implementation of SRS, SRT and SBRT for Medical Physicists and Radiation Oncologists".** The training will offer a unique blend of scientific activities and touristic pleasure together. The program is the result extensive collaborative efforts between BPKMCH and South Asia Center for Medical Physics and Cancer Research (SCMPCR), Dhaka, Bangladesh.

Hands-on Workshop of the South Asia Centre for Medical Physics and Cancer Research (SCMPCR) in Collaboration with B. P. Koirala Memorial Cancer Hospital, Chitwan, Nepal

SCMPCR HW 08: Clinical Implementation of SRS, SRT and SBRT for Medical Physicists and Radiation Oncologists

13 to 16 March 2025

Program Schedule

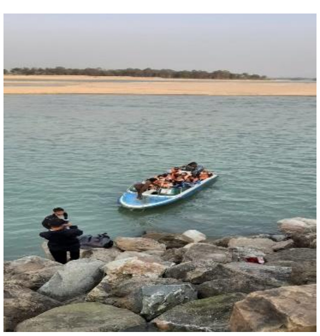
Time (Nepal Time)	Event	Speaker
Day 1: Thursday, 13 March 2025 (Hall Room, Room No, B.P. Koirala Memorial Cancer Hospital)		
08:30-9:00	Registration	
09:00-10:00	Inauguration	
10:00-10:30	Hi Tea	
10:30-11:30	Introduction of SRS, SRT and SBRT Treatment	Dr. Raju Srivastava Belgium
11:30-12:00	Imaging modalities, Image registration and Pitfalls	Dr. Robert Semrau Germany
12:00-12:30	Radiobiological Challenges in SRS, SRT and SBRT	Dr. S. Ghosh Laskar India
12:30-13:30	Lunch Break	
13:30-14:30	4D CT Scanning and RGSC for Advanced Treatment Planning	MP from Varian (specialized on CT sim)
14:30-15:30	Hypofractionation for prostate cancer (Online)	Prof. Dr. Luca Incrocci, MD PhD Netherland
15:30-16:30	Hypofractionation for breast cancer (Online)	Dr. Janine Simons, MD PhD Netherland
Day 2: Friday, 14 March 2025 (Hall Room, Room No, B.P. Koirala Memorial Cancer Hospital)		
09:00-10:00	Introductory Head and Neck Contouring Delineation for SRS, SRT and SBRT Cases and associated issues	Dr. S. Ghosh Laskar India
10:00-11:00	Physics Quality Assurance based on international protocols/guidelines and practices Patient Specific Quality Assurance for SRS, SRT and SBRT	Prof. Dr. Golam Abu Zakaria SCMPCR Dr. Raju Srivastava Belgium
11:00-11:30	Coffee Break	
11:30-12:30	Discussing Impact of Contouring on Quality of Treatment Plans	Dr. Robert Semrau Germany
12:30-13:30	Plan Evaluation and Clinical Protocols in relation to SRS, SRT and SBRT (Online)	Dr Beury (RO), Switzerland

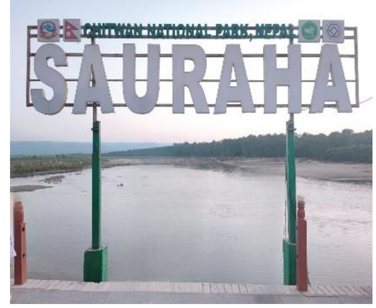
BPKMCH is named after the great Nepalese politician who was able to articulate ambitious political programs and inspire the masses, and who had the ideological clarity, personal integrity and vision to reshape the economy of the nation. It was established with the goals to prevent cancer, diagnose and treat people suffering from this dreaded disease by providing high-quality health services to enable them to lead a good quality life; for conducting high-level research studies on cancer and preparing the necessary manpower to achieve self-reliance in this field; to develop systems that are not adverse to international recognition and practices in relation to the use, accumulation, displacement of radioactive materials for the prevention, diagnosis and treatment of cancer and other protective measures including equipment operation procedures used in that work; for conducting National Cancer Control Program.



BPKMCH is the apostle of cancer care and is the largest government funded comprehensive cancer hospital in the country. Department of Radiation Oncology is the heart of the hospital, served by seven radiation oncologists, six medical physicists, thirteen RT technicians and two onco-nurses. The department has three medical linear accelerators (Varian Truebeam, Clinac iX and 600 C/D), a HDR brachytherapy unit and a CT simulator. It offers a range of treatment services like 3D conformal radiotherapy, IMRT, VMAT and Image Guided Radiotherapy. Currently, it is treating more than 200 patients a month. Our staff members are trained in different countries and dedicated to patient services. We are fortunate to have an executive director - Dr. Shivji Poudel, who belongs to our department and is a radiation oncologist. Currently Dr. Ranjanbhakta Bhandari is the head of the department, and Mr. Surendra Bahadur Chand, Assistant Chief Medical Physicist and RSO is leading the medical physics team.

As of now, BPKMCH hosted different national and international level seminar and conferences, and has praiseworthy amenity and ambiences. Additionally, Chitwan is best known for its natural beauty- mountain ranges clearly visible from the hospital, Narayani River flowing along one side of the city. One can do motor boat ride in Narayani River, enjoy cable car ride to Maulakalika temple on the same day, and enjoy elephant/jeep safari into the national park on another day. If you are fond of mountain biking along the jungle, that is also possible at affordable prices. Royal Chitwan National Park, the oldest national park of the country, is just 15 Kms away from our hospital. If you want to feel a spiritual essence, Devghatdham is just few kms away from our hospital. Other important places to visit are Twenty-thousand lake (Local name: Bishazari taal), and Diyalo Bangala Museum. Bharatpur has made its fame as a medical hub in the country. Bhatbhateni supermarket and other local markets will ensure the availability of items you need during your stay in the town.





Moreover, SCMPCR, under the leadership of Prof. Dr. Golam Abu Zakaria and management under Prof. Dr. Hasin Anupama Azhari, has made its place as a successful organization for organizing various scientific activities: e-learning program, hands-on workshops on regular basis etc. It has gathered wide appreciation from different societies and organization for its causes. As SCMPCR is taking off its activities beyond Bangladesh, it showed its diligence of organizing hands-on training (SCMPCR-HW07) beyond Bangladesh on February, 2024 at Saroj Gupta Cancer Hospital, Thakurpur, Kolkata, India. The event had a true international flavor with participants from South Asia, and training from Germany, India, Bangladesh and Belgium. The event was covered by the Times of India with words of appreciation. This time SCMPCR HW-08, with no doubt will have more interesting program and hands-on workshop series at the lap of Himalayas, at Bharatpur, Chitwan, Nepal.

Furthermore, it is praiseworthy that PTW Germany has supported SCMPCR in various ways. And SCMPCR is glad that PTW featured last hands-on workshop (SCMPCR HW-07) activities on its official webpage and also incorporated in its yearly calendar. Each year PTW publishes SCMPCR news to encourage the later to achieve its goals. PTW has stood as a great partner of SCMPCR at all times, and has extended its arms to support SCMPCR HW-08, by providing tools for practical purposes and an expert for training.

Overall, it will be a great scientific event with immense pleasure for the delegates. And BPKMCH is eager to welcome the delegates and trainers to make the event a great success. Meantime, SCMPCR will have wonderful experience to work hand-in-hand with BPKMCH for the success of the event.

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A Milestone Experience: Moderating the SCMPCR E-learning Program on Brachytherapy Practices

Ms. Pratiksha Shahi
Medical Physicist
BPKMCH, Nepal

The South Asian Centre for Medical Physics and Cancer Research (SCMPCR) is an autonomous, non-profit organization under the Alo Bhubon Trust (ABT), guided by its board of trustees. Bringing together philanthropic professionals worldwide, particularly from South Asia, SCMPCR collaborates on various projects through a unified platform and seeks support from multiple sources to fulfil its mission. The organization is dedicated to advancing cancer care in South Asia by sharing scientific and technical knowledge, fostering education and professional growth, and promoting the highest standards of medical services for patients. SCMPCR conducts diverse programs like e-learning courses including conferences, workshops, cancer awareness campaigns, health screenings, and specialized training for cancer care professionals. It also supports cancer patient self-help groups and publishes newsletters highlighting its activities and contributions to cancer care in the region.

Since 2020, SCMPCR has successfully conducted several accredited E-Learning Programs (ELP), featuring expert speakers and comprehensive sessions that include lectures, discussions, online examinations, and evaluations. These programs have attracted participants from around the world, fostering global engagement and knowledge sharing.

In 2024, SCMPCR proudly completed its 9th E-Learning Program, reinforcing its commitment to continuous education and professional growth. Through these regular e-learning initiatives, SCMPCR provides invaluable opportunities for students and early-career professionals to enhance their understanding and skills. Programs like ELP-09 play a vital role in bridging the gap between theory and practice, offering access to global expertise and the latest advancements in medical physics and oncology.

The E-learning Program (ELP-09) on Brachytherapy Practices for Medical Physicists and Radiation Oncologists, organized by the South Asia Centre for Medical Physics and Cancer Research (SCMPCR), was an exemplary initiative that was between 1st November – 22nd November 2024, with a total of 16 credit points brought together 101 participants, 10 expert speakers, and 9 moderators from many countries from worldwide This program served as a vital platform for advancing knowledge and fostering collaboration in brachytherapy practices, a critical area in cancer treatment.

This year, I had the privilege of serving as a moderator for the first time, which was a truly rewarding experience. My specific session focused on the topic "Electronic Brachytherapy: Physical Basics and Medical Applications" with Dipl.-Ing. Volker Steil (MP) from Germany. Mr. Steil, a former Medical Physicist at the Department of Radiation Oncology, University Hospital Heidelberg, Germany, shared invaluable insights into the fundamentals and clinical applications of electronic brachytherapy.

Moderating this session was an incredible learning opportunity that came with tons of responsibilities. As I prepared to moderate for the first time, excitement blended with uncertainty and self-doubt. I constantly questioned my abilities, fearing mistakes and imagining all that could go wrong, especially speaking in front of a global audience. The thought of technical glitches, like internet failures or microphone issues, only added to my anxiety. The responsibility of ensuring a smooth experience for both participants and speakers felt overwhelming.

Despite these fears, I reminded myself of the program's significance and the trust SCMPCR had placed in me. I prepared thoroughly—rehearsing, familiarizing myself with the topic, and checking the technical setup. Gradually, my nervous energy shifted into determination to give my best.

It was a valuable experience to guide a discussion led by such an expert, ensuring everything ran smoothly and engaging with participants from different backgrounds. The exchange of ideas and the participants' curiosity highlighted the importance of global collaboration and shared learning in improving medical practices.

I am deeply grateful to SCMPCR for entrusting me with this responsibility. This first-time opportunity not only allowed me to contribute to a meaningful initiative but also helped me enhance my professional skills and build confidence. The positive feedback from participants in the program's evaluation reflects its impact and effectiveness. The success of the program stands as a testament to the dedication and collaboration of everyone involved—participants, speakers, and organizers alike.

Programs like ELP-09 are not just about advancing technical knowledge; they also inspire professionals and students to pursue excellence and innovation in patient care. I look forward to being part of more such initiatives and contributing to the global community of medical physicists and oncologists working towards a common goal.

Reflecting on the experience now, I feel a deep sense of accomplishment. Facing my mental dilemma head-on not only helped me grow but also gave me the courage to embrace future challenges with greater confidence. This experience has been a milestone in my journey, and I am excited to see how it will shape my contributions to the field in the future.

Why Medical Physicists in Artificial Intelligence?

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Artificial intelligence (AI), the wide spectrum of technologies aiming to give machines or computers the ability to perform human-like cognitive functions, began in the 40s with the first abstract models of intelligent machines. Later it slowly began with being applied to imaging. Machine learning (ML), the branch of AI that involves algorithms capable of recognizing patterns in medical images, can analyze voxel intensity values or quantitative imaging features, also known as "radiomic features," to determine the optimal combination of these features and develop a model for classification or regression.
Deep learning (DL) is a subset of ML that relies on neural networks with numerous deep layers. These networks, often comprising hundreds of layers, progressively learn to identify increasingly complex features from an image. DL can be applied to tasks such as regression, classification, segmentation, and image registration. Various DL architectures offer exceptional flexibility in extracting information form images or other data types, often surpassing human performance.
Due to this flexibility of architecture, artificial intelligence is revolutionizing radiotherapy and radiodiagnostics. AI has achieved physician-level accuracy in a broad variety of diagnostic tasks, including image recognition, segmentation, and generation [1], modelling of response (tumor control, side effects), image guidance, motion tracking, and quality assurance in radiation oncology [2]. Additionally, it can be applied to analyse time series, prioritizing radiation oncology cases by improving workflows, and personalizing care by enhancing treatment decisions.

Currently artificial intelligence is continuously developing also due to the availability of Open Source and Free Libraries like PyTorch (wwwpytorch.org), which can be run on Python distributions (www.python.org), a high-level and easy-to-learn language. At the same time an increasing trend within the research community to make codes and data publicly available, enhanced collaboration and innovation. The advent of graphics processing units (GPUs) and cloud computing has also provided the substantial computational power necessary to train DL models on large datasets. Another critical driver is the availability of public medical databases such as the Cancer Imaging Archive (www.cancerimagingarchive.net) offering data to train and validate new DL models.

In spite of their continuous advance, AI tools are prone to risks as beautifully reviewed by Challen et al [3]. One of the first of these risks is AI can perpetuate or exacerbate existing biases in the data it is trained on, leading to unfair or discriminatory outcomes that it does not "understand" as problematic. Another risk arises from discrepancies between the training data used to develop the algorithm and actual patient data. This issue, known as input data shift, occurs when changes in patient or disease characteristics, or technical parameters (such as treatment management or imaging acquisition protocols) over time or across locations, impact the accuracy of AI. Other known issues involve the insensitivity to impact of AI, meaning that

AI systems may treat all possible errors equally. In breast cancer screening, this can result in an AI classifying a dubious image as lesion-free, where missing a malignant tumor (false negative) has much more severe consequences than incorrectly identifying a benign lesion as malignant (false positive).

Additionally, AI poses data management and cybersecurity challenges. In conclusion, Implementing AI requires effective risk management, as well as a comprehensive quality assurance program and quality management system.

Medical physicists can apply their technical, numerical, and didactic orientation in the safe and effective application of AI in medicine [4]. The technical skills involve knowing the physical processes at the root of contrast in images and dose deposition in radiotherapy as well as understanding the underlying technology. Also, they possess a number of numerical skills, such as mathematical statistical modelling but also quantitative analysis of images, useful in following the complex behaviour of DL an ML models applied to healthcare data. Finally, they are excellent communicators and divulgators of science.

The main tasks of the medical physicists in AI in radiation medicine and diagnosis include supervising the system installation, ensuring acceptance test before clinical use and provide quality checks at every system upgrade [5]. Moreover, medical physicists should also participate in risk management of the AI tools.

Physical and digital phantoms could also be used to periodically verify the performances of image-based ML algorithms. Physical phantoms could be a 3D printed realistic phantoms simulating a patient with a lung lesion, which can also investigate the dependence of AI from the imaging device used, acquisition modality and image reconstruction algorithms[1].

Digital phantoms, however, are usually representative scans of patients with known acquisition parameters. In contexts where it is necessary to simulate patient variability, such as in a computer-aided detection/diagnosis (CAD) system, a small retrospective cohort of patients representative of the clinical tasks may be used for validation. For example, this cohort can be employed to compare the AI system's outcomes—whether they involve segmentation, classification, or prognosis—with the expected results provided by expert clinicians. Therefore, the collaboration with the medical professional is essential, and it is crucial that the medical physicists participate in the multidisciplinary team of professional involved in AI.

Given their didactic capabilities, medical physicists can participate in educating and training other healthcare professionals in the use of AI. This is of utmost importance as AI-based tools are still perceived as a black box, due to their low level of interpretability. Medical physicist can facilitate interpretability by monitoring AI performance, testing the models in well-known situations, as well as getting and explaining the relevant information on the models used, e.g. the models used, their architecture and field of use. Risk management is also an important aspect of medical physicists' duties. An approach to risk management is, for instance, failure modes and effect analysis, which could consist in investigating possible errors in the automated workflow made possible by AI, such as operator errors and automation biases [6]. In AI research, medical physicists play a vital role in collecting and aggregating data for training AI models. Their involvement is essential for ensuring high-quality data, preventing the "garbage in, garbage out" problem where poor data quality leads to poor model performance.

As medical physicists are at the forefront of safely integrating artificial intelligence into healthcare, the curriculum of the medical physicists need to be updated to include the scientific background of AI. Moreover, they need to be familiar with the regulations pertaining to AI, such as though on medical devices and data protection [7]. Within the European Union (EU), the regulatory framework for medical devices in the is defined by European Medical Devices Regulation 2017/745, and the General Data Protection Regulation (EU) 2016/679 (GDPR), but the EU has also proposed "The Artificial Intelligence Act (AI Act)", with the objective of instituting a unified regulatory and legal structure for AI. The International Agency for Atomic Energy (IAEA) released a new guidance document also endorsed by the American Association of Physicists in Medicine (AAPM), It offers detailed guidance on the necessary competencies, outlines an elective module for postgraduate academic programs, and suggests ongoing professional development activities.

Similar efforts have been made by scientific societies such as European Federation of Organizations for Medical Physics (EFOMP), who developed an updated curriculum [8]. The Italian Association of Medical Physics (AIFM) has created the AI for Medical Physics (AI4MP) task group. Both ESTRO and EFOMP have recently established the permanent Special Interest Groups (SIG) on AI.
In conclusion, the involvement of medical physicists ensures the safe and effective use of AI in clinical settings, while also fostering improved communication, collaboration, and knowledge sharing with other healthcare professionals engaged with AI.

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Radiopharmaceutical Therapy: Is It Ready for Prime Time?

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The use of radioactive materials in medicine dates to the discovery of Radium (Ra) by Marie and Pierre Curie in 1898. In 1934, Irene and Pierre Joliot-Curie demonstrated that stable elements could be made radioactive by exposing them to highly radioactive sources that emit alpha particles or neutrons. Around the same time, Ernest O. Lawrence's invention of the cyclotron enabled the production of radioactive isotopes by altering the nuclei of stable elements. In the 1940s, Dr. Saul Hertz at Massachusetts General Hospital, who, along with Robley Evans, demonstrated the therapeutic application of Iodine-131 (^{131}I) and its ability to target the thyroid gland, which was a significant milestone in radiopharmaceutical therapy (RPT).

Despite its long history, RPT has only recently gained larger attention outside of nuclear medicine departments. This shift in attention is mainly driven by breakthroughs in the recent decade, including a few significant approvals by The United States Food and Drug Administration (FDA).

- Radium-223 (^{223}Ra)-dichloride (Xofigo^{TM}): Approved for the treatment of metastatic castration-resistant prostate cancer (mCRPC) with symptomatic bone metastases marked a key moment in targeted alpha therapies (TATs). Xofigo demonstrated a 30% reduction in the risk of death and significant prolongation of overall survival (OS) in the ALSYMPCA trials. It also provided symptomatic relief by reducing skeletal-related events (SREs), a routine complication in bone metastases.
- Lutetium-177 (^{177}Lu)-DOTATATE (Lutathera™): Approved based on Phase 3 NETTER-1 and NETTER-2 trials, which demonstrated substantial improvements in progression-free survival (PFS) for patients with somatostatin receptor (SSTR)-expressing neuroendocrine tumors (NETs).
- Lutetium-177 (^{177}Lu)-PSMA-617 (Pluvicto™): Approved following the VISION trial, which showed significant gains in OS and PFS for patients with prostate-specific membrane antigen (PSMA)-expressing mCRPC.

These successes have spurred a surge of interest in developing new radiopharmaceuticals (RPs) targeting a broader range of cancer types.

Radiotheranostics:

The concept of theranostics, combining diagnostics and therapeutics, originated nearly a century ago with RPs used to image and treat cancer. Marie Curie foreshadowed this approach in 1921, believing Ra could cure deeply rooted cancer. In 1998, John Funkhouser coined the term "theranostics" to describe strategies linking diagnostics with targeted therapies. Over the past decade, radiotheranostics has revolutionized cancer treatment, particularly for prostate cancer and neuroendocrine tumors, establishing itself as the standard of care in specific cases. Radiotheranostics stands out as the only theranostic category to achieve routine clinical application. It combines radionuclide imaging (RNI) and therapy, one such example is Iodine-123 (^{123}I) for imaging and Iodine-131 (^{131}I) for therapy.

RPs consist of distinct structural components, such as, Targeting Entities: molecules designed for specific receptor or enzyme interactions. Linkers: pharmacokinetic modifiers that optimize distribution and stability. Chelators: structures that securely bind radionuclides. Radionuclides are categorized based on their emissions, Diagnostic radionuclides: Emit gamma rays or beta particles, suitable for imaging. Therapeutic radionuclides: Emit beta-particles, alpha-particles, or Auger electrons, used in treatment. Dual-purpose radionuclides: Examples include Lutetium-177 (^{177}Lu), Samarium-153 (^{153}Sm) and Holmium-166 (^{166}Ho), which primarily emit therapeutic beta-particles but also produce gamma-rays for post-therapy imaging and dosimetry. However, they are not commonly used solely for diagnostic imaging. Radiotheranostics aligns diagnostics and therapy by using nuclear imaging to confirm target affinity, ensuring patients are appropriately selected for RPTs. This integration allows for precise, personalized treatment strategies, enhancing therapeutic outcomes.

Selecting suitable radionuclides is critical for optimizing the efficacy of radiotheranostics. Radionuclides emit one or more types of particles during radioactive decay, each with distinct characteristics:

- Alpha-Particles: Composed of two protons and two neutrons, alpha-particles are relatively large, with limited penetration power (radiation range <100 micrometer). Their short range delivers highly localized, high linear energy transfer (LET) effects, ideal for targeting small clusters of cancer cells while sparing surrounding tissue.
- Beta-Particles: These high-speed electrons or positrons have slightly better penetration capabilities, with a radiation range of up to 2 mm. This allows for crossfire effects, where nearby tumor cells are affected, making them effective for larger or heterogeneous tumors.
- Auger Electrons: Emitted during inner-shell electron ionization, Auger electrons have extremely short ranges (nanometers to micrometers). Their effects are highly localized at a microscopic level, making them ideal for targeting individual cells or subcellular structures.

Understanding these emission properties is vital for predicting biological effects, optimizing therapeutic outcomes, and ensuring radiation safety. Each particle type offers unique advantages, and the choice of radionuclide must align with the clinical goal and tumor characteristics.

Emerging radionuclides for Radiopharmaceutical Therapy (RPT)

While established radionuclides like Yttrium-90 (^{90}Y), Lutetium-177 (^{177}Lu), and Actinium-225 (^{225}Ac) remain central to RPTs, a new generation of radionuclides is gaining attention for its potential versatility and enhanced therapeutic outcomes. Emerging beta emitters, including Terbium-161 (^{161}Tb), and Copper-67 (^{67}Cu) are under clinical/pre-clinical trials, alongside targeted alpha therapies using radionuclides such as Lead-212 (^{212}Pb), Thorium-227 (^{227}Th), Astatine-211 (^{211}As) and Bismuth-213 (^{213}Bi). Terbium offers four medically relevant radioisotopes with identical chemical properties, allowing the development of radiopharmaceuticals with consistent pharmacokinetics. ^{161}Tb, in particular, resembles ^{177}Lu in therapeutic profile but has the added advantage of co-emitting electrons that enhance efficacy by targeting micrometastases. Early studies, such as the first-in-human use of [^{161}Tb] Tb-DOTATOC, demonstrated its feasibility for imaging small metastases.

For ^{225}Ac, effective imaging remains challenging. Lanthanum-132 (^{132}La), a beta-emitter with similar tumor uptake and biodistribution, has been proposed as a surrogate for simulating the behavior of ^{225}Ac-labeled agents. This surrogate approach may address limitations in tracking and dosimetry for Ac-based therapies. The expanding toolbox of radionuclides, particularly Tb isotopes, opens new possibilities in radiotheranostics by combining advanced imaging capabilities with potent therapeutic effects. These developments offer hope for more precise, effective cancer treatments while addressing current limitations in dosimetry, efficacy, and safety.

How RPTs differ from external beam radiotherapy

The administration RPT for cancer treatment differs fundamentally from conventional external beam radiation therapy (EBRT) in how radiation is delivered to tumor cells:

- Uniform vs. nonuniform dose distribution: EBRT delivers a uniform absorbed dose across the tumor site, regardless of cell density. RPT results in a nonuniform absorbed dose, with the relative dose per cell influenced by factors such as: Type of radiation emission, tumor cell density and clustering, proportion of tumor cells successfully targeted by the radiopharmaceutical and the physical and biological half-life of the radionuclide used.

- Cell-Specific targeting: While RPT may struggle to eradicate individual cancer cells completely, it excels at sparing normal tissues and is effective in targeting metastatic lesions in major organs, areas often beyond the reach of EBRT.
- Radiation dose efficiency: RPT can, in some cases, deliver a lower total radiation dose while achieving comparable clinical outcomes, further reducing the risk of damage to surrounding healthy tissues.

RPT offers unique advantages over EBRT, particularly in targeting metastases and sparing normal tissues, though its efficacy depends on optimizing radionuclide selection and delivery to maximize tumor cell absorption.

Patient specific RPT

Radiopharmaceutical therapy relies on the emission of short-range alpha-particles, beta-particles, or auger electrons to induce DNA damage within cancer cells, delivering highly localized radiation that leads to cell death. However, the current "one-size-fits-all" approach to RPT does not account for individual patient variability, which can significantly impact treatment outcomes. Each patient's response to RPT depends on several variables, such as radiopharmaceutical biokinetics, DNA repair mechanism, tumor sensitivity, tumor volume.

Standardized treatment schedules may not maximize therapeutic potential for every patient. Personalized treatment planning, incorporating patient-specific data, could significantly enhance efficacy by tailoring dose delivery to the individual's biological and tumor characteristics. Developing predictive mathematical models could play a critical role in personalized RPT. Such models would simulate patient-specific outcomes, optimize dosimetry which would allow for precise adjustment of administered doses to achieve optimal therapeutic outcomes. While individualized treatment planning is not yet standard practice in RPT, it could help in maximizing therapeutic efficacy while minimizing risks.

RPT toxicity profile

The targeted nature of radiopharmaceutical therapy (RPT) significantly reduces systemic side effects compared to conventional treatments like chemotherapy. However, some risks remain:

- Hematologic Toxicity: Myelosuppression is a frequent side effect, especially with therapies involving ^{177}Lu and ^{223}Ra.
- Organ-specific toxicity: Off-target radionuclide accumulation can lead to renal or hepatic toxicities, requiring close monitoring. There is very limited radiobiological data available for RPTs, most of dose-response data for RPTs are derived from EBRT.
- Long-Term Risks: Potential long-term effects, such as secondary malignancies, remain an area requiring further investigation.

Despite a generally favorable safety profile, meticulous patient selection and monitoring are crucial to minimizing risks, particularly for individuals with underlying comorbidities.

RPTs accessibility and cost

RPT is resource-intensive, requiring advanced infrastructure for production, handling, and administration of radioactive materials. Key challenges include:

- Radionuclide Availability: Short half-lives of therapeutic isotopes like ^{225}Ac and Lutetium-^{177}Lu demand efficient production and rapid distribution networks.
- Specialized facilities: Administration of RPT requires trained personnel and dedicated nuclear medicine facilities, which are not universally available.
- High costs: The complex supply chain, coupled with the novelty of RPT, makes it a costly option, potentially limiting access in low-resource settings.

Addressing these challenges is crucial for ensuring equitable access and fostering widespread adoption.

RPT has made significant progress, demonstrating its potential as a targeted and effective cancer treatment. While it has proven transformative in specific areas, broader adoption faces challenges related to logistics, cost, and regulation. Future research should prioritize developing radiopharmaceuticals for diverse disease targets. Comprehensive studies on safety, efficacy, radiobiology and long-term dose-response are crucial for RPT to become a standard treatment. Though some tracers may not reach clinical use, continued innovation in tracers will expand RPT's clinical applications. With sustained investment, improvements in availability and affordability, RPT is poised to become standard of care for many cancer treatments. For now, its widespread adoption depends on overcoming these remaining barriers.

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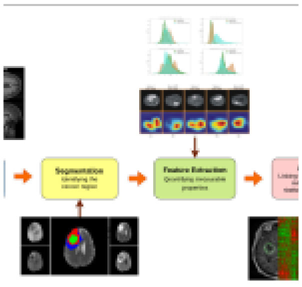

MRI-Based Radiomics in Cancer: Unlocking Predictive Biomarkers

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Cancer is one of the most lethal diseases globally due to its aggressive and heterogeneous nature. It often begins as a small cluster of mutated cells within complex tissue environments, making early diagnosis challenging. Imagine if a single Magnetic Resonance Imaging (MRI) could predict how a cancer might behave, guiding treatment decisions before a biopsy is performed, this is the promise of radiomics.

What is Radiomics?

Radiomics is an emerging field that uses advanced computational methods to extract quantitative data from medical images, uncovering patterns invisible to the human eye. Since its introduction in 2012, radiomics has gained momentum due to advancements in imaging technology and computational power, enabling more complex analyses of medical data [1].

By quantifying structural information such as shape, texture, and intensity within cancers, radiomics provides predictive insights into treatment outcomes and genetic profiles. This approach is similar to texture analysis in agriculture, which assesses the quality of soil or harvests, as it characterizes the "texture" of cancers to enhance understanding of their properties.

<<Figure 1 - The radiomics workflow>>

Why MRI is Ideal for Radiomics?

MRI is particularly suited for radiomics due to its high soft tissue differentiation, allowing clear visualization of cancers and their surroundings. Unlike other imaging modalities, MRI uses no radiation, ensuring patient safety during repeat scans required for ongoing monitoring. Its multi-parametric imaging capabilities, such as T2-weighted imaging (T2WI), apparent diffusion coefficient (ADC) maps, and multi-phase contrast-enhanced sequences, provide a comprehensive view of cancer features.

For example, MRI-based radiomic features can differentiate between high-grade and low-grade cancers in Glioblastoma, offering critical diagnostic insights [2]. These enhanced imaging features facilitate extracting a wide range of quantitative data, improving cancer characterization and diagnosis in clinical practice.

Predictive Biomarkers in Cancer Treatment

Predictive biomarkers are vital in cancer treatment as they provide measurable characteristics that guide therapeutic decisions based on cancer behavior. MRI-based biomarkers identify normal biological processes, pathogenetic changes, and therapeutic responses. As examples,

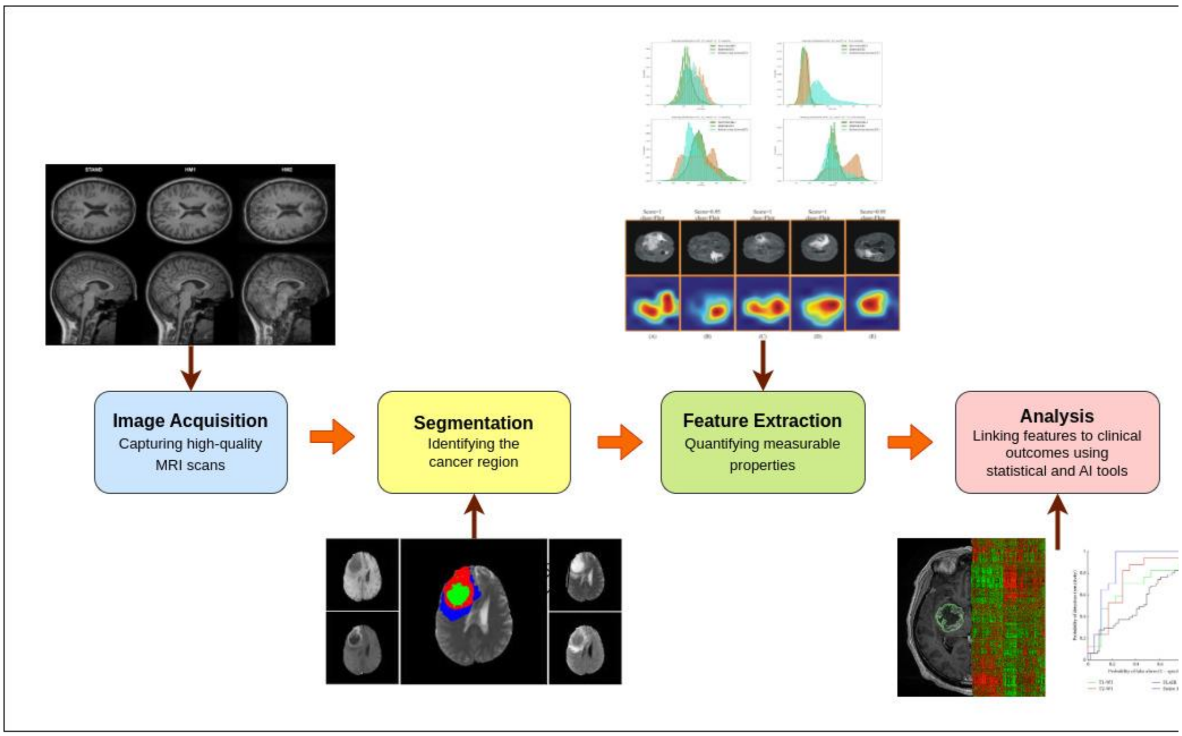
- In glioblastoma, MRI features can predict the Isocitrate Dehydrogenase (IDH) mutation status, a crucial factor in the diagnosis, prognosis, and treatment of gliomas [3].
- In breast cancer, radiomics can predict responses to neoadjuvant chemotherapy [4].

- In non-small cell lung cancer, radiomic biomarkers achieved 87.42% accuracy in predicting outcomes for patients undergoing immunotherapy [5].

Challenges and Future Directions

Despite its potential, the broad use of MRI-based radiomics faces several challenges. One of the major issues is the lack of standardization in pre-operative MRI protocols, complicating result comparisons and model validation. Variations in MRI scanner settings can lead to inconsistent radiomic feature values, impacting reproducibility. Furthermore, analyzing high dimensional radiomic data requires advanced computational tools and regulatory hurdles must be addressed for successful clinical implementation [6].

Looking forward, the future of MRI-based radiomics is promising. The research will focus on incorporating diverse imaging sequences to extract more informative features and improve model stability [7]. Advancements in data standardization, interpretability of deep learning models, and the development of user-friendly predictive tools will be essential for clinical acceptance and effective implementation in oncology practice. As ongoing research addresses current challenges, MRI-based radiomics has immense potential as a predictive biomarker in cancer, to revolutionize cancer management and improve patient outcomes.



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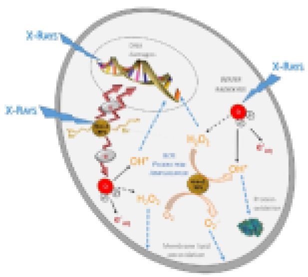

Metallic Nanoparticles as Radiosensitizers in Clinical Radiotherapy: A Review

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Introduction

Since the discovery of X-rays more than 100 years ago, ionizing radiation has been used extensively worldwide for medical imaging and treatment. The primary objective of cancer treatment using ionizing radiation has never really changed since then: to deliver the maximum dose to the targeted tumor while minimizing the radiation effects to the surrounding healthy tissues. The advancements in radiotherapy technologies are primarily developed to achieve this objective.

Despite that, the side effects of radiotherapy never ceased to persist. The exact localization of dose to the tumor remains a considerable hurdle to be surpassed due to external radiation delivery as it must pass through healthy tissues to reach the commonly deep-seated tumors. The radiation also scatters upon interaction, compromising the neighboring healthy tissues. In addition, some cancer patients are more radiosensitive than others. Therefore, around 5% of the patients received limited radiation dosage to avoid adverse side effects.

Multiple post-treatment remedies were used to treat these side effects. However, this option will introduce additional costs at the expense of the patient's quality of life. Thus, it is essential to continue discovering ways to maximize the treatment efficacy and healthy tissue sparing in the current and upcoming radiotherapy treatment regimes. The effectiveness of stereotactic body radiation treatment (SBRT) in enhancing the biologically effective dose (BED) is unquestionable, as multiple clinical reports have already proven the superior outcome of cancer management by using SBRT over conventional therapies (Rosenberg et al., 2019). This favorable outcome entices the oncologists to escalate the radiation dose further to improve tumoricidal effectiveness. However, this venture is also hindered by the constraint of the dose to the nearby organs at risk (Yadav et al., 2021).

The restriction of higher doses at the tumor site became the main factor in avoiding the side effects of ionizing radiation in normal tissues. An alternative way to overcome the problem is by implementing radiosensitizer, which aims to increase the absorbed dose at the accumulated high atomic number of materials in cancerous cells only while sparing the normal tissues surrounding it. Application of radiosensitizers may improve the efficacy significance of these advanced methods over conventional ones. Radiosensitization is a method to enhance the dose deposition to the targeted treatment volume while sparing the surrounding healthy tissues. The strategies to radiosensitize the treatment site for better tumoricidal effect can be divided into three: a) reversal of radiation resistance of tumor cells, b) radioprotection of the surrounding healthy tissue, or c) radiosensitization of the tumor cells (Kwatra et al., 2013). This review will encompass the third method, radiosensitizing the tumor cells using high atomic number (Z) nanoparticles

(NPs), specifically gold NPs. Figure 1 present radiosensitization mechanism of x-ray and high Z NPs that results in generation of different reactive oxygen species (ROS) production through radiolysis water molecule. Consequence of cell death such as (e.g. apoptosis, necrosis, mitotic cell death, autophagy, and permanent cell cycle arrest). With metallic NPs amplified production of ROS and secondary electron manifest radiation enhancement within targeted cancer area.

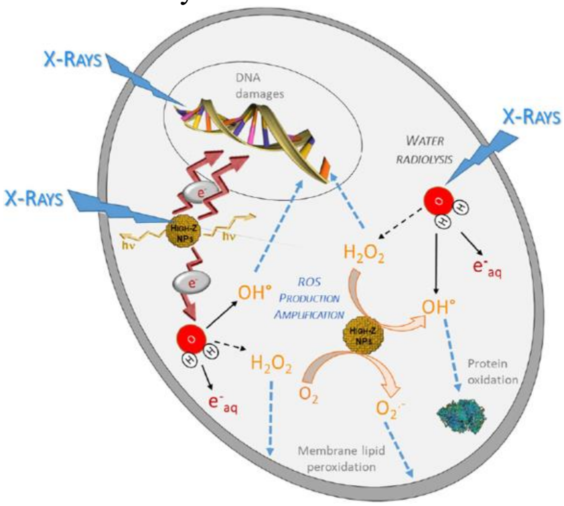

Figure 1 Mechanism interaction when X-ray bombarded high-Z NPs. (Source: Pinel et al., 2019)

Metallic Nanoparticles as Radiosensitizers

Recently, many studies have investigated a new method for increasing optimal radiobiological impact on cancer cells by applying radiosensitizer. The application of radiosensitizer seems to be a promising technique in enhancing DNA damage and cell death in tumors and elevating radiotherapy efficacy. The mechanism behind the radiosensitization effect was correlated to the synergistic performance of each NP component, where the combination has allowed for more efficient energy transfer between the materials and facilitated the generations of secondary radiations. However, the physical enhancements further resulted in more significant ROS generation within the biological medium, damaging the intercellular components, particularly mitochondria (H. Liu et al., 2020).

The first attempt was by Matsudaira et al., 1980, using iodine as a radio-enhancer element. Nevertheless, the achievement in nanotechnology enables the production of nano-sized metal with unique characteristics such as biocompatible, easy to synthesize, high surface ratio, and tuneable. The radiosensitizing agents can be fabricated in multiple forms, such as nanoparticles (NPs) or organic and inorganic molecules, with more flexibility in functionalization and personalization. This is especially important in the future, where personalized medicine is becoming more prominent (Scott et al., 2021). This approach may be more viable for developing countries that already possess conventional radiotherapy equipment but cannot afford to have the latest advanced ones. In addition, of course, this will undeniably benefit the patients, as they will have a better chance to get improved cancer management at a considerably lower expected treatment cost.

NPs have been studied extensively in the past decade as therapeutic agents due to their unique pharmacokinetics and the simplicity of their fabrication and functionalization methods. However, only a few NPs therapeutic agents have been developed using high-atomic number (Z) metallic materials to harvest their high interaction cross-section properties, such as gold (Z=79) and hafnium (Z=72) NPs. The number of studies that report the radiosensitization effect of high-Z metallic NPs has considerably increased in past years and some of this efforts have been translated towards clinical application.

Conclusion

Metallic radiosensitizers represent a transformative approach in radiotherapy treatments, harnessing the power of advanced materials in cancer therapy. Novel metallic NPs combined with radiotherapy continue to be a groundbreaking approach in cancer treatment. Persistent research on exploring and leveraging the unique properties of these materials will significantly enhance the precision and effectiveness of radiotherapy.

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The AFOMP Golam Abu Zakaria Best Young Leadership Award is a prestigious honor presented by the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP). This award, named in tribute to Dr. Golam Abu Zakaria, a respected expatriate medical physicist, Germany aims to inspire and support young professionals in advancing the field. Each year, this award highlights those who have made significant contributions to the field and have shown exceptional promise for continued leadership in the profession.

Dr. Men Kuo has been selected as the recipient of the 2024 AFOMP Golam Abu Zakaria Best Young Leadership Award, acknowledging his exceptional leadership and groundbreaking research in medical imaging and radiotherapy.

Dr. Men Kuo has been with the Cancer Hospital, Chinese Academy of Medical Sciences since 2010, where he currently serves as the Chief Medical Physicist. He also holds the role of Associate Researcher since 2020 and is the Director of the Radiation Physics Laboratory in the Radiotherapy Department, a position he took up in 2019. His research focuses on the development of cutting-edge medical imaging and radiotherapy techniques, emphasizing the application of deep learning and big data to improve image quality, patient-specific treatment planning, and adaptive radiotherapy. His work includes innovations in cone-beam CT, MRI-guided radiotherapy, proton therapy, and AI-based segmentation and dose calculation methods. Dr. Kuo has over 30 publications in these fields, contributing significantly to both academic research and clinical practice.

He completed his Ph.D. in Medical Physics from Peking Union Medical College and an M.A. in Medical Physics from Wuhan University. His academic journey reflects his dedication to advancing the field. In addition to his research, he has mentored numerous young scientists, further contributing to the growth of medical physics. He has received several prestigious awards, including the Young Scientist Award from the International Organization for Medical Physics (IOMP) in 2018 and the Beijing Nova Program in 2020.

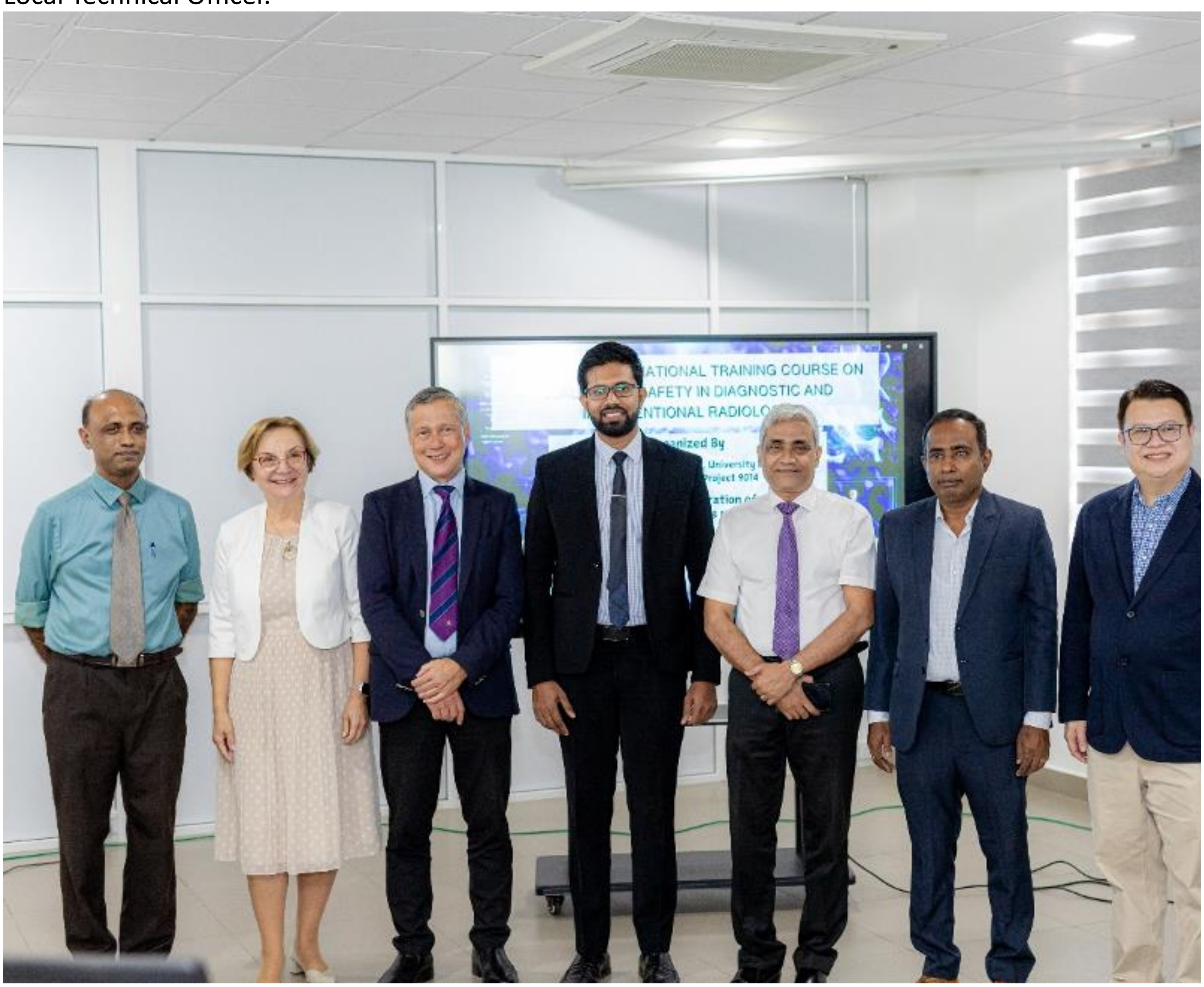
In light of his outstanding achievements and continuous dedication, Dr. Kuo was selected to receive the AFOMP Golam Abu Zakaria Best Young Leadership Award. Although an emergency prevented him from attending the Asia-Oceania Congress of Medical Physics (AOCMP) 2024 in Penang, Malaysia, Dr. Kuo participated virtually, where he expressed his heartfelt gratitude for the recognition. During his virtual appearance, he delivered a motivational speech that emphasized his dedication to advancing the field and his commitment to inspiring the next generation of medical physicists. His words resonated deeply with the audience of esteemed professionals, reinforcing the spirit of leadership and innovation that this award seeks to celebrate.

As part of the recognition, Dr. Kuo was presented with a US$400 cash prize and a certificate in honor of his leadership and groundbreaking work in medical physics. The award and accompanying recognition were subsequently sent to Dr. Kuo in China.

The AFOMP Golam Abu Zakaria Best Young Leadership Award not only highlights Dr. Kuo's exceptional contributions to medical physics but also serves as a testament to his continued influence in the field. His work is shaping the future of healthcare, especially in radiotherapy, and his leadership and vision continue to inspire both current professionals and the next generation of medical physicists. Through this award, Dr. Kuo's ongoing contributions to the profession are celebrated, reaffirming his place as a key figure in the continued advancement of medical physics.

Report by Prof. J. Jeyasugiththan and Duminda Satharasinghe, Department of Nuclear Science, Faculty of Science, University of Colombo, Colombo.

The Department of Nuclear Science, Faculty of Science, University of Colombo, recently hosted the Joint UOC-IAEA National Training Course on Quality and Safety in Diagnostic and Interventional Radiology from December 16 to 20, 2024. This highly successful event was organised under the IAEA technical cooperation project SLR 9014: Optimizing Radiation Doses in Diagnostic and Interventional Radiology by Strengthening Technical Capabilities and Human Resources, conducted by the Department of Nuclear Science. Collaboratively supported by the TC-SLR 9012 project and the National Hospital of Sri Lanka, the program underscored Sri Lanka's commitment to advancing radiation safety and optimising diagnostic radiology practices. The national project TC-SLR 9014 was led by Prof. Jeyasingam Jeyasugiththan, Professor in Medical Physics, as the National Project Counterpart (NPC), Dr. Aruna Pallawatte, Consultant Radiologist, as the Alternative National Project Counterpart (ANPC), and Dr. Duminda Satharasinghe, Lecturer in Medical Imaging Physics, as the Local Technical Officer.



Inauguration Ceremony

The training course commenced with an inauguration ceremony held on December 16, 2024, at the Faculty of Science. The event was graced by Senior Professor (Chair) H.D. Karunaratne, Vice Chancellor of the University of Colombo, as the Chief Guest, and Senior Professor (Chair) Upul Sonnadara, Dean of the Faculty of Science, as a special guest. The lighting of the oil lamp marked the traditional start of the proceedings, symbolising wisdom and enlightenment. The ceremony also featured addresses by distinguished speakers, including Vice Chancellor, Dean, course director Professor Jeyasingam Jeyasugiththan, co-course director Dr. Aruna Pallawatte, and Course Secretary Dr. Duminda Satharasinghe.

Focus of the Training Program

The training program focused on enhancing quality assurance, dose monitoring, and diagnostic and interventional radiology optimisation strategies. Sessions were designed to address key areas such as Quality assurance and quality control practices, Justification and appropriate use of medical imaging and Education and competency building among healthcare professionals. The program aimed to foster multidisciplinary collaboration, bringing together 50 participants from diverse disciplines, including radiologists, radiographers, and medical physicists. The event provided a platform for local and international experts to share knowledge and best practices to strengthen radiological standards in Sri Lanka.

International Expertise

A highlight of the event was the participation of renowned international IAEA experts as resource persons. Professor Jenia Vassileva, a medical physicist specialising in radiation protection, Dr. Denis Remedios, a clinical radiologist with extensive expertise in radiation safety, and Professor Napapong Pongnapang, a specialist in diagnostic radiology physics, contributed invaluable insights. Their lectures covered global best practices, advanced imaging techniques, and strategies for radiation dose optimisation.

Program Overview

The five-day program covered key quality and safety aspects in diagnostic and interventional radiology, including quality assurance, dose monitoring, and optimisation strategies. Sessions focused on justification and appropriate use of medical imaging, education and training, and enhancing professional competencies. Expert-led discussions and group activities addressed radiation safety, patient dose evaluation, and establishing diagnostic reference levels. International speakers shared best practices and advanced techniques, while participants collaboratively identified action points to strengthen local practices. Finally, the program emphasised interdisciplinary collaboration to advance radiological standards and promote radiation protection in Sri Lanka.

Commitment to Radiation Safety

The program emphasised the importance of adopting radiation safety measures, particularly in fluoroscopy-guided diagnostic and interventional procedures, which are known for their complex and high-dose requirements. Participants engaged in discussions and group activities to identify gaps in local practices and proposed action points to strengthen dose monitoring and optimisation frameworks.

Outcomes and Future Directions

The training concluded with a collective resolution by all participants to implement strategies for dose evaluation and optimisation in diagnostic and interventional radiology. This commitment highlights the program's success in fostering collaboration among professionals and advancing radiation safety practices in Sri Lanka. The Department of Nuclear Science, as the coordinator of the TC-SLR 9014 IAEA National Project, continues to play a pivotal role in supporting local professionals in improving radiological standards across the country. This training course represents another significant milestone in their ongoing efforts to build technical capabilities and strengthen human resources in the field.

Acknowledgements

The Faculty of Science, the University of Colombo, and the organising committee extend their gratitude to the International Atomic Energy Agency (IAEA) for their support and to all participants and experts who contributed to the success of this event. The collaboration between national and international stakeholders ensures a brighter future for radiological practices in Sri Lanka.

Dr. Vysakh Raveendran, Medical Physicist at ACTREC Proton Therapy Centre, Navi, Mumbai, recently participated in the prestigious School of Hadron Therapy held at the International Centre for Theoretical Physics (ICTP) in Trieste, Italy.

Dr. Raveendran’s research poster earned the Best Poster Award, recognizing his outstanding contribution to the field. The award included a 200 Euro cash prize along with a Certificate of Merit.

This achievement highlights Dr. Raveendran’s dedication to advancing research and innovation in hadron therapy, a cutting-edge modality in cancer treatment. Congratulations to Dr. Raveendran on this well-deserved recognition!

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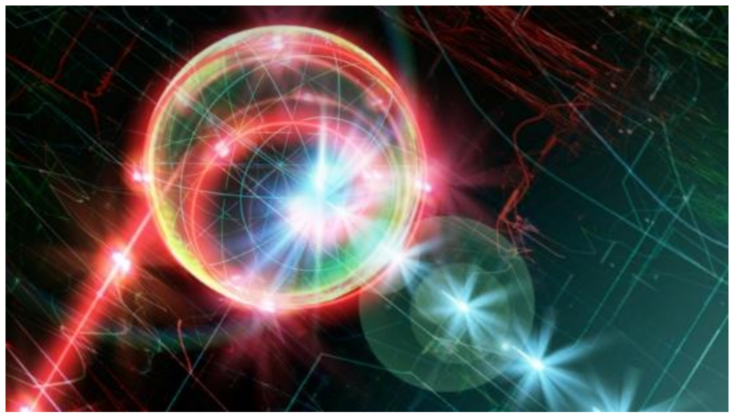
International Year of Quantum Science and Technology (IYQ)



(Abb.: Universität Innsbruck/Harald Ritsch)

The United Nations General Assembly is declaring 2025 the International Year of Quantum Science and Technology (IYQ) to mark 100 years since the development of matrix mechanics by Heisenberg, Born and Jordan and the formulation of wave mechanics by Schroedinger. Quantum mechanics gradually evolved from theories to explain observations that were incompatible with classical physics, such as Max Planck's solution to the blackbody radiation problem in 1900 or the correspondence between energy and frequency in Albert Einstein's 1905 paper explaining photoelectric radiation.

What do the smartphone, the supermarket barcode scanner, magnetic resonance imaging and many more modern technologies have in common? None of these technologies would exist without quantum mechanics, which began in 1925. A global initiative is set to celebrate the groundbreaking contributions of quantum science to technological progress over the past hundred years in 2025.

A total of 57 countries are taking part in the "Quantum Year" proclaimed by the United Nations. In Germany, the German Physical Society is coordinating the activities. A wide range of events will take place in 2025 under the motto "Quantum 2025 - 100 years are just the beginning...". In addition to generally understandable lectures on the topic, training courses for teachers are also planned, as are concerts and poetry slams. The Quantum Year 2025 will open in Germany with a public event on January 14, 2025 at the Humboldt University in Berlin. In addition to a lecture by Nobel Prize winner Wolfgang Ketterle on the social value of quantum science and its future applications, You Tuber Jacob Beautemps will moderate a panel discussion "Quantum physics: The next 100 years".

Shriram Rajurkar, PhD Scholar and Medical Physicist at King George's Medical University (KGMU), Lucknow, has been selected for the prestigious **IUPAP AOCMP-SEACOMP Travel Award 2024**. This recognition supports aspiring medical physicists by enabling their participation in the 24th Asia-Oceania Congress of Medical Physics (AOCMP) and the 22nd Southeast Asia Congress of Medical Physics (SEACOMP), scheduled to take place from **October 10–13, 2024, in Penang, Malaysia**

The award acknowledges Shriram's outstanding achievements in medical physics and includes a financial grant to facilitate his attendance. His participation in this international event is expected to foster collaborative research and highlight advancements in medical physics that contribute to revolutionizing patient care.

The SCMPCR community congratulates Shriram on this well-deserved honor and wishes him continued success in his academic and professional endeavors.

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Breast Cancer Symposium at Saleem Memorial Hospital

In an inspiring gathering of expertise and experience, Lahore's oncology community recently came together for a significant event aimed at enhancing breast cancer treatment management. Originally planned as an awareness session, the event quickly expanded into a full-fledged symposium, featuring prominent figures from the oncology sector.

An esteemed panel including Dr. Zeba Aziz, Dr. Abbas Khokhar, Dr. Huma Majeed, Dr. Misbah Masood, Dr. Abubaker Shahid, Dr. Asma Rashid, and Dr. Abdullah Javaid Bukhari graced the event and made it a success by giving their talks and having a panel discussion. Two cases were discussed by **Institute** of **Nuclear Medicine** & **Oncology** (INMOL) hospital team by Dr. Bushra Ayyaz & Dr. Zohair A Chohan. Panel discussion was very informative and healthy. Dr. Awais Amjad Malik presented a talk who is a Surgical Oncologist and working as Assistant Professor of Surgery at Services Hospital Lahore.

Dr. Taskheer Abbas, Head of the Department of Radiation Oncology at Saleem Memorial Hospital, shed light on the state-of-the-art facilities available at their center. He detailed the capabilities of their high-energy LINAC equipped with a 6-degree freedom couch, Cone Beam Computed Tomography (CBCT), and Volumetric Arc Therapy (VMAT) technology, alongside a dedicated Computed Tomography (CT) simulator. The chemotherapy department, designed with aseptic areas featuring Laminar air flow systems, underscores the comprehensive care the facility provides in treating all types of cancer.

The event drew more than 80 participants from various esteemed institutions such as Shaukat Khanum, INMOL, Jinnah Hospital, and Combined Military Hospital (CMH), marking it as a milestone in collaborative cancer care and education. This symposium not only fostered a shared understanding of innovative cancer treatments but also highlighted the collaborative spirit within Lahore’s medical community, driving forward the mission to offer the best care to those in need.

Dr. Gaganpreet Singh has been awarded the prestigious AMPI Best Oral Presentation Award at the Annual Conference of the Association of Medical Physicists of India (AMPICON 2024), held in Hyderabad in November this year.

The award-winning research, titled “A Novel Whole-Body Intensity Modulated Proton Therapy for Total Bone Marrow and Lymphoid Irradiation (TMI/TMLI),” was conducted in the Department of Medical Physics at Apollo Proton Cancer Centre, Chennai, under the supervision of Prof. and Head Dr. Dayananda Sharma.

This innovative study explores advancements in proton therapy techniques, offering new possibilities for precise and effective irradiation in bone marrow and lymphoid treatments. The recognition highlights Dr. Singh’s exceptional contribution to advancing cancer treatment methodologies.

The SCMPCR community congratulates Dr. Gaganpreet Singh on this remarkable achievement and wishes him continued success in his research journey.

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Inspiring the Next Generation of Radiation Professionals

On Saturday, 30th November, the Department of Radiation Oncology & Radiodiagnosis at CMC & Hospitals, Ludhiana, organized a distinguished conference themed ***"Inspiring the Next Generation of Radiation Professionals,"*** in celebration of the International Day of Medical Physics and the International Day of Radiology.

It was a great honour for me, **Mirza Burhan Saleem, Faculty of Radiology, Department of Life Sciences and Allied Health Sciences, Sant Baba Bhag Singh University, Jalandhar** to be invited as Chairperson for a scientific session. Along with 40 enthusiastic students from SBBSU, we had an enriching experience at CMC. Students of Radiology from the Department of Life Sciences and Allied Health Sciences, Sant Baba Bhag Singh University, Jalandhar, showcased remarkable talent and innovation by participating in both e-poster and model presentations. Their dedication earned them **2nd and 3rd prizes in the e-poster category** and **1st prize in the model presentation**, underscoring their commitment to academic excellence and research in Radiology

The event was impeccably organized, with the entire faculty and staff extending warm hospitality and unwavering support. The professionalism displayed by the organizing team was exemplary, ensuring a smooth and engaging experience for all participants.

The conference featured insightful presentations and discussions led by renowned experts in medical physics, radiology, and radiation oncology. Topics included advancements in diagnostic imaging, innovations in precision radiotherapy, radiological safety protocols, and the integration of AI in imaging analysis. These sessions provided a valuable opportunity to deepen our understanding of current trends and future directions in the field.

Moreover, the interactive environment encouraged knowledge sharing, with CMC faculty members and ISRT dignitaries offering guidance and mentorship throughout the event. The collaboration fostered an atmosphere of mutual respect and learning, emphasizing the importance of professionalism, ethics, and continuous education in medical practice.

This conference was more than an academic event—it was a celebration of innovation, teamwork, and the pursuit of excellence. The experience not only inspired students to strive for greater achievements but also reinforced the vital role of radiology in advancing patient care. We returned enriched with new insights, a deeper appreciation for the field, and a renewed commitment to shaping the future of healthcare.


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We are pleased to announce that the prestigious Dr. Udipi Madhvanath Memorial AFOMP Best Ph.D. Award in Radiobiology for 2024 has been awarded to Dr. Balbir Singh. This distinguished award recognizes excellence in radiobiological research, honoring groundbreaking contributions that advance the understanding and application of radiobiology in medical sciences.

The award reflects a commitment to fostering high-quality research and innovation in the field of radiobiology.

Congratulations to Dr. Balbir Singh for achieving this outstanding recognition, further inspiring the medical physics and radiobiology community.

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AI-Powered Optimization in Cancer Treatment: A Collaborative Symposium at UOG

Dr. Asrar had the privilege of delivering the keynote address at a one-day symposium on "Optimization in AI-Powered Cancer Treatment" hosted by the University of Gujrat (UOG) on November 21, 2024. His presentation, titled "Innovative Applications of AI-Driven Mathematical Optimization in Cancer Diagnosis and Radiotherapy Planning," highlighted the transformative role of artificial intelligence in advancing cancer care—from enhancing diagnostic accuracy to optimizing treatment planning.

The event concluded with an engaging collaborative session between Dr. Asrar, UOG's students, and faculty from the Department of Mathematics and Computer Science. The discussions explored promising research opportunities and interdisciplinary collaborations in AI-driven medical applications, fostering innovative ideas to bridge the gap between computational advancements and real-world healthcare solutions.

Zahid Islam, a BS Physics student at the Pakistan Institute of Engineering & Applied Sciences (PIEAS), achieved an impressive milestone by securing the 2nd position in the oral paper presentation category at the 9th Annual Conference of the Pakistan Society of Nuclear Medicine. His paper, titled “SPECT Image Reconstruction Enhancement using Deep Learning,” was conducted under the guidance of Dr. Asrar Ahmad from the Department of Medical Sciences, with Dr. Nadeem Shaukat from the Center for Mathematical Sciences as the co-supervisor.

The study delves into advanced image reconstruction techniques for Single Photon Emission Computed Tomography (SPECT) using deep learning, contributing to significant improvements in medical imaging. Zahid’s achievement highlights PIEAS commitment to research and the invaluable contributions of young researchers to the field of nuclear medicine.

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Radiation Protection plays a pivotal role in the field of Nuclear Medicine, ensuring the achievement of expected medical outcome while limiting the radiation risk to the patients, medical personnel and public. In this context, Mr. Muhammad Waqar (Pr. Medical Physicist) at AECH-NORIN was awarded the prestigious Young Investigator Award (Gold Medal) during the 9th Annual Conference of the Pakistan Society of Nuclear Medicine (PSNM) held in October 2024 at Faisalabad, Pakistan. The award was presented by Dr. Shazia Fatima, Director General of NMO (PAEC) and President of PSNM, in recognition of his exemplary contributions to the field. With 16 research articles to his credit, Mr. Muhammad Waqar has made significant strides in the research on radiation protection in Nuclear Medicine, focusing on Quality Assurance in NM, radionuclide administration, personnel dose monitoring, and other pressing challenges in the field. His work is particularly noteworthy as he works at AECH-NORIN in Nawabshah, a rural area characterized by limited resources. Despite these challenges, Mr. Muhammd Waqar’s commitment to advancing research has garnered admiration and support from his peers. This award highlights the importance of encouraging young talent in the medical physics community and encourages further research and collaboration among professionals in Pakistan.

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Sindh Institute of Urology and Transplantation (SIUT) Celebrates Its First Radiographer Day

SIUT recently celebrated its inaugural Radiographer Day, honoring the vital role of radiographers in Radiation Oncology, PET-CT, Radiology, and Nuclear Medicine.

The event featured engaging presentations highlighting the essential contributions of radiographers in advanced imaging and therapy. Adding a creative touch, students performed informative skits that showcased the significance of radiographers in healthcare.

The celebration was graced by esteemed guests from renowned institutions, including Kiran Hospital, Ziauddin University Hospital, Indus Hospital, Aga Khan University Hospital, and Dow University Hospital, making the occasion truly memorable.

The event concluded with a certificate distribution ceremony, recognizing radiographers with over 10 years of dedicated service for their invaluable contributions to patient care and medical imaging excellence.

The success of SIUT's first Radiographer Day reflects its commitment to acknowledging and celebrating the tireless efforts of radiography professionals in advancing healthcare.

We are delighted to announce that Mr. Ranjith C. P., Senior Medical Physicist at the Proton Therapy Centre, Department of Radiation Oncology, ACTREC, Tata Memorial Centre, Mumbai, has been recognized with a prestigious award for his outstanding contributions to the field of Medical Physics.

Ranjith C. P. is currently pursuing his PhD in Physics, focusing on “Implementation of Machine Learning Models in Proton Therapy Quality Assurance,” under the supervision of Dr. Mayakannan Krishnan at D. Y. Patil Education Society (Deemed to be University), Kolhapur. A certified medical physicist by the Clinical Medical Physics Association (CMPI), India, he was also the recipient of the Kingston Medical Physics Award in 2018.

Ranjith has published eight papers in international journals, including four as the first author, and has presented his research on machine learning applications in proton therapy QA at numerous national and international conferences. His work reflects a commitment to advancing precision, safety, and quality assurance in healthcare practices, particularly in proton therapy.

The SCMPCR community congratulates Mr. Ranjith on this well-deserved recognition and applauds his dedication, innovation, and impactful contributions to medical physics research and education.

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NICVD Inaugurates State-of-the-Art TLD Lab for Enhanced Radiation Safety

The National Institute of Cardiovascular Diseases (NICVD) proudly announces the opening of its state-of-the-art Thermoluminescence Dosimetry (TLD) Lab, inaugurated by Executive Director, Professor Tahir Saghir.

Following the inauguration, an insightful session was held to discuss the significance of this advanced facility. The new TLD Lab is a milestone for NICVD, as it ensures precise radiation measurement and enhances safety protocols for both patients and healthcare professionals.

The establishment of the TLD Lab reinforces NICVD's commitment to advancing healthcare technology and maintaining the highest standards of safety in medical radiation practices.

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In India, medical physics activities started in the mid 40s with the appointment of Dr. Ramaiah Naidu as the first medical physicist at the Tata Memorial Hospital, Bombay with a responsibility to set up and operate a radon plant for cancer treatment. He was a pioneering Indian medical physicist who helped to establish the foundations of medical physics in India and thus rightly called as the "Father of Medical Physics" in India. He is better known for working under double Nobel Laureate, Marie Curie, for his post-doctoral thesis in Paris, France. After the passing away of Dr. Ramaiah Naidu in the year 1991, the Association of Medical Physicists of India (AMPI) constituted a oration award in his memory in the year 1992. The award is conferred at the annual national conference of the AMPI every year to an outstanding medical physicist.

This year the oration award was bestowed on Dr. T. Ganesh, Chief Examiner, College of Medical Physics of India (CMPI) during the AMPICON-2024 held in Hyderabad from Nov 8 to 10, 2024.

It is a matter of pride for the entire SCMPCR community that Dr. Ganesh, who is the Editor-in Chief of the SCMPCR Newsletter, has been awarded with this most prestigious honor and wholeheartedly congratulates him on his achievement.

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Mr. Dinesh Saroj,
Sr. Medical Physicist & RSO-III
Balco Medical Center,
Unit of Vedanta Medical Research Foundation, Raipur, Chhattisgarh, India

Enhancing Skills at the ICTP-IAEA Monte Carlo Workshop

From October 28 to November 8, 2024, I had the privilege of attending the prestigious Joint ICTP-IAEA Workshop on Monte Carlo Radiation Transport and Associated Data Needs for Medical Applications in Trieste, Italy. Supported by a scholarship, this opportunity proved to be an invaluable experience for deepening my understanding of Monte Carlo techniques and their pivotal role in medical physics. Selection for the workshop was highly competitive and based on "merit and relevant experience" in the field. This ensured that all participants brought unique expertise and perspectives, further enriching the learning experience.

The workshop brought together leading experts, researchers, and fellow participants from across the globe, fostering an environment of collaboration and innovation. Each day featured lectures, hands-on sessions, and group discussions that explored the intricacies of Monte Carlo simulations, with a special focus on their application in radiotherapy, diagnostic imaging, and nuclear medicine.

One of the highlights of the workshop was learning the "EGSnrc Monte Carlo Code", a widely used and highly accurate tool for simulating the transport of electrons and photons in various mediums. Through guided sessions, I gained hands-on experience in configuring and running simulations using EGSnrc, understanding its modular structure, and interpreting the results for practical applications. This exposure was particularly beneficial in broadening my knowledge of Monte Carlo techniques and their clinical applications.

The workshop included interactions with seasoned professionals, who shared their experiences and challenges, and the hands-on sessions, which allowed us to apply theoretical knowledge in real-world scenarios. These experiences reinforced my belief in the potential of Monte Carlo simulations to revolutionize precision in radiation dose delivery and patient safety.

I strongly encourage other professionals and scholars in medical physics and related fields to apply for such opportunities. Workshops like these provide a platform to connect with global experts, gain advanced knowledge, and collaborate with peers who share similar interests.
This workshop has been a cornerstone in my academic and professional journey, aligning seamlessly with my ongoing PhD research. I am deeply grateful to ICTP and IAEA for this opportunity and am committed to applying the knowledge gained to advance the field of medical physics.

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Journey at the 24th Asia-Oceania Congress of Medical Physics (AOCMP) and 22nd SEACOMP

Attending the 24th Asia-Oceania Congress of Medical Physics (AOCMP) and the 22nd Southeast Asia Congress of Medical Physics (SEACOMP) from October 10th to 13th, 2024, at The Wembley - A St Giles Hotel in Penang, Malaysia, was a true honor. This prestigious event brought together over 500 professionals from radiotherapy, nuclear medicine, radiology, radiation protection, and biomedical engineering, creating an active forum for sharing knowledge and collaboration.

The theme, "Revolutionising Patient Care Through Medical Physics," set the tone, with inspiring talks from leaders like Prof. Dr. Eva Bezak, Prof. Dr. Chai Hong Yeong, and Prof. Dr. John Damilakis, who reminded us of the vital role medical physics plays in patient safety and care, driven by technology and collaboration across fields.

The conference offered a rich scientific program with highlights like the plenary sessions on proton and heavy ion therapy, AI in medicine, and theragnostics. The Monte Carlo Workshop, led by experts Tatsuhiko Sato and Hiroshi Iwase, was a particular highlight, providing a hands-on look at radiation safety and treatment planning techniques.

A personal highlight was presenting my poster and receiving valuable feedback from peers and experts. These interactions and the networking opportunities allowed me to connect with researchers worldwide who are equally passionate about advancing patient care through medical physics. Receiving the International Union of Pure and Applied Physics (IUPAP) AOCMP SEACOMP 2024 Travel Grant made this experience possible, and I am grateful to have been one of the selected awardees, enabling me to engage deeply with leaders in the field.

Beyond the science, the event provided a vibrant cultural exchange. The Gala Dinner, with its traditional attire and performances, and the informal gatherings with other attendees, enriched the experience, blending diverse backgrounds and ideas.

Participating in AOCMP-SEACOMP 2024 has strengthened my commitment to medical physics. This conference underscored the transformative impact of our work on patient care, and I look forward to applying what I have learned as we continue to innovate and improve lives worldwide.

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Bangladesh Medical Physics Society (BMPS) Celebrates International Day of Medical Physics (IDMP) 2024 with a Special Webinar on Liver SBRT

Md. Jobairul Islam[1,2], Md Akhtaruzzaman, PhD[1,3]
[1]Bangladesh Medical Physics Society (BMPS)
[2]Labaid Cancer Hospital and Super Speciality Centre, Dhaka, Bangladesh
[3]Evercare Hospital Chattogram, Bangladesh

The Bangladesh Medical Physics Society (BMPS) celebrated the International Day of Medical Physics (IDMP) 2024 with an insightful webinar titled “Radiation Dose-Volume Effects for Liver SBRT.” The event was held on 7 November 2024 via Zoom, attracting over 120 participants from Bangladesh and abroad. The webinar aligned with this year’s IDMP theme, "Inspiring the Next Generations of Medical Physicists," and brought together medical physicists, radiation oncologists, and students from around the world.

The webinar began with a welcome speech by Md. Jobairul Islam, Secretary of BMPS and Medical Physicist at Labaid Cancer Hospital and Super Speciality Centre, Dhaka, Bangladesh. In his address, he highlighted the significance of IDMP celebrations in promoting the role of medical physicists in healthcare. He expressed gratitude to the speaker, Prof. Moyed Miften, and the moderator, Dr. Md. Akhtaruzzaman, for their contributions to the event.

The webinar featured a keynote presentation by Prof. Moyed Miften, PhD, DABR, FASTRO, FAAPM, Professor and Director of the Medical Physics Division at the University of Colorado School of Medicine, USA. Prof. Miften is an internationally recognized authority in radiation oncology and stereotactic body radiotherapy (SBRT). His presentation focused on "Radiation Dose-Volume Effects for Liver SBRT," providing valuable insights into the challenges and advancements in liver SBRT.

The session highlighted the importance of balancing radiation dose and volume to maximize tumor control, provided practical guidance on treatment planning and toxicity management, and discussed technological advancements in SBRT.

The session was moderated by Dr. Md. Akhtaruzzaman, PhD, Chief Medical Physicist at Evercare Hospital Chattogram and President of BMPS. Dr. Akhtaruzzaman, a distinguished figure in the Bangladeshi medical physics community, ensured a smooth and engaging session, facilitating an interactive Q&A segment.

Following the presentation, there was an engaging Q&A session, where participants posed questions about the clinical application of SBRT and overcoming challenges in treatment planning. The discussion provided participants with valuable clinical insights and best practices for improving patient outcomes.
The webinar concluded with closing remarks by Dr. Md. Akhtaruzzaman, who thanked the speaker, participants, and the organizing team for making the event successful. He reiterated BMPS’s commitment to promoting medical physics education and research and encouraged participants to stay connected for future BMPS activities.

The IDMP 2024 webinar marked another successful event by BMPS in celebrating the contributions of medical physicists worldwide. The event inspired participants to advance their knowledge and contribute to the medical physics profession, aligning with the IDMP 2024 theme: "Inspiring the Next Generations of Medical Physicists." BMPS looks forward to continuing its efforts to promote the medical physics profession and foster international collaboration in radiation oncology.