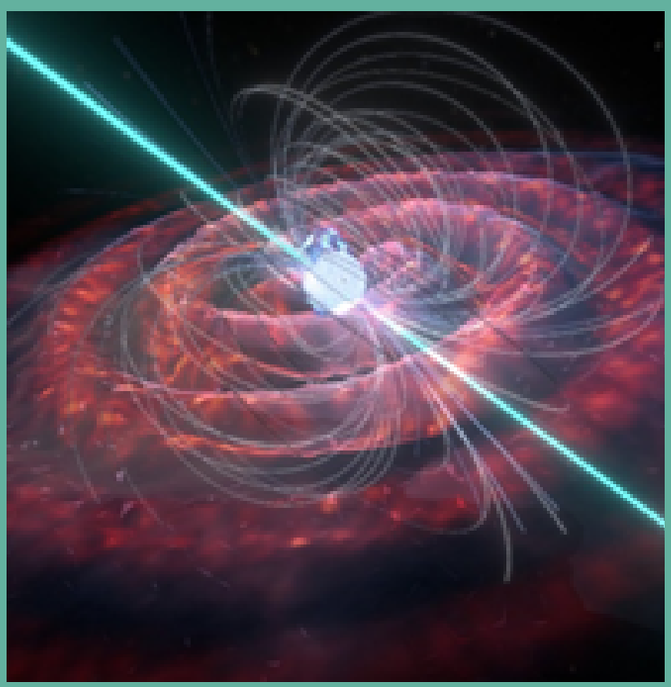
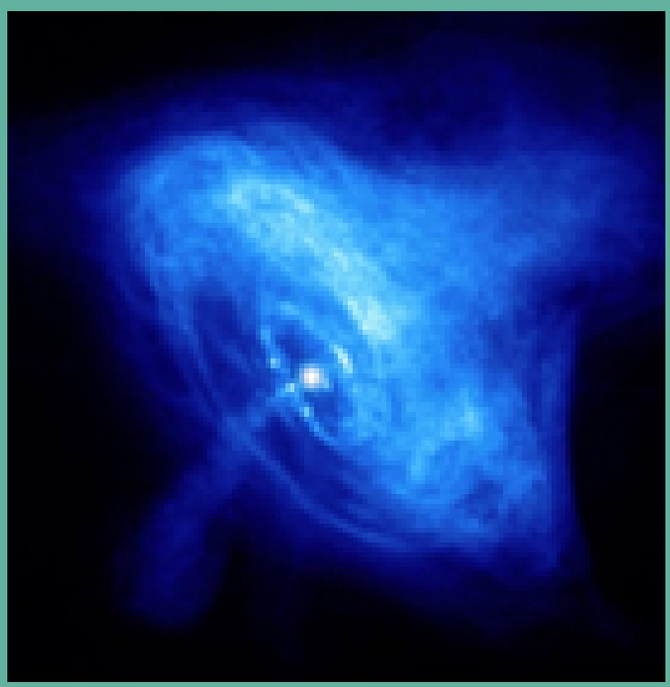
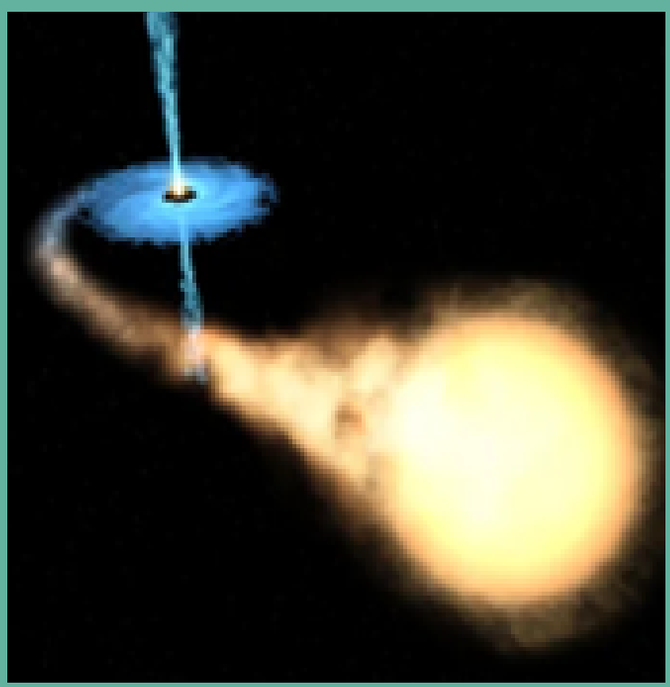
AFOMP Pulse

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







Volume15 No.1, March 2023

TABLE OF CONTENTS

Editorial

Marching Ahead with A New Team And New Name of Newsletter, "AFOMP Pulse"

Dear Readers,
Greetings from Editorial Board!
We are pleased to welcome all to read the first edition of AFOMP newsletter in 2023.

We are exciting to share with you all in this edition that the closing ceremony of AOCMP2022 at congress venue in December 2022 has bestowed with a new team of AFOMP executive committee for the year 2023-2025 under the leadership of Prof.Eva Bezak. Immediately after taking over, the new ExCom of AFOMP has approved and adopted the new name of its Newsletter as "AFOMP Pulse". The editorial board takes this opportunity to congratulate and welcome the new team for the noble service and also thanks for the approval of the new name for our newsletter.

This edition presents with lots of information about the Executive Committee of AFOMP activities including messages from newly elected and appointed Officers and Chairs, highlights of AOCMP2022 congress and IUPESM 2022 world congress reports, NMOs activities, scientific articles and CRC book reviews. Also, there are new items such as Meet the Expert interview, Did you know: marvellous science in action, MCQs in Medical Physics and PhD abstracts in the AFOMP regions have added in this edition.

It is also happy to inform you all that AFOM newsletter have strengthen with the editorial board consisting of the President and Secretary-General of AFOMP as Ex-officio members who are also being advisors and publisher, Chief Editor, three new editors for scientific, educational and professional aspects of Medical Physics activities across the AFOMP regions and Website manager as a member in the editorial board for the enhanced and shared work. The editorial board is further planning to have live interviews with students, trainees, early and mid-career researchers, members feedback survey and also to have social media such as Twitter and LinkedIn for fast communication to the members about the federations activities soon.

Hope you all will enjoy in reading this issue of Newsletter.
We welcome your positive comments and contributions.

Thanks & Regards
Dr.V.Subramani
Chief Editor, AFOMP Pulse
Asst. Professor of Radiation Oncology (Medical Physics)
AIIMS, New Delhi

Editorial Board

Dr. V.Subramani
Chief Editor, AFOMP Pulse

Dr. M.Akhtaruzzaman
Editor, Scientific

Dr. Leyla Moghaddasi
Editor, Education

Dr. Zulaikha Jamalludin
Editor, Professional

Prof Eva Bezak,
President, AFOMP

Dr. Aik Hao Ng
Secretary General, AFOMP

Dr. Rajni Verma
Member, Website Manager

AFOMP President's Message

Dear AFOMP colleagues,

A new AFOMP term has commenced, and I am honoured to have taken over from Professor Arun Chougule as President of AFOMP. We have assembled an excellent Executive Committee (please visit our AFOMP website) and the committee chairs are currently in the process of finalizing the membership of their respective committees, where we are aiming for geographical and gender diversity of appointments.

During this change of guards, I would like to wholeheartedly thank the outgoing ExCom members, namely Prof Kwan Ng, Prof Tomas Kron, Prof Chai-Hong Yeong and Dr Hajime Monzen for their service in the last election period 2018-2022. Some of them will continue to serve in advisory roles to the current chairs, which is greatly appreciated. A special thank you belongs to the past President, Prof Chougule, who worked tirelessly to improve the AFOMP international status, service to our members, including more educational programs and successfully secured funding for new AFOMP awards to recognize high achieving medical physicists and students in our region.

The current ExCom aims to continue the excellent work of the previous years and we will keep delivering educational offerings to members, including webinars and AFOMP schools. The Education and Training (ETC) chair, Prof Jin Xiance, and Science Committee (SC) chair, Prof Shigekazu Fukuda, are currently organizing the programme.

Our newsletter will continue to be issued twice a year and I am grateful to the editor, Dr Subramani, for continuing his role. It is, however, a big commitment and as such, we have just established an editorial team that will assist him with material preparation and newsletter production. We are also working on changing the format of the newsletter to make it more accessible. The content can always be greatly influenced by you – just send us your newsletter contributions.

I am also pleased that Dr Rajni Verma will continue to provide services related to IOMP website. Again, your input on the website improvements is very welcome.

There are many objectives of the ExCom for this election period, including developing more formal documentation of our processes (e.g. webinars organization, newsletter preparation, evaluations of applications for AFOMP endorsement, medical physics education syllabus finalization, etc.), establishing archives for all documents, so that the history of AFOMP is better documented and future hand-overs to new committees are seamless. We also wish to record interviews with our prominent members to create a historical record of our members' work and achievements.

The IOMP's 25th International Conference on Medical Physics (ICMP) - to be held in Mumbai, India during 6 to 9 Dec 2023 (https://www.icmp2023.org). This is the major IOMP conference, outside the IUPESM World Congresses, and is organized every 3 years. We are very honoured that ICMP 2023 is being held in the AFOMP region and it will also incorporate our annual AOCMP meeting. Many of our members will serve on the conference committees, for example, Prof Fukuda will be the Scientific Programme Committee Chair, and I will serve as the chair of the International Advisory Committee. We hope to see as many of you as possible in India for a face-to-face conference – hopefully in a fully post-pandemic world with international travel enabled.

I am very much looking forward to be working with the new Executive Committee and all National Member Organizations to further advance the medical physics profession in the AFOMP region.

With best wishes
Prof Eva Bezak, FACPESM, FIUPESM

AFOMP Vice-President's Message

Dear Colleagues,

Happy New Year 2023! I hope all of you are doing well. As a newly elected vice president, I would like to introduce myself with a short personal introduction before sharing some of my visions for the professional development of the AFOMP.

Currently I am working as a Director and Professor of the Centre for Biomedical Science and Engineering, United International University (UIU). I was the Chairman and Professor of the Dept of Medical Physics and Biomedical Engineering, Gono Bishwabidyalay (GB, University) for 16 years and Dean, Physical and Mathematical Sciences, GB for 6 years. I have completed MSc in Medical Physics through DAAD scholarship. Afterward, I received PhD degree in Medical Physics from National University through a sandwich program between OWSD (Organization for Women in Science for the developing world) and NU, under OWSD fellowship, Trieste, Italy. My PhD research station was Zhejiang Cancer Hospital, China and German Cancer Research Center, Germany. I am the recipient of the Outstanding Medical Physicists Award, AFOMP 2020, and the International Medical Physics Award, IOMP 2018. I am also an associate editor of Physics Medica, a member of the European Journal of Medical Physics and the Editorial Board of the Iranian Journal of Medical Physics, the Bangladesh coordinator for the multilingual dictionary MP, EMITEL, and IOMP, and a reviewer of many articles in international journals. About 40 research works were published in different national and international journals and books. Many national and international conferences and workshops have been organized by me. I am the Founder President of the Bangladesh Medical Physics Society (BMPS), the Vice President of the Bangladesh Association of Women Scientists (BAWS), a Regular Associate Member of the ICTP, a Member of the Bangladesh Physical Society (BPS), the European Society for Therapeutic Radiology and Oncology (ESTRO), the Association of Medical Physicists of India (AMPI), the American Association of Physicists in Medicine (AAPM), and a Member of the Asia-Oceania Federation As the first woman in Bangladesh with an MSc in MP, I worked with the Directorate of Health Services and the Ministry of Health to develop GO and unified recruitment rules for all hospitals.

I am honored to be appointed Vice President (2023-2025) of the AFOMP, which is one of the largest, most vibrant, and oldest medical physics communities in Asia-Oceania. During my term as a secretary for 2019–2022, I have been in close contact with all the officers on the AFOMP board, as well as NMOs and affiliated bodies. It is my hope and my intention to let the same spirit saturate my actions in the coming years of my new role. As VP, I will follow and facilitate all decisions made by the president, and as chair of the AHC, I will solicit nomination criteria for each award from other new members. I will try to stimulate the young generations through each NMOs to get enough nominees for each award. I believe that all the great objectives of AFOMP that are in front of us can only be reached through teamwork and the collaboration of the entire community of medical physicists. I'm ready to work with all AFOMP officers, committee members, NMO presidents, and delegates, as well as every single medical physicist who is willing to provide some of his or her time to AFOMP operations. One of my responsibilities is to facilitate the transformation of great, viable proposals into reality.

Last but not least, I would like to congratulate Dr. V. Subramani, Editor, AFOMP Newsletter, and his team for their continuous efforts to make this productive creation, which has been an important media to share activities, knowledge, and the present status of medical physics with its reader.

Prof. Dr. Hasin Anupama Azhari
Vice President and Chair of Awards & Honors Committee, AFOMP

AFOMP Immediate Past President's Message

Dear Colleagues,

Greetings! Wishing you all a happy and healthy new year 2023.
I have been privileged to serve as the President of AFOMP for the term 2019-2022. The new executive committee under the leadership of Prof Eva Bezak as President has taken over for the 2023-2025 term. Before all else, let me congratulate and wish the very best to the new team.

AFOMP has a history spanning over 22 years and grown up to be the largest regional organization in IOMP representing over 11000 medical physicists across Asia-Oceania. AFOMP has contributed steadfastly and sustainably for the betterment and growth of medical physics profession in the region in particular and across the world in general.

World has seen hard and difficult situations when the pandemic struck. In-person meetings and activities couldn't be held for almost two years due to Covid-19. Despite of all, with the support and contribution of AFOMP Ex-Com and AFOMP NMO's the academic and teaching activities were kept continued virtually, thanks to the technological advancements. AFOMP could rise to the need of the hour and started AFOMP monthly webinars virtually from June 2020. 30 webinars were conducted on various interesting topics of medical physics until November 2022. On popular demand of many young medical physicists and students of the region and recognizing the need for continued educational activities AFOMP has started the virtual monthly AFOMP schools from June 2021. With the support of a group experts from specialized fields scientific talks and discussions spanning over 2.5 to 3 hours were delivered through online platform. 17 AFOMP schools were conducted successfully by AFOMP Ex-Com so far.

To encourage, motivate and support young medical physicists and students to excel in research and publication and to enhance their contributions to medical physics various awards are started since 2020, the details are available on AFOMP website (www.AFOMP.org). Requesting all of you to disseminate the award information to your students, colleagues and encourage them to apply for the awards as per the eligibility criteria.

It is a great privilege for AFOMP and AMPI that the ICMP2023 is being organized in conjunction with AOCMP2023 and SEACOMP2023 in Mumbai during 6-9 December 2023. You can find the details at www.icmp2023.org. I request you all to encourage your colleagues and students to submit abstracts and attend this very important meeting.

Your active participation, contributions, suggestions and constructive criticism are the keys for the success and progress of AFOMP. I take this opportunity to thank each and every one of you for your support and cooperation during my presidency of AFOMP.I will continue to work for the upliftment of medical physics profession in the region and across the globe to my best of abilities.

Once again wishing you all a fruitful year ahead and all success in all your endeavors.

Warm Regards
Prof (Dr) Arun Chougule
Immediate Past President, AFOMP

AFOMP Secretary-General's Message

Dear colleagues,

It is my great honour and pleasure to be the AFOMP Secretary-General for the term of 2023-2025. With reference to the AFOMP constitutions, I will try my very best to work with the executive committee (ExCom) and the national member organizations (NMO) to achieve the organization goals.
I am deeply humbled by your trust and support. I look forward to working with the AFOMP family, the regional and global medical physics communities in moving the profession forward in the coming years.

We would like to take this opportunity to thank ExCom and its committee members of the previous terms for their tremendous dedication and hard work. They have brought AFOMP together over the past two decades and created significant impacts to the community worldwide.

We congratulate the organisers of AOCMP2022, IUPESM WC2022, AFOMP School, webinar and related scientific events for bringing us a wonderful scientific avenue at this challenging time. I hope these events have benefited our members.

This year, we will continue to deliver more. I am looking forward to see you all in the coming events, especially during the 25th International Conference on Medical Physics (ICMP) in conjunction with our very own AOCMP 2023, which will be held in Mumbai, India on 6th-9th December 2023.

Congratulations to the AFOMP Newsletter Editorial team for your incredible contributions as the AFOMP's mass media. It promotes a better information dissemination and communication platform among the community.

I would like to encourage all our members to actively participate in AFOMP activities and interact with us on how we could make it better. Together we learn, serve and contribute!

Wishing you all be blessed with bundle of happiness, good health and prosperity in the New Year 2023.

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

AFOMP Treasurer's Message

Dear Members of AFOMP,

Warm Greetings to all,

I would like to thank you all for the support extended to me to serve as Treasurer, AFOMP for the tenure of 2023-2025. Also I take this opportunity to congratulate all new officers and chairs, as new team of AFOMP. I hope your strong support for making good revenue and planning for fund generation to support our organization activities for positive outcome.

Best wishes and regards
Dr. Taweap Sanghangthum
Treasurer, AFOMP.

AFOMP Education-Training Committee Chair

Dr. Xiance Jin, Vice Dean of School of Basic Science of Wenzhou Medical University, the chief medical physicist and director of the Department of Radiotherapy Center of the 1st Affiliated Hospital of Wenzhou Medical University, Wenzhou, China, started his career as a medical physicist in China since 2001 after he graduated from Zhejiang University. He went to United States in 2007 and studied in the medical physics program of University of Toledo for his doctoral degree. He went back to China in September 2011 after got his Ph.D.

Dr. Xiance Jin is the Chair of Education and Training Committee of Asia-Oceania Federation of Medical Physics (AFOMP), Board member and committee member for the International Medical Physics Certification Board (IMPCB, 2013-2021), Council member and Education and Training Committee of International Organization for Medical Physics (IOMP), Subcommittee member of international library subcommittee and member of exchange scientist program subcommittee of AAPM; Associate Editor of Journal of Applied Clinical Medical Physics (JACMP), Associate editor of Technology in Cancer Research & Treatment , Associate editor of Radiological physics and technology, Associate editor of Frontiers in Oncology for Cancer Imaging and image-directed interventions, Vice Chair of Radiotherapy physics group of Radiation Oncology Committee of Chinese Medical Association, Chairman of Radiotherapy Physics and technology Committee of Zhejiang Anticancer Association, etc. Dr. Jin had published nearly 100 papers and abstracts both in Chinese and international journals. His main research interests are innovative cancer prevention and therapy techniques, radiomics, image guided radiotherapy technology, etc. Involved research programs won Chinese national and provincial awards.

ETC members:

1. Dr. Hui-Yu Tsai, Taiwan (female)
2. Dr. Kimi Bin Yang, Hong Kong (male)
3. Dr. Suphalak Khachonkham, Thailand (female)
4. Dr. Jiazhou Wang, China (male)
5. Dr Md Akhtaruzzaman, Bangladesh (male)
6. Dr. Sudesh Deshpande, India (male)
7. Dr. Mohd Hafiz Mohd Zin, Malaysia (male)
8. Prof Natalka Suchowerska Australia (female)

The vision of ETC is:

- To improve medical physics in the Asia and Oceania regions by disseminating systemized knowledge through education and training of medical physicists
- To advance the practice of physics in medicine by fostering the education, training and professional development of medical physicists, and by promoting highest quality medical services for patients in the Asia and Oceania regions
- To promote internationally sponsored education and training programs sponsored or endorsed by AFOMP, National Member Organizations and Regional Organizations
- To identify the need for international education and training activities, prioritizes and assesses the applications, and recommends to AFOMP the method of support. The ETC can also assist with the organization of the event and suggest suitable changes in the curriculum and faculty of the activity
- To consider applications from national and regional organizations for sponsoring or endorsing meetings. Applications to be considered in accordance with the document 'AFOMP policy on Scientific, Educational and Professional Meetings
- To work on evaluation and promotion of medical physics education and training programs and on any alternative mechanisms supporting regional cooperation addressing the education/training needs of medical physicists
- To stimulate the foundation of regional centres for education and training in collaboration with IAEA, WHO and other agencies
- To support and collaborate with the education and training committees of national Organizations on matters relating to education and training, including development of training materials and training methodology
- To liaise with International Medical Physics Certification Board (IMPCB) with regard to appropriate international certification

Thanks & Regards
Prof. Jin Xiance
Chair, ETC, AFOMP

AFOMP Science Committe Chair

Dear members of AFOMP and readers of AFOMP newsletter,

I am deeply grateful for the opportunity to chair the AFOMP Science Committee from 2023 to 2025. There are 10 roles of Science Committee as described on the AFOMP website and I would like to work on these matters together with the nine new members [1].
A pressing issue is the support of the organizers of the AOCMP 2023 held concurrently with the ICMP 2023 in Mumbai, India in December [2], through assistance in selecting the theme of the conference, providing help with suggestion of invited speakers, assisting with the review of abstracts and having input into the scientific program design.

Medical physics is the branch of applied physics that studies radiotherapy, diagnostic radiology, nuclear medicine, and medical radiation protection. As the seeds of cutting-edge technology, much attention has been focused on diagnostic radiotherapy, particle beam therapy, RI therapy, and AI technology that further advances them.

On the one hand, medical physics must serve the needs of medical practice. In other words, it is also necessary to contribute to the equalization of the level of radiological treatment. The Asia-Oceania region is characterized by diversity, and there are more themes and issues those are directly related to medical practice.

We are looking for ideas such as programs to lead ICMP2023/AOCMP2023 to fruitful success and would appreciate it if you, AFOMP members, could make proposals through the Science Committee members or each medical physics society.

Sincerely yours,

Prof. Shigekazu Fukuda
Chair, Science Committee

1. https://afomp.org/science-committee/
2. https://www.icmp2023.org/

AFOMP Professional Relations Committee Chair

Dear Members of AFOMP
Greetings to All

As we start a new year and new tenure of AFOMP Ex-Com, I wish you all a very happy, healthy and blessed new year. AFOMP has been striving hard in promoting medical physics education and professional status in the region by implementation of novel ideas and efficient programs even amidst the pandemic. The professional relations committee (PRC) in its previous edition, has set the stage in supporting, collaborating, promoting and nurturing medical physics professional development activities among and across the national member organizations (NMO). I would like to thank Prof Arun Chougule, immediate past president and Prof Chai Hong Yeong, the immediate past chair-PRC, chairs of other committees and each and every member in each of the committees for their dynamic and courageous endeavors in the past term in setting the standards high against all hurdles, even a pandemic. There are huge diversities in medical physics education and medical physicists' status in AFOMP. We have a diverse and balanced team enthusiastic about reaching out to everyone in sustaining and uplifting the professional status of medical physicists. Under the vibrant leadership of Prof Eva Bezak, I am sure the new team will lead AFOMP to better heights. We are pledged to bring unity in diversity, sustain integrity, stand up strong for each other, explore the vast possibilities future holds and etching the vision and mission of AFOMP bold and sturdy.

Personal Introduction
Dr Mary Joan is Associate Professor and Radiological Safety Officer in the department of Radiation Oncology, Christian Medical College (CMC) and Hospital Ludhiana, India. She holds post M.Sc diploma in Radiological Physics from Bhabha Atomic Research Center Mumbai and Ph.D from Kidwai Memorial Institute of Oncology, Bangalore. She was Assistant Professor in the department of Radiological Physics, SMS Medical College and Hospitals Jaipur before joining CMC Ludhiana.

Dr. Joan is a master educator, mentor and awareness builder and she successfully employed her skills and knowledge in various clinical projects and professional community service programs. Her vision is to be an honest, empathetic and impactful medical physicist and researcher and aims to deliver leading clinical outcomes, best patient experiences and quality health education. She won many awards, 4 research grants and published 30 peer-reviewed articles. She is peer reviewer to 5 internationally reputed medical physics journals and co-Editor-in-Chief of SCMPCR newsletter. Dr. Joan organized over 32 CME programs, conferences, workshops and crash courses promoting education in medical physics, awareness and capacity building in the recent past. Dr. Joan's interpersonal skills with her colleagues and peers are excellent and she is a source of inspiration for her students.

She is a life member of the Association of Medical Physicists of India (AMPI) and 8 other professional bodies. She has been very active in the various activities of the Asia Oceania Federation of Organizations for Medical Physics (AFOMP) since 2016 and organized the 17th Asia Oceania Congress of Medical Physics (AOCMP) 2017 in Jaipur for the first time in India as the organizing secretary. Currently, she is the chair of Professional Relations Committee (PRC)-AFOMP, Member of Science Committee- International Organization for Medical Physics (IOMP) and Member Executive Committee of AMPI Northern Chapter.

Thanks & Regards
Dr Mary Joan
Chair, Professional Relations Committee, AFOMP

AFOMP Funding Committee Chair

Dear members of AFOMP and readers of AFOMP newsletter,

I am very happy to serve as the chair the AFOMP Funding Committee from 2023 to 2025.

The objective of the Funding Committee is to raise funds from a range of sources and distributes them throughout the new era, enabling member nations and organizations, especially in developing countries, to build sustainable pathways for medical physicists of all abilities and to clearly communicate our core values of courage, determination, inspiration.
To achieve this goal, our committee will work on the following three roles;

1. To recruit Corporate Members from industry for the purpose of providing funds to assist AFOMP activities
2. To get grants from international organizations such as IOMP for AFOMP in its primary role of training and promotion of medical physics
3. For the purpose of successful recruiting and getting grants mentioned above item 1 and 2 respectively, business plan of AFOMP activity should be presented to industries and international organization with close cooperation with other AFOMP Committees such as ETC, PDC and SC

The Funding Committee are organized with the following 5 members;

1. Prof. Hajime Monzen, Japan (Male), Ex-Chair
2. Prof. Ung Ngie Min, Malaysia (Male), Ex-member
3. Dr. Huanli Luo, China (Female)
4. Prof. So Hyun Park, Korea (Female)
5. Prof. Dr. Rajesh Kinhikar, India (Male)

I will work together with these members to achieve the goal as much as possible.
On behalf of the FC, I also ask all NMOs for your interest and cooperation.

Sincerely yours,

Prof. Byungchul Cho
Chair, Funding Committee, AFOMP

AOCMP 2022 Congress Report

22nd Asia-Oceania Congress on Medical Physics, 2022 in Taipei, Taiwan on 10th-12th December 2022

The 22nd Asia-Oceania Congress on Medical Physics, 2022 (AOCMP 2022), which was authorized by the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) and organized by The Chinese Society of Medical Physics, Taipei (CSMPT), was successfully held in Howard Civil Service International House, Taipei from December 10 to 12, 2022 with 532 participants from 24 countries attending.

Congress Program

Congress include 8 Workshops with 23 Topics, 2 Keynote Speech, 8 Scientific Sessions, 6 Mini-Symposiums, 1 Plenary Session and the Prof. KIYONARI INAMURA Memorial AFOMP Oration with a total of 2 Keynote Speakers and 72 Invited Faculty. Collect 48 Topics on the last two days. Received total of 157 abstracts, include 42 oral presentations and 115 E-Poster Presentations.

Opening Ceremony, Award Ceremony and Closing Ceremony

The Opening Ceremony was held in Convention Hall, Howard Civil Service International House, on December 11th, 2022. In the beginning, Song Kun Traditional Arts provided an extraordinary drumming performance that impressed delegates from worldwide. After the wonderful show, AOCMP 2022 Congress Chairman, Prof. Shen Hao Lee, provided a welcome address. Prof. Hasin Anupama Azhari, Secretary General of AFOMP, and other honorable presidents to deliver a welcome address.

There was a total of 6 AFOMP awards and 27 AOCMP awards given. The closing ceremony came after the award ceremony. Prof. Shen-Hao Lee, Prof. Arun Chougule and Prof. Hasin Anupama Azhari provided closing remarks to conclude the success of AOCMP 2022 and pass sincere wishes to the next AOCMP congress.

Social Program

Congress arranged two official social programs which was Welcome Reception and Gala Dinner.

Sponsorship and Exhibition

AOCMP 2022 was supported by 18 companies from different countries. There were 19 booths in the exhibition area on both the first floor and second floor.

Shen-Hao Lee

Chairman
22nd Asia-Oceania Congress on Medical Physics, 2022

President
Chinese Society of Medical Physics, Taipei (CSMPT)

Report of IUPESM WORLD CONGRESS ON MEDICAL PHYSICS AND BIOMEDICAL ENGINEERING (IUPESM Wc2022)

One of the largest gatherings of medical physicists and biomedical engineers in the world is the IUPESM WORLD CONGRESS ON MEDICAL PHYSICS AND BIOMEDICAL ENGINEERING (IUPESM WC), which is organized by the International Union for Physical and Engineering Science in Medicine (IUPESM).

This is a unique platform focused on multidisciplinary discussions, innovations and collaborations in engineering, physical, biological and medical sciences – on an international scale. Last year, it was held from 12 June 17 June 2022 in Singapore, first ever in Southeast Asia. Due to ongoing Covid 19 pandemic restrictions, the IUPESM WC 2022 was organized in HYBRID mode.

The six-days scientific programme was comprised with a variety of insightful sessions including awardees speech, plenary and keynote speaker sessions on 24 key themes and topics. The congress lecture was delivered by **Prof. Sir K. S. Novoselov, Noble Laurate in Physics (2010)**. In this IUPESM WC 2022, there were 8 Plenary Speakers, 34 Keynote Speakers, 190 Invited Speakers, 20 Educational Sessions, 75 Posters, 15 Awards, Challenges and Competitions, and 56 business meetings. More than 800 participants from 71 counties and regions were joined the congress in-person and online.

Due to pandemic, the participants and exhibitors were very less than expected, which impacted organizer's budget significantly.

Dr. M.Akhtaruzzaman
on behalf of organizing committee, IUPSEM

Annoucement of AFOMP Monthly Webinars

Asia Oceania Federation of Organizations for Medical Physics

AFOMP Monthly Webinar Series (March- Augest) 2023
(Every first Thursday/ of the month, 07.00 08.00 AM GMT)

No	Date of Webinar	Speakers	Topics
01	02 March 2023	Dr. Aik Hao Ng, Malaysia	PET/CT for radiotherapy therapy planning
02	06 April 2023	Dr. Eva Bezak, Australia	The review of cumulative doses from radiological imaging and the risk of cancer in children and young adults.
03	04 May 2023	Prof. Hasin Anupama Azhari, Bangladesh	Medical Physics Contribution to Women's Health and Radiation
04	01 June 2023	Prof. Shikegazu Fukuda, Japan	Introduction to Radiation Oncology Project of FNCA(Forum for Nuclear Cooperation in Asia
05	06 July 2023	Dr Mary Joan, India	Principles of brachytherapy
06	03 August 2023	Dr. Guangzhong Gong, China	The Clinical Application Introduction of MRI Simulation for Radiation Therapy

AFOMP SCHOOL-2023

Webinar - 01

Come & Join Us !!!!!!!

18th March 2023, Saturday
6:30 AM GMT – 9:30 AM GMT

ACPSEM CPD Endorsed Activity

Moderated by: Dr. Sivananthan Sarasanandarajah , Australia

Time (GMT)	Topic	Speaker
6:30 AM	Concepts of Radiobiology for Radiotherapy: Fundamentals and Current Perspectives	Dr Arun Chougule
7:15 AM	Biological Basis of Radiotherapy Effectiveness; From Radium to Particle therapy	Dr Hossein Mozdarani
8:00 AM	Radiobiological Rationale of Radiation Protection	Dr Mary Joan
8:45 AM	Question Answer Session	All the speakers

MEET THE EXPERT INTERVIEWS

A/ Professor Anchali Krisanachinda

In 2023 we will celebrate the 60th Anniversary of the International Organization for Medical Physics (IOMP) and this year's International Day of Medical Physics (November 2023) will celebrate the following theme: **"IOMP's 60th Anniversary: Standing on the Shoulders of Giants."** It is important to look back and draw inspiration, because the tireless efforts of every member contribute to the strength and success of any organization or community.

AFOMP, as a regional member of IOMP, will also take this opportunity to recognize the contribution of our own medical physics giants. The new generation of medical physicists in the region may not be aware of the humble beginnings and how the work of many brought us to the present day where many of our member countries have university programs and some sort of certification process for medical physicists. To celebrate the contribution of our medical physicists, AFOMP is starting a series of interviews with our own giants of the region. These interviews will be presented and documented on the AFOMP website and in the AFOMP Newsletter "AFOMP PULSE". This will also create historical archives of AFOMP.

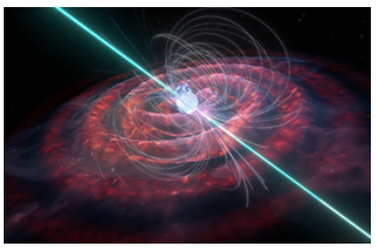
To start with, AFOMP presents our first interview with the Associate Professor Anchali Krisanachinda, the president of Thai Medical Physicist Society of Thailand, a founding member of AFOMP and SEAFOMP. She was also the Professor Inamura Memorial AFOMP Orator for the year 2022. Enjoy watching the interview to learn more about Dr Krisanachinda's incredible legacy.

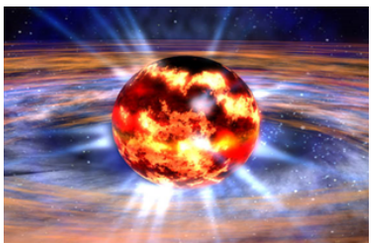
Link to the meet the expert is: https://afomp.org/2023/02/22/meet-the-expert-interview-series-announced-by-afomp/

Did you know????
Marvellous Science in Action

Dr. Leyla Moghaddasi, New South Wales, Australia

Neutrons in Action: Neutron Stars





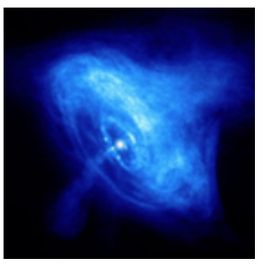
ONE OF NATURE'S MOST WONDROUS CREATIONS

In the field of medical physics, there is an air of mystery and bitter-sweet feeling about neutrons. We know of neutrons, fast or epithermal, as a highly effective form of ionising radiation in radiotherapy. Contrarily, they present as nuisance by-products of high megavoltage photon beams and are handled as contamination.

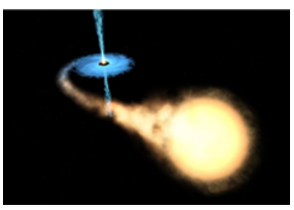
Beyond the realm of medical physics, however, neutrons are quite a spectacle!
Matter in any state consists largely of empty space. The reason is matter is constituted of atoms made of clouds of electrons orbiting the nucleus. Nuclei make up more than 99.9% of atom mass, while their radius is on average 105 times less than electron clouds' radius. When the core of a massive star undergoes gravitational collapse at the end of its life, atoms are crushed completely, and the electrons are scrunched inside the protons to form a star composed almost entirely of neutrons, leaving behind a neutron star. A tiny star composed of a gigantic nucleus and no empty space.

"With neutron stars, we're seeing a combination of strong gravity, powerful magnetic and electric fields, and high velocities," says the Large Area Telescope (LAT) science team of NASA's Goddard Space Flight Centre in Greenbelt.The Crab Nebula; Credit: NASA.

The most known type of neutron stars are pulsars which are classified into rotation-powered, and accretion-powered pulsars. Rotation-powered pulsars, such as the Crab Nebula, are relatively young neutron stars that rotate extremely rapidly. As a result, their strong magnetic fields combined with rapid rotation create magnetic fields trillions of times stronger than Earth's. Pulsars' magnetic fields are practically high-energy particle accelerators that can create deadly blizzards of high-energy particles.
Accretion-powered pulsars, exhibiting behaviours much like Black Holes, are produced when neutron stars in binary star systems capture matter from a companion star. The captured matter forms a disk around the neutron star. The powerful magnetic field of the neutron star funnels the matter towards the poles where it will spiral down and fall, or accrete, onto the neutron star. The infalling matter will gain an enormous amount of energy as it accelerates. Most of this energy will be radiated away at X-ray energies, the phenomenon that gives them the name the *Universe Light House.Now you may* wonder why a neutral (uncharged) particle could possess a strong magnetic field. The short answer is the spin of neutrons. Particles with spin can possess a magnetic dipole moment, just like a rotating electrically charged body in classical electrodynamics. Let us have a quick peek into Particle Physics to understand where neutrons inherit their magnetic dipoles.



The Crab Nebula;
Credit: NASA.



Accretion-powered pulsar siphoning gas from a nearby companion star; Credit: NASA.

In the standard model of particle physics, particles are composed of elementary particles that are subatomic particles not composed of other particles. All elementary particles are currently thought to be either bosons or fermions. Their spin is differentiated via the spin-statistics theorem: it is a half-integer for fermions and an integer for bosons. Elementary fermions include leptons, antileptons, quarks and antiquarks which generally are matter particles and antimatter particles. Elementary bosons (gauge bosons and the Higgs boson) act as force carriers that mediate interactions among fermions.

Quarks, classified into six types/flavours (up, down, charm, strange, top, and bottom) have various intrinsic properties, including non-integer electric charge, mass, colour charge, and spin. Unlike other elementary particles, they experience all fundamental forces, i.e., electromagnetism, gravitation, strong interaction, and weak interaction. Quarks are combined to form hadrons, with neutrons and protons being the most stable. In the quark model for hadrons, the neutron is composed of one up quark (charge +2/3 e) and two down quarks (charge - 1/3 e), resulting in a non-charged fermionic particle, the hero of this story.

Report of NMO's Activities

Report of SCMPCR on Accredited Training programs for Medical Physics and Bio Medical Engineering

Fahim Muhammad Rafiul Islam, Program Officer, SCMPCR, Bangladesh

Technology has advanced so quickly in the modern era that it is impossible for one person to learn everything in a single room. Everywhere in the world, there are people with a diverse range of knowledge. In South Asia, around 4 billion people reside. While some regions lack educated professionals but have cutting-edge machinery, other places have qualified medical physicists but inferior equipment. South Asia Centre for Medical Physics and Cancer Research (SCMPCR) has been conducting Different categories of training program for the cancer care professionals since 2018.

In the year of 2022, two elearning programs and one in service training program has been held.

E-learning programs (ELP)

Recent advances in radiation technologies have opened the field to new and promising radiation strategies. SCMPCR organized its 6th and 7th e-learning program this year to maintain this trend of medical physics progress (Figure-1). ELP-6 began on July 1 and ran through July 22. ELP-07 took place from October 7 through October 22. Both were a series of 8 lectures and a group discussion.

Figure-1: Posters of SCMPCR ELP-06 and ELP-07

Unlike other e-learning programs, ours is unique. With accredited programs, we offer group discussion and examination facilities. Young students or medical physicists are given the opportunity to be moderators in these programs so that we can develop the skills of the next generation.

E-learning Program Name	*Details*	*Accredited by*
SCMPCR E -learning Program (ELP -06): Clinical Medical Physics in Modern Radiotherapy	Duration : 01 July 2022 – 22 July 2022 Group Discussion: 17 July 2022 Examination: 22 July 2022 CPD Credit Points : 20	International Organization for Medical Physics (IOMP)
SCMPCR E -learning Program (ELP -07): Computed Tomography and Interventional Radiology	Duration : 7 October 2022 –28 October 2022 Group Discussion: 23 Octobe r 2022 Examination: 28 October 2022 CPD Credit Points : 32	European Board for Accreditation in Medical Physics (EBAMP)

As you can see on the map below 144 medical physicists registered for the events from all over the world (Figure-2). It was a fantastic chance to earn 20 and 32 CPD points recognized by the International Organization for Medical

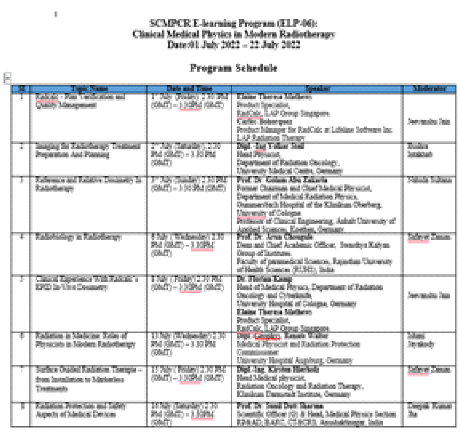
Physics (IOMP) and European Board for Accreditation in Medical Physics (EBAMP) respectively.

There were participants from 36 different nations. Out of them, 25 are from Bangladesh, 42 are from India, 5 are from Nepal, and the remainder is from other nations, including Israel, Kosovo, Malaysia, Mexico, Sudan, Morocco, Indonesia, China, United Arab Emirates, China, Sudan, Mexico, Egypt, Cambodia, Lebanon, Singapore, Australia, Colombia, Nigeria, Saudi Arabia, Qatar, Kazakhstan, Palestine, Botswana, Romania, Bulgaria, Hong Kong, Philippines, Slovakia, France, and United Arab Emirates.

These ELPs were a real delight for the participants; each session was instructive and informative. They had the ability to learn from leading medical physics professionals and engage with a large number of other medical physicists.

Reputable international medical physics experts from several countries delivered their valuable talks here.

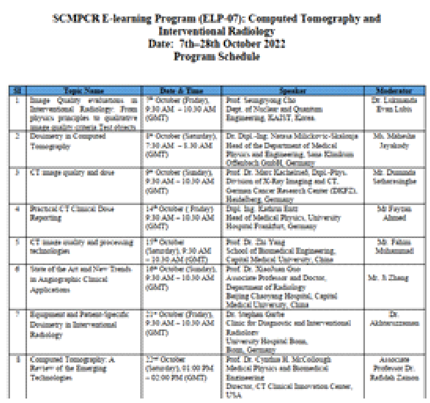
The program schedules were as below-



SCMPCR E-learning Program (ELP-06):
Clinical Medical Physics in Modern Radiotherapy
Date:01 July 2022 – 22 July 2022

Program Schedule

Sl	Topic Name	Date and Time	Speaker	Moderator
1	RadCalc - Plan Verification and Quality Management	1st July (Friday) 2:30 PM (GMT) – 3:30PM (GMT)	Elaine Theresa Mathews, Product Specialist, RadCalc, LAP Group Singapore. Carter Bohorquez, Product Manager for RadCalc at LifeLine Software Inc. LAP Radiation Therapy	Jeevanshu Jain
2	Imaging for Radiotherapy Treatment Preparation And Planning	2nd July (Saturday), 2:30 PM (GMT) – 3:30 PM (GMT)	Dipl.-Ing Volker Steil, Head Physicist, Department of Radiation Oncology, University Medical Centre, Germany	[illegible]
3	Reference and Relative Dosimetry in Radiotherapy	3rd July (Sunday) 2:30 PM (GMT) – 3:30 PM (GMT)	Prof. Dr. Golam Abu Zakaria, Former Chairman and Chief Medical Physicist, Department of Medical Radiation Physics, Gummersbach Hospital of the Klinikum Oberberg, University of Cologne, Professor of Clinical Engineering, Anhalt University of Applied Sciences, Koethen, Germany	Nahida Sultana
4	Radiobiology in Radiotherapy	6th July (Wednesday) 2:30 PM (GMT) – 3:30PM (GMT)	Prof. Dr. Arun Chougule, Dean and Chief Academic Officer, Swasthya Kalyan Group of Institutes, Faculty of paramedical Sciences, Rajasthan University of Health Sciences (RUHS), India	Safayet Zaman
5	Clinical Experience With RadCalc's EPID In-Vivo Dosimetry	8th July (Friday) 2:30 PM (GMT) – 3:30PM (GMT)	Dr. Florian Kamp, Head of Medical Physics, Department of Radiation Oncology and Cyberknife, University Hospital of Cologne, Germany. Elaine Theresa Mathews, Product Specialist, RadCalc, LAP Group Singapore	Jeevanshu Jain
6	Radiation in Medicine: Roles of Physicists in Modern Radiotherapy	13th July (Wednesday) 2:30 PM (GMT) – 3:30 PM (GMT)	Dipl. (Complex) Renate Walter, Medical Physicist and Radiation Protection Commissioner, University Hospital Augsburg, Germany	[illegible] Jayakody
7	Surface Guided Radiation Therapie – from Installation to Markerless Treatments	15th July (Friday) 2:30 PM (GMT) – 3:30PM (GMT)	Dipl.-Ing. Kirsten Herbold, Head Medical physicist, Radiation Oncology and Radiation Therapy, Klinikum Darmstadt Institute, Germany	Safayet Zaman
8	Radiation Protection and Safety Aspects of Medical Devices	16th July (Saturday) 2:30 PM (GMT) – 3:30PM (GMT)	Prof. Dr. Sunil Dutt Sharma, Scientific Officer (G) & Head, Medical Physics Section RPRAD, BARC, CT-RCRS, Anushaktinagar, India	Deepak Kumar Jha



SCMPCR E-learning Program (ELP-07): Computed Tomography and Interventional Radiology
Date: 7th–28th October 2022
Program Schedule

Sl	Topic Name	Date & Time	Speaker	Moderator
1	Image Quality evaluations in Interventional Radiology: From physics principles to qualitative image quality criteria Test objects	7th October (Friday), 9:30 AM – 10:30 AM (GMT)	Prof. Seungryong Cho, Dept. of Nuclear and Quantum Engineering, KAIST, Korea.	Dr. Lukmanda Evan Lubis
2	Dosimetry in Computed Tomography	8th October (Saturday), 7:30 AM – 8:30 AM (GMT)	Dr. Dipl.-Ing. Natasa Milickovic-Skalnija, Head of the Department of Medical Physics and Engineering, Sana Klinikum Offenbach GmbH, Germany	Ms. Mahesha Jayakody
3	CT image quality and dose	9th October (Sunday), 9:30 AM – 10:30 AM (GMT)	Prof. Dr. Marc Kachelrieß, Dipl.-Phys. Division of X-Ray Imaging and CT, German Cancer Research Center (DKFZ), Heidelberg, Germany	Mr. Dumindu Sathersinghe
4	Practical CT Clinical Dose Reporting	14th October (Friday) 9:30 AM – 10:30 AM (GMT)	Dipl. Ing. Kathrin Entz, Head of Medical Physics, University Hospital Frankfurt, Germany	Mr Faysal Ahmed
5	CT image quality and processing technologies	15th October (Saturday), 9:30 AM – 10:30 AM (GMT)	Prof. Dr. Zhi Yang, School of Biomedical Engineering, Capital Medical University, China	Mr. Fahim Muhammad
6	State of the Art and New Trends in Angiographic Clinical Applications	16th October (Sunday), 9:30 AM – 10:30 AM (GMT)	Prof. Dr. Xiaohuan Guo, Associate Professor and Doctor, Department of Radiology, Beijing Chaoyang Hospital, Capital Medical University, China	Mr. Ji Zhang
7	Equipment and Patient-Specific Dosimetry in Interventional Radiology	21st October (Friday), 9:30 AM – 10:30 AM (GMT)	Dr. Stephan Garbe, Clinic for Diagnostic and Interventional Radiology, University Hospital Bonn, Bonn, Germany	Dr. Akhteruzzaman
8	Computed Tomography: A Review of the Emerging Technologies	22nd October (Saturday), 01:00 PM – 02:00 PM (GMT)	Prof. Dr. Cynthia H. McCollough, Medical Physics and Biomedical Engineering, Director, CT Clinical Innovation Center, USA	Associate Professor Dr. Rafidah Zainon

Figure-3: Program Schedules of SCMPCR ELP-06 and ELP-07

Apart from 8 classes and exam, we had one day of group discussion (Figure-4). Prof. HA Azhari and Dr. Jeyasingam Jeyasugiththan were in charge of program moderation. All the students and most of the speakers were present in the group discussion. The students raised all the problems from the previous lectures and they were solved through discussion. Finally, all moderators from previous lectures and some participants shared their experiences with all.

The evaluation and the examination was held on July 22 and 28 October 2022. 50 % Marks were the passing marks of the examination. Those who attended the examination and achieved more than 50% marks received a certificate with CPD points. The rest of the participants received the certificate of attendance. Every participant, moderator, as well as speakers, enjoyed the courses.

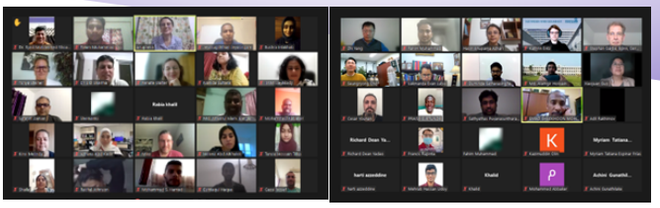


Figure-4: Group discussion session of SCMPCR ELP-06 and ELP-07

In order to enhance the quality of our programs, we also solicit feedback (Figure-5) from all speakers and participants after each session. We strive to develop future leaders along with QMP to enhance skills in all areas. We promote education that is accessible and of a good standard.

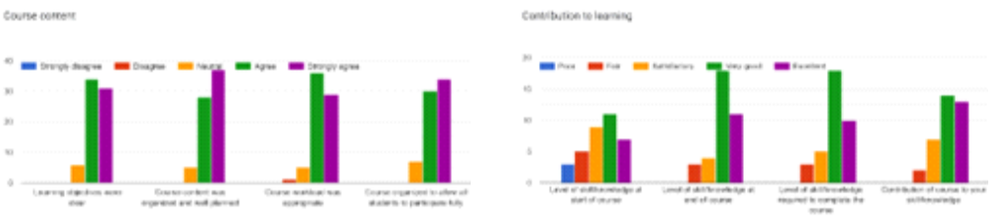


Figure-5: Feedback infographics of SCMPCR ELP-06 and ELP-07

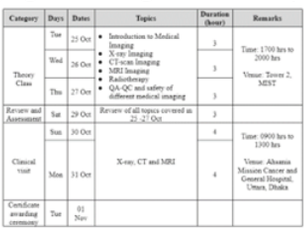
Radiation therapy is currently crucial in the treatment of cancer patients because cancer is one of the leading causes of death in the world. With as little harm to surrounding healthy tissue as possible, radiotherapy aims to deliver a carefully calculated dose of radiation to a predetermined tumor volume.

In Service Training Program

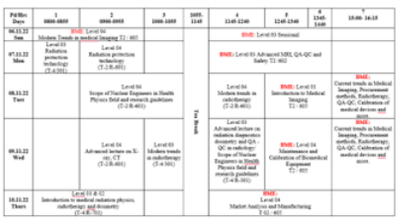
SCMPCR invited one senior expert Eng. Salih Arican from Germany for in-service training in October 2022 (24 October -14 November 2022) at the Military Institute of Science and Technology (MIST).

A circular is given to different media for applying for the training program on Medical Imaging and Radiotherapy. An overwhelming response of around 100 applications was received by the organizing committee. SCMPCR in-service committee has selected 37 efficient participants to enroll in the course.

In this in-service training, the trainer was Mr. Salih Arican who is a B.Sc. in Electrical Engineering and M.Sc. in Medical Physics, (Germany). Eng. Salih Arican has expertise is on specializing in communications engineering, as an electrical engineer (Dipl.-Ing.). After the successful completion of the examination, the participants received the certificates. Following the completion of the course, Mr. Salih Arican also offered some demonstrative lectures at MIST on advanced imaging technologies of health physics and radiotherapy and biomedical engineering.



Course Schedule



Class Routine

Certificate Giving Program

Inaugural program

SCMPCR is constantly working to train Medical Physicists , Radiotherapists, as a whole cancer professionals, to be qualified in the South Asia Region and beyond, in accordance with SDG goal 3 of ensuring health and well-being for all by 2030.

News and Activities in Hong Kong

In Dec 2022, Dr Francis LEE, HKAMP, attended the AOCMP Annual Meeting in Taiwan, and presented on the topic "The training and development of Medical Physics professional in Hong Kong". Similar to many Medical Physicists who found it difficult to attend overseas activities due to the pandemic situation, Dr LEE could only attend online, but the situation is improving and we should hopefully resume normal in this coming year.

A 3D printing workshop, including lectures, were held by HKAMP in Dec 2022. In addition to the online lectures which drew a large audience, 20 physicists also got to get their hands dirty when trying out the design and printing themselves. The application of 3D printing is expanding rapidly in the medical field. The roles of Medical Physicists, as technical and medical experts, are also being explored.

Physicists trying out 3D printing in the workshop. The forth person from the left at the back is the trainer, Dr Carrison TONG.

Congratulation to the 4 physicists who have completed their HKAMP certification programme and obtained their certificates after passing their professional assessment held in September 2022. They are regarded as competent to perform their medical physics duties independently, they will also need to maintain their certification through continual professional development activities that are subject to regular audit.

A region wide radiation emergency drill was held by the Government on 12 Jan 2023, simulating a radiation incident happening in the nearby DayaBay Nuclear Powerplant. More than 1400 personnel from 37 bureaux, departments, and organizations, including police, fire, border control, observatory, etc, participated in the drill. Medical physicists were invited to be observers this time. "Residents" and "visitors" on the Island Tung Ping Chau, closest, to the powerplant, were evacuated by the marine and checked for radiation contamination when landing on a dedicated port. There were also demonstrations of the vehicles and equipment used for radiation monitoring and emergency, with numerous upgrades to the equipment compared to the previous drill performed 5 years ago.

A helicopter equipped for aerial radiation monitoring, with the radiation detecting element attached outside (the black box).

Preparation of the decontamination tent on the shore for people with contamination from a radiation incident.

AMPI has great honour and proud to organise
the mega scientific event of ICMP 2023- AOCMP 2023- AMPICON 2023
- ISEACOMP 2023 in Mumbai India

25th INTERNATIONAL CONFERENCE ON MEDICAL PHYSICS

ICMP 2023

6 to 9 DECEMBER 2023

23RD ASIA-OCEANIA CONGRESS ON MEDICAL PHYSICS (AOCMP 2023)

International SOUTH-EAST ASIA CONGRESS ON MEDICAL PHYSICS 2023 (ISEACOMP 2023)

44TH ANNUAL CONFERENCE OF ASSOCIATION OF MEDICAL PHYSICISTS OF INDIA (AMPICON 2023)

CONTACT US

Dr. Sunil Dutt Sharma

email: **icmp2023@gmail.com**

IOMP

Scientific Article-1
Recent CT technology and Medical Physics

Fujita Health University. Toyoake-city, Japan
Invited Professor Katsumi Tsujioka
tsujioka@fujita-hu.ac.jp

1. Diagnostic imaging in medical physics

Medical Physics plays an important role in modern medicine. It will be to maintain the health and life of the people, to contribute to the detection and treatment of diseases, and to control radiation exposure. The field of medical physics consists of radiotherapy and diagnostic imaging, but now diagnostic imaging has expanded to include interventional radiology. What about the activities of Medical Physics in such current medical care? In the United State, there is ASTRO (American Society for Radiation Oncology) for Radiation Oncology and AAPM (American Association of Physics in Medicine) for Medical Imaging. In Japan, there is JSMP (Japanese Society of Medical Physics) for Radiation Oncology and JSRT (Japanese Society of Radiological Technology) for Medical Imaging. These are not fully shared. In addition, many members belong to two organizations.

Medical Physics is expected to consist of radiotherapy and diagnostic imaging. And the field of diagnostic imaging has expanded tremendously in recent years.

2. Diagnostic imaging activities in Japan

JRC (Japan Radiology Congress) is made up of three organizations, JSRT, JSMP, and JRS (Japan Radiological Society), and is one of the largest conferences in the world after RSNA (Radiological Society of North America) and ECR (European Congress of Radiology).

JSRT is the main activity society for diagnostic imaging in Japan. Most of the members that organize JSRT are radiological technologists working in hospitals, but there are also university professors, staff at research facilities, and workers at companies. JSRT's main committees are run by university faculty members and research facility staff.

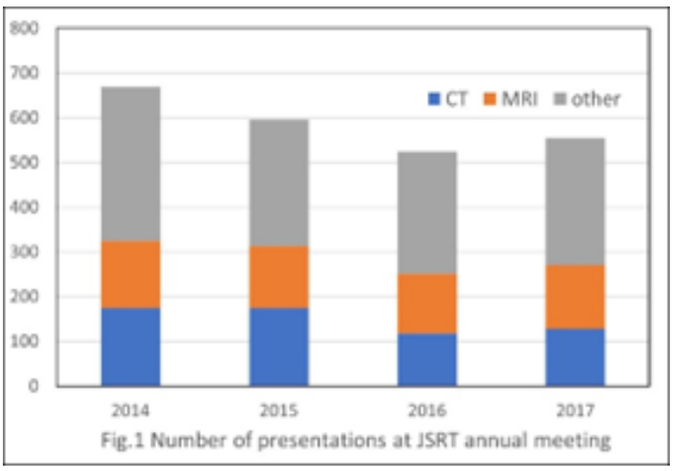


Fig.1 Number of presentations at JSRT annual meeting

Here, we will introduce the number of presentations at the JSRT annual meeting before COVID-19 (Fig. 1). JSRT

is the world's third largest radiological conference held every April in Yokohama City jointly with JRS and JSMP as JRC. The member presentations to be announced at the JSRT annual meeting are 500 to 600 titles. Research fields at JSRT include general radiography, angiography, CT, MRI, nuclear medicine, ultrasound, education, and more. Among them, CT and MRI account for a half of the total.

3. Recent CT technology

In recent years, CT equipment and CT inspection technology have made remarkable progress. It has never stopped evolving since the development of the EMI scanner by Hounsfield in 1973.

(1) Development of helical scanning

Before the advent of helical scanning, a CT machine was just a machine for tomography. Scanning is performed for each target cross section, and diagnosing human organs requires multiple scans to be performed over time while changing the scanning position. In fact, a lung CT scan required 30 to 40 scans with a slice thickness of 10 mm. This made it impossible to make a correct diagnosis when the respiratory arrest phase was not constant. Therefore, helical scanning using a continuously rotating CT scanner was developed. In helical scanning, the human body

moves at a constant speed through a CT device that rotates continuously. This makes it possible to collect three-dimensional data in a single scan. Fig. 2 shows the world's first helical scan experiment that I conducted in 1987. In the experiment, continuous rotation scans were performed while the lung model was pulled by hand. After that, we created an operating table to move the human body and conducted a basic experiment. This device has been registered as a Future Technology Heritage of the Science and Technology Museum of Japan (Fig. 3).

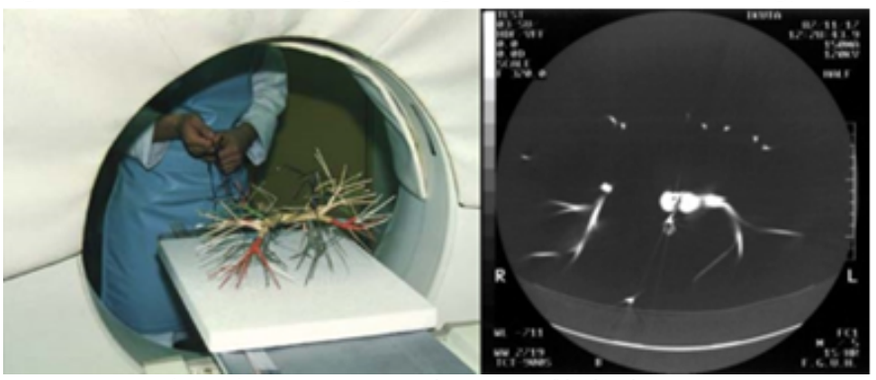


Fig.2 Development of helical scan

Fig.3 Future Technology Heritage

The clinical advantages of helical scanning include reduced scan time and improved image continuity. Due to the reduction in scan time, lung CT examinations can now scan the entire lung with a single respiratory hold. In addition, it has become possible to reduce the amount of contrast medium used and enhance the contrast enhancement effect. Three-dimensional image diagnosis has become possible by improving the continuity of images.

(2) Development of multi-slice CT

The development of helical scanning changed CT technology from a single scan plane to a stereoscopic scan. Then, multi-slice CT with multiple rows of detectors was developed to realize faster scanning. With the advent of multi-slice CT, it has become possible to perform faster and more detailed scans than ever before.

(3) Development of 3D display

The development of helical scanning and multi-slice CT has greatly changed diagnostic imaging. Along with this, 3D display technology has also evolved. Computers have made it possible to easily display three-dimensional structures that radiologists had previously understood empirically. There are many techniques for three-dimensional image diagnosis, such as MPR (multi-planar reconstruction) diagnosis, MIP (maximum intensity projection), MinIP (minimum intensity projection), and RaySUM (ray-summation).

(4) Development of contrast medium injection techniques

With the development of helical scanning and multi-slice CT, contrast medium injection techniques have changed significantly. These newer CT machines allow for shorter scanning times, but it is difficult to inject contrast media accordingly. Optimal contrast injection techniques allow less contrast to be used. And a more effective contrast enhancement effect can be obtained.

(5) Development of image reconstruction method

The biggest problem with CT is X-ray exposure. In digital images, the higher the X-ray intensity, the smaller the image noise and the more detailed diagnosis becomes possible. For this reason, there was a time when patients' exposure to radiation increased with the advent of CT. However, as the image reconstruction method has changed from the conventional FBP method to the IR method and DLR, it has become possible to obtain images sufficient for diagnosis with a small X-ray output.

(6) Development of ultra-high-Resolution CT

A high-resolution CT device is required for detailed diagnosis. Factors that affect CT spatial resolution include detector size, focal spot size, and detector data acquisition rate. Canon Medical System has realized ultra-high-resolution CT with a 0.25mm detector.

(7) Development of area-detector CT (ADCT) and Four-dimensional CT (4DCT)

CT diagnostic technology has evolved from 3D to 4D. In helical scanning, the start and end times of scanning are different in order to obtain volume data for spiral rotation. With the area detector CT (ADCT), it is possible to acquire volume data with a single non-helical scan. Four-dimensional CT is possible by performing continuous rotation with this CT device. Fig. 4 is Canon Aquilion ONE with 320 rows x 0.5mm detector. One shot 3D scanning is also possible with this CT, which allows volume data to be obtained in a single scan. This is useful in emergency medicine.

Fig.4 Area detector CT (Canon Aquilion ONE)

(8) Development of Dual Energy CT and Photon counting CT

The latest CT technologies include Dual Energy CT and Photon Counting CT (Fig. 5). With conventional CT, it was not possible to distinguish different materials if they had the same X-ray absorption behavior. Dual Energy CT (DECT) and Photon Counting CT (PCCT) distinguish and detect the X-ray energy transmitted through the object. Then tissue discrimination of iodine, fat, calcium, etc. becomes possible.

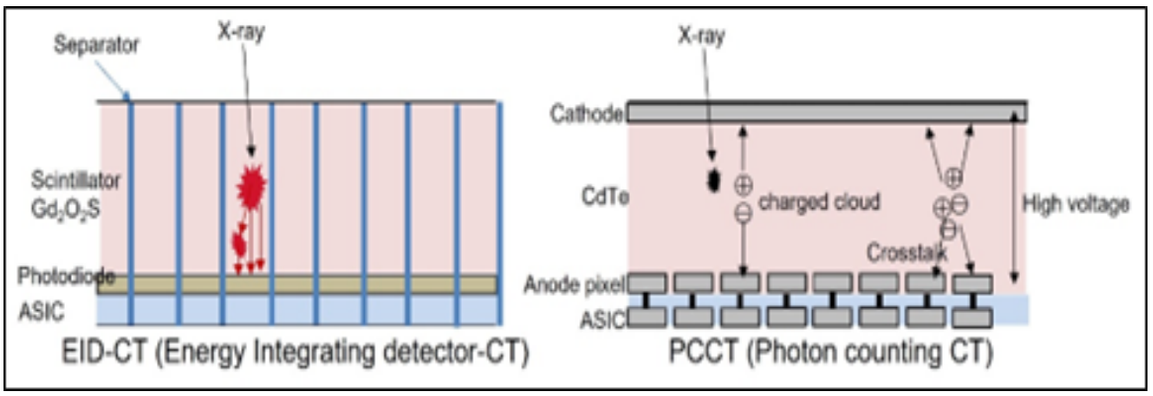


Fig.5 Conventional CT (EID-CT) and Photon counting CT (PCCT)

4. Recommendations for AFOMP Members

CT is a very important diagnostic device in modern medicine. Treatment begins with a CT diagnosis. Academic activities related to CT will contribute to global medical care. It is the members of Medical Physics who can carry out these activities. We believe that the widespread development of CT and MRI research in the field of medical physics will lead to the development of medical care in your country. **Let's start CT and MRI research together.**

Scientific Article-2
RadCalc QA Software – a complete patient-centric 3D QA solution
Why constant innovation paves the way to excellence

Carlos Bohorquez, MS, D.A.B.R,

There are hundreds of global publications that try and compare the results of new products to RadCalc. Oscar Wilde popularized the saying, "imitation is the sincerest form of flattery. And as such, we are proud to continue our track record of being the ground-breaking solution in the market. Continuous evolution is in our DNA, not just as physicists but as a company, working with our customers' suggestions for over two decades.

Formidable competition leads to paradigm-changing innovation that disrupts the market, advances the field, and sets a new standard in treatment plan quality control for our patients globally. It is this level of momentum that drives RadCalc to develop new features and improvements with every release.

Our latest release showcases the following:

1. Patient QA solutions for the new technologies and techniques in Radiation Oncology. These include experience with adaptive treatments, supporting MR Linacs, and working with new-to-market products that may not currently adhere to DICOM standards.

2. Ready with solutions conforming to global recommendations recently released and in progress. These include the American Association of Medical Physicists (AAPM) TG 219 and TG 218. Additionally, we are working with the community to have features ready upon publication of TG 307, expected this year and, in the not-so-distant future, the results of the newly formed TG 360.

3. Superior beam modeling for a true independent 3D volumetric secondary check solution with our implementation of gold standard BEAMnrc Monte Carlo and the most precise Collapsed Cone algorithm available in our 7.0 and 7.1 releases. We have also incorporated and improved upon EPID dosimetry technology with our patented True 3D EPID dosimetry patient QA module released in version 7.2 just over a year ago.

There are hundreds of global publications that try and compare the results of new products to RadCalc. Oscar Wilde popularized the saying, "imitation is the sincerest form of flattery. And as such, we are proud to continue our track record of being the ground-breaking solution in the market. Continuous evolution is in our DNA, not just as physicists but as a company, working with our customers' suggestions for over two decades.

Formidable competition leads to paradigm-changing innovation that disrupts the market, advances the field, and sets a new standard in treatment plan quality control for our patients globally. It is this level of momentum that drives RadCalc to develop new features and improvements with every release.

Our latest release showcases the following:
1. Patient QA solutions for the new technologies and techniques in Radiation Oncology. These include experience with adaptive treatments, supporting MR Linacs, and working with new-to-market products that may not currently adhere to DICOM standards.

2. Ready with solutions conforming to global recommendations recently released and in progress. These include the American Association of Medical Physicists (AAPM) TG 219 and TG 218. Additionally, we are working with the community to have features ready upon publication of TG 307, expected this year and, in the not-so-distant future, the results of the newly formed TG 360.

3. Superior beam modeling for a true independent 3D volumetric secondary check solution with our implementation of gold standard BEAMnrc Monte Carlo and the most precise Collapsed Cone algorithm available in our 7.0 and 7.1 releases. We have also incorporated and improved upon EPID dosimetry technology with our patented True 3D EPID dosimetry patient QA module released in version 7.2 just over a year ago.

4. An efficient clinical workflow with RadCalcAIR, introduced in version 6.3 (2015), to intelligently automate every step of performing patient-specific QA. The powerful functions of RadCalcAIR, included in the RadCalc installation, simplify the clinical workflow with a one-time customized setup. With the **latest** release, RadCalcAIR will usher your treatment plan through its secondary dose/MU check, the true composite 3D volumetric pre-treatment EPID dosimetry delivery, and any number of in-vivo transit beam dosimetry measurements performed.

Thanks to our development team's flexibility, resourcefulness, and dedication, we have proven that RadCalc has a prominent standing as the gold standard in patient-specific QA. By listening to our customers and scientific community, RadCalc provides accuracy and precision.

If it is not invisible, it is not Intelligent Automation

As we work towards a better future for all, our roadmap is full of even more improvements and features. We continue open collaboration with our partners to meet the needs of our customers for the benefit of patients globally. Our current focus on the efficiency of direct user interaction represents our initial investment in the overall user experience (UX). RadCalc's new developments leverage automation to streamline increased data management while providing innovative quality metrics. Our latest release debuted these features, which were explained in our last webinar. However, to truly understand where we are going and be a part of shaping the future, give us a call, schedule a demo, and send us your suggestions.

As the product manager for RadCalc, I know with great detail the high sensitivity and specificity of the algorithms within the software. The future RadCalc UX maximizes the users' customizations and promises the power of invisibility.

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

PhD Abstract-1

Study on Methods for Defining Target Volume of Breast Tumor Bed in Postoperative Radiotherapy

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

Background and Objectives: For breast cancer postoperative radiotherapy, the target volume definition of tumor bed is susceptible to the number of surgical clips, clarity of seroma, inter-observer variability and other factors. Registering preoperative and postoperative images and calculating the tumor contour propagation can help target volume definition. Existing researches mainly employed intensity-based registration methods. However, the structures in pre- and post-operative images were non-conrresponding because of tumor resection, clip insertion and post-surgical changes. And these non-corresponding structures will affect the results of intensity-based methods. In clinical practice, the target volume of tumor bed is manually delineated by radiation oncologists. However, manual delineation is affected by many factors. It is time-consuming and labor intensive. And there exists obvious inter-observer variability. Besides, tumor bed marker is considered to be a major reference in target volume definition. So far titanium clip has been widely used both at home and abroad. However it was found in clinical applications and research reports that the usage of titanium clip had two main problems. First, it could result in metal artifacts both on simulation CT and MR images. Second, it was nondegradable and thus had an effect on postoperative recovery and cosmetic results. To solve these problems, this study is to be carried out in the following three aspects: ⅰ) To establish new image registration method for improving registration accuracy. ⅱ) To establish new auto-segmentation method for improving efficiency and consistency of delineation. ⅲ) To develop biodegradable tumor bed marker for solving the problem of titanium clip.

Materials and Methods: Two deformable image registration (DIR) methods were proposed to register preoperative CT and planning CT images. One method was multi-metric DIR method which combined intensity-based, fiducial-based and region-based metrics together. The other method was two-step DIR method which combined biomechanically based finite element method (FEM) with intensity-based DIR method. This two-step DIR method modeled global organ deformation and local tumor resection induced changes separately.

A deep learning based auto-segmentation method was established to segment target volume of breast tumor bed. The tumor contour in preoperative CT image was first deformed and propogated onto postoperative CT image via image registration. This propogated contour acted as prior information, which provided the initial position of target volume on postoperative CT image. Then a prior information guided deep learning 3D U-Net was developed.

Biodegradable materials were used to develop tumor bed marker and four steps were successively carried out: ⅰ) The most suitable material was determined by evaluating imaging results on both CT and MR images, as well as changes of appearance, mass and viscosity during in-vitro degradation testing. ⅱ) In consideration of the problem that titanium clip had in clinical use, and the property of selected material itself, the proper fixation mode was determined. Then adapted shape of marker was designed. ⅲ) The ideal size of marker was determined through suture experiment on gauze and silicone according to predefined evaluation criteria. ⅳ) In pre-experiment of animal experiment, the implant model of rat was established first. Then validity assessment based on image scanning experiment and safety assessment based on specimen analysis experiment were performed.

Results: For image registration, the mean TREs of the intensity-based DIR (i-DIR) method for soft tissues, rigid structures and boundaries were 7.82 mm, 3.34 mm, and 6.93 mm. And the multi-metric DIR method (fri-DIR) achieved mean TREs of 2.06 mm, 3.02 mm, and 3.70 mm for corresponding three pointsets. Compared with the i-DIR method, the p-values were less than 0.05 of multi-metric method for soft tissue and boundary alignment, which indicated significance with the introduction of fiducial-based and region-based metrics. Besides, the two-step DIR method achieved mean TREs of 3.01 mm, 3.34 mm, and 6.93 mm for corresponding three pointsets. Compared with the i-DIR method, the p-values were less than 0.05 of the two-step DIR method for soft tissue alignment, which indicated that the improvement achieved by the two-step DIR method was significant. The TRE results in rigid structure and body boundary were the same for the two methods since the two pointsets were outside the

established first. Then validity assessment based on image scanning experiment and safety assessment based on specimen analysis experiment were performed.

For auto-segmentation, the average DSC achieved by prior information guided deep learning network was 0.808. Comparatively, the average DSC achieved by the traditional gray-level thresholding segmentation method was 0.622. P value was less than 0.05, which indicated that the improvement achieved by the proposed auto-segmentation method was significant.

For tumor bed marker, five kinds of biodegradable materials, Poly Glycolic Acid (PGA), Poly-L-Lactic Acid (PLLA), magnesium alloy1 (Mg1), magnesium alloy2 (Mg2) and Poly Lactic Acid/Beta-Tricalcium Phosphate (PLA/β-TCP) were initially determined through literature review and manufacturer consulting. Image scanning experiment showed that, test sample made of PLA/β-TCP material did not result in obvious artifacts both on CT and MR images. Also it had distinct difference from surrounding background. And because of the increasement of density, its contrast with surrounding background was notably enhanced on CT images. Besides, in-vitro degradation testing showed that, the appearance of PLA/β-TCP sample did not have substantial change at 40th week. However the viscosity decreased evidently and mass loss rate was about 10%. In terms of degradation, it could remain undegradable within nine months' observation. Also it entered into an accelerated degradation stage after nine months and would not remain in the body for too long. Considering the degree of imaging distinction and degradation cycle, PLA/β-TCP was determined as the most suitable biodegradable material. The marker was further designed as button-like structure with circular apertures and notch. And the ideal size was decided as 8 mm length, 6 mm width and 2 mm thickness. Subsequent pre-experiment of animal experiment further proved that newly-developed tumor bed marker could meet the imaging requirements. As for safety assessment, some basic data was obtained and the feasibility of formal experiment was demonstrated.

Conclusions: For image registration, compared with the intensity-based DIR method, the two proposed DIR methods both improved registration accuracy. The influence of large deformations and non-correspondence on registration accuracy was reduced to a certain degree. For auto-segmentation, prior information guided deep learning network improved the segmentation accuracy, which could improve efficiency and consistency of delineation. For tumor bed marker, the most suitable biodegradable material, as well as the shape and size of tumor bed marker was determined. Pre-experiment of animal experiment demonstrated the feasibility of formal experiment.

PhD Abstract 2

Multi-organ Multi-omics Prediction of Adaptive Radiotherapy Eligibility in Patients with Nasopharyngeal Carcinoma

LAM Sai Kit

Department of Health Technology and Informatics, The Hong Kong Polytechnic University, Hong Kong, Hong Kong SAR, China

Presently, Intensity-modulated radiotherapy (IMRT) is a standard-of-care remedy for advanced nasopharyngeal carcinoma (NPC) patients. Notably, the success of treatment relies on an assumption that the patient anatomy remains throughout the entire IMRT course. In response to treatment perturbations, however, tumors and surrounding healthy organs may exhibit significant morphometric volume and/or geometric alterations, which may jointly alter patient anatomy and jeopardize the efficacy of the original treatment plan. Confronted with this, Adaptive Radiotherapy (ART) has been introduced to compensate for these patient-specific variations. Numerous criteria as ART triggers has been introduced. Nevertheless, most of these factors require close monitoring throughout the IMRT course for each patient, and are deficient in capturing inter-patient disparity in intrinsic biologic response of tissue upon receiving treatment perturbation. Therefore, effective pre-treatment prediction of ART eligibility is greatly demanding.

In this study, various machine learning techniques was applied to investigate capability of a variety of prediction models, which were developed by using different types of "-omics" features extracted from a variety of organ structures, for pre-treatment prediction of ART demand in NPC patients, with an ultimate objective to facilitate ART clinical implementation in the future. First, 124 and 58 NPC patients from Queen Elizabeth Hospital (QEH) and Queen Mary Hospital (QMH), respectively, were retrospectively analyzed. Radiomic features extracted from neck nodal lesions of Computed Tomography (CT) images, patient's clinical data, and combined types of features were used for developing R, C, and RC models, respectively, for predicting ART event triggered by ill-fitted thermoplastic mask (IfTM) due to significant nodal volume shrinkage. Results showed that the R model performed significantly better than the C model in the external QMH testing cohort ($p < 0.0001$), while demonstrating no significant difference compared to the RC model ($p = 0.5773$). Second, pre-treatment contrast-enhanced T1-weighted (CET1-w), T2-w magnetic resonance (MR) images of seventy NPC patients from QEH were processed for extraction of radiomic features from Gross-Tumor-Volume of primary NPC tumor (GTVnp), for developing CET1-w, T2-w, and joint T1-T2 models for ART eligibility prediction. Models were developed using the least absolute shrinkage and selection operator (LASSO) logistic regression. Results indicated promising predictability of MR-based tumoral radiomics, with AUCs ranging from 0.895 – 0.984 in the training set and 0.750 – 0.930 in the testing set. In general, the joint T1-T2 model outperformed either CET1-w or T2-w model alone. Third, pre-treatment CECT and MR images, radiotherapy dose and contour data of one-hundred and thirty-five NPC patients treated at QEH were retrospectively analyzed for extraction of multi-omics features, namely Radiomics (R), Morphology (M), Dosiomics (D), and Contouromics (C), from a total of eight organ structures. Four single-omics models (R, M, D, C) and four multi-omics models (RD, RC, RM, RMDC) were developed under 10-fold cross validation and evaluated on hold-out test set. Results demonstrated that the R model significantly outperformed all other three single-omics models (all p-value<0.0001), achieving an average AUC of 0.942 (95%CI: 0.938-0.946) and 0.918 (95%CI: 0.903-0.933) in training and hold-out test set, respectively. Besides, the R model demonstrated no significant difference as compared to all studied multi-omics models in the hold-out test sets. Intriguingly, Radiomic features accounted for the majority of the final selected features, ranging from 64% to 94%, in all the studied multi-omics models.

In conclusion, a series of studies in this thesis demonstrated that CT-based neck nodal radiomics was capable of predicting IfTM-triggered ART events in NPC patients undergoing RT, showing higher predictability over traditional clinical predictors. MRI-based tumoral radiomics was shown promising in pre-treatment identification of ART eligibility in NPC patients. In particular, the joint T1-T2 model outperformed both T1-w and T2-w models. Multi-organ multi-omics analyses revealed that the Radiomic model played a dominant role for ART eligibility in NPC patients. The overall findings may provide valuable insights for future study into developing an effective screening strategy for ART eligibility in NPC patients in the long run, ultimately alleviating the workload of clinical practitioners, streamlining ART procedural efficiency in clinics, and achieving personalized RT for NPC patients in the future.

(95%CI: 0.903-0.933) in training and hold-out test set, respectively. Besides, the R model demonstrated no significant difference as compared to all studied multi-omics models in the hold-out test sets. Intriguingly, Radiomic features accounted for the majority of the final selected features, ranging from 64% to 94%, in all the studied multi-omics models.

In conclusion, a series of studies in this thesis demonstrated that CT-based neck nodal radiomics was capable of predicting IfTM-triggered ART events in NPC patients undergoing RT, showing higher predictability over traditional clinical predictors. MRI-based tumoral radiomics was shown promising in pre-treatment identification of ART eligibility in NPC patients. In particular, the joint T1-T2 model outperformed both T1-w and T2-w models. Multi-organ multi-omics analyses revealed that the Radiomic model played a dominant role for ART eligibility in NPC patients. The overall findings may provide valuable insights for future study into developing an effective screening strategy for ART eligibility in NPC patients in the long run, ultimately alleviating the workload of clinical practitioners, streamlining ART procedural efficiency in clinics, and achieving personalized RT for NPC patients in the future.

PhD Abstract 3

Ultra-quality 4D-MRI for Liver Tumor Radiation Therapy

XIAO Haonan
Department of Health Technology and Informatics, The Hong Kong Polytechnic University, Hong Kong, Hong Kong SAR, China,

Background: Four-dimensional (4D) magnetic resonance imaging (MRI) is becoming popular in liver cancer radiation therapy (RT) for its excellent soft-tissue contrast in the abdominal region. However, most available 4D-MRI techniques suffer from insufficient image quality, long acquisition time, or require specially designed sequences or hardware not available in the clinic. These limitations have greatly hindered the clinical implementation of 4D-MRI.

Purpose: This study aims to solve the abovementioned deficiencies of existing 4D-MRI techniques by developing novel ultra-quality (UQ) 4D-MRI methods capable of motion management and real-time tumor tracking in liver RT using a commercially available 4D-MRI sequence and deep learning-based registration models.

Methods: In the first part, an UQ 4D-MRI method was developed. Thirty-nine patients receiving RT for liver tumors were included, each received 4D-MRI scan and multi-parametric (Mp) 3D-MRI scans as prior images. UQ 4D-MRI at any instant was considered a deformation of the prior images, and the deformations was obtained via a dual-supervised deformation estimation model (DDEM). The registration accuracies of DDEM, VoxelMorph (normalized cross-correlation (NCC) supervised), VoxelMorph (end-to-end point error (EPE) supervised), and parametric total variation (pTV) algorithm were compared. Tumor motion on UQ 4D-MRI was evaluated using region-of-interest (ROI) tracking errors, while image quality was evaluated using the contrast-to-noise ratio (CNR), lung–liver edge sharpness, and perceptual blur metric (PBM). In the second part, the proposed UQ 4D-MRI method was further extended on temporal efficiency to be ultra-fast high-quality (UFHQ) Mp 4D-MRI by obtaining deformations from retrospectively downsampled 4D-MR images via a dual-supervised downsampling-invariant deformable registration (D3R) model. Besides all the above-mentioned evaluation metrics, the registration robustness of the D3R model was compared to iterative registration methods, including Demons, Elastix, and pTV algorithm.

Results: The registration accuracy of the DDEM was significantly better than all the other methods, with an inference time of 69.3±5.9 ms. The registration robustness of the D3R model was also significantly better than all the iterative methods, giving stable DVF prediction and higher image similarities at downsampling factors up to 500. UQ 4D-MRI yielded ROI tracking errors of 0.79±0.65, 0.50±0.55, and 0.51±0.58 mm in the superior-inferior (SI), anterior-posterior (AP), and mid-lateral (ML) directions, respectively. From the original 4D-MRI to UQ 4D-MRI, the CNR increased from 7.25±4.89 to 18.86±15.81; the lung–liver edge full-width-at-half-maximum decreased from 8.22±3.17 to 3.65±1.66 mm in the in-plane direction and from 8.79±2.78 to 5.04±1.67 mm in the cross-plane direction, and the PBM decreased from 0.68±0.07 to 0.38±0.01. The UFHQ Mp 4D-MRI yielded ROI tracking error of 1.18±1.20, 0.52±0.55, and 0.41±0.47 mm in the SI, AP, and ML directions and similar image quality improvement as the UQ 4D-MRI.

Conclusion: We have successfully demonstrated novel 4D-MRI techniques for liver RT. Compared with the original images, UQ 4D-MR images provided versatile image contrast, improved image quality, and accurate tumor motion trajectories within short processing times. The UFHQ Mp 4D-MRI technique further enhanced the temporal efficiency, making the imaging frequency greater than 3 Hz. These methods show great promise to expand the clinical implementation of 4D-MRI for motion management in liver RT.

MCQ in Medical Physics

1. Electric force and magnetic force are actually the same type of interaction, so-called electromagnetic interaction. Which physicist unified those two interactions?

A. Einstein, with the theory of special relativity
B. Maxwell, with Maxwell equation group
C. Hertz, with the discovery of electromagnetic wave
D. Faraday, with his discovery of electromagnetic induction

2. A patient is receiving 250 cGy/fx to a depth of 5 cm from a single spine field at 100 SSD. What will be the dose received at 5 cm depth if the optical distance indicator (ODI) is misread and the therapist set up the patient at 100 cm SSD when in reality it is 115 cm SSD?

A. 189 cGy
B. 217 cGy
C. 330 cGy
D. 200 cGy

3. Which of the following dosimetric parameters is considered on large total skin electron irradiations (TSEI)?

A. I, II, and III.
B. I and III only.
C. II and IV only.
D. IV only.

I. Field flatness at Dmax
II. Electron beam output at dose calibration point
III. PDDs measured at a depth of 15 cm
IV. TMR measured at a depth of 15 cm

4: Which of the following radionuclides are used to treat thyroid cancer?

A. I, II, and III.
B. I and III only.
C. II and IV only.
D. IV only.

I. 131I
II. 125I
III. 32P
IV. 103P

5: During the time of uptake and waiting, a patient to take a PET/CT scan should void to clear the activity in the bladder by urinating, and this amount is about what percentage of total activity?

A. 5 %
B. 15 %
C. 25 %
D. 35 %
E. 45 %

6 . Which of the following will not reduce patient dose during a fluoroscopy procedure?

A. Minimise beam-on time
B. Use magnification mode
C. Collimate to region of interest
D. Use last image hold

7. **For a gradient in the x direction of 3 mT.m-1 and a receiver bandwidth of 32 kHz, tuned to hydrogen nuclei (42.576 MHz.T-1), what is the field of view? [pp. 109]**

A. 25 cm
B. 3.9 cm
C. 39 cm
D. 250 cm

8. **When high energy MV photons collide with nuclei they can undergo (g,n) nuclear interaction, leading to the production of free neutrons. This process also occurs in medical linear accelerators, as some photons may interact with the components in the linac treatment head and elsewhere. This phenomenon occurs:**

A. For all MV photon beams of any energy
B. For photon beams below 6 MV energy
C. For photon beams above 10 MV energy
D. It is the protons that are ejected from the nuclei not neutrons

9. **Which of the following statements regarding radiation-induced cell death is TRUE?**

A. Most cells undergoing radiation-induced cell death do so following mitotic catastrophe
B. The cells that will undergo mitotic catastrophe can be identified immediately post irradiation by their characteristic morphological features
C. Apoptosis occurs exclusively through a p53-dependent pathway
D. Cells that undergo necrosis can be identified by blebbing of their cell membrane, shrinking of
E. the cytoplasm and development of specific DNA fragmentation patterns
F. At sublethal doses, most cells undergo permanent growth arrest

10. **What is the most common type of cancer identified in children who were in the vicinity of the Chernobyl nuclear power plant when it exploded in 1986?**

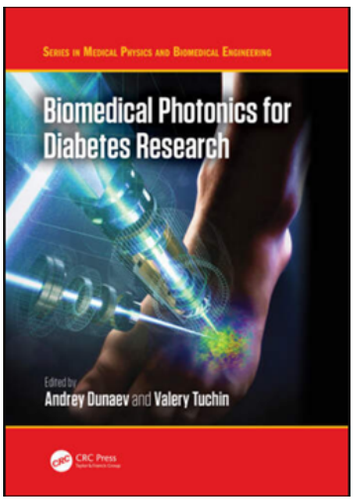
A. Osteosarcoma
B. Leukemia
C. Thyroid cancer
D. Glioma
E. Mesothelioma

Visit AFOMP Website for Answers, Explanation and Reference soon

Latest CRC Press Published Books: 2023

1st Edition
Biomedical Photonics for Diabetes Research

Edited By
Andrey Dunaev and Valery V. Tuchin



About the Book
In 2021, over 537 million people worldwide were diagnosed with diabetes, according to the International Diabetes Federation and so the diagnosis, care and treatment of patients with diabetes mellitus have become one of the highest healthcare priorities. Biomedical photonics methods have been found to significantly improve and assist in the diagnosis of various disorders and complications arising from diabetes. These methods have also been widely used in various studies in the field of diabetes, including in the assessment of biochemical characteristics, metabolic processes, and microcirculation that are impaired in this disease.

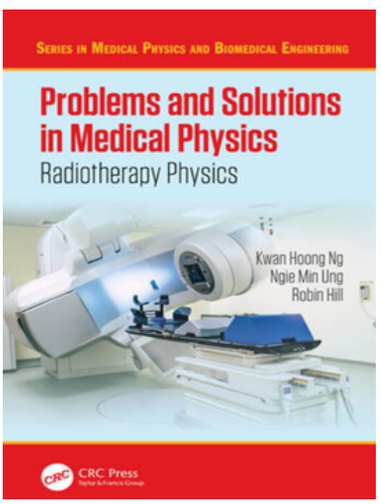
This book provides an introduction to methods of biomedical photonics. The chapters, written by world-leading experts, cover a wide range of issues, including the theoretical basis of different biophotonics methods and practical issues concerning the conduction of experimental studies to diagnose disorders associated with diabetes. It provides a comprehensive summary of the recent advances in biomedical optics and photonics in the study of diabetes and related complications.

This book will be of interest to biomedical physicists and researchers, in addition to practicing doctors and endocrinologists looking to explore new instrumental methods for monitoring the effectiveness of patient treatment.

1st Edition
Problems and Solutions in Medical Physics
Radiotherapy Physics

Edited By
Kwan-Hoong Ng, Robin Hill and Ngie Min Ung

About the Book
The third in a three-volume set exploring Problems and Solutions in Medical Physics, this volume explores common questions and their solutions in Radiotherapy. This invaluable study guide should be used in conjunction with other key textbooks in the field to provide additional learning opportunities. One hundred and forty-four solved problems are provided in ten chapters on basic physics topics, including External Beam Therapy Equipment, Photon Beam Physics, Radiation Dosimetry, Treatment Planning for External Beam Radiotherapy, and External Beam Commissioning and Quality Assurance. Each chapter provides examples, notes, and references for further reading to enhance understanding.



Upcoming Conferences 2023

S.No	Meeting Dates	Meeting Title	Location of Meeting (City,State or Country	Abstract Submission of Abstract	Website/ Email address
1	May 12-16, 2023	ESTRO2023: European Society of Therapeutic Radiology and Oncology.	Vienna, Austria.	October 26,2022	www.estro.org
2	May 20-22, 2023	MEFOMP23: MEFOMP Medical Physics Conference 2023	Royal Hospital, Muscat, Sultanate of Oman	March 16, 2023	www.mefomp-conference.com email: mefomp@gmail.com
3	June 2-7, 2023	AAPM 2023 Summer School on "Radiopharmaceutical Therapy and Dosimetry"	University of Minnesota,USA	March 15, 2023	www.aapm.org
4	June 5-7, 2023	UK Imaging and Oncology Congress 2023	ACC, Liverpool, UK	February,12, 2023	ukio.org.uk
5	June 10-16, 2023	PTCOG61: Annual Meeting of Particle Therapy Co-operative Group,	Madrid, Spain	January,17, 2023	www.ptcog61.org Email: info@ptcog61.org
	June 24-27, 2023	SNMMI 2023: Annual Meeting	McCormick Place, Chicago, USA	January 16, 2023	Am.snmmi.org
6	July 23-27, 2023	2023 AAPM Annual Meeting	Houston, Texas, USA	February, 28, 2023	www.aapm.org
7	October 1-4, 2023	ASTRO2023: America Society for Radiation Oncology	Convention Centre, San Diego, California,USA	February,13, 2023	www.astro.org
8	November 5-8, 2023	EPSM2023: Annual Conference of ACPSEM on Engineering and Physical Sciences in Medicine.	Te Pae, Ctautahi Christchurch, New Zealand		www.epsm.org
9	November,6-9, 2023	ICRP2023: International Conference of Radiological Protection	Grant Nikko, Diaba Tokyo, Japan		www.icrp.org
10	November 26-30, 2023	RSNA2023: Annual conference of Radiological Society of North America	McCormick Place, Chicago, USA	May,03,2023	www.rsna.org
11	December 6-9, 2023	International Conference on Medical Physics. ICMP-2023-AMPICON2023-AOCMP2023-ISEACON 2023	Department of Atomic Energy (DAE) Convention Centre, Anushaktinagar, Mumbai, India		www.icmp2023.org email: icmp2023@gmail.com


INDEPENDENT X-RAY
QUALITY ASSURANCE
40 years of X-ray safety & quality
X-ray Quality Assurance Test
Solutions for Multimodalities
RTI offers complete quality assurance solutions for
different medical X-ray modalities.
Contact us to learn more about our Ocean Next™
software and wireless Piranha and Cobia
meters - Bluetooth connection up to 100 m.
Fast, easy checks and unrivaled control!
www.rtigroup.com
RTI Group APAC
3791 Jalan Bukit Merah
#08-10 E-Centre @ Redhill
Singapore 159471
sales@rtigroup.com
piranha
MULTI
Status

SunCHECK™

Automated, Independent Quality Management

Platform

One Solution for Radiation Therapy QA
Speed and E翱 ciency through Automation
Access from Anywhere
Seamless Clinical Integration

Patient

Physics and Dosimetric Plan Checks
Secondary Checks
Phantomless and Array-Based Pre-Treatment QA
In-Vivo Monitoring

Machine

Daily, Monthly, Annual QA
Measurement Device Connectivity
Imaging, VMAT, MLC QA

Learn more: **sunnuclear.com/suncheck**

Patient Safety Starts Here

SUN NUCLEAR corporation

Precise
Reliable
India Made

ROSALINA INSTRUMENTS

Compact design

Light weight

Customisable

The SureDos-E is a high-precision, secondary standard Universal Dosemeter combined with modern features. This unique dosemeter offers high quality, reliability and precision comparable to the best performance dosemeter on the Medical Physics market.

When combined with the FAR 65 GB Graphite, rugged ion chamber assembly, the SureDos-E becomes an economical device for performing Absolute Dosimetry, daily beam output, etc.

- Absolute Dosimetry
- Relative Dosimetry
- INVIVO Dosimetry
- VMAT Dosimetry

SURE DOSE

- Farmer type ionisation chambers
- Electro Meters
- Specialized phantoms
- IGRT Dosimetry

Officers and Council of AFOMP

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

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

Secretary General
Dr. Aik Hao Ng
Senior Lecturer and medical physicist
Faculty of Medicine, University of Malaya
AFOMP correspondence should be addressed to:
aikhao.ng2022@gmail.com

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

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

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

Chair, Education & Training Committee

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

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

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

AFOMP webmaster: Ms. Rajni Verma
Contact Email: 1989vermarajni@gmail.com

afompnewsletter@gmail.com
www.afomp.org