

WOMEN IN MEDICAL PHYSICS AND CONTRIBUTIONS THAT SHAPED THE PROFESSION IN AUSTRAL-ASIAN COUNTRIES

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Members of IOMP Women subcommittee

1. Introduction

Historically, women have made a huge progress in STEM. Women's role in science can be traced back to ancient times. The role of the women in medical physics is indisputable, with contribution to every aspect of the profession - education, research and development, clinics, professional development.

However, the proper workplace balance and acknowledgement of female contribution turned out to be a challenging task in certain times and regions. Therefore in 2013 the International Organization for Medical Physics (IOMP) joined forces towards formalizing its support for women in medical physics and established the Women in Medical Physics Group which later-on grew to a Sub-committee (<https://www.iomp.org/iomp-w/>).

The initial talks were held in 2013 during the International Conference for Medical Physics in Brighton, UK. The idea received unanimous support by the IOMP President prof. K. Y. Chaung, Vice-President prof. Slavik Tabakov and the entire ExCom. The activities related to preliminary analysis, establishing objectives and creating the basics for the international networking were undertaken by Virginia Tsapaki, Simone Kodlulovich and Magdalena Stoeva. The official establishment of the Women Subcommittee (IOMP-W) under the IOMP is the most active step the organization took towards supporting the gender balance in the profession.

The Women Subcommittee was charged with the functions to:

- Develop, implement, and coordinate tasks and projects related to the role of females in medical physics scientific, educational and practical aspects.
- To disseminate the experiences, good practice and learning within IOMP NMOs and other relevant accessible areas/across the globe.
- Popularize the role of the women in medical physics and encourage female medical physicist to advance in the profession.
- Organize international cooperation in medical physics and related specialities.
- Provide regular status/progress updates to the IOMP on all tasks and projects related to the IOMP Women Group.

As the activities of the committee grew and its regional and functional coverage expanded, it turned into a central networking point to coordinate and analyze various aspects related to the involvement of female professionals in medical physics, including but not limited to international collaboration, awareness campaigns, organizing scientific sessions, publications, workforce data analysis.

IOMP Women will shortly celebrate its 10th anniversary, and this is the right moment to convey special gratitude to IOMP Women Group and Subcommittee members who actively contributed to our common goal during these years:

2015-2018 WOMEN IN MEDICAL PHYSICS SUBCOMMITTEE

Virginia Tsapaki, Chair (Greece)
Simone Kodlulovich, Secretary (Brazil)
Stoeva Magdalena, Website (Bulgaria)
Jamila Al Suwaidi, Calendar (UAE)
Teh Lin (USA)

Nicole Ranger (USA)
 Anchali Krisanachinda (Thailand)
 Rebecca Nakatudde (Uganda)
 Efi Koutsouveli (Greece)
 Pola Platoni (Greece)
 Guadalupe Martín Martín (Spain)
 Francesca McGowan (UK)
 Hasin Anupama Azhari (Bangladesh)

2018-2022 WOMEN IN MEDICAL PHYSICS SUBCOMMITTEE

Virginia Tsapaki, (Greece), Chair Jun 2018 - Mar 2020
 Magdalena Stoeva (Bulgaria), Chair Apr 2020 - Jun 2022
 Laura Cervino (USA)
 Simone Kodlulovich (Brazil) – SG
 Anchali Krisanachinda (Thailand)
 Hasin Anupama Azhari (Bangladesh)
 Rajni Verma (India)
 Nadia Octave (Canada)
 Eva Bezak (Australia)
 Huda Al-Naemi (Qatar)
 Chai Hong Hong (Malaysia)
 Zakiya Al-Rahbi (Oman)
 Elina Samara (Switzerland)
 Savanna Nyarko (Ghana)
 Hanan Aldousari (Kuwait)
 Lucie Sukupova (Czech Republic)

2022-2025 WOMEN IN MEDICAL PHYSICS SUBCOMMITTEE

Loredana Marcu (Romania) – Chair
 Huda Al-Naemi, Qatar
 Zakiya Al-Rahbi, Oman
 Hanan Aldousari, Kuwait
 Hasin Anupama Azhari, Bangladesh
 Laurentcia Arlany, Singapore
 Eva Bezak, Australia
 Kathleen Hintenlang, USA
 Simone Kodlulovich, Brazil
 Anchali Krisanachinda, Thailand
 Savanna Nyarko, Ghana
 Nadia Octave, Canada
 Elina Samara, Switzerland
 Magdalena Stoeva, Bulgaria
 Rajni Verma, India
 Rafidah Zainon, Malaysia

2. Women in Medical Physics in South East Asia in the past 60 years

In South East Asia (SEA), four women medical physicists have been in the forefront of the development of medical physics in their respective countries. Prof Anchali Krisanachinda, Prof Djarwani Soejoko, Prof Agnette Peralta and Dr Noriah Jamal are the Top 4 women medical physicists in South East Asia (SEA). They have taught or trained many medical physicists and have made the MP profession known in their respective countries. They have inspired female medical physicists in SEA to follow in their footsteps of contributing to the development and promotion of MP in the region.

2.1. Individual Writeups

(I) Prof Dr Anchali Krisanachinda, PhD, THAILAND

Prof Krisanachinda is the most famous and most accomplished woman medical physicist of Thailand. She established the MSc Medical Physics program in 1974 and the PhD Medical Physics program in 2015 in Chulalongkorn University. Together with other MP leaders in the region, she co-founded AFOMP and SEAFOMP in 2000, and the ASEAN College of Medical Physics (ACOMP) in 2014. She was the President of SEAFOMP from 2007 to 2009. She was the founding president of the Thai Medical Physicist Society (TMPS) in 2001. She has organized and chaired multiple local (TMPS) and international (SEACOMP, AOCMP, ACOMP, AAPM/ISEP, ICMP) conferences/workshops.

Prof Krisanachinda has dedicated her life to the development and promotion of the MP profession in her country and in the region. In the latter part of her career, she has focused on helping the less developed ASEAN countries through the education and clinical training of MP from these countries.

For IOMP, she served as the Treasurer from 2012 to 2018, and for AFOMP from 2001 to 2012. In 2013, she was honored as one of the 50 medical physicists of the world who had made “Outstanding Contributions over the Last 50 Years” during the 50th anniversary celebration of IOMP. She received the fellowship award from both IOMP and IUPESM for her outstanding contributions. She received in 2018 - the IOMP Harold Johns Medal, in 2020 - the AFOMP Lifetime Achievement award, and in 2022 - the IOMP International Day of Medical Physics (IDMP) award. She was the SEAFOMP Prof. John Cameron Memorial speaker in 2017 and the AFOMP Prof. Kiyonari Inamura Memorial Oration speaker in 2022. Prof Krisanachinda has served as an expert in multiple IAEA missions. She has been the Project Lead and National Project Coordinator of various IAEA RCA projects.

(II) Prof. Dr. Djarwani Soeharso Soejoko, PhD, INDONESIA

Prof. Soejoko is the pioneer woman medical physicist of Indonesia. She was appointed full professor in medical physics at the University of Indonesia in 2006. She established the BSc Physics major in Medical Physics program in 1998 and the MSc Physics with specialization in Medical Physics in 2002.

She has been the driving force in the development of the MP profession in Indonesia. Together with other MP leaders in the region, she co-founded AFOMP and SEAFOMP in 2000, and the ASEAN College of Medical Physics (ACOMP) in 2014. She received the fellowship award from IOMP in 2019. She received the IDMP award in 2020 for her significant contributions to the profession. Prof Djarwani has served as an IAEA expert in several medical physics missions. She was the National Project Coordinator for multiple IAEA/RCA projects up to 2015. She was the SEAFOMP Prof. John Cameron Memorial speaker in 2012.

She established the x-ray machine compliance testing program under Nuclear Regulatory Agency and has been the chairperson of the government x-ray machine certification scheme since 2012. She also initiated and was involved in drafting government laws and regulations on the use of ionizing radiation in medicine and the role of medical physicists. Due to Prof. Soejoko, the recognition of the MP profession in Indonesia was achieved and the registration of medical physicists by the government commenced in 2012.

(III) Prof. Agnette Peralta, MSc, PHILIPPINES

Prof. Agnette Peralta is the pioneer diagnostic radiology medical physicist (DRMP) in the Philippines, who has taught almost all medical physicists in her country. She has had an important role in the establishment of the MSc Medical Physics program in the University of Santo Tomas in 1981 and in the development of medical physics in her country. Together with other MP leaders in the region, she co-founded AFOMP and SEAFOMP in 2000, and the ASEAN College of Medical Physics (ACOMP) in 2014. She was the President of SEAFOMP from 2013 to 2014. She was the founding president in 1986 of the Philippine Organization of Medical Physicists (now known as the Society of Medical Physicists in the Republic of the Philippines). She has organized and chaired various local and international conferences/workshops in medical physics held in the Philippines.

She was the Director of the Center for Device Regulation, Radiation Health, and Research of the Department of Health, the Philippines for twenty-four years. She retired from government service as an Assistant Secretary of Health, the highest government position ever held by a Filipino medical physicist. She chaired or served in many government committees and task forces. At present, she still teaches in the University of Santo Tomas Medical Physics program

on a part-time basis and chairs the subcommittee on clinical equipment and devices of the Health Technology Assessment Council of the Philippines.

Prof. Peralta has served as an expert/consultant for IAEA and WHO. She was elected for three terms as a member of the International Commission on Non-Ionizing Radiation Protection, the only Asian medical physicist to have been an ICNIRP member. She was the National Project Coordinator for two IAEA/RCA projects on education and training of MP. She was one of the examiners for the first board certification examination in DRMP in the Philippines in 2019. Prof. Peralta was awarded the IOMP Fellowship in 2017. She was honoured in 2020 as one of the “Top 21 Outstanding Medical Physicists in the AFOMP Region” on the occasion of the 20th anniversary of AFOMP.

(IV) Dr Noriah Jamal, PhD, MALAYSIA

Dr Noriah Jamal is one of the pioneer women medical physicists in Malaysia. Her career has been dedicated to the promotion and application of physics in medicine, both at the national and the international level. She was the Director of the Division of International Relations and Planning at the Malaysian Nuclear Agency before she retired. She has made major contributions to the academic and professional development of medical physics in her country. She has also organized and directed several national and regional conferences/workshops on radiation protection, diagnostic radiology and nuclear medicine.

She was the Vice Chair of the Medical Physics Division, Malaysian Institute of Physics. She was also the Chair of the Radiation Protection Committee, Malaysia Association of Medical Physics (MAMP). She was the National Project Counterpart of the IAEA/RCA Project RAS6083: Strengthening Medical Physics Through Education and Training (2006-2012). Until the end of 2019, she was the Lead Country Coordinator for the IAEA project RAS6088: “Strengthening the Effectiveness and Extent of Medical Physics Education and Training in the Asia Pacific region.” She has served as an expert for IAEA in several missions. Dr Jamal was honoured in 2020 as one of the “Top 21 Outstanding Medical Physicists in the AFOMP Region” on the occasion of the 20th anniversary of AFOMP.

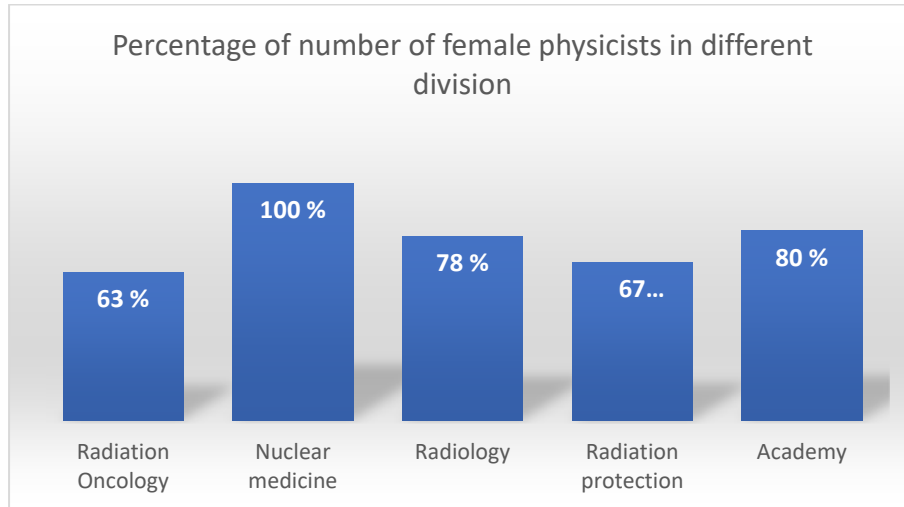
2.2 Other Women Medical Physicists Who Contributed to MP Development in SEA

Other women medical physicists in SEA who contributed to the development of medical physics in the region include Eulinia Valdezco, Lilian Rodriguez, Joyce Melchor, Monica Bacaling, Carmen Mesina, Marilou Rojero, and Aida Lobrigitto from the Philippines; Pirunthavany Muthuvelu, Rozana Hussin, Mahzom Pawanchek, Azleen Mohd Zain, Sarene Chu, Nurmazaina Md Ariffin, Jeannie Wong, Chai Hong Yeong, Rafidah Zainon, and Nursakinah Suardi from Malaysia; Ratana Pirabul and Sivalee Suriyapee from Thailand; Ratih Oemiyati, Yekti Nastiti, Rini Shintawati, Darmawati, and Indah Lestariningsih from Indonesia; and Cheryl Lian and Laurentcia Arlany from Singapore.

Dr Chai Hong Yeong is the youngest ever elected President of SEAFOMP (2022-2025). She also holds multiple positions internationally: Chair of the Medical Physics World Board (MPWB) of the IOMP, Founding Committee of the ASEAN College of Medical Physics (ACOMP), Committee Member of the Professional Relations Committee of AFOMP, etc. She is the current Editor of the e-Medical Physics World (e-MPW) bulletin, and the Editorial Board member of the Physics and Technology in Medicine (PTM). She was the Chair of the 18th AOCMP and 16th SEACOMP in 2018 that successfully hosted >550 participants from 40 countries in Malaysia. She has published more than 80 peer-reviewed journals, 2 academic books, 2 book chapters, and has assisted the IAEA in drafting the “IAEA HHS No. 46: Worldwide implementation of digital mammography imaging” and “Quality assurance and optimization for fluoroscopically guided interventional procedures” guidelines. She received the IUPAP Young Scientist Award in Medical Physics 2021, and the SEAFOMP Young Leaders Award 2017.

3. Women in Medical Physics in Sultanate of Oman

In Oman, women represent the majority of the graduates of Sultan Qaboos University in the field of physics / medical physics. Females currently constitute to nearly 80% of the workforce in all medical physics disciplines in the Ministry of Health and Sultan Qaboos University and the Sultan Qaboos Comprehensive Cancer Center as shown in the chart below. The percentage of Omanisation of females in all sub-specialists in the medical physics field reached 100%.



Up until the article was written, there are two female medical physics who successfully achieved doctorate (PhD) level and about 9 physicists have a master's degree. Three of the Omani female physicists who underwent an accredited residency program and one specialized training program after achieving their master's degree.

Female Medical physicists have an effective role in this field as they have contributed to many national and international training programs, conferences and workshops within Oman. Moreover, they continue to participate in the world by celebrating the international medical physics day on 7th November and also breast cancer awareness in October.



Dr **Zakiya Salem Al Rahbi**, Chief Specialist Medical Physicist, works for the National Oncology Center, Radiotherapy Department, Royal Hospital. Dr Al Rahbi is a medical physicist researcher and international speaker and lecturer. Since 2019, she is the coordinator of the Physics program in the Diagnostic residency program at OMSB. In addition, she is assigned to be Radiation Protection Supervisor at the Royal Hospital. She is a deputy president of the Omani Medical Physics Society (OMPS) since 2018, as well as Chairperson of the Award and Honours Committee in the Middle East Federation Organization of Medical Physics (MEFOMP), and a member of the International Organization of Medical Physics- Women Group (IOMP-W) and MEFOMP-W. She has presented several proposals to improve the quality of the workflow and to improve the situation of the Medical Physics field in the Ministry of Health, Oman. Recently, her application to join ICRP Mentorship Program is accepted, and she has been selected to take part in work for Task Group 116 Imaging in Radiotherapy.

Dr **Al Rahbi** is the first Omani medical physicist in the MoH. She has a PhD degree from the University of Wollongong, Australia in 2019 and an MSc degree from the UK in 2009. She underwent a Residency program at King Faisal Specialist Hospital and research center in 2015. She has attended many trainings in her field and gained experience in the field of quality assurance of Radiotherapy modalities, Brachytherapy as well as in radiation safety aspects of workers, patients, and workplace. Dr Al Rahbi has several scientific research, which have been published in international journals in this field. She has participated in many international and national workshops, conferences and presented several presentations and posters. She has participated in several international and national conferences as a speaker or organizer. Additionally, she has conducted several workshops and training courses in and out of Oman. She has participated in many international planning competitions as well and achieved high scores. Currently, Dr Zakiya Al Rahbi is the Chairperson, of the local organizing conference committee, MEFOMP Medical Physics Conference 2023. <https://mefomp-conference.com/>

Dr Al Rahbi achieved many awards. The highlights of these achievements include the “AOCMP-AMPICON 2017 Best Poster Award”, 17th Asia-Oceania Congress of Medical Physics “AOCMP – 2017”, which was evaluated by the president of the International Organization of Medical Physics and 1st prize in Breast Abstract Presentation’, the 5th middle east best of CTRC-AACR, San Antonio BEAST CANCER Symposium .

Her passion does not stop here, she went through the International Medical Physics Certification Board (IMPCB) parts 1 & 2 and passed them with high scores. Her priority is always to update her knowledge and skills in all sub-fields of medical physics by attending plenty of lectures and webinars as well as carrying out research and participating in several international treatment planning competitions. Over the years, she has gained great experience in the field of quality assurance of radiation oncology, radiological diagnostic imaging modalities, as well as in the radiation safety aspects of radiation staff, patients, and the workplace. Besides my residency study, her attachment to the Medical Physics and Radiation Protection department in MoH gave her the opportunity to cover all sub-specialties of the Medical Physics major, as well as the management in medical physics Oman. Dr Al Rahbi has developed several manuals, protocols, guidelines, policies, and procedures based on international standards.

4. Women in Medical Physics in other Austral-Asian countries

Among the most proactive female physicists in promoting and supporting the role of women in medical physics in Austral-Asia is **Eva Bezak**. Prof. Bezak, MSc, PhD, FACPSEM, FIUPESM is an internationally known medical physicist and professor in Medical Radiation at the University of **South Australia** (from 2015). Prior to 2015, she spent 17 years in industry as a medical physicist at the Royal Adelaide Hospital (RAH), becoming Chief of Medical Physics in 2006. She was the first female president of the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM; 2010-2012) and secured \$5.5M of government funding for an Australian medical physics training. In 2015 she was appointed to the Administrative Council of the International Union for Physical and Engineering Sciences in Medicine (IUPESM) and was founding member of the IUPESM Women in Medical Physics and Biomedical Engineering Task Group. In 2017 she became the first female vice president (now president, 2023) of the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP). In 2019 she was appointed the Secretary General of the International Organization for Medical Physics and was elected the IOMP VP in 2022. She is a convenor for the IUPESM World Congress 2025, to be held in Adelaide, Australia.

Eva is a co-author of the Australian Academy of Science Report on future accelerators in Australia (2016) informing the government on the need for proton therapy and a past member of the National Radiation Oncology Tripartite Committee that developed quality and performance standards for radiation oncology in 2012 directly impacting the

quality and the delivery of radiation oncology services in Australia. She co-authored the Tripartite National Plan for Radiation Oncology 2012-2022 as well as the National Needs Analysis Survey, examining accessibility to antenatal ultrasound and training in rural Australia (2022). Additionally, she is an author of over 200 publications and 3 books and has supervised over 40 research postgraduate students (MSc, PHD).

In 2019 she was included in the South Australian Women's Honour Roll, tributing South, Australian women who have made a significant impact on the community, women who are role models and leaders.

Representing **Bangladesh**, Prof. **Hasin Anupama Azhari** is currently serving as Vice-President of AFOMP and Member of IOMP Women Subcommittee. She is involved as Associate Editor of European Journal of Medical Physics (Physics Medica). She was the chairperson of several national and international medical physics conferences. In addition, she was the chair of many scientific sessions related to medical physics (e.g. AOCMP 2019, 2021, 2022, AMPICON, EPSM, IUPESM WC etc).

From the early years of medical physics in **Iran**, women were actively involved in such roles as Vice-President of the first IAMP ExCom (Prof. R. Bagherzadeh Akbari), etc. Nowadays, female Iranian medical physicists have further leading roles, such as membership of an AFOMP committee (Prof. P. Mehnati), journal editorial boards, conference scientific/organizing committees, and university faculty (including many full professors) as well as authoring books/papers, chairing departments and research centers, etc. (e.g., Professors P. Shokrani, M. Mokhtari-Dizaji, A. Sazgarnia, S. Khoei, N. Gharehaghaji, S.M. Hejazi, etc). About 50% of IAMP members and Radiotherapy Physics Board certificate holders are female. Also, those living abroad hold further leading positions.

In **India**, women in medical physics have recently started to come to leadership positions in professional fronts apart from some very few exceptions, due to male dominance and traditional mindset of the society. Dr **Rajni Verma** is the first and the youngest women medical physicist as member to various AFOMP and IOMP committees and working groups. Since 2018 she is actively involved in all activities related to women participation in medical physics organized by the IOMP Women subcommittee, which include special session in international conferences. Rajni is also an active member of the IOMP website committee, contributing along with other members of group to design and develop the contents for the website. Mainly focused on aim of "space for all" and encouraging the peers globally to report the activities. As the first female to this position, in 2018 she became the AFOMP website manager, while during COVID-19 she got actively involved in materializing the idea of virtual academic programs AFOMP Monthly webinar (since June 2020), AFOMP School Webinar (since June 2021) which are running successfully till date and proved to be one of the key academic programs of AFOMP. Rajni is also a member of the IOMP Medical physics World Board subcommittee which handles the IOMP newsletter, website, webinar and social media. On a national level, Dr Verma is a member of the Executive Committee of the Association of Medical Physicist of India-Northern Chapter, working on the development of member directory for the chapter and regularizing academic events, also being involved in the celebration of International Day of Medical Physics on Chapter level every year (since 2017), working to digitalize it on several social platforms for better recognition of medical physics community within the nation.