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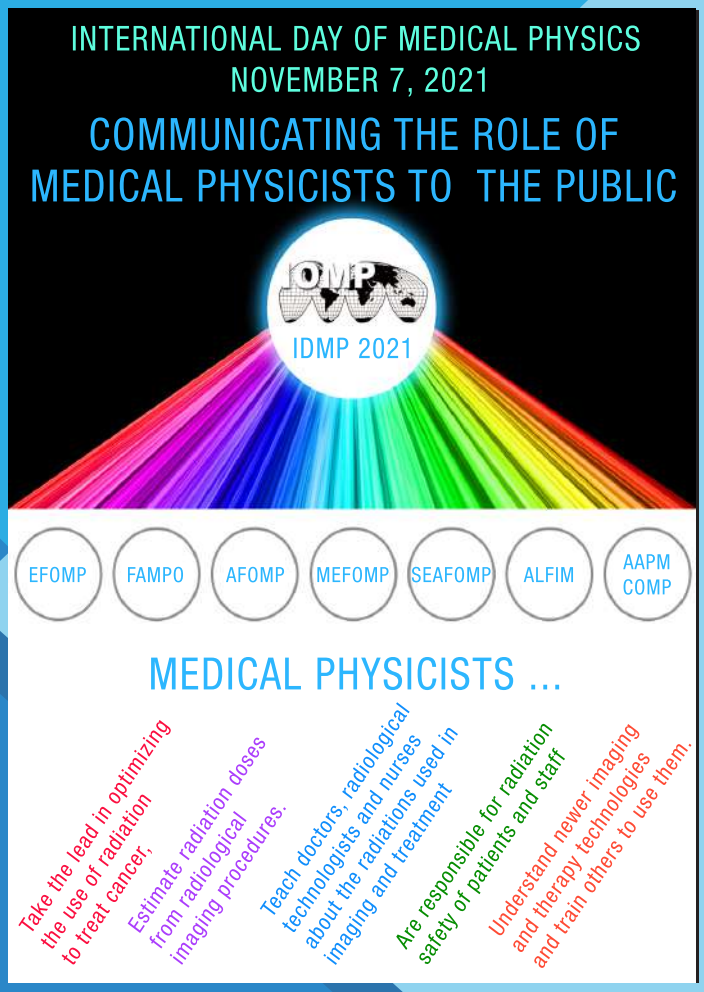
Voice of BMPS

An official E-Newsletter of BMPS, Issue 9, November,2021



Marie Sklodowska-Curie
(7 November 1867 – 4 July 1934)

Contents

Contents

Editorial

On behalf of Bangladesh Medical Physics Society (BMPS), we wish you all a Happy International Medical Physics day. It is a great pleasure of us to present you the "Voice of BMPS" (Electronic Newsletter of Bangladesh Medical Physics Society) Issue-9, 2021 on this joyful day. We feel honored to publish the newsletter each year on the International Day of Medical Physics (IDMP) that celebrates the birthday of Madam Marie Sklodowska–Curie. The theme of IDMP of this year 2021 is "Communicating the Role of Medical Physicists to the Public". COVID-19 pandemic brings new challenges to even well-developed healthcare systems. As Healthcare Professional, Medical Physicists across the world who are working hard in the frontline, treating patients despite the health risks.

This edition of the newsletter contains the activities of the active participants of BMPS members. Also it contains the previous one (01) year of progress of BMPS. Although COVID-19 has affected the progression quite a bit, it is still noticeable. Medical Physics development in education, profession, training is remarkable. The young generation is driving it utmost to move it forward. In the meantime BMPCB (Bangladesh Medical Physics Certification Board) is going to establish individual certification which is one step progress. It is our pleasure to organize AOCMP-2021, 21st Asia-Oceania Congress of Medical Physics (AOCMP 2021) in Bangladesh by BMPS in cooperation with our national, international organizations. Voice of BMPS editors are improving the newsletter in different ways, and moving it along the pathway to maintain international standards. A huge thanks to all the persons who contributed by writing wonderful and inspiring articles, without which there wouldn't have been this newsletter issue. I hope you will enjoy reading this issue. Let's celebrate this joyful day with proper social distancing and do our best to improve the quality of treatment incorporated with updated technology involving all the medical physics professionals. I thank all the readers for being with us. Please do inform us if you have any suggestions regarding this sector. It will help us to grow and help the world as a whole.

Thank you. Stay safe.

Editor
K. M. Masud Rana

Chief Editor
Prof. Dr. Hasin Anupama Azhari

INTERNATIONAL ORGANIZATION
FOR MEDICAL PHYSICS (IOMP)
Member of the International Union of Physical and Engineering Sciences in Medicine
(Union Member of the International Council for Science)
www.iomp.org

Message from President, IOMP

I am delighted to note that "Bangladesh Medical Physics Society (BMPS) is observing the International Day of Medical Physics (IDMP) which is celebrated every year on 7th November. It is heartening to note that BMPS is regular in using the opportunity of IDMP to promote medical physics. The release of BMPS e-Newsletter titled "Voice of BMPS" on 7th November 2021 is most appropriate.

I wish to encourage all BMPS members to join the IOMP webinar being organized on the theme of IDMP2021 "Communicating the Role of Medical Physicists to the Public. We have selected experts from public media and journalists to enlighten us to communicate with public, as otherwise we remain confined within our small circle of professional colleagues.

I congratulate BMPS on its active programs for medical physics community and wish BMPS all success.

Yours sincerely,

MADAN REHANI

Madan M Rehani
President, IOMP

Message from President, AFOMP

Presidential message,

As the President of Asia-Oceania Federation of Organizations for Medical Physics (AFOMP), kindly accept my greetings and best wishes on the International Day of Medical Physics (IDMP 2021). I am very happy to note that Bangladesh Medical Physics Society (BMPS) organizing activities as IDMP 2021 celebration and bringing out e-newsletter.

The IDMP is being celebrated every year on seventh November since 2013 and this year it will be celebrated on 7 November 2021, the theme of this year's IDMP is "Communicating the role of medical Physicist to Public ". Despite of huge contribution of the medical physicists to healthcare, they are not very well recognised not only by public but also by many health professionals, therefore IOMP has decided this is IDMP theme very appropriately. We need to reach to public and apprise them about our contribution to healthcare. We need organise programmes in public, news articles, TV debates so that our role as health professional get well recognised.

Year 2020 and 2021 was very difficult and hard time for each one of us due to unprecedented COVID-19 pandemic. The COVID-19 pandemic has affected each one of us in every aspect of life, medical physicist also affected by this pandemic. However, as a health professionals and warriors, we have been brought up and taught to encounter the obstacles and difficulties.

During the pandemic, the health services needed to be continued and therefore medical physicist also contributed hugely to tackle the pandemic during COVID. The Radiotherapy facility, Radio Diagnosis, Nuclear Medicine, Radiation safety, QA, QC, education, and training continued with greater challenges than usual.

Medical physics is a very dynamic and vastly evolving profession and therefore we must upgrade our knowledge and skills continuously. Despite of approval by ILO and WHO as health Profession many countries medical physicists are not getting the dues as is expected. As health professions the clinical medical physicists needs to be certified and registered by the national authority of the country so that directory of registered clinical medical physicists is maintained. Recently IAEA has brought out guidelines for certification of medical physicist in form of Training course series document TCS 71 which is endorsed by IOMP and IMPCB.

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This document is freely available for download from IAEA website. I am sure that you will use this document to get the medical physicists' certification and registration from your country authority.

To increase the professional status of medical physicist in AFOMP region, we have to work collectively and effectively. As you know cooperation and coexistence is the key for growth of oneself and as a profession and therefore all efforts need to be made in this direction.

I hope and wish that the Covid 19 pandemic will over soon, and we will be able to function more effectively and efficiently.

Looking forward to meeting you all in person at Dhaka, Bangladesh during 10-12 December 2021 during AOCMP 2021.

I am delighted that BMPS is celebrating IDMP and carrying activities. I wish all of you a very happy IDMP 2021.

Arun Chougule

Prof. Arun Chougule
President- AFOMP

International Organization for Medical Physics

Message from Coordinator, IDMP

Dear Medical Physics Colleagues across the Globe,

It is my pleasure to announce to you the theme of this year to mark the celebrations of the International Day of Medical Physics (IDMP 2021):

"Communicating the Role of
Medical Physicists to the Public"

How often do people ask you what is your profession? Did you notice how difficult it is to explain to the public what medical physicists do? Do people know medical physicists' role in the diagnosis and treatment of cancer? Do people really realize the responsibilities of medical physicists to protect people from the harmful use of radiation? There are many other concerns and ambiguity surrounding who medical physicists are and what they do, not only among the public but even in many medical sectors too.

Thus, IOMP and many of our partners agreed on this year's theme to spread awareness and familiarity about our profession. It is needless to say that the International Labor Organization (www.ILO.org) has updated its definition of Medical Physicists profession in 2008 stating that ".... medical physicists are considered to be an integral part of the health work force alongside those occupations classified in sub-major group 22, Health professionals....".
I hope this year's vision of knowing who we are and what we do will be clear to all members of the community we serve around the globe.

I wish all my colleagues around the World a Happy Medical Physics Day. Enjoy the celebrations of this day and tell your neighbors how great Medical Physicists are!in your office to show our pride of being a Medical Physicist!

Ibrahim Duhaini
IOMP Treasurer
IDMP Coordinator

Message from President, BMPS

It is very much good to let all of you know that Bangladesh Medical Physics Society (BMPS) will celebrate the International Day of Medical Physics (IDMP) by publishing the 9 th issue of its official e-Newsletter to commemorate the birthday of Prof. Mary Curie who contributed immensely for medical physics.

The theme of IDMP of this year "Communicating the Role of Medical Physicists to the Public". Heartfelt Welcome to all our readers for our new newsletter. BMPS regularly organizes national and international seminars, conferences, workshops in cooperation with the relevant international organizations for Continuous Professional Development in the field of Medical Physics. This edition includes articles, different continuous professional developments events, news and events, award and honour, colourful ads pictures etc around the year. We hope you will enjoy the newsletter and welcome your suggestions and advice for future development.

Thanking You

Md. Anwarul Islam
President
Bangladesh Medical Physics Society (BMPS)

Message from General Secretary, BMPS

I am delighted that "Bangladesh Medical Physics Society (BMPS)" is going to observe the International Day of Medical Physics (IDMP), which is celebrated every year on 7th November- the birth day of Mary Sklodowska Curie. It is worth to note that BMPS publishes its electronic newsletter- "Voice of BMPS" on this auspicious day each year.

This year, the theme of IDMP is "Communicating the Role of Medical Physicists to the Public". Medical Physicists are healthcare professionals recognized by World Health Organization (WHO) and International Labour Organization (ILO). As like as other healthcare workers, Medical Physicists are also in the frontline in dealing with the patients during COVID-19 pandemic situation. Therefore, they deserve recognition and appreciation for their efforts. It is expected that this year's theme may bring awareness and importance of medical physicist in the healthcare discipline.

I believe that the COVID-19 pandemic situation cannot stand in the way of celebrating this day to honour our profession. Taking social distancing into consideration, this remarkable day can still be celebrated through online meetings, gatherings, contests, and parties.

I would like to thank all BMPS colleagues for their great initiatives and efforts for the celebration of IDMP 2021 and I also wish all my Medical Physicist colleagues across the globe a "Happy Medical Physics Day".

M. Akhtaruzzazman, PhD
General Secretary
Bangladesh Medical Physics Society (BMPS)

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General Articles

TREATMENT OF BREAST CANCER IN BANGLADESH PERSPECTIVE: MYTHS AND FACTS

Dr. Arman Reza Chowdhury
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According to GLOBOCAN data 2020, Breast cancer is the most common malignancy worldwide in females. In Bangladesh perspective, this is also in the top position followed by cervical cancer. Every year around 13,000 ladies are newly diagnosed with breast cancer in Bangladesh.

In the last one decade, there are so many developments happening in cancer treatment in Bangladesh. But still there are some misconceptions as well as some lack of knowledge or awareness among people regarding cancer management in Bangladesh.

In my write up I will discuss about 7 facts that are associated with cancer management specially breast cancer in Bangladesh perspective.

1.Diagnosis of cancer by FNAC or Biopsy:

FNAC or fine needle aspiration cytology is not a good testing option for any cancer. Because it is said that, in 50% cases FNAC can give us wrong information or confuse us. Biopsy is the best option for diagnosis of cancer. In breast cancer, it can be done by core biopsy or tru cut biopsy. In around 90% cases, biopsy can give us confirmatory information. As well as with the help of the biopsy tissue from breast, we can also do immunohistochemistry of breast panel that includes ER (Estrogen receptor), PR (Progesterone receptor), HER 2 (Human Epidermoid Receptor 2), Ki 67 and P 53.

2.Lots of investigations even after cancer diagnosis:

We all know that breast cancer is a systemic disease. It has a great propensity to metastasize. So, after diagnosis of breast cancer by biopsy and immunohistochemistry – we need to do several investigations. We can classify these investigations in two parts:

a)Staging works up investigations – CT scan of chest/abdomen/pelvis, Whole body isotope bone scan (If any bone pain or locally advanced disease), Brain MRI scan (If symptomatic) etc. We also need to do PET scans if needed sometimes but this is not routine practice.

If logistic or financial constraints are present then CT scan of chest/abdomen/pelvis can be replaced by chest X-ray and ultrasonography of abdomen, but these are not good alternatives.

b) Investigations to check physical status before going to anti-cancer treatment – Complete blood count, liver function test, kidney function tests, baseline tumor marker (CA 15.3), ECG, Echocardiogram etc.

3. Necessity of determining staging before starting treatment:
We know that most common cancer diagnoses have 4 stages. In breast cancer, Stage I and II is told at an early stage. Stage III is locally advanced stage and stage IV is advanced or metastatic stage. Treatment pattern as well as treatment outcome is solely depending on stage. So, it is mandatory to determine the stage of breast cancer before starting treatment.

4. Importance of multidisciplinary tumor board:
MDT or multidisciplinary tumor board is a standard practice worldwide especially in the developed world for the management of breast cancer. MDT is also done in some centers or hospitals in Bangladesh. Breast MDT includes – Surgeon or breast surgeon, clinical oncologist or radiation and medical oncologist, radiologist, histopathologist, nuclear medicine specialist, oncology nurse etc. They sit together, discuss the case thoroughly and finalize the necessary treatment options and explain it to the patient and his/her attendance. MDT always tries to opine in an evidence-based way which is essential for better treatment for any cancer.

5. Surgical option for breast cancer:
In the earlier time it was thought that mastectomy that means total removal of the breast is the only surgical option for breast cancer. But the days have changed. Nowadays, besides mastectomy there are several breast conserving approaches like lumpectomy, wide local excision, quadrantectomy are widely practiced in Bangladesh. Even after lumpectomy surgery, to maintain the previous shape of the breast, Oncoplastic breast surgery is also available in some centers in Bangladesh.

6. Systemic therapy for breast cancer in Bangladesh perspective:
As I already mentioned that breast cancer is a systemic disease, so systemic treatment in the form of chemotherapy, hormone therapy, targeted therapy, immunotherapy is needed in different stages of breast cancer. But it is true that each option is not for all. We cannot treat breast cancer in the manner of “One shoe for all”. It can differ according to stage, receptor status, age, tumor biology etc. But the fact is that all the options like chemotherapy, hormone therapy, targeted therapy, immunotherapy – all are vastly available at present in Bangladesh.

7. Radiation therapy in breast cancer and Bangladesh:

Radiation therapy is a very important treatment option for breast cancer management. After mastectomy – chest wall irradiation is applied in some situations if indicated. But it should be remembered that after breast conservative surgery whole breast radiotherapy +/- tumor bed boost is mandatory for almost all the patients. This radiation therapy can be given by two-dimensional technique/ 3D CRT (Three-dimensional technique)/ IMRT (Intensity modulated radiotherapy)/ VMAT (Volumetric arc radiation therapy). These all techniques are available in Bangladesh in different government and private hospitals. Radiation therapy is teamwork. It is not the only job of a Radiation Oncologist. At first a clinical oncologist or radiation oncologist assesses the patient and decides to treat with radiation therapy. Then the simulation is done by a technologist in presence of a medical physicist and radiation oncologist. Then a radiation oncologist contours over the CT images and makes a prescription of radiation therapy. Then according to that prescription – medical physicists do plan and dosimetry. Then again clinical or radiation oncologists evaluate the plan by sitting together with a medical physicist. After being satisfied with the plan, the oncologist approves the plan. Then accruing to that approved plan – medical technologist treats the patient with radiation therapy. So, several people are involved for quality radiation treatment and each person's role is important.

So, finally all options for breast cancer management are available in Bangladesh. The most important things are to find the appropriate doctor as well as the appropriate center/hospital.

Cancer treatment facilities in Rajshahi Medical College Hospital, Rajshahi, Bangladesh

Shahidul Miah, Shafayat Habib, Prodip Kumar Ray
Rajshahi Medical College Hospital, Rajshahi, Bangladesh

Introduction:

Bangladesh is a developing country and is now facing many challenges, especially in the health sector. Cancer management is a priority due to the current trend of cancer diseases in this region. In Bangladesh have eight divisions with 64 districts, Rajshahi is one of them. The current population of Rajshahi district is around 2.5 million based on Bangladesh government data in 2016. The population is increasing day by day. In Rajshahi district there is no radiotherapy center except Rajshahi Medical College Hospital but for chemotherapy, patients can get this service in privet chamber or hospital. In Rajshahi an accurate number of cancer patients are currently unavailable, but according to a 2018 Globocan report (a global project on cancer research), Cancer patients are increasing day by day and at present more than 1.4 to 1.5 million over cancer patients in the country and about 0.15 million new cases are being added in every year. Around 0.10 million cancer patients die annually.In Rajshahi has more cancer patients [1,2].

Rajshahi Medical College Hospital established in 1958. The department of radiotherapy at Rajshahi Medical College was started from 1977. It is located in Rajshahi District. It was the second such institution in erstwhile East Pakistan after Dhaka Medical College. It has a large hospital that is the central provider for advanced health care in the northern part of Bangladesh. Here treatment is given in indoor and outdoor basis facilities. In this department suitably equipped to provide almost all possible therapeutic services for inpatients and outpatients like Radiotherapy, Brachytherapy, Chemotherapy and Surgery. The surgery treatment facilities are given by through the department of surgery and allied departments in this hospital.

According to the World Health Organization (WHO), one cancer center is needed for every 0.10 million people [3]. In Rajshahi needs 2 centers to adhere to the WHO standard. Howover, in rajshahi has 1 center; Rajshahi Medical College Hospital tries to put their best effort to adapt modern technology in radiotherapy treatment.

Rajshahi Medical College Hospital (RMCH)

Chemotherapy Facilities:

In Rajshahi Medical College Hospital has a both indoor and outdoor treatment facility for cancer patients.

Indoor facilities:
For chemotherapy, in this hospital has 30 bedded male or female ward and 10 bedded cancer care center. In a day 30 patients has received chemotherapy daily and average 50 patients admitted daily here.

Outdoor facilities:
In a day approximately 70 patients attend for outdoor service in Radiotherapy department and 60 to 70 patients got radiation treatmnet daily.

Figure: Indoor Male and Female ward

Radiotherapy Facilities:
In this department has provided both radiotherapy facilities (external beam radiotherapy and Brachytherapy).

Teleherapy:
For Teletherapy Cobalt-60 machine is available since 1996 for cancer treatment. At present in this department has an advanced technology 30 pair MLC based Cobalt 60 Teletherapy Machine which is installed in 2018 with PROWESS treatment planning software system and Record & Verifying system. It has multiple treatment options such as 3DCRT, IMRT etc.The cancer patient now can get advance and more acurate treatment that maximum radion to the tumour and minimum radiation to the healthy tissue by using this tratment option.

Brachytherapy:
Brachytherapy treatment is very effective for many cases of cancer patients especially of cervical cancer. In this hospital most cervix cancer patients got the cervical cancer treatment by using High Dose Rate Brachytherapy machine with cobalt 60 source. A Brachytherapy treatment was start from 2016 and it's going still now. For Brachytherapy treatment has used BEBIG HDR Brachytherapy remote after loading machine with well equipped HDRPlus Treatment Planning software systems and different type of applicator.

Figure: (a) Teletherapy (Co-60) Machine Room and (b) Machine Control Room

Figure: (a) Brachytherapy OT room (b) Brachytherapy Simulation (C-arm Xray) and Machine Room

Figure: Treatment Planning Software Room for Teletherapy and Brachytherapy

Radiotherapy simulator:

A new CT Simulator machine has installed in July 2020. For brachytherapy simulation has used Xray C-arm machine. By using CT simulator patients can get modarn treatment in Rajshahi Medical College Hospital. It will be start very soon. By using this simulator machine cancer patients will get more accurate treatments than before.

Figure: Computed Tomography (CT) Simulator

Surgery:

The radiotherapy department has no onco surgeon but cancer patient got these facilities through the department of surgery and allied departments in this hospital by oncology consultant.

Manpower:

Four radiation oncologist, two medical physicist, three radiation technologist and three nurses worked in outdoor patient regularly. For indoor service there is no doctor post but MD residency (students) doctors have given the support with four nurses' day or night.

Future Plan:

The department and hospital authority try to add the updated and modern radiotherapy technology in this department. And also they try to open surgical oncology department, Gynecological oncology department and Haemato oncology department in this hospital.

In recently Bangladesh government has taken a step to establish 100 beds dedicated cancer hospital in eight divisions with full facilities of cancer treatment services. Hopefully it will complete around 2022.

Limitation:

For indoor servises in this department have no posted doctors like Register or medical officer. The MD residency (students) doctors have given the support day or night. And in this hospital has no medical physicist post for radiotherapy department to provide advanced therapy and takecare of radiotherapy machine like quality assurance or quality control. Manpower is very important for provide best tratment so it is mandatory to posted doctor and medical physicist in this department.

In Rajshahi Medical College Hospital has no Linac machine now. The Linac machine is very important for many cases of cancer patients in radiotherapy treatment. Linac machine played very important role in early diagnosed cancer patients and mostly can be cured. The cobalt machine is a fixed energy 1.5MeV so many cases its does not work accuratly when tumour depth is high but the linac machine has variable X-rays and Electron energy like 4 to 25 MeV so it can be used varible tumour depth with choice of energy. So if linac machine has in this hospital then many cancer patients will get best treatment facilities from here like Dhaka. As thinking of best treatment the authority is trying to setup a new Linac machine in this hospital.

Summary:

Radiotherapy is a multidisciplinary area which uses complex equipment and radiation sources for treatment. The cancer patient is incrising day by day all over the world. The cancer patients need radiotherapy any time of cancer stage. According to International Atomic Energy Agency (IAEA), 2 Teletherapy machines and 1 Brachytherapy machine are needed for 1 million populations.

According to this estimation of Rajshahi district needs two radiotherapy centers and needs around four Teletherapy and two Brachytherapy machine respectively. However, in Rajshahi there are only one radiotherapy centers with one teletherapy cobalt machine and HDR Brachytherapy machine. There is no privet center in rajshahi.

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Speaking from Germany- Interview with Prof. Zakaria

Directed by- Khairul Islam Tufan, presented by - Mr. Habibur Rahman Helal

(Date of Interview: 30th March 2021, 10 pm Bangladesh time)

An interesting TV interview (Bengali language) of Eminent Professor Dr. Golam Abu Zakaria on Channel I regular program of Positive Thinking.

This interview is translated and reproduced in English by Soma Jannatul Ferdusy and Farzana Akhter Zeba with small modification in cooperation with Prof. Golam Abu Zakaria.

Presenter: *Dear audience, AssalamuAlaikum. Welcome everyone I am Habibur RahmanHelal from Germany on Channel-i's Positive Think program. Today I will talk to an expatriate Bangladeshi Scientist Prof. Golam Abu Zakaria who has been living in Cologne, Germany for 48 years, whose activities are much appreciated in Germany as a Bangladeshi. Let's hear the story of his life. Professor Zakaria, thank you for joining us.*

Prof. Dr. Zakaria: Thank you very much for inviting me on this day of such a glorious year. This year is very important for Bangladesh. This year, Bangladesh is celebrating the 50th anniversary of independence and the centenary of Bangabandhu's birth. I want to start today's discussion with great remembrance of these historical events. I extend my best wishes to all Bengali speaking viewers and many thanks to Channel-i and you for giving me the opportunity to speak on this occasion.

Presenter: *You were one of the first batch of students to come to Germany after Bangladesh became independent. You have been able to build an exceptional career among the Bengalis in Germany. I would like to hear about how you started your journey of education in East Germany at that time.*

Prof. Dr. Zakaria: That was a long time ago. 1972, I remember it was October 20th 1972. I said goodbye to my family and friends at Tejgaon Airport and left for Germany on an East German plane called 'Interflug'. Inside that plane we were 5 scholarship holder students from Bangladesh. We had a total of 14 scholarship holder students, 9 of whom had already left. We left later because we didn't get the news from the German embassy. On that plane with us there were many wounded freedom fighters and many people of other professions who were going to East Germany for education. On the 21th October 1972, we arrived at Berlin Airport. It was winter, and we had a new experience. We were amazed to see the boys' long hair there. A teacher from the language institute picked us up. We arrived with him

in the town of Leipzig, where our German Herder Institute of Language Education of the Leipzig University (Founded 1409)is located. You know, at that time the Herder Institute taught German in East Germany and the Goethe Institute in West Germany. Herder was a famous philosopher and writer. We came there late at night. After arriving there we spent the night, the next morning we went to class. When we went to class, we met the rest of our friends there and students from different countries of the world whom we had never seen before, students from Africa, Asia, Latin America, more different countries. We started our German class.

At first, I thought we would learn German through some dictionary or with the help of English, but they said no. Even baby can learn language without using a dictionary. This is like a new method; the German language was started on the first day without the help of English. There we had a one-year course in German. Of which, three months for a basic course where everything was taught in German, and later ninemonths' timeline was conducted by the language according to each of our subjects. As my subject was physics, so I was taught the language in such a way that I could study physics well. Another very important thing during our one-year course there were educational tours. We were taken to various important places in Germany almost every week. After completing our one-year course, everyone went to university according to their subject. I went to study Physicsat the Martin Luther University Halle-Wittenberg (Founded in 1502) in 1973. You know Halle/ Saale is a famous city in Germany, the city of university, research institutions and academies. At that time there was no Bachelor's or Master's degree in Physics in Germany,it was called a Diploma. There I studied Diploma in Physics which was a 5-year course. In 5 years, we get a single degree by combining Bachelors and Master's degrees. At that time, we were sent abroad for practical, sent to different industries, various research projects were done, all these things were done so that after becoming a physicist we become capable enough in real research and professional life. That's how I got my university graduate degree in 1978.

Presenter: *How did your educational life and going abroad for higher education attract you before you came to Germany? The tendency to emigrate from newly independent Bangladesh was much less at that time. I want to know about this.*

Prof. Dr. Zakaria: I was born in 1953 in a respected Haji Family of a small village. Our village, Ikarkuri, is 3 km away from Naogaon city. I visited to a primary school in the village Dhamkuri next to it till class five. After being first in class, I was admitted to K.D.High School in Naogaon (Established1884). The school was only 3 kilometers away from our village. From 6th to 10th class, I walked to school. It is a famous school in Naogaon, many great people of that era studied here. For example, HumayunKabir (1906-1969), who later became the Education Minister of India, was a student of this school.

Notably, his novel 'Nodi o Nari' has been translated into German. A hope awakens us that we can do something big as well. I passed Matriculation (SSC) from K.D.High School in 1968. I was ranked 10th in Rajshahi Board. My results in science subjects were very good but I got 10th position because in English and some other subjects I got relatively low marks. Anyway, after passing from there I got admitted in Rajshahi Government College(Established1873)in 1969, which is one of the best colleges in North Bengal. It was in Rajshahi College that the horizon of my knowledge was truly opened. That time was the era of mass movement in Bangladesh. Dr. Md. Shamsuzzoha (1934-1969)killed in that movement. I was in Rajshahi at that time and I still remember Bangabandhu Sheikh Mujibur Rahman (1920-1975) paid homage to that place with flowers. I also had more different experiences in Rajshahi. In 1970 I passed from Rajshahi College. The funny thing is that even in Intermediate (HSC) I placed 10th in Rajshahi Board. Then, like other middle-class families in Bangladesh, I was asked by my family to study engineeringor in medical. Then I decided to study engineering.I also applied to study in the physics department of Dhaka University (Established 1921). At that time, I started studying at BUET (Established 1962). I used to live in Quaid-e-Azam Hall of BUET, now it has been named ShaheedTitumir Hall. That's where those turbulent days of 1970 were spent. I was there during Bangabandhu's speech on 7th March 1971, from where I had the opportunity to see him up close. On that day, Tikka Khan became the Governor of East Pakistan. It was certain that we would face a lot of trouble on Tikka Khan'sarrival, so we were told to leave the hall. Then I left the hall and went to Naogaon, Bangabandhu's speech could be heard everywhere. In Naogaon we continued to do much more, including theater, music, in promoting the liberation war. When military came to Naogaon, their violence started there. Then I took my family to the Naogaon border in the direction Balurghat. While staying there, I did various things to help the people of refugee camp. I myself had survived death twice. One night my mother said, the Pakistani army will come, get out of the house and save your life. I went out and hid in the sugarcane field. I saw the armies but they did not see me. I wasn't cautious about they would have shoot me if they saw me.

When we came to our house from the border area of Naogaon after the end of the 9 months war, we saw that our whole house had been burnt down, nothing was left. My parents were devastated. I returned to Dhaka a few days later. Shortly after my return, I came to know that after the liberation war of Bangladesh, scholarships were being given to various socialist countries like Russia, East Germany, Poland, and other countries who helped us a lot during the war. My future plan at the time was to teach engineering after completing my Engineeringdegree, but when I saw many of my classmate's submitted application for scholarships, I applied too. Luckily, I got the scholarship from East Germany. Then I came to East Germany which I have already described, though I did not have any plan to study abroad at that time. I had the thought that I might go abroad for Ph.D. after finishing engineering,

but I didn't think I would be able to go after college study. My mother was very worried about how I would be able to live in such an unfamiliar country at such a young age, in a country where I don't know anything about the environment or eating habits. But the desire to conquer the world arose inside us after independence which didn't allow us for being feared. When I came to Germany, I knew only two German words, one isKindergarten and the other is Lufthansa. Besides, I didn't know any other German word. That's how I got my scholarship to go to Germany.

Presenter: *There is a huge difference between the scholarships given that time and present time by the German government; I think many students would be benefited fromyou, if you could saysomething in short.*

Prof. Dr. Zakaria: We officially got the scholarship after passing intermediate class. Coming to Germany we graduated in German language and as a result, we have been benefited a lot from being established in Germany. But now most of the students who are coming to Germany aiming to do Masters and it is in English, which makes them not proficient in German and therefore it is very difficult for them to get established and get a job in Germany. Some gifted students may work in various research institutes, but it is not possible for passed students to have a job without German language skills. So, it is seen that most of the students move to countries like USA and Canada after graduation from Germany.
You know there is no study fees for education in Germany, which is a beneficial aspect for our students. Another thing I would like to say is that we used to get state scholarships then but now there are no state scholarships to study in Germany. Now the students have to get scholarships on their own initiative. For example, the German government has DAAD Scholarships, as well as HumboldtScholarships for talented scientists. Many scientists in our country, especially agriculture scientists, receive this Humboldt Scholarship. Another thing I would like to add here is that the government of Bangladesh has introduced a scholarship called Bangabandhu Scholarship. If you apply for a suitable subject under a foreign professor, the Bangladesh government will give you the Bangabandhu Scholarship. Students of Bangladesh will also be able to go to different countries through this scholarship. I would say to the students, Germany is a very promising country, all the facilities of research on various subjects are available here, and the students of Bangladesh should take this opportunity. Already many students are making a very good position in Germany. However, they must acquire language skills.

Presenter: *Tell me about starting your job in Germany after graduation. Was it difficult to get a job at that time?*

Prof. Dr. Zakaria: My case is a little different. I did my Diploma in Physics in 1978 which is equivalent to the current Master's degree. When I was doing my Master's thesis, my professor told me to start my Ph.D. in East Germany because my work was so good. After starting my Ph.D., I had to get official permission for the scholarship for which I wrote an application to the East German government. But it was officially announced that they had an agreement with the Bangladesh government that a student would not be given more than one scholarship. So, it was not possible for me to do my Ph.D. there. However, during my thesis, I had contact with the famous medical physicsprofessor BennoMarkus (1921-1989) of West Germany. I wrote to him about my Ph.D. scholarship. That was in 1979, he told me to start working (post graduate study) with him, but he would retire the next year, so it would not be possible for me to finish my Ph.D. there. Yet I went there to start work. I started Postgraduate research at the University of Goettingen(Founded in 1734) underProfessor Markus. You know, the University of Goettingen is known in Germany like the University of Cambridge (Founded in 1209) in England.Things like quantum mechanics had been discovered here. I already had the desire to work there. It was here that I met Professor Dietrich Herder (1930-2019), another famous medical physicist from Germany. He later became my favorite and we have been able to do a lot of work and research together for a long time. Then after working for a year under Professor Markus, he gave me the addresses of two other professors, one was Professor Kiefer of the University of Giessen (Founded in 1607), and the other was Professor Dieter Fehrentz (1935-2020) of the Heidelberg University (Founded in 1386). The city of Heidelberg is my favorite. If the University of Gottingen is like the University of Cambridge, then the University of Heidelberg like the University of Oxford (Founded in 1096). Studying and starting a career at these two prestigious universities in Germany as a foreign student is a big chapter of my life. I began my Ph.D. in 1980 at the University Hospital of Heidelberg under Professor Dieter Fehrentz. This time I had to do three things. You know that I am a medical physicist, I don't just have to do a Ph.D., I also have to do various residency programs. At the same time, I had to do an assistantship there. In other words, residency, assistantship, and Ph.D., I have completed these three jobs through a lot of hard work. I have done some of my work at the famous German Cancer Research Center in Germany (DKFZ, Founded in 1964)). I am indebted to Professor Wolfgang Schlegel (1945-) andProfessor Walter Josef Lorenz (1932-) as my co-supervisors here. Note to mention that the director of the center, Professor HaraldzurHausen (1936-), won the Nobel Prize in Medicine in 2008 for his discovery of the papillomavirus. His discovery is protecting hundreds of our women from genital cancer today. I had a good relation with him and travelled to an international conference in Tanzania as a member of his team. Another thing is that, the center trained the first 4 batches of master studentsfrom the Gono Universityunder the German government scholarship DAAD in 2003-2006 and they completed the clinical part of their master's thesis. These students are currently working as pioneer medical physicists in various

universities and hospitals in Bangladesh and are contributing to the treatment of cancer in Bangladesh. And the thing that has been very helpful to me in Heidelberg is that in eighties, I had the opportunity to work as a member my professor Dr.Josef Billewho was preparing to establish the Department of Medical Physics at the University of Heidelberg. How a course is designed, how the curriculum is fixed, I have learnt all these things there. This experience helped me a lot to establish a medical physics department in Bangladesh.

Presenter: *How did you become interested in medical physics, then how did you finish university? Did you face any difficulties at that time?*

Prof. Dr. Zakaria: This is an interesting question you have asked. Here I will tell you how an event changes people's lives that have happened in my life. How did I get into medical physics? When I was a second-year student at Halle University, I suddenly noticed one day that everyone was running towards a common direction. Without realizing it, I followed them to see where they were going. Then I went there and found that there is one of the oldest science academies in Germany, even in Europe, called Leopoldina(Founded in 1652); a professor had come to give a lecture in this science academy. He was a German professor, but he left Germany during the reign of Hitler because he was of Jewish descent. His name is Max Delbrueck (1906-1981).I went there. He was the first man in the thirties who proved that the genes in our bodies are actually a combination of an atom complex. He was a famous physicist and after listening to Niels Bohr (1885-1962) he came to do research from physics to biology and revolutionized biology. He and his team won the Nobel Prize in Medicine in 1969 for their work. Another physicist wrote a book based on the research that Max Delbrueckdid. All of us who have studied physics or chemistry know him, he is Erwin Schroedinger (1887-1961). The name of this book is 'What is Life'. Most physicists and chemists are attracted to biology after reading this book. Then molecular biology was born and also became the subject of physicists and chemists. James Watson (1928-) and Francis Crick (1916-2004) won the Nobel Prize in 1953 for their research in molecular biology and later for their discovery of the structure of DNA.

Delbrueck gave a lecture on biology there. I was amazed to hear how a physicist lectures on biology. At the end of his speech, he said, physicists no longer need to be at the forefront of research with the atom bomb, they need to come to the work of medicine. The words got stuck in my head. It wasn't until I heard his speech that I knew that physicists could also work with medicine. I thought that if we studied physics, we would be physicists like Newton (1642-1726) and Einstein (1879-1955). The great hopes of childhood would peek into my head. Then I got the news about the medicine that physicists work in. One of my uncles had been living in Great Britain. When I informed Dr. Golam Mostafa, he advised me to study this subject. Then I started studying in medical physics and am still working.

When I entered this subject, there was no medical physics study at Halle University. I expressed a strong desire to study medical physics to my professorsDr. Dr. Gunnar Berg (1940-) and Dr. Fritz Froehlich. According to their guidance, I started studying medical physics and they fixed me in the hospital for my thesis work. Prof. Berg became the Vice Chancellor of the Halle University and later the Vice President of the National Academy of Sciences (Leopoldina). I met my clinical supervisor at the University Hospital. I did my thesis on medical physics under Dr. Detlef Salewsky (1942-2020)where Ideveloped an ionization chamber. At that time, it was not easy to do a medical physics thesis on one's own initiative. Later, in 1996, the subject of medical physics was introduced in Halle University. There I was invited as a guest to the 10th anniversary of Medical Physics Department. The events of that difficult journey in medical physics in my time were shared with everyone at the event on that day. That's how I am a medical physicist today.

Presenter: *We heard you did a special job in the Master's thesis. That was far-reaching for the hospital. Please tell me about the issues.*

Prof. Dr. Zakaria: There are good times and bad times in people's lives. When I went to the hospital to do my thesis, I was given a task on a newly purchased linear accelerator (Linac) machine. Linac is the mainstay of radiotherapy and cancer treatment. Towards the end of 1977, I started my thesis work with the construction of a detector. At that time there was no detector to measure the electron radiation in the Linac machine. I was asked to construct a detector. With a lot of hard work, I was able to make that detector (plane-parallel ionization chamber). It's surprising to think that the detector I made had to go to the famous Charity Hospital in Berlin for calibration. The journey was not easy at all. It is thrilling to think about how I arranged all the things as an unexperienced student.
Cancer treatment gets hampered if the radiation dose given to a cancer patient is not measured properly. I have been able to measure the radiation dose since I made this detector. Later I heard that the detector I had made had been used at Halle University Hospital for 10 years. The detector created by a student's master thesis is really very fortunate to have been used for so long in a reputed university hospital in a country like Germany.

Presenter: *We heard that you did higher research at the University of Heidelberg and finished your PhD there. Please say something about that.*

Prof. Dr. Zakaria: You know, the University of Heidelberg is the oldest (founded 1386) and a famous university in Germany. At that time Germany also was at the childhood phase of medical physics. In the late 1980, I joined the medical physics department at the Heidelberg

University Hospital. At that time treatment planning systems were not made commercially. We had to make it ourselves.When I went to Heidelberg, there was one program for oral and lung treatment, its accuracy was not so good.I was asked if I could develop the program as needed. I said, 'Give me the program, I'll try.' Then I developed the new program under my thesis. I was able to do this with a new algorithm. By applying a pencil beam algorithm, I did the program. Today this matter is known to medical physicists. I later heard that it was used in Heidelberg more than 10 years till buying a new commercially treatment planning system. It is a matter of great pride for me.That's why many people tell me that the work I did in my Master and PhD thesis have been well recognized as very useful in the hospitals. Being able to do something new, which is very useful for the patients, gives me immense happiness.

Presenter: *Then you moved to Cologne and started your professional journey there, please say something about it.*

Prof. Dr. Zakaria: While working at the University Hospital of Heidelberg, I heard that a vacancy had arisen at the newKlinikum Oberberg in Gummersbach (Founded 1985)of the Cologne University (Founded 1388). Then I joinedthere in 1986 and established the Department of Medical Radiation Physics in 1987 and got the position of the chairman of this department. That was a new and prestigious position.
I had to do two works together. One is to treat patient in the hospital. You know that one of the tasks of medical physicist is to work with a team.The team will include radiotherapists, radio-diagnostic doctors, medical physicists, technicians, all of whom together treat cancer. This is actually my main job and I have also taught university students in the following times (University of Applied Sciences in Koethen).Thus,carried onclinical work on one hand and didteaching on the other. In my life I am very happy that I have been there for almost thirty years and in these thirty years, directly or indirectly I have been able to treat about fifty thousand cancer patients.Moreover, I have been able to produce innumerable students from different countries of the world. Our research has been of good use to cancer patients at home and abroad.

Presenter: *We know you set up a department in Bangladesh. Please Professor tell us something about it.*

Prof. Dr. Zakaria: We are the children of the war of independence. I was only 17 years old at that time of 1971. We have witnessed the most difficult time during our liberation war and actively took part in it which has changed many aspects of our lives. In our time, those who got scholarships, they would go in groups to say goodbye to Bangabandhu Sheikh Mujibur Rahman. Bangabandhu used to tell everyone, 'I hope you will return to the country after

Bangabandhu's words still reverberate in our ears. When we came to Germany, we had to hear the things that Bangladesh was a poor country, a country of cyclones. Listening to all this, the thought worked in my mind that we will prove and spread that our country also has its own culture and we are children of an ancient civilization. We have created a new independent country by fighting.It was as if we had all become undeclared ambassadors. Everyone was trying to figure out how to improve the image of Bangladesh. Today the position of Bangladesh is far ahead. I never imagined that Bangladesh of 1971 would come to this level today; the country that Henry Kissinger once mocked as the "bottomless basket." But the thing to be proud of is that now Bangladesh is considered as a country of role model. In this journey, many people of our country have contributed. The present Prime Minister of our country Sheikh Hasina Wazed (1947-) is working to take the country forward. Now we don't have to hear that our country is a poor country, peace of mind works in this regard.

I wanted to do something for the country from my place. In Germany, my subject was medical physics. My experience in Heidelberg was how to open a subject at a university. I saw that there is no medical physicist in our country. Cancer is treated only by radiotherapists and technicians. Curry without salt is tasteless, same as advanced medical treatment of cancer is ineffective without medical physicists. The doctor will tell you where the tumor is in the body of the cancer patient and how much radiation dose should be given there. But whether the dose is going to the right place, whether it is reaching properly, whether all the normal cells in the vicinity are protected from damage, these tasks are done by the medical physicists. In a country where there is no medical physicist, it is not possible to give cancer treatment in radiotherapy.

Thinking about all this, a tendency pressed on my head. The strong morale to establish medical physics in Bangladesh worked for me. Since I have worked on this in Germany and I have the skills and experience, I think I can do the job. Then I contacted various hospitals, BUET, Dhaka University about this. I did a lot of seminars and workshops with German professors in Bangladesh especially in BUET in the '90s (1996-2000). In these seminars I had two German companions, they were my colleague Dr. Karl- Heinz Hoeverfrom Heidelberg and Professor Ulrich Quast from Essen and the local organizer Professor Gias uddin Ahmad from BUET and Dr. Reza Hussain from Delta Hospital and their team.Prof. Quast later became one of my best friends and promoter and we did a lot of work and research together for a long time.

I have tried to open a medical physics department in BUET and Dhaka University. Unfortunately, it was not possible to open the said department in a public university. Till now the public universities do not understand the importance of this subject.At that time the activities of private universities have just started in Bangladesh. Many advised me to talk to private universities about this. Then I went to three private universities (North-South, Gono University and an another).Among them, the conditions of the Gono University were our

choice. There were also some facilities such as GonoshasthayaMedical College, very close to Jahangirnagar University and Atomic Energy Commission which could play an important role in the development of the Department of Medical Physics in Gono University.
Then in 2000, we started the Department of Medical Physics and Biomedical Engineering at Gono University. This would not have been possible without the sincere cooperation of Dr. ZafrullahChowdhury,the founder of this university. In 2001 I was able to establish a cooperation with the famous 600-years-old Heidelberg University (Founded in 1386) with this new founded Gono University (Founded in 1998). We made the impossible possible, a milestone for medical physics in Bangladesh. We have been working since then and are taught internationally by teachers from home and abroad. So far, we have taken nearly 80 students/ teacher/ Medical physicists/ medical doctors to Germany under the German government scholarship DAAD in the years 2003-2006, 2014-2017 and 2018-2020. Many experts and medical physicists around Germany especially Dipl.-Ing. Volker Steil, Professor Guenther Hartman, Dr. Frank Hensley, Prof. Wolfgang Schlegeland Prof. Frederik Wenz have helped uswith great arrangement. You will be surprised to hear that so far about 48 Master and 186 Bachelor students have come out of our department and there is no cancer hospital in Bangladesh now where we do not have a medical physicist. They are constantly there with medical doctors and technicians providing quality treatment to cancer patients. This has led to the development of medical physics in this country.Many people in Bangladesh including medical physicists, radiotherapists, the University administration and hospital administrations of different hospitals have supported usvery strongly. Nonetheless, the person who has been working with me in this department in Bangladesh, she is Dr. Hasin Anupama Azhari. It would not have been possible to do this at all without finding such a dedicated and hard-working person. She has been selflessly holding the helm of the department since 2005. I also should not forget another name Mr. Delower Hossain, the former registrar of the Gono University who always helped and supportedus when we needed.
And I think of this was a big job in my life. I feel lucky as a Bangladeshi because I have been able to contribute a little for the country. I thank my familyfor standing always by my side and support to all my contributions.

Presenter: *What are your next plans?*

Prof. Dr. Zakaria: I retired from my workplace in August 2019. It has taken a lot of time. I have teamed up with two international organizations to use this time. One is the International Organization for Medical Physics (IOMP), where I am the Vice-Chairman of the Accreditation Board and the other is the International MedicalPhysics Certification Board (IMPCB), where certification takes place- In countries around the world where there is no Medical Physics Certification Board, we international experts work together for this certification.

One of my thoughts was whether more could be done for Bangladesh in the time I would get after retirement. From there I planned some work structurally. According to that plan, in 2017 I founded an organization called AloBhubon Trust (Alo-BT). Through this organization, we are working on three issues - health, education, and energy. We have come a long way in terms of health. We set up a center in Bangladesh in 2018 called South Asian Center for Medical Physics and Cancer Research (SCMPCR). There doctors, physicists and technicians involved in the treatment of cancer are trained. It is not a very difficult thing to buy a machine for cancer treatment even in the developing countries, because there are many rich people there besides the government. But the problem is the lack of skilled manpower in Bangladesh like other developing countries. The government must or will pay attention to this matter.We also want to be partners in this work. The South Asian Center for Medical Physics and Cancer Research - At the Center, we jointly train cancer-related manpower from South Asian countries (India, Nepal, Bhutan, Sri Lanka, Pakistan, Maldives, and Afghanistan) to build manpower in these regions and it is possible to create truly skilled manpower through the exchange of knowledge among themselves.

My birthplace is in the Naogaon district. There is a place of work of Nobel Laureate poet Rabindranath Tagore (1861-1941) in Patisar. Rabindranath Tagore worked there on many subjects including education, health, and agriculture. At the request of the people of the area, I made a sculpture in Patisar in 2011 on the occasion of the 150th birth anniversary of Rabindranath Tagore with the help of Germany. Since then, I have developed a good friendship with the people of Patisar, especially with Rabindra memory collector and researcher M.Matiur Rahman Mamun. People there tell me that since you work with cancer, build a cancer center in our area. But I wondered how it is possible in this remote rural area.Our Bangladesh government also wants these works to be done in different rural areas of the country. I then reassured them and expressed a desire to build a cancer center there. First, we will do a screening and awareness center there and with time, opportunity, and survival it can one day be turned into a full-fledged cancer center. In this, the help of government, private, domestic and foreign is desirable. There is a lot of cancer hospitals centered in big cities like Dhaka, Chittagong, Rajshahi etc., but not many in rural areas. That is why we have such a plan.

This is my dream, the dream of the people of the village - if we can do something for everyone's dream, then in addition to education and training in Bangladesh - we can make a direct contribution to the treatment of cancer patients. Now I am working towards this goal.

Presenter: *Thank you sir for this interesting and fruitful discussion. We hope to you again*

Prof. Dr. Zakaria: Thank you once again for the invitation

Scientific Articles

Verification of Monitor Units of Treatment Planning system for 6MV Photon Beam by 3DCRT Technique

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Introduction

Monitor unit is a machine output from clinical accelerator for radiation therapy. Now a day, there are many accidents occur in radiotherapy because error in monitor unit calculations of Treatment Planning system (TPS). In order to prevent accidents in radiotherapy, the monitor unit recalculations are a prerequisite component of quality assurance (QA) in radiation therapy. Because errors and large uncertainties in dose calculations reduce the quality of a treatment, MU recalculations have been recommended as a routine quality assurance (QA) procedure when verifying individual treatment plans [1]. In-hand monitor unit calculations can be performed for simple geometry fields. TPS based calculation is required for advanced techniques such as 3D conformal radiotherapy, and intensity modulated radiotherapy of MU calculation. TPS dose calculation is validated either by hand calculations or by using programing language [3-4].The Task Group 40 &and 114 recommends that the calculation results of any TPS should be independently verified [5-6]. The main aim of this project is the "independent monitor unit verification," where the monitor unit MU setting determines the quantity of radiation delivered to the patient accurately. In this project, the "primary MU" refers to the calculation used for the actual treatment of the patient, while "MU verification" (MUV) refers to a measurement or calculation that is achieved only for the resolveof positive the primary MU calculation and is not used for the distribution of radiation [7-11]. The MUV is measured to be an independent check of the dose or machine setting at one point and is a separate activity discrete from the treatment plan review, with its own assessment of the accuracy of the factors that are used in the check. While these settings are generically referred to as "monitor units" in this project, this term also applies to time settings for treatment units that employ radioactive sources. The introduction of extensive computerization, volumetric imaging, and improved computation algorithms has changed both the complexity of the patient treatment and the manner in which MUV is performed. Most MUV calculations are performed today by computer programs using electronic data transfer protocols, which are much less likely to result in the arithmetic, etc.

This is accomplished by delivering the suitable radiation dose accurately to the tumor with meticulous computerized planning in the TPS. Computerized treatment planning is a rapidly developing modality that depends on hardware and software efficiency [2]. The TPS calculation can be a part of overall uncertainty, so the measurement of manual calculation should be taken to decrease the errors transcription, or look-up errors that the traditional verification calculation was designed to find. Modern treatment planning systems TPSs, which use sophisticated algorithms and build 3D geometrical patient models complete with heterogeneous tissue densities, are complex. This complexity presents challenges to traditional manual verification methods since much of the information required to perform the verification needs to come directly from the TPS [12]. The goal is to ensure accurate dose delivery to the patients independent or secondary verification of monitor units (MU) check is preferred. The purpose is to verify the MU calculation of the 3D CRT plan for lung on the treatment planning system and compere the monitor unit calculation of planning system and hand calculation for lung.

Methods

The practical work for this study was carried out by the following parameter which is given below:

1.1 Monitor Units:

A monitor unit (MU) is a measure of machine output from a clinical accelerator for radiation therapy such as a linear accelerator or an orthovoltage unit. Monitor units are measured by monitor chambers, which are ionization chambers that measure the dose delivered by a beam and are built into the treatment head of radiotherapy linear accelerators. The monitor units are calculated both fixed SSD and Isocentric Technique (SAD).

The formula for SSD technique is given in equation:

$$MU = \frac{D \times 100}{D_o \times Scp \times PDD(d, A, SSD) \times WF \times OAR}$$

The formula for isocentric technique (SAD) is given in equation:

$$MU = \frac{D}{D_o \times Scp \times TMR(d, Ad) \times WF \times OAR}$$

In this Study only the formula for isocentric technique (SAD) is used to calculate for the MU calculation to compare the TPS calculation of MU for the verification of MU calculation.

1.2 Using the Eclipse TPS:

Eclipse Treatment Planning system was designed and developed by Varian Medical Systems. The Eclipse Treatment Planning System (Eclipse-13.6) is used to plan radiotherapy treatments for patients with malignant or benign diseases. Eclipse-13.6 was used to calculate the MU from the treatment planning of Lung cancer.

1.3 Excel Sheet:

The Excel sheet was used to calculate the manual calculation of MU and verify with the TPS calculation of MU for Lung cancer.

Results:

Monitor units and treatment time calculations for isocentric set-ups:

Figure:1 shows a typical isodose distribution obtained for a three field lung boost treatment with an isocentric(100cm) technique on a 6 MV linac.

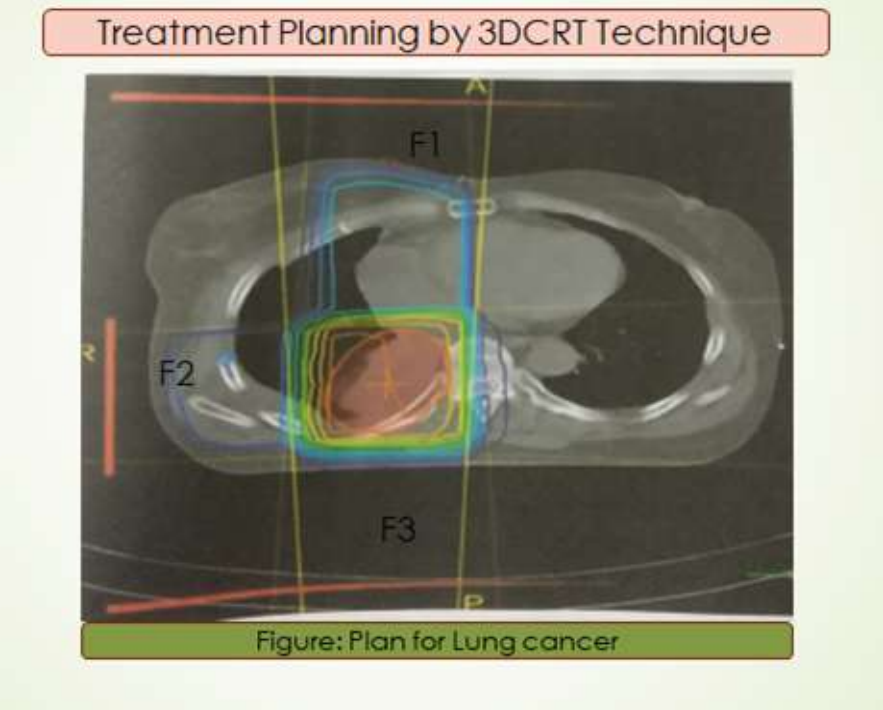

Figure1: Medial tangential, lateral tangential and anterior posterior field

The dose distribution shown that delivers a dose of 250.5cGy to the ICRU reference point Q is achieved under the following conditions:

A dose D_Q of 200cGy is prescribed at the ICRU reference point, which is located at the treatment isocentre. The IL at this point is 240% (sum of the weights in percent), the maximum dose in the distribution is 242% and 235% isodose completely covers the PTV.

The dose distribution shown in fig- that delivers a dose of 250.5cGy to the ICRU reference point Q is achieved under the following conditions:

* 100cGy is delivered by F_1 field at the isocentre (W=1.3);
* 100cGy is delivered by F_2 field at the isocentre (W=0.5);
* 50.5cGy is delivered byF_3field at the isocentre (w=0.7);

Thus to obtain the prescribed dose of 200cGy at point Q, doses of 103.7cGy, 40cGy and 55.9cGy should be delivered by the respective beams of at the isocentre.

Theses doses are obtained by considering the relative weight of each beam such that:

$$D(Q)_{F1} = \frac{D(Q)\times 100\times W_{F1}}{IL} = \frac{200cGy\times 100\times 1.3}{250.5} = 103.8\text{cGy}$$

$$D(Q)_{F2} = \frac{D(Q)\times 100\times W_{F2}}{IL} = \frac{200cGy\times 100\times 0.5}{250.5} = 40\text{cGy}$$

$$D(Q)_{F3} = \frac{D(Q)\times 100\times W_{F3}}{IL} = \frac{200cGy\times 100\times 0.7}{250.5} = 55.9\text{cGy}$$

To calculate the linac monitor chamber setting in MUs it is first necessary to calculate the doses from each beam at the isocentre at depth of maximum dose $D(Q_{\max})$Where SSD=SAD-Z_{max}. The TMR is obtained for each field and used in calculation as follows.

$$D(Q_{max})_{F1} = \frac{D(Q)_{F1}}{TMR} = \frac{103.8}{0.8737} = 118.9\text{cGy}$$

$$D(Q_{max})_{F2} = \frac{D(Q)_{F2}}{TMR} = \frac{40}{0.709} = 56.4\text{cGy}$$

$$D(Q_{max})_{F3} = \frac{D(Q)_{F3}}{TMR} = \frac{55.9}{0.791} = 70.7\text{cGy}$$

Once the dose at $D(Q_{\max})$ is known for each beam it is possible to calculate the MU setting (MU) from the basic linac output $\dot{D}(z_{max,}10,f,hv)$ multiplied by the RDF (A_Q), the ISF and other transmission factors as applicable, such that :

$$MU_{(F1)} = \frac{D(Q_{max})_{F1}}{D(Z_{max,}10,100,hv)\times ISF\times RDF} = \frac{118.9cGy}{1.0405} = 114.2cGy$$

$$MU_{(F2)} = \frac{D(Q_{max})_{F2}}{D(Z_{max,}10,100,hv)\times ISF\times RDF} = \frac{56.4cGy}{1.06} = 53.2cGy$$

$$MU_{(F3)} = \frac{D(Q_{max})_{F3}}{D(Z_{max,10,100,hv})\times ISF\times RDF} = \frac{70.7cGy}{1.03} = 68.7cGy$$

The following table shows the result of Hand MU calculation and TPS MU calculation from the three field of Lung treatment plan.

Field	1	2	3
Depth(z)	7	13	10
SSD	93.1	87.1	90.2
TMR	0.8737	0.709	0.791
RDF	1.01	1.3	1.00
Hand MU calculating	114.2	53.2	68.7
TPS MU calculating	112.1	52	67

Table: The factors and MU were compared between TPS and hand calculation.

Discussions and Conclusion:

In this study we sought to estimate the accuracy of in-house developed spreadsheet with TPS. Monitor units verification (MUV) gave the accuracy levels of our TPS system for the tested cases. This study indicated that MU calculation can be corroborated to the TPS planning when the plans are normalized at the isocentre or any reference point.The MU verification calculation should be performed before treatment by an independent physicist. The calculation showed that 3D-CRT treatment plans were accurate for treatment delivery

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Continuous Professional Development (CPD)

Participation in Global Radiation Treatment Planning Competition Organized by Radiation Knowledge, USA with Oncology Club, Bangladesh

K. M. Masud Rana, Dr. Murugan Appassamy, Prof. Dr. Narendra Kumar, Dr. Biswajit Bhattacharjee, Dr. Taohida Yasmin, Dr. Arman Reza Chowdhury

Department of Radiation Oncology, Evercare Hospital Dhaka, Bangladesh

A USA based Organization "Radiation Knowledge" & Oncology Club, Bangladesh, jointly organized "1st SAARC Radiation Oncology Educational Symposium & Planning Challenge Event [Figure 1]" on 6th March -24th April 2021 for the Radiation Oncologists, Medical Physicists and Radiation therapy Technologists of SAARC countries. The event was arranged on a virtual platform. This educational symposium consisted of lectures on radiation therapy and disease site-specific discussion on breast and cervical cancer. The highlight of the symposium was a planning competition among the participating medical physicists. The SAARC Radiation Oncology Event started with the Educational Component, then followed by the Planning Activity, and concluded with the Knowledge Sharing sessions presented by best planners.

Radiation Knowledge (RK) is a global quality improvement platform in radiation medicine. They have successfully organized eight international radiotherapy planning competitions (eight advanced clinical cases). The best planners presented the best planning strategies for all other planners globally to learn from. RK Community started with 400 planners from 55 countries in 2016. Now the RK community has reached more than 4000 participants from 3500 hospitals located in more than 100 countries worldwide, and the community is still growing. The International Atomic Energy Agency (IAEA) recognizes RK's importance by allocating a dedicated web page on the IAEA Human Health Campus for RK events and activities.

It's the first time we (Evercare Hospital Dhaka) participated in such a prestigious global competition, in which I have been awarded a prize with 10th Rank for Cervix Plan & 16th Rank for Breast Plan among more than 3500 registered participants [Figure 2]. For my Breast Plan I have been awarded first prize in country wise (Bangladesh). More importantly, what I learned from the process became a treasure in my pursuit of my dream.

Figure1: Brochure about the Radiation Oncology Symposium

Figure 2: Certification from the Organizer

Before Competition, RK created the event and added two tasks: Breast and Cervix plan [figure 3,4]. The "Package" per task prepared and uploaded to the corresponding task on the website and registered participants could see once logged in .The Package is composed of: PDF (Competition Guidelines), DICOM sets (Images & structures) & RK Plan Evaluation Application – Desktop version.

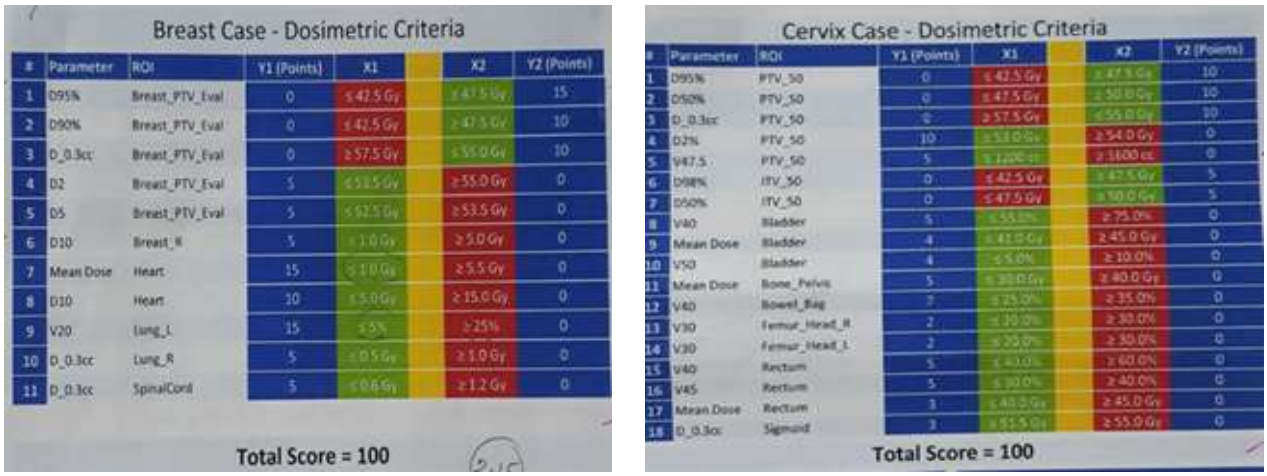


Figure 3: Before Competition, RK provided to all participants about the dosimetric Criteria for 3DCRT

Score Sheet

Structure	Metric	Type	Target	Tolerance	Points	Result	Score	Performance
Breast PTV Eval	D95%[Gy]	min	47.500	42.5	15	47.550	15.000	100.0%
Breast PTV Eval	D90%[Gy]	min	47.500	42.5	10	49.180	10.000	100.0%
Breast PTV Eval	D0.3cc[Gy]	max	55.000	57.5	10	53.880	10.000	100.0%
Breast PTV Eval	D2%[Gy]	max	53.500	55.0	5	52.700	5.000	100.0%
Breast PTV Eval	D5%[Gy]	max	52.500	53.5	5	52.470	5.000	100.0%
Breast_R	D10%[Gy]	max	1.000	5.0	5	0.630	5.000	100.0%
Heart	Mean[Gy]	max	1.000	5.5	15	1.380	13.740	91.6%
Heart	D10%[Gy]	max	5.000	15.0	10	2.130	10.000	100.0%
Lung_L	V20Gy[%]	max	5.000	25.0	15	6.600	13.800	92.0%
Lung_R	D0.3cc[Gy]	max	0.500	1.0	5	0.580	4.170	83.4%
SpinalCord	D0.3cc[Gy]	max	0.600	1.2	5	0.370	5.000	100.0%
				Max Score:	100	Total Score:	96.71	

Score Sheet

Structure	Metric	Type	Target	Tolerance	Points	Result	Score	Performance
PTV_50	D95%[Gy]	min	47.500	42.5	10	47.350	9.710	97.1%
PTV_50	D50%[Gy]	min	50.000	47.5	10	50.000	9.990	99.9%
PTV_50	D0.3cc[Gy]	max	55.000	57.5	10	52.960	10.000	100.0%
PTV_50	D2%[Gy]	max	53.000	54.0	10	51.920	10.000	100.0%
PTV_50	V47.5Gy[cc]	max	1200.000	1600.0	5	1197.340	5.000	100.0%
ITV_50	D50%[Gy]	min	50.000	47.5	5	50.150	5.000	100.0%
ITV_50	D98%[Gy]	min	47.500	42.5	5	48.000	5.000	100.0%
Bladder	V40Gy[%]	max	55.000	75.0	5	80.460	0.000	0.0%
Bladder	Mean[Gy]	max	41.000	45.0	4	45.140	0.000	0.0%
Bladder	V50Gy[%]	max	5.000	10.0	4	0.180	4.000	100.0%
Bone_Pelvis	Mean[Gy]	max	30.000	40.0	5	32.000	4.000	80.0%
Bowel_Bag	V40Gy[%]	max	25.000	35.0	7	25.150	6.890	98.5%
Femur_Head_R	V30Gy[%]	max	20.000	30.0	2	18.740	2.000	100.0%
Femur_Head_L	V30Gy[%]	max	20.000	30.0	2	15.270	2.000	100.0%
Rectum	V40Gy[%]	max	40.000	60.0	5	39.280	5.000	100.0%
Rectum	V45Gy[%]	max	30.000	40.0	5	20.990	5.000	100.0%
Rectum	Mean[Gy]	max	40.000	45.0	3	38.800	3.000	100.0%
Sigmoid	D0.3cc[Gy]	max	51.500	55.0	3	50.970	3.000	100.0%
				Max Score:	100	Total Score:	89.6	

Figure 4: Left Breast & Cervix Case and also shared the final submitted score sheet for Breast & Cervix Case.

During Competition, I logged in to their RK account and downloaded the package per task & read the document carefully and follow guidelines. I started planning and scoring the plan (trials) through the desktop app or website given by RK. After so many trials I reach highest score as per my best effort of repetitive refinement of the plan. After that I submitted and tagged as "Finalized" plan before the deadline mentioned by RK organizer.

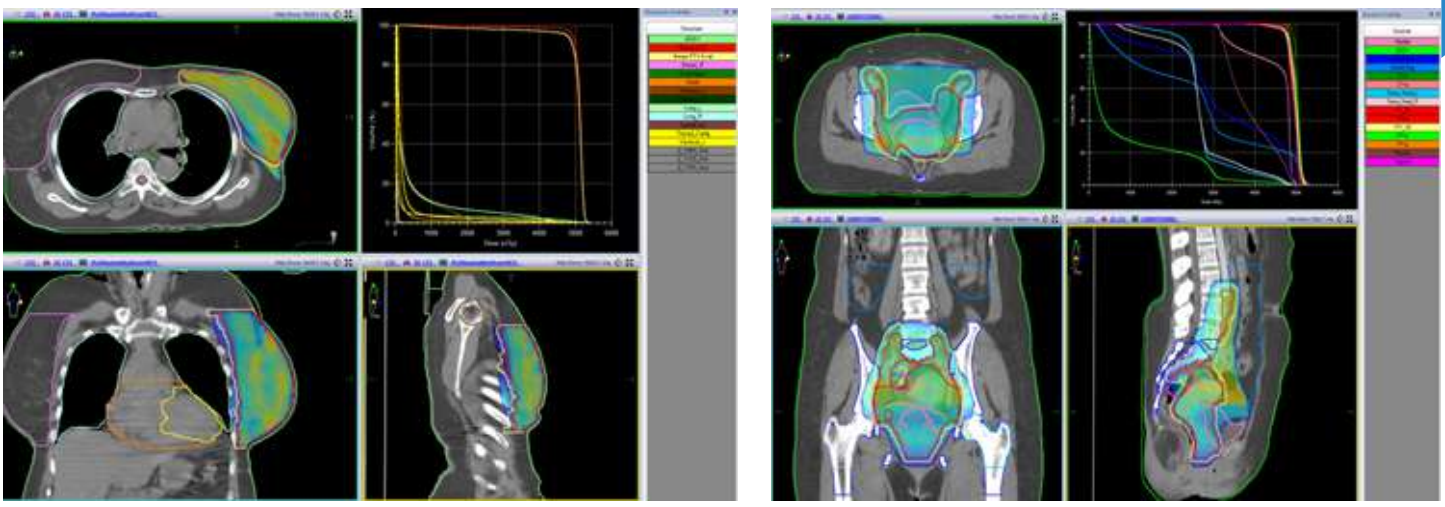


Figure: Finalized Plan for Both Breast & Cervix (95% Isodose of Prescription Dose)

Plan Assessment/Verification By RK, "Finalized" plans were evaluated by RK admins, after being checked the plan will be tagged as "Checked". They made the Ranking according to the score achieved by each planner and made a top 20 list. After declaring the Top-20 planners, they contacted me over email to prepare my planning tips for a presentation as part of knowledge sharing session as I was the only MONACO user in the Top 20 list.

In my view, the both submitted plan for the competition is a good plan, in terms of to meet the competition criteria. But in Asian subcontinent clinical practice, we will not have such stringent criteria for OARs such as Heart, Lungs, Urinary Bladder, Rectum and Bowel. However, one can get deep understanding from this experience to achieve less dose to OARs by modifying their own criteria.

Finally, I would like to express my sincere appreciation to all stakeholders of oncology club & Radiation Knowledge (RK) for arranging such a full blend of updated and resourceful knowledge sharing scientific symposium. My heartfelt thanks as I've got such a precious opportunity to show my abilities and practiced my planning skills in front of so many people. Moreover, I am also grateful to Dr. Murugan Appassamy (Chief Medical Physicist), all of our department consultants & specialist for their continuous inspiration during my planning competition. I believe such an experience will be a wonderful asset on my way to becoming an outstanding medical physicist and able to find my full potential in planning by stretching beyond the limits.

Online CPD program for the medical physicists of Bangladesh in the Time of Pandemic: SCMPCR

Medical physicists play an important role in modern medicine, most notably in the diagnosis of medical disorders and cancer treatment. Depending on the country in which they operate, medical physicists working in the field of radiation oncology are referred to as "qualified medical physicists in radiotherapy" or "radiation oncology medical physicists." They're part of a radiation oncology department interdisciplinary team dedicated to offering cancer treatment that's both safe and effective. Oncologists, therapists, maintenance engineers, and nurses are among the team's other members. Medical physicists play an important role in the safe and effective treatment of psoriasis.

The education and training for medical physicists is becoming more evident due to the increasing complexity of both treatment and diagnostic equipment coupled to the raising expectations of good health care in all parts of the world as well as the implementation of radiation protection and safety standards, however the supply of suitably qualified and trained personnel has not kept up with these developments and hence this shortage is worsening.

The COVID-19 crisis has created new opportunities to adopt the online based distance learning. To meet the challenges of the next industrial revolution and the digitalization of health-care technologies, e-learning interventions for education and training, particularly in low-resource settings where knowledge can be shared. The mode of online learning has been extremely beneficial for promoting good health and well-being and providing knowledge and skills for the medical physicists.

South Asia Centre for Medical Physics and Cancer Research (SCMPCR) has established at 2018 and constantly trying to create skilled manpower for the cancer treatment through different categories of programs along with national and international collaborative approach. SCMPCR has introduce e-learning program (ELP) during this corona Pandemic from June 2020, for the first time in Bangladesh for medical physicists.
Hence, SCMPCR has implemented five consecutive successful e-learning programs with the accreditation from IOMP and EBAMP. The programs demonstrate the theoretical knowledge and latest clinical experience on the Brachytherapy, Diagnostic radiology and advanced radiotherapy techniques and other radiotherapy techniques. The courses were designed with series of lectures, group discussions, practical demonstration of TPS and online examination where the participants has gone through step-by-step demonstration of various aspects in the field of diagnosis and treatment.

The e-Learning programs were clearly defined and experienced faculties were involved in delivering the scheduled lectures. The lectures had greatly benefit the BMPS member to update their knowledge, skills and competences as well as they had also achieved accredited CPD points by successfully completed the courses.

Figure: Posters of SCMPCR E-learning Programs.

BMPS News and Events

International Medical Physics Week (IMPW)- 2021

Bangladesh Medical Physics Society (BMPS)

IMPW 2021
April 26-30, 2021

International Medical Physics Week (IMPW)- 2021

Program Schedule

27 April 2021		
Dr. Md Akhtaruzzaman **Moderator**		
2:00 PM- 2:05 PM GMT	Welcome Speech	Md. Anwarul Islam President, BMPS
2:05 PM- 2:25 PM GMT	Expanding the Medical Physicist Curricular and Professional Programme to Include Artificial Intelligence (AI)	Prof. Dr. Golam Abu Zakaria Germany
2.25 PM- 2:35 PM GMT	Q & A Session	
29 April 2021		
Md. Anwarul Islam **Moderator**		
1:30 PM – 1:50 PM GMT	Proton Therapy: An Overview of Treatment Delivery Technology	Abdul Sattar Khalid Qatar
1:50 PM- 2:00 PM GMT	Q & A Session	
30 April 2021		
Safayet Zaman **Moderator**		
2:05 PM – 2:25 PM GMT	Dependence of Tissue Inhomogeneity Correction Factors on Photon Beams	Dr. Md Akhtaruzzaman Bangladesh
2:25 PM- 2:35 PM GMT	Q & A Session	

Registration Link: https://forms.gle/VeQXzvPQzB6U7MMM8

After registering, you will receive a confirmation email containing information about joining the meeting.

Annual Conference of BMPS-2020

www.bmps.org.bd

Annual Conference of Bangladesh Medical Physics Society

9th ACBMPS -2020

Friday, 18 December 2020

Time: 1.00 PM -3.00 PM GMT/ 7.00 PM-9.00 PM Bangladesh Time

Join & Get Certificate

Flashes of Insight

·Radiation Oncology ·Diagnostic Radiology ·Radiation Protection
·Nuclear Medicine ·Education & Training ·Biomedical Engineering

Panel of Experts

Prof. Dr. Golam Abu Zakaria
Former Chairman & Chief Medical Physicist
Gummersbach Hospital
University of Cologne
Germany

Prof. Guenther H. Hartmann
Former Senior Scientist
German Cancer Research Center
Germany

Prof. Dr. Hasin Anupama Azhari
Chairman
Dept. of Medical Physics and Biomedical Engineering
Gono Bishwabidyalay
Bangladesh

Dr. Xiance Jin
Chief Medical Physicist & Vice Director
Wenzhou Medical University First Affiliated Hospital
China

Md. Anwarul Islam DIMPCB
Coordinator Medical Physicist & RCO
Square Hospitals Ltd
Bangladesh

Dr. Md. Akhtaruzzaman
Senior Medical Physicist
Labaid Cancer Hospital
Bangladesh

Suresh Das
Chief Medical Physicist cum RSO
Narayana Super Speciality Hospital
India

K M Masud Rana
Medical Physicist cum RSO
Evercare Hospital Dhaka
Bangladesh

Md. Nazmul Islam
Associate Engineer
Fashion Optics Ltd
Bangladesh

Welcome Speech

Safayet Zaman
Vice President
BMPS

Moderator

Md. Jobairul Islam
Joint Secretary
BMPS

Vote of Thanks

Sadia Afrin Sarah
Treasurer
BMPS

Organizer:

Registration Link:
https://forms.gle/7Wga86mWqcRvtzHJA

Remembrance IDMP 2020
Challenges and Contribution for Women in STEM: Medical Physics

Report published in the daily Bengali News Paper Prothom Alo on 03.09.2021: Why Expensive Cancer Treatment Equipment Remains Unused?

Md. Anwarul Islam
Coordinator Medical Physicists, Square Hospitals Limited
President, Bangladesh Medical Physics Society
Diplomat, International Medical Physics Certification Board (IMPCB)

Photo: The linear accelerator, a powerful radiotherapy device, has been boxed in Khulna since 2012.

Note: The article has been published in the daily Prothom Alo newspaper on 3rd September 2021 as a reply from the BMPS President. This is the translated version of the published news.

In the investigative report published in the daily Prothom Alo on 25.06.2021 and in the editorial discussion on 26.08.2021, the news item titled "**Instrument worth Tk 24 crore has remain unused in Khulna Medical College Hospital for 9 years**" has come to the notice of this author. The report highlights the traditional culture of blaming each other for arbitrary wastage of public property and a strategy to avoid negligence and responsibility on the part of the authorities concerned. Where is the end of this culture of blaming each other?

The linear accelerator machine of 24 crore taka is one of the most widely used cancer treatment devices in the world. With this device it is possible to provide the latest cancer treatment services. All private and autonomous hospitals in Bangladesh are providing international standard cancer treatment with this device. However, the extra pressure of cancer patients in government hospitals. But in most of the cases, medical services are being provided to the common people in the conventional manner of the Old-fashioned.

There are five LINAC at the National Institute Cancer Research and Hospital (NICRH) in Dhaka and one LINAC at the Dhaka Medical College Hospital, which is inadequate for the treatment of a large population, this can be easily estimated by looking at the waiting list of the mentioned hospitals for two-three months.

A device used for medical treatment at Shaheed Ziaur Rahman Medical College Hospital in Bogra outside Dhaka has been closed now due to a defect. Although cancer treatment, like other medical services, could not reach the doorsteps of the people, the government's decision to install at least one modern machine in the divisional cities was certainly timely. However, there is enough manpower in the Bangladesh to treat cancer with this device, which can be understood by looking at the private hospitals of the country and the country also has the academic and training infrastructure to create future manpower.

Preparations should also start now to meet the demand of manpower for a 100-bed specialized cancer hospital under construction in six divisional cities. For this, more academic and training centers should be set up by the government. So that there is no manpower crisis in future. In this case, the cooperation of our experts who have been working in the country and abroad for a long time can also be taken. Regrettably, the most important manpower for radiation cancer treatment the medical physicists has not yet been officially recruited by the Government.

It is a matter of hope that, the Bangladesh Medical Physics Society has been able to work with the National Cancer Hospital and Research Institute to revise the recruitment rules. As a result, the National Institute of Cancer Research and Hospital (NICRH), Dhaka Medical College Hospital (DMCH) and Neuroscience Hospital have integrated recruitment rules of Medical Physicists, which will be followed in other hospitals later.

In important treatments like cancer treatment, proper management of limited resources should be ensured by avoiding the culture of guilt towards each other. At the same time, the medical activities have to be started immediately by activating the currently closed devices. In the same way that nurses and physicians were engaged on an emergency basis to cope with the COVID-19 issue, the medical physicist should be appointed as part of the radiotherapy treatment team. If medical physicists are given the opportunity to participate in the management of radiotherapy later, the amount of such mismanagement will be reduced.

People familiar with cancer treatment know that even in Faridpur Medical College Hospital like Khulna, a linear accelerator has been in a box for five-seven years. What is the current status of the device? Will the device see the light of day at all, or will it be a news headline like Khulna after expiration?

Journey of the state of art cancer care center in Bangladesh- A Labaid initiative

M. Akhtaruzzaman, PhD
Sr Medical Physicist & Coordinator
Labaid Cancer Hospital and Super Speciality Center, Dhaka, Bangladesh

Cancer affects people in all countries regardless of their age, gender or socio-economic conditions. According to World Health Organization (WHO), it is estimated that the global cancer burden will increase from 12.7 million new cases per year in 2008 to 21.4 million per year by 2030, with nearly two-thirds of all cancer diagnoses occurring in low- and middle-income countries. With respect to the global context, about 24.59% populations are present in South Asia area and the burden of cancer death is 68.85%. As far as cancer in the South Asia region is concerned, incidence of new cases is 10.23 % and the burden of cancer deaths as compared to the incidence is 68.44 % of the world's cases. This well-known fact indicates that this region of the world requires improving its strategies in cancer management.

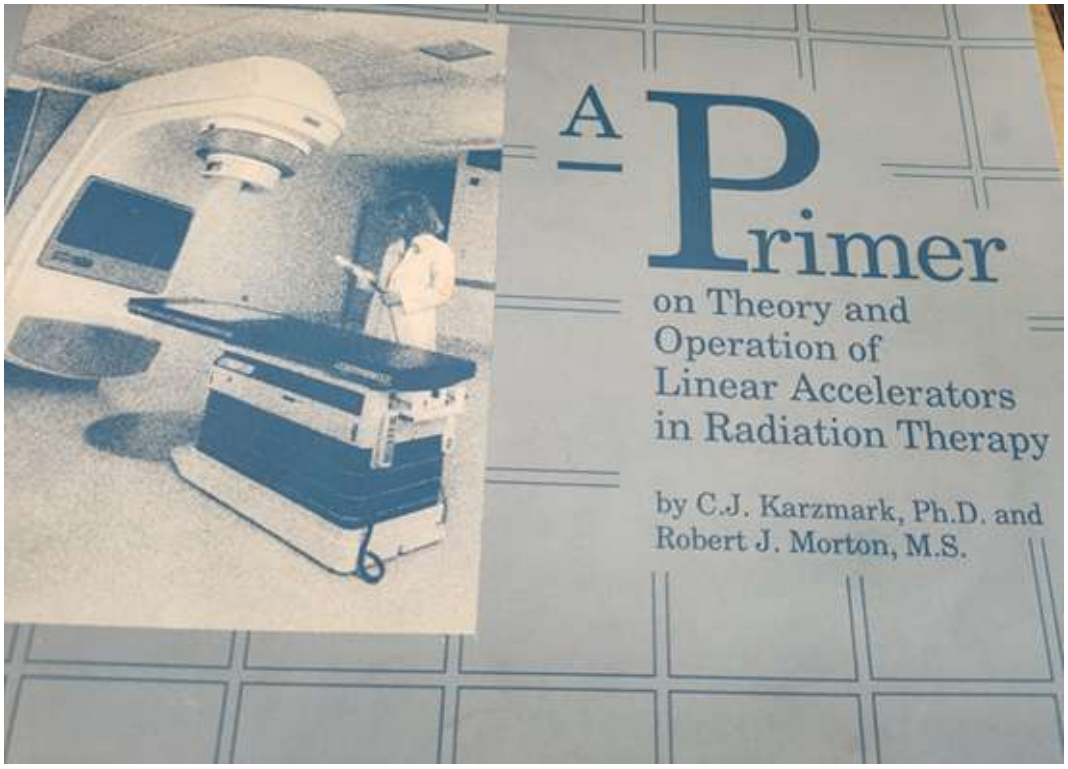
According to WHO's updated estimation, the number of cancer patients are increasing day by day and at present there are over 1.5 million cancer patients in Bangladesh. It also says, every year 200,000 people are attacked by cancer and 150,000 people die of the disease. The Cancer Awareness Foundation Bangladesh says, the country at present has 37 cancer treatment facilities, which is ridiculously inadequate. Therefore, it is a burning need of establishing specialized cancer centers across the country. One bit of good news is "Labaid Group" has taken the initiative in setting up an international-standard cancer hospital called "Labaid Cancer Hospital & Superspecialty Centre". It started its journey from March 1, 2021 with OPD, radiotherapy, chemotherapy and diagnostic services.

The radiotherapy department is well equipped and governs by the skilled expertise. It has latest TrueBeam linear accelerator with 4D CBCT, RPM, 6D treatment couch, dedicated CT-Simulator with 4D gating. The department is currently offering all high-tech treatment including SRT and SBRT. During this short period, we already have treated about 500 cancer patients with the highest level of quality. The brachytherapy service will be launched by the end of this month. Another TrueBeam linac will be added by January next year. We also have plan for third linac, which will be brought by January 2023.

Remembrance of Clarence Karzmark: Pioneer in Radiation Oncology

Clarence J. Karzmark, Ph.D., one of the first physicists to apply his knowledge to the practice of radiation oncology, died 16 January 2005 in a care facility close to his home in Palo Alto. He was 84.

Karzmark was a pioneer in developing equipment and treatment techniques essential to the evolution of modern radiotherapy as a professor in the Department of Radiation Oncology, most notably the development at the medical school of the country's first linear accelerator, or LINAC, used for cancer radiation therapy treatment.



After earning a doctorate in nuclear physics from the University of Indiana in 1952, Karzmark came to the medical school, where he served as chief of the Division of Radiation Therapy Physics from 1959 to 1980. He remained involved in the division's activities until he retired in 1988.

Among Karzmark's other accomplishments were developing the technical aspects of a successful treatment for the skin cancer, mycosis fungoides, and along with colleagues, devising a rigorous dosimetric system for the treatment of Hodgkin's disease. He also coauthored the landmark reference text, Medical Electron Accelerators.

He worked to promote the role of physicists in radiation oncology. He established at Stanford one of the nation's first programs for the training of physicists embarking on a medical career.

Karzmark was helpful in addressing the demand for a journal for medical physicists in the United States as the 14th president of the American Association of Physicists in Medicine (AAPM). In 1974, the AAPM began publishing the journal Medical Physics as a result of his efforts.

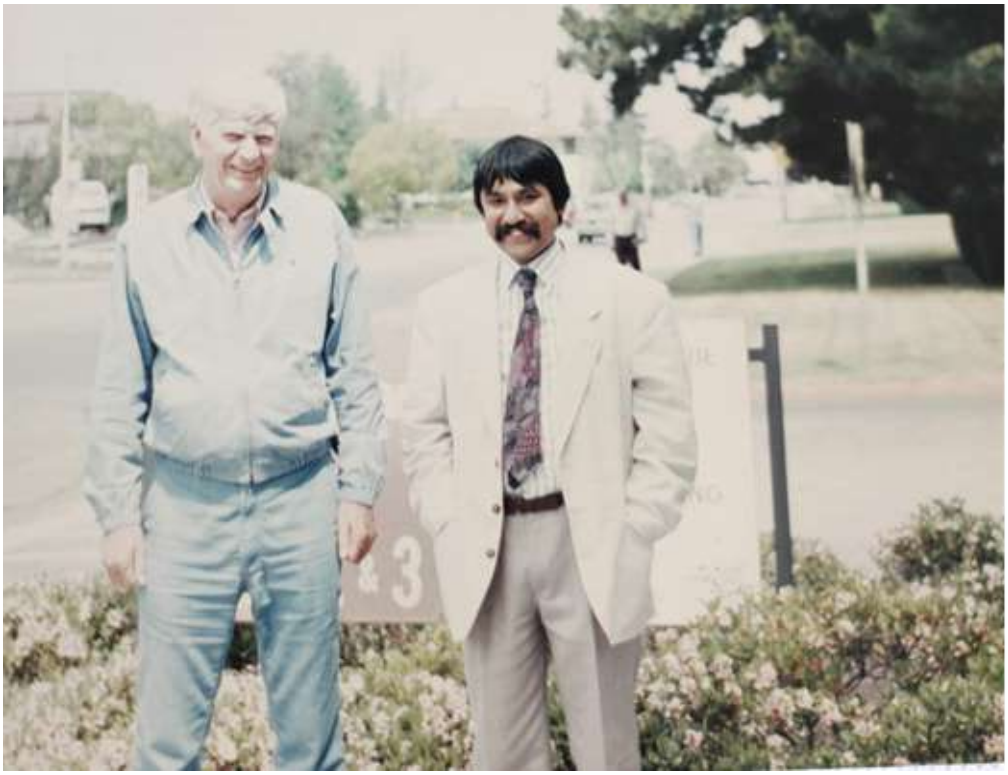


Photo: Advisory Member BMPS Prof Zakaria with Prof Clarence J. Karzmark in Stanford, San Fransisco on 1989.

Charity Organizations in Bangladesh working for Cancer Treatment

1. Alo Bhubon Trust (Alo-BT)

The establishment of the organization Alo Bhubon Trust (Alo-BT) in 2017 by Prof. Dr Golam Abu Zakaria along with some of his close like-minded majestic persons. Alo Bhubon Trust is a non- profit, charitable and voluntary welfare association with its primary motto "Serving Humanity and Sustainable Development our Vision."

The first and prime project of Alo Bhubon Trust is the establishment of the South Asia Centre for Medical Physics and Cancer Research (SCMPCR). He has the goal to develop for advanced and innovative treatment of cancer patients not only in Bangladesh but also in the South Asia region, considering the urgent need of qualified manpower in these treatment sectors.

The projects of other sectors will be started successively under Alo Bhubon Trust. All the projects will be run by the efficient manpower defined in the organigram for each project. The board of trustee is well experienced and will act as a good advisor to run the Alo Bhubon Trust.

Contact Details

- Address: B-66,E/4, Eastern Housing, 2nd Phase, Pallabi, Mirpur, Dhaka-1216, Bangladesh.
- Phone: +880 1711841063
- Email: alobhubon@gmail.com
- Web: www.alobhubon.org

2. ASHIC stands for A Shelter for Helpless Ill Children

This is a non-profit organization in Bangladesh, serving children living with cancer. It was started in 1994. ASHIC is the first foundation in Bangladesh that focuses solely on Childhood Cancer. Through our work we have encountered countless families from all socio- economic backgrounds, which helps us identify and modify programs and activities that can have a positive impact on the Survival Rate of cancer affected children. Ever since ASHIC started addressing these issues, survival rate for cancer children in Bangladesh has been on a dramatic uptrend, while overall quality of life for the terminally ill children and their families has

Contact Details

- House-52, Road-3/A, Dhanmondi R/A, Bangladesh
- Phone: +88 025 861 3594
- Mobile: +880-1552100293
- Email: info@ashic.org
- Web: www.ashic.org

3. The Blue Sky Charitable Foundation (BSCF)

This is a non-profit, non-political charitable organization dedicated to providing the most reliable, complete and up to date information's regarding awareness and treatment facilities to cancer patients especially for Breast cancer patients in Bangladesh and its region. The Blue Sky Charitable was formed on 26th May 2016 as a charitable foundation. It was registered under the society Registration Act XXI of1860 and approved as an institution of a public character in Bangladesh since 26th May 2016.

The Blue Sky Charitable Foundation (BSCF) has expanded its role to provide help and inspire those affected by Breast cancer and their loved ones. Our aim to create awareness on early detection and complex medical procedures and to provide information about breast health and breast cancer. The foundation wants to help those who are financially disadvantaged, especially women, by giving them the support to cope during a very difficult period of life.

The Blue Sky Charitable Foundation (BSCF) is dedicated to eradicate and reduce cancer specially breast cancer as a life threatening disease from Bangladesh. BSCF is proud to launch awareness and early detection campaigns for women and breast cancer patients in Bangladesh.

Contact Details

- Hasan Court (1st Floor) 23/1, Motijheel, Dhaka-1000, Bangladesh
- Phone: +88 029553407
- Email: blueskycharity@gmail.com
- Web: www.theblueskycharity.org

4. Cancer Awareness Foundation of Bangladesh

This is a Government registered non- profit, non-government, community based voluntary organization in Bangladesh established in 2016.

Cancer Awareness Foundation of Bangladesh has been working to spread awareness, prompt early detection, and ensure proper treatment and rehabilitation. It is also involved in cancer research to enrich cancer care and steering health policies in Bangladesh.

It has fast growing volunteer network composed of people from different age group and socio-economic which is vital for sustained development and success.

Contact Details

- Hasan Court (1st Floor) 23/1, Motijheel, Dhaka-1000, Bangladesh
- Phone: 01703-046946
- Email: info@cancerfoundation.org.bd
- Web: www.cancerfoundation.org.bd

5. BANCAT - Bangladesh Cancer Aid Trust (formerly known as Bangladesh Cancer Aid Foundation)

This is an organization that makes an effort to help those brave hearts who fought or are fighting their war against this terminal disease. We, at BANCAT, are here to assist those affected people in taking control of their lives. We are striving not only to create an organization, but a society to motivate and inspire patients, survivors and their families so that they can come together and share their experiences. We hope that this will further encourage and create awareness for the disease and connect present patients with survivors to promote a positive mindset.

Contact Details

- Rangs Bhaban, 117/A, Bijay Sarani, Bir Uttam Ziaur Rahman Rd, Dhaka 1215, Bangladesh.
- Phone: +880-1612226223
- Email: support@bancat.org.bd
- Web: www.bancat.org.bd

Awards & Honors

BMPS founder president Re-elected as OWSD Executive Board Member of Asia Pacific Region

The Organization for Women in Science for the Developing World (OWSD) is an international organisation that provides research training, career development and networking opportunities for women scientists throughout the developing world at different stages in their career. Prof. Anupama have been associated with OWSD since 2005 and have been working to enhance the number and quality of women in science. Prof. Azhari has been reelected as an OWSD Regional Member of the Executive Board for the Asia Pacific Region (for a second term) for the years 2021-2025 in recognition to her devotion, hard work, and passion. From June 28 to July 4, 2021, regional members were elected via the OpaVote platform. Prof. Anupama received 201 votes out of 375 votes casted by the OWSD active full members in the Asia Pacific region.

Currently, Prof. Anupama has been working as the Director at the Centre of Biomedical Science and Engineering in United International University (UIU). Prof. Azhari is also working as the general secretary of the Alo Bhubon Trust.

BMPS Founder President: Member IMPCB AC2

The International Medical Physics Certification Board (IMPCB) was formed on May 23rd 2010. Since then it has established an accreditation program for Medical Physics Certification Boards and a certification scheme for medical physicists from countries where no other certification exists. Prof Azhari has been selected as a member of the IMPCB Accreditation Committee Subcommittee AC2. She is also the IMPCB second proctor along with the IMPCB Chief Proctor Dr. Golam Abu Zakaria. With her initiatives IMCPB Part-I and Part-II exams will be held in United International University (UIU) United City, Madani Avenue, Badda, Dhaka, Dhaka 1212, Bangladesh. Part I will be on Monday morning December 13, 2021, and Part II on Tuesday morning, December 14, 2021. Both are from 9 am to noon.

BMPS Advisory Member Selected Representative of South Asian region: AAPM

The Global Needs Assessment Committee (GNAC) of the AAPM's International Council (IC) is established to identify and develop strategies for advancing the practice of medical physics globally, to address global disparities in healthcare and develop mitigation strategies in collaboration with other stakeholders that include international medical physics organizations, international radiology and radiation oncology societies, and NGOs that deal with the cancer burden as well as other diseases requiring medical physics involvement.

To realize this goal, it is imperative that the AAPM works in concert with regional medical physics organizations and other stakeholders in different regions of the world to perform comprehensive needs assessments for global collaboration on an on-going basis. The GNAC is dedicated to working with key leaders from different world regions to conduct such needs assessment, which will serve as a basis for high impact collaboration in consonance with the mission of the IC. Prof. Dr. Golam Abu Zakaria has been selected as a key leader from the South Asian region who can work with the Global Representatives Subcommittee (GRSC).

BMPS Executive Committee 2019-2021

At the end of ACBMPS-2019, Annual General Meeting (AGM) was held with all members of BMPS. A new executive committee has been formed for the year 2019-2021. The new members are as follows:

Mr. Md. Anwarul Islam
President

Mr. Safayet Zaman
Vice President

Mr. Md. Mostafizur Rahman
Vice President

Dr. Md. Akhtaruzzaman
General Secretary

Mr. Md. Jobairul Islam
Joint Secretary

Mrs. Sadia Afrin Sarah
Treasurer

Capt. Md. Khairul Islam
Member

Mr. Md. SajanHossain
Member

Mst. ZinatRehana
Member

Mr. Md. Nazmul Islam
Member

Mr. Md. Shahidul Miah
Member

Mr. Sujan Mahamud
Member

The 21st Asia-Oceania Congress of Medical Physics

United International University,
Dhaka, Bangladesh

21st AOCMP

The 21st Asia-Oceania Congress of Medical Physics

Co Organizers:

Endorsed by

International Organization for Medical Physics

Speakers Sessions

Key Note Speakrers 5
Invited Speakers 23
Oral speakers 91
Poster presenters 64

AFOMP AWARDS

Kiyonari Inamura award
C.V. Saraswathi – A.N. Parameswaran Memorial
AFOMP Best PhD Award
Llife time acheivement Award
Young Acheiver Award
Professor Sung Sil Chu
AFOMP Best Student's Publication Award

Mini Symposium

Speakers 22

Education & Training in AFOMP Region
Women for Women – connecting women health scientists for the benefit of women in the AFOMP region.
Medical physics contributes during the Covid-19 pandemics
Setting up a certification board 101

AOCMP-2021

50th ANNIVERSARY

Date
10 – 12 December 2021

Venue
United International University

BANGLADESH

A Role Model for Developing Countries

impcb
INTERNATIONAL MEDICAL PHYSICS CERTIFICATION BOARD

IMPCB Examination - 13 and 14 December, 2021

United International University,
Dhaka, Bangladesh

IDMP 2020 Online

Remembrance IDMP 2020
Challenges and Contribution for Women in STEM: Medical Physics
01 December (Tuesday) 2020
Time: 07.00 AM – 09:05 AM Greenwich Mean Time (GMT)

Program Schedule

Moderators

Ms Nupur Karmaker Member and Ex-Treasurer, BMPS Joint Secretary, OWSDNCBD Lecturer, Gono Bishwabidyalay (University), Bangladesh	**Dr. Rajni Verma** Member, AMPI Committee Member, IOMP-W Assistant Professor Dept. of Radiological Physics, SMS Medical College and Hospitals, Jaipur, India

Welcome Speech

07:05-07:10	**Prof. Dr. Hasin Anupama Azhari**	General Secretary, AFOMP OWSD Executive Board Member, Asia and Pacific Region Committee Member, IOMP-W Dean, Faculty of Physical and Mathematical Sciences Chairman, Dept. of Medical Physics and Biomedical Engineering (MPBME) Gono Bishwabidyalay (University), Savar, Dhaka, Bangladesh

Inspiring Motivational Speech for the Young Generations

07:10-07:18	**Prof. Dr. Magdalena Stoeva**	Chair, IOMP Women Subcommittee Editor in Chief - Health and Technology Journal - Springer Nature - IUPESM- WHO Officer, International Union for Physical and Engineering Sciences in Medicine (IPESM) Professor, Translational Neurosciences Centre, Medical University – Plovdiv, Bulgaria
07:18-07:26	**Prof. Dr. Eva Bezak**	General Secretary, IOMP Member: IOMP-W Vice President, AFOMP Director, Translational Cancer Research, University of South Australia
07:26-07:34	**Dr. Chai Hong Yeong**	Chair, Professional Relations Committee, AFOMP, Vice President, South-East Asia Federation of Organizations for Medical Physics (SEAFOMP) Web Sub-Committee (Newsletter), IOMP Committee Member, IOMP-W Associate Professor,

Register in advance for this meeting:
https://bdren.zoom.us/meeting/register/u5EucumqrTsuG9XYP-8Tb7Fzz9cLrqXmsqyV
After registering, you will receive a confirmation email containing information about joining the meeting
Facebook Live: www.fb.com/bmpsorgbd

Remembrance IDMP 2020
Challenges and Contribution for Women in STEM: Medical Physics
01 December (Tuesday) 2020

Time: 07.00 AM – 09:05 AM Greenwich Mean Time (GMT)

		School of Medicine, Taylor's University, Malaysia
07:34-07:42	**Dipl. Ing. Kirsten Hierholz**	Chief Medical Physicist, Radiation Oncology and Radiation Therapy, Darmstadt Hospital, Germany
07:42-07:50	**Dr. Jianjian Qiu**	Associate Professor and Clinical Medical Physicist, Department of Radiation Therapy, Huadong Hospital, Fudan University
07:50-07:58	**Dr. Vijitha Ramanathan**	Head, Department of Radiography & Radiotherapy, General Sir John Kotelawala Defence University, Sri Lanka
08:00-08:55	**Session of Early Careers: Young Drives**	
Topic	**Challenges, Status, Leadership: Women Medical Physicist**	
08:00-08.10	**Ms. Sadia Afrin Sarah**	M.Sc. Medical Physics Student, Gono Bishwabidyalay, Bangladesh
08:10-08.20	**Ms. Xin Yang**	M.Sc. Medical Physics Student, Fudan University, China
08:20-08.30	**Ms. Pratibha Singh**	MSc. Medical Physics Student, Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India
08:30-08.40	**Ms. Zulaikha Jamalludin**	M.Sc. Medical Physics Student, University of Malaya, Malaysia
08:40-08.50	**Mrs. Ishani Jayakody**	M.Sc. Medical Physics Student, University of Colombo, Sri Lanka
	Discussion & QA	
08:50-09:00	**Discussants**	Prof. Dr. Magdalena Stoeva Prof. Dr. Eva Bezak Dr. Chai Hong Yeong Dipl. Ing. Kirsten Hierholz Dr. Jianjian Qiu Dr Vijitha Ramanathan
	Vote of Thanks	
09.00-09:05	**Jannatul Ferdusy Soma**	General Member, BMPS

Register in advance for this meeting:
https://bdren.zoom.us/meeting/register/u5EucumqrTsuG9XYP-8Tb7Fzz9cLrqXmsqyV
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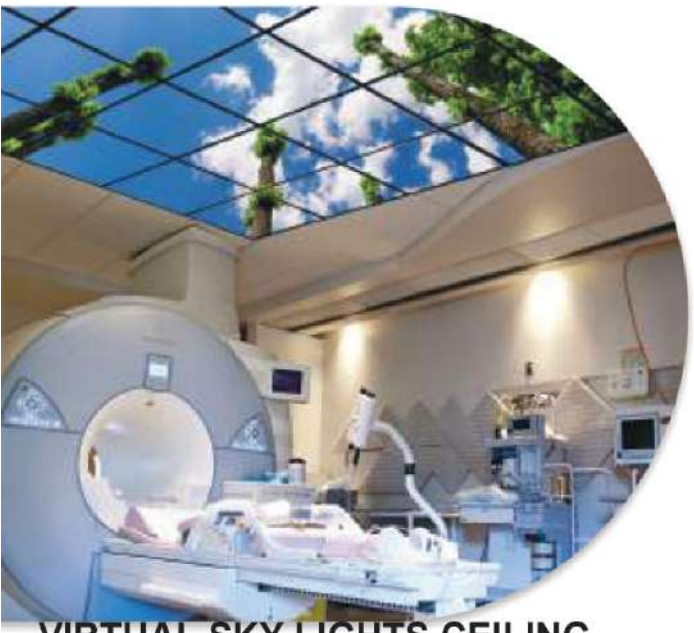

VIRTUAL SKY LIGHTS CEILING
KRYPTONITE - INDIA

WORKING AREAS AND BRANDS

- RADIATION ONCOLOGY
  - Immobilization device (ORFIT – BELGIUM)
  - Moving Laser (GAMMEX – USA)
  - Radiation Oncology Accessories
- MRI INBORE CINEMA (TELEMED – TURKEY)
- VIRTUAL SKY LIGHTS (KRYPTONITE – INDIA)
- ORTHOPEDIC
  - Splinting Materials (ORFIT – BELGIUM)
- OT EQUIPMENT
  - OT Table (INFIMED – POLAND)
  - OT Light ((INFIMED – POLAND)
  - Modular Operating Theater (INFIMED – POLAND)
- HOSPITAL FURNITURE (TAIWAN / CHINA)
- LAUNDRY EQUIPMENT (RENZACCI – ITALY)
- MEDICAL GAS PIPELINE SYSTEM (MEGASAN – TURKEY)
- CSSD – (UNILENE – PERU, 4aMedical – TURKEY, Sturdy – TAIWAN)

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