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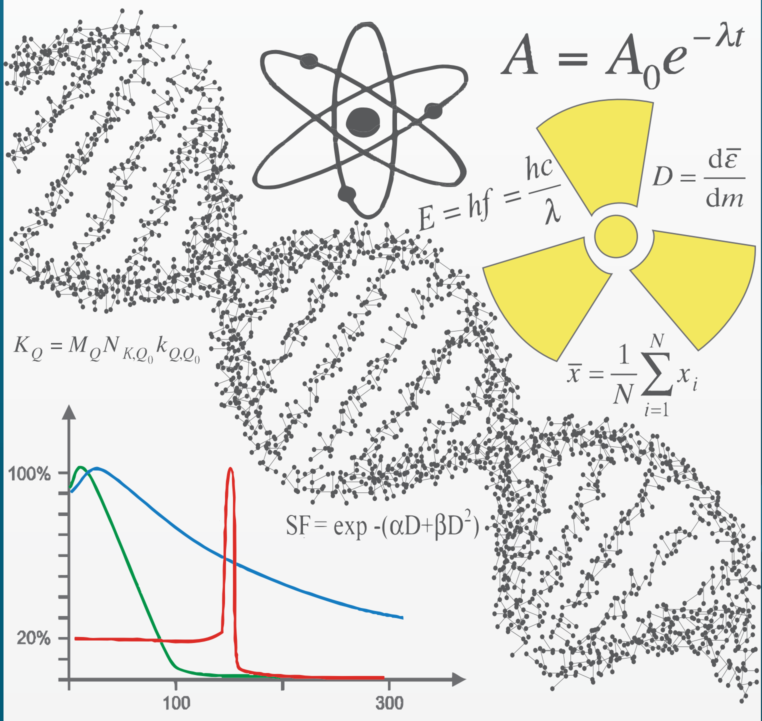

Voice of BMPS

An official e-Newsletter of BMPS, Issue 7, November 2019

International Day of Medical Physics (IDMP)
7th November 2019

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

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CONTENTS

MESSAGES

ARTICLES

CONTINUOUS PROFESSIONAL DEVELOPMENT

NEWS & EVENTS

CONTENTS

AWARDS & HONORS

Voice of BMPS

Editorial

Dear Colleagues,

On behalf of the BMPS, I welcome you to "Voice of BMPS" (Electronic Newsletter of Bangladesh Medical Physics Society)Issue-7,it is an immense pleasure to launch this on the occasion of International Day of Medical Physics (IDMP), 7th November 2019.The theme of this year to mark the celebrations of the International Day of MedicalPhysics (IDMP 2019) is"It is a Medical Physics World"to raise awareness about the role of medical physicists to improve safety and qualityof health care for the benefit of patients.The "Bangladesh Medical Physics Society" celebrates International Day of MedicalPhysics (IDMP) on November 7, as this represents an important date in the history of medical physics. Maria Skłodowska-Curie known for her pioneering research on radioactivity, was born in Poland on 7th November1867.Every 7th November BMPScelebrates this day through organizing seminar, rally as well as publication of an E-newsletter Issue 7 in 2019 is acontinuation of each year.

As a continuation of every year2019 has been a year full of eventsand impactful activities by the active participation of BMPS members. This edition tried to reach out theactivities of the different scientific and educational program or researchorganized/participated by BMPS members from 08 November 2018 to 06 November 2019. In this newsletter, there arescientific articles, articles on CPD, news, events, awards and so on. We are glad to announce that CPD has done aremarkable task in producing QMP in Bangladesh, which are published in this volume.

Since the inception of BMPS in 2009, it is promoting medical physics in Bangladesh through the advancement in status and standard of practice of the medical physics profession by organizing conference, seminar, workshop and public awareness programs every year. In the meantime, BMPS has already achieved an international reputation for their relentless activities in Bangladesh. The remarkable achievement of BMPS is, it has been able to make the government understand the role of MP in cancer treatment and thereby the Directorate of General Health Service and ministry of Health establish unified recruitment rules and positions for the medical physicists in Bangladesh.

I would like to give my warmest congratulations toevery member of BMPS for winning the bid for hosting AOCMP-2021.It is really an outstanding achievement for BMPS to beat such a highly competitive field and organize such scientific events on the occasion of 50 years anniversary of Bangladesh.

As an AFOMP Secretary General, I would like to form one organization in those countries where there are more than one MP organization including Bangladesh. Unification of BMPA and BMPS is mandatory in Bangladesh for cumulative development in educational & professional level of medical physicists across the country. We hope together we can lead emerging challenges in quality and safety ofradiotherapy and organize all the future scientific events like AOCMP-2021.

Thankyou to all the persons who contributed writing the wonderful and inspiring articles, and the local board members for their everlasting support throughout the creation of this editionwithout which there wouldn't have been this newsletter issueand I look forward to your continuous support in the coming issue.

We hope you enjoy reading this issue as much as we have enjoyed making it.Any suggestions or criticism on this issue would be most welcome.

Prof. Dr. Hasin Anupama Azhari
Founder President, BMPS
Member of the Advisory Committees, BMPS
Head, Dept. of Medical Physics and
Biomedical Engineering, Gono University

President, AFOMP

Kindly accept my greetings and best wishes on the occasion of International Day of Medical Physics IDMP 2019. I am happy to note that BMPS is publishing special issue of "voice of BMPS" on the occasion of IDMP.

International Organisation of Medical Physicist (IOMP) started celebrating IDMP since 2013 on 7th November every year, commemorating the birthday of Prof. Mary Curie, greatest scientist who contributed immensely for medical physics and health. The purpose of celebrating IDMP is to showcase the contribution of medical physicist to health care. This year theme of IDMP is "It's a medical physics world" to showcase the important contribution of medical physics to healthcare.

IOMP has six regional organisations (RO) and Asia Oceania Federation of Organisations for Medical Physics (AFOMP) is seemed largest RO and 21 countries Medical Physicist Organisation are member of AFOMP with about 8000 Medical Physicist members. BMPS is one of the active and vibrant members of AFOMP.

I wish everyone my good wishes and hope you will contribute to Medical Physics to best of your abilities.

Prof. Arun Chougule
President, AFOMP

Coordinator, IDMP

Dear Medical Physics Colleagues,

It is my pleasure to address my fellow Medical Physicists in Bangladesh to congratulate them on the hard work and persistence to develop Medical Physics in Bangladesh and surrounding countries.

During my first visit to Bangladesh as an invited speaker at the BMPS International Conference on Medical Physics in Radiation Oncology and Imaging in March 2011, I have noticed determination of Bengali Medical Physicists to promote medical physics in their country with minimum available resources. My second visit was during the 2nd International Conference on Medical Physics in August 2014. I have noticed a big change in the expansion and growth of medical physics both in the number of colleagues and the expertise they have gained in the field. This is all came true due to the efforts of the senior colleagues in the country to attract experts in the field from around the world as speakers and trainees to participate in many conferences and workshops across the country to encourage their young generation physicists whom they gained a lot of knowledge and experience.

The theme of this year to mark the celebrations of the International Day of Medical Physics (IDMP 2019): It is a Medical Physics World. From this, I inspire all physicists in Bangladesh and around the world to contribute to the profession by conducting research and seek explorations in the fields of medical physics for the enhancement and improvement in the diagnosis and treatment of diseases especially cancer.

I wish all my colleagues around the World a Happy Medical Physics Day. Enjoy the celebrations of this day by preparing symposiums, parties, contests, gatherings, rallies, or any other means to show our pride of being a Medical Physicist!

Ibrahim Duhaini
IOMP Treasurer
IDMP Coordinator

President, BMPS

I am very happy that the Bangladesh Medical Physics Society (BMPS) will publish the 7th issue of its official newsletter as a consequence of the previous issue started from 2013. 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.

Thank you.

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

General Secretary, BMPS

Dear Colleagues

Greetings from Bangladesh Medical Physics Society (BMPS)!

It is my pleasure to inform you that BMPS celebrates International Day of Medical Physics (IDMP) on the birthday (7th November) of legend women scientist Maria Sklodowska Curie (1867-1934).

This year, the theme of the IDMP 2019 has been chosen as ***"It is a Medical Physics World"****, which reflects that there are a considerable number of medical physicists working across the globe and they are united through the national and regional organizations under the auspices of International Organization for Medical Physics (IOMP).*

As part of the celebration of IDMP, BMPS is going to publish its electronic newsletter ***"Voice of BMPS"*** *in this year also. It contains some interesting articles, information about past medical physics activities. It also consists of future medical physics events to be held in the home and abroad, which can be beneficial for the professionals as well as students, who want to explore their scientific outlook in the international arena.*

I strongly believe continuous cooperation and collaboration among individuals & various organizations in the field of medical physics will definitely enhance the educational & professional standard of medical physicists.

I wish the ***"Voice of BMPS"*** *will be the more constructive and informative platform for BMPS members as well as for the Medical Physicists from other parts of the World.*

Thank you.

Md. Akhtaruzzaman
General Secretary
Bangladesh Medical Physics Society (BMPS)

ARTICLES
BMPS

History of radiotherapy

M. Akhtaruzzaman
Senior Medical Physicist
Ahsania Mission Cancer and General Hospital, Dhaka, Bangladesh

Cancer is a significant health care problem worldwide, accounting for a one-fourth of all deaths and surpassing heart disease as the leading cause of death for people under the age of 85 [1]. Moreover, cancer management is a rising concern and is increasingly important in developing countries. Radiotherapy itself, or very often given in association with surgery and medical treatments such as chemotherapy, has been a prime means of fighting cancer since the discovery of X rays by Roentgen in 1895 [2].

There was a prestigious period for radiotherapy during the late 19th century as three Nobel prizes were awarded for discoveries related to ionizing radiation [3]. In December 1895, Roentgen discovered X rays (Timeline 1) [2, 4], in June 1896 Becquerel discovered natural radioactivity [5] and in 1898, Curie isolated radium [6]. These three elementary discoveries paved the way for the two main techniques of radiotherapy: teletherapy using long source to surface distance (SSD) and later called external beam radiotherapy (EBRT); and brachytherapy based on a short SSD, initially delivered with radium and later with low energy X- rays [7].

In 1896, for the first time, radiation was used to treat patients with gastric cancer and basal-cell carcinoma in France, America and Sweden - that is 6 months after Roentgen's discovery [8–10]. The detrimental effects of radiation also became clear rapidly [11] and were taken into consideration in order to optimize the effect on cancers relative to the detriment to healthy tissue and motivate the development of the concept of radiation protection.

For the routine use of radiotherapy in fighting cancer, radium tubes or needles and Coolidge tubes were designed by 1913 [3]. Since then, from a physical point of view, the aim of radiotherapy has always been to deliver the maximum of the prescribed dose in the target volume (gross tumour volume [GTV] or subclinical disease) and the minimum to the organs at risk (OAR). A notable accomplishment made in 1932 was the ability to measure the radiation dose using ionizing chambers with the first accurate dose unit (the Roentgen unit) [12]. However, with the energy variations between 50 kV and 200 kV, it was very challenging to deliver doses adequately into deep-seated tumours primarily because of the associated inevitable skin toxicity [13].

With EBRT, cancer cure was anecdotal and was restricted to small superficial tumours (skin and vocal cord) [14] or to intrinsically radiosensitive cancers (Hodgkin lymphoma and seminoma) [5]; and for brachytherapy to 'accessible' tumours (mobile tongue, anal or uterus cancers) [15]. Radiotherapy offered a revolution to oncology in the 1920s, when for the first time it was possible to cure early stage laryngeal cancers without permanent mutilation from a tracheostomy [16].

The following fundamental laws were established during the early-to-mid 20th century, underpinning toady's radiotherapy practice. Firstly, Bergonié and Tribondeau demonstrated the different patterns of intrinsic radiosensitivity among cells and tissues in 1906 [17]. Secondly, the role of fractionation in creation of a beneficial differential effect between cancer and normal cells was discovered [18]. In 1934, Coutard proposed a fractionation scheme of 200 Roentgen per fraction, five times a week, which was converted into the standard contemporary 2 Gy/fraction scheme and more recently was well fitted with a linear-quadratic functional model to describe its biological effect [19]. Finally, the International Commission on Radiological Protection (ICRP) was established in 1928 to address the question of radioprotection; [20]. In 1928 the Geiger Müller tube was invented to detect radioactivity [21].

Voice of BMPS

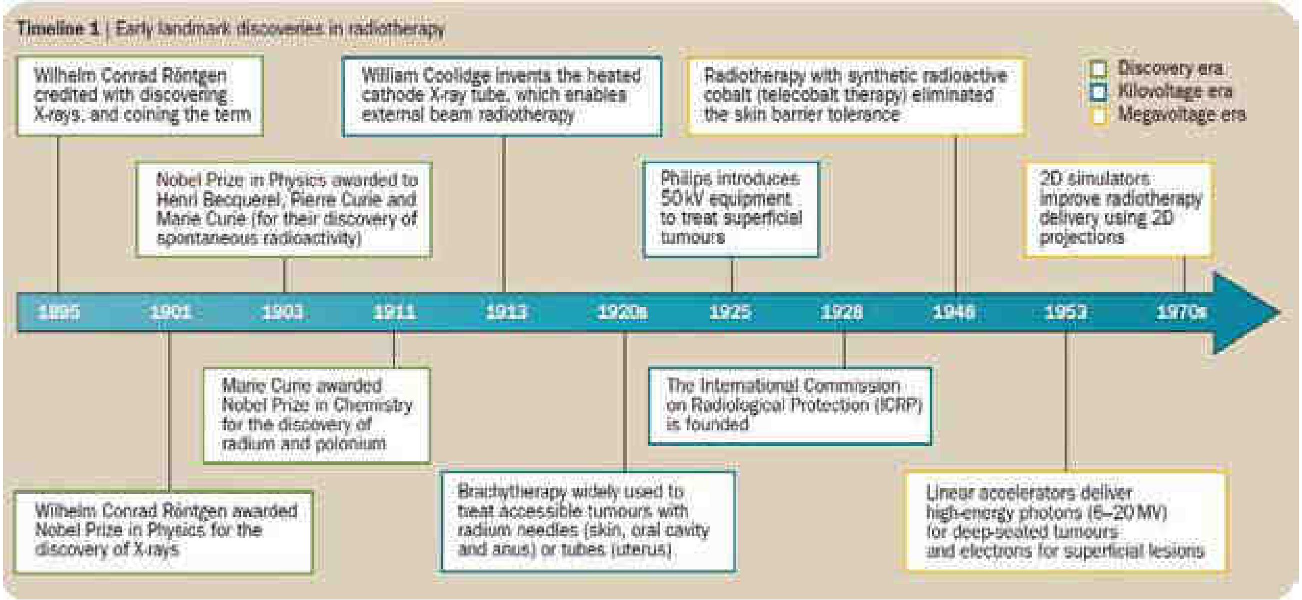


Figure 1. 1 Discoveries in radiotherapy [4]

After the Nobel Prize was awarded to Irène and Frédéric Joliot-Curie for the discovery of artificial radioactivity in 1934 [22], and following the work of Johns and Cunningham [23], cobalt-60 was adopted as an alternative source of high-energy γ rays for teletherapy. γ emissions from cobalt-60 produce X ray beams with an average energy of 1.25MeV. In 1948, the first telecobalt unit was installed in Hamilton, Canada (Timeline 1) [4]. In the following 10 years, over 1,000 machines were sold to hospitals worldwide and these were used widely for 20–30 years and are still in use today [24]. For the first time, the 1.25 MeV photon beam energy allowed delivery of doses of up to 45–60 Gy to deeply seated tumours without exceeding the tolerance doses of the OARs. With access to high-energy large-fields, this development was also considered to be an oncological revolution with the capacity to cure Hodgkin lymphoma, a disease that was previously considered to be an incurable cancer. The main drawback of this robust and efficient technology was the use of radioactive sources associated with the risk of radiation exposure while managing waste sources [25], one reason contributing to the replacement of telecobalt devices with linear accelerators.

Radar (klystron and magnetron) research led to microwave power tube technology and then to the construction of the first megavoltage linear accelerator (linac) machine in 1948 [26]. In 1953, the first medical linac built by Vickers was installed at Hammersmith Hospital in London [27]. Linacs were able to produce X ray beams with megavoltage energies above those of cobalt-60, and deliver doses of 60–70 Gy without exceeding the tolerance doses of OARs, even in very deeply located tumours in the pelvis or thorax of obese patients [28]. Moreover, these linacs could also produce megavoltage electron beams, suitable for treating superficial targets (0.5–4.0 cm in depth) [29].

With the use of two-dimensional (2D) simulators in radiotherapy departments, it became possible to treat tumours more accurately using 2D bony landmarks. At the same time, the introduction of treatment planning systems (TPS) allowed more-accurate planning to further improve the accuracy of calculation of dose distributions using the first computerized algorithms [30]. During this period, with the use of new detectors, dosimetry improved significantly and the unit ‘rad’ was replaced by the Gray (joules/kg) [31]. Quality Assurance (QA) methods were introduced to control treatment delivery, reduce deviations from a planned protocol [32] and increase the accuracy of dose delivery. Since that time, radiotherapy has been a model for risk management and QA programmes. Radiation oncologists became important members of the multidisciplinary oncology team and radiotherapy had become a standard curative treatment as it dramatically improved local control of primary tumours, allowing curative treatment and often improved survival [33].

The International Commission on Radiation Units and Measurements (ICRU) [20] demonstrated the concepts of GTV, clinical tumour volume (CTV), planning target volumes (PTV), and so on, which remain essential parameters of current treatment planning [34]. The concepts developed by the ICRU form a basic, common language to harmonize the prescription, recording and most of all reporting of radiotherapy treatment.

Three-Dimensional conformal radiotherapy

The invention of CT scanners by Hounsfield in 1971 [35] facilitated the development of image-based radiotherapy treatment in the 1980s. Using computers in radiotherapy treatment planning, [36] treatment delivery gradually shifted from conventional (2D) to conformal (3D) planning. CT based simulation and planning confirmed better radiation dose distributions. The invention and implementation of Multileaf collimators (MLCs) driven by sophisticated computerized algorithms [37] and the new TPS [38] provided beams-eye-view (BEVs), digitally reconstructed radiographs (DRRs), [39] and rapidly revolutionized radiotherapy. It became possible to deliver the radiotherapy dose accurately to target volumes and to minimize the dose delivered to OARs. Dose–volume histograms (DVHs) (Timeline 2) [4,28] allowed the definition of specific tolerance doses of OARs and cumulative data on clinical tolerance.

Intensity modulated radiotherapy

In the early 2000s, based on a 3D conformal approach, the next technical step forward consisted of the ability to spatially 'modulate' the photon beam intensity during fractions and to use inverse treatment planning for dose optimization using TPS [40].

This advancement of technology allowed better conformation around the CTV and surrounding OARs and was termed inten¬sity modulated radiotherapy (IMRT). IMRT is particularly useful in the treatment of patients with head and neck cancer [41]. In addition, Zelefksy et al. [42] also showed an advantage of IMRT in patients with prostate cancer who were treated with dose escala¬tion up to 81 Gy without increasing rectal toxicity compared to the adverse effects observed after exposure to 70 Gy using 3D-conformal radiotherapy. Furthermore, recent improvements of IMRT technology have led to reduced treatment time using dynamic arc therapy (VMAT) [43]. Other derived tech¬niques include tomotherapy which uses a dedicated CT like-scanner unit and is well adapted to treat large volumes [44]. It is noteworthy that these techniques are used with con¬ventional fractionation, but are also well adapted to deliver a simultaneous integrated boost.

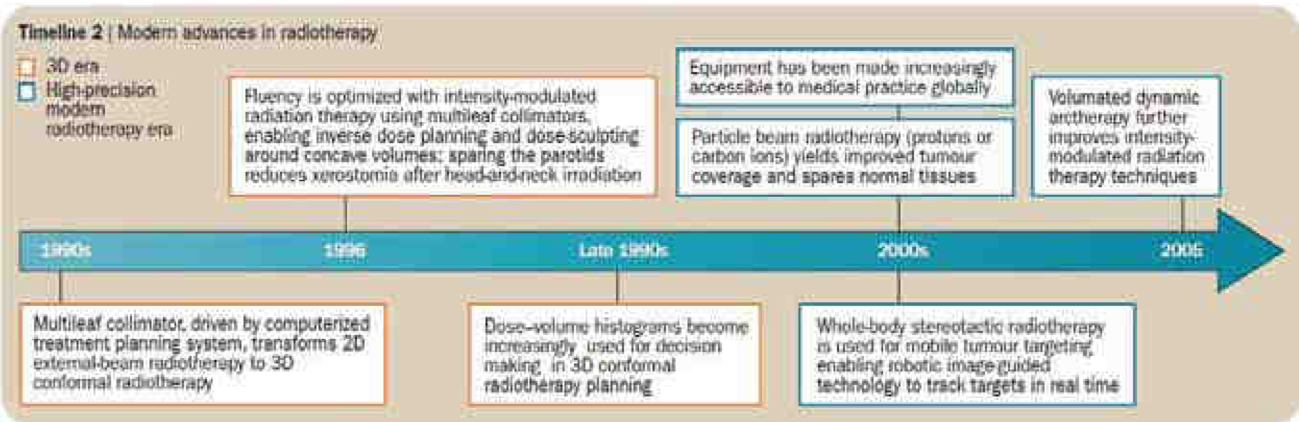


Figure 1. 2 Evolution of dose calculation algorithms [68]

Stereotactic radiotherapy

The first stereotactic devices were designed by Leksell for the treatment of intracranial benign or malignant lesions [45]. These devices called Gamma Units and later gamma knife use multiple 60Co sources to produce non-coplanar narrow beams which deliver high doses into small target volumes in a highly accurate way using a stereotactic frame. This allowed hypofractionation of tumour doses without increasing treatment side-effects. Such stereotactic radiotherapy is delivered today using dedicated machines [46]. Although intracranial lesions (including brain metastases) are the primary indications that can be treated using these systems, technical improvements in stereotactic body radio¬therapy (SBRT) planning allow its use for extracranial lesions (such as those in the spine and mobile tumours). SBRT yields excellent results compared with surgery in patients with early stage lung tumours [47]. SBRT is also extensively used as an aggressive treatment modality for oligometastases with a potential to prolong remission and good quality of life in some selected patients on the basis of number and size of metastases [48].

4D radiotherapy

Patient, organ and tumour motions are the new technological frontier for radiotherapy. With the increasing use of highly conformal EBRT, it becomes possible to reduce the size of the PTV by reducing geometric uncertainties during the radiotherapy course. Intrafraction and interfraction patient set-up uncertain¬ties result from tumour and organ movements (including lung and liver movements with breathing) and tumour and patient contour changes in shape and volume over the 5–7 weeks of radiotherapy. Compensation for these uncertainties requires image-guided radiotherapy (IGRT) approaches. IGRT has the capability to control changes in patient, tumour or organ position using kV planer imaging or cone beam CT offline or online [49,50]. Formal assessment of the clinical benefit of IGRT is under way. Adaptive radiotherapy (ART) consists of 're-planning' and sometimes optimizing the treatment tech¬nique during the course of radiotherapy when clinically relevant. This allows to opti¬mize the dose distribution depending on patient anatomy changes and organ and tumour shape [51,52]. Most recently, with the introduction of the MR linac, radiotherapy will enter a new era of high precision treatment with a wide range of opportunities. MRI guidance will improve tumor targeting accuracy, allow for smaller PTV margins and thus result in a reduction of normal tissue exposure which will enable hypofractionation and dose escalation up to ablative dose levels. In addition, daily and even intrafraction plan adaptation and dose painting based on anatomical changes, tumor regression and functional MR imaging will further refine dose escalation and might provide an organ-sparing treatment strategy for a growing number of indications [53].

Vendors of radiotherapy technologies have overcome the problem of moving targets by designing new machines including stereotactic equipment such as the CyberKnife® (Accuray, Sunnyvale CA), TrueBeam™ (Varian, Palo Alto CA), VersaHD (Elekta, Stockholm, Sweden) and most recently MR linacs, which allow online image guidance and real-time tracking of moving targets [47]. The excellent soft tissue contrast in combination with advanced online motion-compensation of the MR linac will also broaden the potential indications for radiotherapy [53]. The software and TPS algorithms are being constantly upgraded to improve the accu¬racy of dose delivery with the integration of time-related changes. To achieve such aims, continuous software optimization is an essential part of technological innovation.

Brachytherapy

Brachytherapy with radioactive sources utilize needles, plastic tubes or other applicators placed within (interstitial) or close (plesio or endocavitary) to the target volume [54,55]. Following the inverse-square law, brachytherapy offers an intrin¬sic conformal dose distribution, which facilitates dose escalation [56]. After a long period of manual afterloading with low-dose-rate, remote afterloading with high-dose-rate image-guided brachytherapy with 192Ir and 60Co is now common practice. Permanent implants using 125I or 103Pd seeds have also gained a major place in the treatment of patients with low-risk prostate cancer as an alternative to radical prostatectomy [57].

Proton therapy

There have been spectacular developments in proton therapy in the last 10 years with about 70,000 patients treated in 30 centers in the USA, Asia and Europe [58]. Protons are considered to be a standard conservative treatment for ocular melanomas [59]. Protons are also used to treat base of skull chordomas or chondrosarcomas with excellent outcomes [60]. The high cost of proton machines continues to impede greater uptake of proton radiotherapy. New technological innovations are ongoing and they may overcome this problem [61]. The new facilities will be equipped with gantries to facilitate the beam orientation and an active spot scanning beam system to better tailor the dose distribution to the 3D shape of tumours. Taking advantage of pulsed beam production and online proton imaging will facilitate the positioning and accuracy of the beam delivery [62].

Carbon ion therapy

Like protons, 12C have the same advantage (in terms of their Bragg peak) for dose distribution with even less lateral diffusion in deep-seated tumours [62]. As compared with protons the advantage of treatments based on 12C comes from an increased relative biological effectiveness in the region of the Bragg peak between 2 and 3 [63]. These types of characteristics make treatment with 12C especially attractive for radioresistant cancers with hypoxic cells and for sarcomas, melanomas and some adenocarcinomas. The vast clinical experience with 12C is in Chiba (Japan) where approximately 6,000 patients has been treated using this method since 1994 [64]. Lately, 12C was used in Hyogo and Gunma (Japan), and Lanzhou (China) [65]. In Germany, since 1998, treatment with 12C has been under¬taken at Darmstadt and more recently, in the hospital-based facility of Heidelberg [66].

References

[1] Siegel, R., Naishadham, D. & Jemal, A. Cancer statistics, 2012. CA Cancer J. Clin. 62, 10–29 (2012).

[2] Roentgen, W. C. On a new kind of ray (first report) [German]. Munch. Med. Wochenschr. 101, 1237–1239 (1959).

[3] Paterson, J. R. The Treatment of Malignant Disease by Radium and X Rays, Being a Practice of Radiotherapy (Williams & Wilkins, London, 1948).

[4] Juliette Thariat, Jean-Michel Hannoun-Levi, Arthur Sun Myint, Te Vuong and Jean Pierre Gérard Past, present and future of radiotherapy for the benefits of patients. Nat. Rev. Clin. Oncol. 10, 52-60 (2013).

[5] Becquerel, J. & Crowther, J. A. Discovery of radioactivity. Nature 161, 609 (1948).

[6] Curie, E. Marie and Pierre Curie and the discovery of radium. Br. J. Radiol. 23, 409–412 (1950).

[7] Schäfer, W. & Witte, E. Über eine neue Körperhöhlenröntgenröhre zur Bestrahulung von Uterustumoren. Strahlentherapie 44, 283 (1932).

[8] Grubbé, E. H. Priority in the use of X rays. Radiology 21, 156–162 (1933).

[9] Despeignes, V. Observation concernant un cas de cancer de l'estomac traité par les rayons Roentgen. Lyon Med. 82, 428–430 (1896).

[10] Dubois, J. B. & Ash, D. in Radiation Oncology: A Century of Progress and Achievement: 1895–1995 (ed. Bernier, J.) 77–98 (ESTRO publication, Brussels, 1995).

[11] Mould, R. F. A Century of X rays and Radioactivity in Medicine (IOP Publishing, Bristol, 1993).

[12] Thoraeus, R. A. A study of ionization method for measuring the intensity and absorption of roentgen rays and of the efficiency of different filters used in therapy. Acta Radiol. 15, 1–86 (1932).

[13] Chaoul, H. Short-distance roentgenotherapy (contact roentgenotherapy). J. Radiol. Electrol. Arch. Electr. Medicale 31, 290–298 (1950).

[14] Baclesse, F. Comparative study of results obtained with conventional radiotherapy (200 KV) and cobalt therapy in the treatment of cancer of the larynx. Clin. Radiol. 18, 292–300 (1967).

[15] Pierquin, B., Chassagne, D. & Gasiorowski, M. Présentation technique et dosimétrique de curiepuncture par fils d'or 198. J. Radiol. Electrol. Med. Nucl. 40, 690–693 (1959).

[16] Kramer, R. Radiation therapy in early laryngeal cancer. J. Mt Sinai Hosp. NY 14, 24–28 (1947).

[17] Bergonié, J. & Tribondeau, L. L'interpretation de quelques resultats de la radiotherapie et essai de fixation

d'une technique rationnelle. C. R. Seances. Acad. Sci. 143, 983–985 (1906).
[18] Regaud, C. & Ferroux, R. Discordance entre les effects des rayons X sur les testicules et la peau, implications pour le fractionnement de la dose. Compt. Rend. Soc. Biol. 97, 431–434 (1927).
[19] Coutard, H. Principles of X ray therapy of malignant disease. Lancet 224, 1–8 (1934).
[20] Taylor, L. S. History of the International Commission on Radiological Protection (ICRP). Health Phys. 1, 97–104 (1958).
[21] Geiger, H. & Müller, W. The electron counting tube [German]. Physikalische Zeitschrift 29, 839–841 (1928).
[22] Curie, I. & Joliot, F. A new type of radioactivity [French]. Compt. Rend. Acad. Sci. (Fr.) 198, 254–256 (1934).
[23] Johns, H., Bates, I. & Watson, T. 1000 Curie cobalt units for radiation therapy. I. The Saskatchewan cobalt 60 unit. Br. J. Radiol. 25, 296–302 (1952).
[24] Laugier, A. The first century of radiotherapy in France [French]. Bull. Acad. Natl Med. 180, 143–160 (1996).
[25] Courageot, E., Huet, C., Clairand, I., Bottollier Depois, J. F. & Gourmelon, P. Numerical dosimetric reconstruction of a radiological accident in South America in April 2009. Radiat. Prot. Dosimetry 144, 540–542 (2011).
[26] Le Bourgeois, J.-P., Chavaudra, J. & Eschwege, F. Rádiotherapie Oncologique (Hermann, Paris, 1992).
[27] Fry, D. W., Harvie, R. B., Mullett, L. B. & Walkinshaw, W. A travelling-wave linear accelerator for 4-MeV electrons. Nature 162, 859–861 (1948).
[28] Emami, B. et al. Tolerance of normal tissue to therapeutic irradiation. Int. J. Radiat. Oncol. Biol. Phys. 21, 109–122 (1991).
[29] Johns, H. E. & Cunningham, J. R. The Physics of Radiology 4th edn (Charles C. Thomas, Springfield, IL, 1983).
[30] Tiemann, J. Practical irradiation planning using a "dedicated system" [German]. Strahlentherapie 148, 463–467 (1974).
[31] Scientific Committee on Radiation Dosimetry (SCRAD) of the American Association of Physicists in Medicine. Protocol for the dosimetry of X rays and gamma ray beams with maximum energies between 0.6 and 50 MeV. Phys. Med. Biol. 16, 379–396 (1971).
[32] Horiot, J. C., van der Schueren, E., Johansson, K. A., Bernier, J. & Bartelink, H. The programme of quality assurance of the EORTC radiotherapy group. A historical overview. Radiother. Oncol. 29, 81–84 (1993).
[33] Bernier, J., Hall, E. J. & Giaccia, A. Radiation oncology: a century of achievements. Nat. Rev. Cancer 4, 737–747 (2004).
[34] Purdy, J. A. Current ICRU definitions of volumes: limitations and future directions. Semin. Radiat. Oncol. 14, 27–40 (2004).
[35] Hounsfield, G. N. Nobel Award address. Computed medical imaging. Med. Phys. 7, 283–290 (1980).
[36] Dutreix, A. The computer in radiotherapy [French]. Rev. Prat. 22, 1359–1360 (1972).
[37] Mohan, R. Field shaping for three-dimensional conformal radiation therapy and multileaf collimation. Semin. Radiat. Oncol. 5, 86–99 (1995).
[38] Dutreix, A. Prescription, precision, and decision in treatment planning. Int. J. Radiat. Oncol. Biol. Phys. 13, 1291–1296 (1987).
[39] Oldham, M., Neal, A. & Webb, S. A comparison of conventional 'forward planning' with inverse planning for 3D conformal radiotherapy of the prostate. Radiother. Oncol. 35, 248–262 (1995).
[40] Brahme, A. Development of radiation therapy optimization. Acta Oncol. 39, 579–595 (2000).
[41] Pow, E. H. et al. Xerostomia and quality of life after intensity-modulated radiotherapy vs. conventional radiotherapy for early-stage nasopharyngeal carcinoma: initial report on a randomized controlled clinical trial.

Int. J. Radiat. Oncol. Biol. Phys. 66, 981–991 (2006).
[42] Zelefsky, M. J. et al. Incidence of late rectal and urinary toxicities after three-dimensional conformal radiotherapy and intensity-modulated radiotherapy for localized prostate cancer. Int. J. Radiat. Oncol. Biol. Phys. 70, 1124–1129 (2008).
[43] Glatstein, E. Intensity-modulated radiation therapy: the inverse, the converse, and the perverse. Semin. Radiat. Oncol. 12, 272–281 (2002).
[44] Fenwick, J. D., Tomé, W. A., Soisson, E. T., Mehta, M. P. & Rock Mackie, T. Tomotherapy and other innovative IMRT delivery systems. Semin. Radiat. Oncol. 16, 199–208 (2006).
[45] Leksell, L. The stereotaxic method and radiosurgery of the brain. Acta Chir. Scand. 102, 316–319 (1951).
[46] Gérard, J. P. et al. Recommendation of the working group commissioned by the French Nuclear Safety Authority on stereotactic radiation therapy [French]. Cancer Radiother. 16 (Suppl.) S5–S9 (2012).
[47] Salama, J. K., Kirkpatrick, J. P. & Yin, F. F. Stereotactic body radiotherapy treatment of extracranial metastases. Nat. Rev. Clin. Oncol. 9, 654–665 (2012).
[48] Milano, M. T., Katz, A. W., Zhang, H. & Okunieff, P. Oligometastases treated with stereotactic body radiotherapy: long-term follow-up of prospective study. Int. J. Radiat. Oncol. Biol. Phys. 83, 878–886 (2012).
[49] Bucci, M. K., Bevan, A. & Roach, M. 3rd. Advances in radiation therapy: conventional to 3D, to IMRT, to 4D, and beyond. CA Cancer J. Clin. 55, 117–134 (2005).
[50] Ling, C. C., Yorke, E. & Fuks, Z. From IMRT to IGRT: frontierland or neverland? Radiother. Oncol. 78, 119–122 (2006).
[51] Thariat, J. et al. Image-guided radiation therapy for muscle-invasive bladder cancer. Nat. Rev. Urol. 9, 23–29 (2012).
[52] Schwartz, D. L. Current progress in adaptive radiation therapy for head and neck cancer. Curr. Oncol. Rep. 14, 139–147 (2012).
[53] Linda G. W. et al. The MRI-Linear Accelerator Consortium: Evidence-Based Clinical Introduction of an Innovation in Radiation Oncology Connecting Researchers, Methodology, Data Collection, Quality Assurance, and Technical Development. Front Oncol, 6, (2016).
[54] Mazeron, J. J. et al. GEC-ESTRO recommendations for brachytherapy for head andneck squamous cell carcinomas. Radiother. Oncol. 91, 150–156 (2009).
[55] Speight, J. L. & Roach, M. 3rd. Radiotherapy in the management of clinically localized prostate cancer: evolving standards, consensus, controversies and new directions. J. Clin. Oncol. 23, 8176–8185 (2005).
[56] Hannoun-Levi, J.-M., Chand-Fouche, M.-E., Dejean, C. & Courdi, A. Dose gradient impact on equivalent dose at 2 Gy for high dose rate interstitial brachytherapy. J. Contemp. Brachyther. 4, 14–20 (2012).
[57] Crook, J. M. et al. Comparison of health-related quality of life 5 years after SPIRIT: surgical prostatectomy versus interstitial radiation intervention trial. J. Clin. Oncol. 29, 362–368 (2011).
[58] De Ruysscher, D. et al. Charged particles in radiotherapy: a 5 year update of a systematic review. Radiother. Oncol. 103, 5–7 (2012).
[59] Caujolle, J. P. et al. Proton beam radiotherapy for uveal melanomas at nice teaching hospital: 16 years' experience. Int. J. Radiat. Oncol. Biol. Phys. 78, 98–103 (2010).
[60] Feuvret, L. et al. A treatment planning comparison of combined photon-proton beams versus proton beams-only for the treatment of skull base tumors. Int. J. Radiat. Oncol. Biol. Phys. 69, 944–954 (2007).
[61] Shirai, T. et al. Recent progress of new cancer therapy facility at HIMAC. Proc. IPAC2011, 3604–3606 (2011).
[62] Suit, H. et al. Proton vs carbon ion beams in the definitive radiation treatment of cancer patients. Radiother. Oncol. 95, 3–22 (2010).
[63] Kraft, G. The radiobiological and physical basis for radiotherapy with protons and heavier ions. Strahlenther. Onkol. 166, 10–13 (1990).
[64] Kamada, T. Clinical evidence of particle beam therapy (carbon). Int. J. Clin. Oncol. 17, 85–88 (2012).

[65] Ohno, T. et al. Carbon ion radiotherapy at the Gunma University Heavy Ion Medical Center: new facility set-up. Cancers 3, 4046–4060 (2011).
[66] Rieken, S. et al. Proton and carbon ion radiotherapy for primary brain tumors delivered with active raster scanning at the Heidelberg Ion Therapy Center (HIT): early treatment results and study concepts. Radiat. Oncol. 7, 41 (2012).

Verification of Dose Calculation for Cervical Carcinoma Cases Treated With HDR Brachytherapry with Ir-192 and Co-60 Photon Sources According To HEBD Report 229

Sadia S A[1], Islam M J[1],Azhari H A[1], Islam M A[2], Zakaria G A[1,3]
[1]Department of Medical Physics and Biomedical Engineering, Gono University, Dhaka-1344, Bangladesh
[2]Department of Oncology & Radiotherapy Center, Square Hospital, West Panthapath, Dhaka 1205, Bangladesh
[1,3]Department of Medical Radiation Physics, Gummersbach Hospital, Academic Teaching Hospital of the University of Cologne, Germany

Pre-treatment dose verification is a very important step in Brachytherapy. In both types of radiotherapy, the treatment planning process is vital to assure the best treatment. The HEBD Report 229 is used to dose confirm the TPS results manually using an excel method for high-dose-rate (HDR) brachytherapy treatment plans. The purpose of the study the HEBD Report 229 which is an updated version of the AAPM TG-43 protocol is used to verify the TPS results with manual dose calculations. The 2D planning system for the 60Co source & 3D planning system for 192Ir source has taken different hospitals.

In dose calculation verification, a patient was treated by Brachytherapy using a 60Co&192Ir HDR source in Fletcher Style Applicator. In TPS, a total dose of 7Gy is prescribed at point A (Lt, Rt). ICRU 38 is used for dose and volume specification as well as reporting Intracavitary Brachy Therapy in Gynecological cancer & HEBD Report 229 is used for dose calculation at point Lt A, Rt A, according to the Manchester system. For 60Co source the deviation between TPS calculations and manual calculations at point A (Rt) (Lt) according to HEBD Report 229 are 11.01%&4.89% respectively & for 192Ir source, the dose deviation between TPS and HEBD Report- 229 is 5.3%,7.3% respectively. This deviation is out of tolerance level which is due to an error of the applicator insertion of the patients, reconstruction of catheters, and applicator after loader connection, applicator length, cables, and transfer tubes. Therefore manual calculations can be used for commissioning especially for a newly installed TPS (Treatment Planning System) as well as for periodical quality control checks. It is highly recommended that HEBD Report 229 is a restructured protocol of AAPM TG-43U1.

Introduction:

Brachytherapy is a form of radiotherapy where a sealed radiation source is placed inside or next to the area requiring treatment. The term Brachytherapy refers to treating tumours from a short distance, in contrast to teletherapy, where tumours are treated at a long distance from the radiation source. Brachytherapy is usually achieved by placing radioactive sources on or in the tissue to be irradiated. Modern Brachytherapy is a treatment modality within the framework of oncology, and which encompasses the entire spectrum of cancer and treatment [1].

Brachytherapy is commonly used to treat cancers of the cervix, prostate, breast, and skin. Brachytherapy can also be used in the treatment of tumors of the brain, eye, head and neck region (lip, floor of mouth, tongue, nasopharynx and oropharynx),respiratory tract (trachea and bronchi), digestive tract (esophagus, gall bladder, bile-ducts, rectum, anus) urinary tract (bladder, urethra, penis), female reproductive tract (uterus, vagina,

Voice of BMPS

Brachytherapy is commonly used to treat cancers of the cervix, prostate, breast, and skin. Brachytherapy can also be used in the treatment of tumors of the brain, eye, head and neck region (lip, floor of mouth, tongue, nasopharynx and oropharynx),respiratory tract (trachea and bronchi), digestive tract (esophagus, gall bladder, bile-ducts, rectum, anus) urinary tract (bladder, urethra, penis), female reproductive tract (uterus, vagina, vulva), and soft tissues [1].

High Dose Rate (HDR) after loading Brachytherapy is a highly widespread practice today. The most common nuclide used in the modern HDR after-loading machine presently is Ir-192, however, use of Co-60 is increasing [2]. These two radionuclides show different physical characteristics.

Dose Calculations and control of dose distribution are essential parts of the periodic quality assurance program for the brachytherapy unit.In brachytherapy, the treatment planning process is vital to assure an optimum treatment. In this type of Radiotherapy, determination of dose distribution, selection of radiation source and to provide a complete dose distribution in the target volume, are important tasks to be performed. The quality assurance of treatment planning has been the subject of several communications and was extensively reviewed in the AAPM TG-59 report [3]. Maintaining a high quality of the life of a patient, during and after treatment is one of the primary objectives of the radiotherapy.

Verification of dose at the prescription point (or another suitable point) within 5% is considered reasonable, considering the severe dose gradients encountered in brachytherapy [4]. Co-60& Ir-192 is common as well as effectively used HDR brachytherapy source for different treatment sites, as compared with some other brachytherapy sources. [5, 6]

In this study, Intracavitary brachytherapy is used for cervical carcinoma patients. Brachytherapy is the clinical use of small encapsulated radioactive sources in the tissue to be irradiated. In intracavitary treatment, the radioactive source is put into a space near where the tumor is located, such as the cervix, the vagina or the windpipe. [7]

In this study, the dose has been calculated at reference point A according to ICRU-38 (Manchester System). The Manchester system is one of the most commonly used methods for intracavitary brachytherapy.

There exist several dose calculation methods for brachytherapy sources. In modern brachytherapy, dose calculations formalism is usually completed and published by Task Group 43 (TG 43) of the Radiation Therapy Committee of the American Association of Physicists in Medicine (AAPM) [8,9]. In this study, the TPS dose is verified manually by the HEBD Report 229.

In 1995, AAPM TG-43 recommended dosimetry protocol including a formalism for dose calculations that defines the necessary physical quantities, such as air kerma strength, radial dose function, anisotropy function, dose rate constant for both low and high dose rate brachytherapy sources. In 2004, AAPM published the updated protocol (AAPM TG-43U1) that includes consensus datasets in the form of dose rate constant, radial dose function and one dimensional (1D) and two-dimensional (2D) anisotropy function for all low energy brachytherapy sources.

In August 2012, AAPM and ESTRO published High Energy Brachytherapy Source Dosimetry (HEBD Report 229) for high energy (average energy higher than 50kev) photon-emitting brachytherapy sources. This report includes considerations in the application of the TG-43U1 formalism with particular attention to phantom size effects, interpolation accuracy dependence on dose calculation grid size, and dosimetry parameter dependence on source active length. It also modified interpolation and extrapolation techniques of the AAPM TG-43U1 report for the 2D anisotropy function and radial dose function. In both protocols, geometry function, radial dose function, anisotropy function has been included to consider complex source design, filtration effect of source and its encapsulation accurately and source strength specification is air kerma strength. AAPM TG-43U1 protocol is developed for calculation of dose rate distributions around photon emitting brachytherapy sources (LDR, MDR, PDR). But HEBD Report 229 is established for the dose calculation of photon emitting brachytherapy sources only high dose rate (HDR).

Materials and Method:

Eckert & Ziegler BEBIG Co-60 HDR Co60-A86Treatment planning software, HDRPlus 3.0 by Eckert &Ziegler&GammaMed Plus 192Ir HDR 0.9MM SourceTreatment Planning software (TPS) GammaMedix were performed in this study.Fletcher Style Applicator Set is used .
ICRU 38 is used for dose and volume specification as well as reporting Intracavitary Brachy Therapy in Gynecological cancer & HEBD Report 229 is used for dose calculation at point Lt A, Rt A, according to the Manchester system.

Manual Verification of TPS Calculation

In this study, the TPS dose has been verified by HEBD report 229. The procedure of manual calculation is described as follows: [10]

According to HEBD report 229

The dose rate at a distance (point A) has been calculated by using the following formula and the description of the parameters has been given.

$$\dot{D}(r,\theta) = S_k \Lambda \frac{G(r,\theta)}{G(r_0,\theta_0)} g(r) F(r,\theta) \text{..} (1)$$

Determination of the parameters according to HEBD report 229

Each parameter of the HEBD report 229 protocol are determined manually which are as follows:

Current Air Kerma Strength

The Activity of the source has been calculated using the decay correction factor. In this study, activity is specified by air kerma strength. Accuracy of the dose delivered to the patient by brachytherapy directly depends on the accuracy of source strength. At first, the source activity was 40.7 mGym2/h. At the treatment date and time, the activity is calculated using the following formula,

$$A = A_0 e^{-\lambda t}$$

Where,

A_0 =The activity present at calibration date

$T_{\frac{1}{2}}$ = Half life

λ = decay constant

t= time period (the difference between calibration date treatment date)

$e^{-\lambda t}$= decay factor

The manual calculation of air kerma strength has been given in Appendix

Dose rate constant (Λ)

The dose rate constant for GMP 192Ir HDR is 1.12 that is specific for Varian Medical System radioactive source model. [10]

Geometry Factor G (r,θ)

To determine the Geometry Factor, distance (r) is determined between point A and the midpoint of each dwell position. Calculation of distance r is done in the following steps.

Origin of Coordinate System:

To calculate the three dimensional (3D) dose distribution a coordinates system is defined in two CT images (AP view, Lateral view). In the AP image, the Y-axis points along the length of the intrauterine tandem and the X-axis is perpendicular to this line. The positive X-axis points to the patient's left side and the other is the patient's right side. In the lateral CT image, the origin lies at the intersection of the dorso-ventral line at the cranial surface of the ovoids with the intrauterine tube. The lateral radiograph shows the Z-axis pointing to the ventral patient side and the Y-axis pointing cranio – caudal.

Measurements of Coordinates of the Source:

Then the source coordinates are measured. From the center of the source, a line is drawn perpendicularly onto Y-axis.

X-Coordinates: - On the AP image, the X coordinate of a point can be measured as the distance from the point to the Y axis along a line parallel to the X axis or perpendicular to the Y-axis

Y-Coordinate: - The Y coordinate of a patient can be measured as the distance from the point to the X axis along a line parallel to Y-axis.

Z-Coordinate:-On the lateral image, the Z coordinate of a patient can be measured as the distance from the point to the Y axis, parallel to to Z-axis.

The Distance from reference point A and each dwell position is determined using coordinates as defined in section 2.1 above. The Dose rate is calculated at point A.

The distances are designed as r (A), r (B), r ($OAR_{Bladder}$), r ($OARR_{ec}$).

For distance r (A),

$$r(A)=\sqrt{(S_x - A_x)^2 + (S_y - A_y)^2 + (S_z - A_z)^2} \quad \text{.......... (2)}$$

Where,

Where,

S_x,S_y,S_zare the coordinates of the source.

Ax, Ay, Azare the coordinates of point A, where the dose is prescribed.

Again BxBy, Bz, OAR_{Recx}, $OAR_{Bladderx}$, $OAR_{Bladdery}$, and $OAR_{Bladderz}$ are the coordinates of point B, Rectum and Bladder respectively.

Results:

Results of Manual Calculation for 192Ir Source:

Results of Dose at point A (Lt,Rt) (according to HEBD Report 229)

Table-4.1: Result of dose rate, dose in A (Lt,Rt)

LT(A)			RT (A)		
D(r,θ) cGy/h	Dose cGy	Dose Gy	D(r,θ) cGy/h	Dose cGy	Dose Gy
1922.3	692.08	6.92	1894.76	682.11	6.82

Verification of dose calculation between TPS and HEBD Report 229 Protocol

Table-4.2: Comparison of the treatment planning system and HEBD report 229 calculated dose values for intracavitary brachytherapy treatment plans

No of Obs.	Calculation Point	TPS Calculated Dose (Gy)	HEBD Report 229 protocol Calculated Dose (Gy)	% variation
1	Rt A	6.80	6.82	0.2%
2	Lt A	7.19	6.91	-4.05%

Results of Manual Calculation for 60Co Source:

Results of Dose at point A (Lt,Rt) (according to HEBD Report 229)

Table-4.3: Result of dose rate, dose in A (Lt,Rt)

LT(A)			RT (A)		
D(r,θ) cGy/h	Dose cGy	Dose Gy	D(r,θ) cGy/h	Dose cGy	Dose Gy
1922.3	692.08	6.92	1894.76	682.11	6.82

4.1.1.4 Verification of dose calculation between TPS and HEBD Report 229 Protocol

Table-4.4: Comparison of treatment planning system and HEBD report 229 the calculated dose values for intracavitary brachytherapy treatment plans

No of Obs.	Calculation Point	TPS Calculated Dose (Gy)	HEBD Report 229 protocol Calculated Dose (Gy)	% variation
1	Rt A	6.80	6.82	0.2%
2	Lt A	7.19	6.91	-4.05%

Deviation of dose calculation between TPS Calculated Dose (Gy)and HEBD Report 229 ProtocolCalculated Dose (Gy) for Point Rt Ais0.2%&Lt Ais-4.05%for Co60 Source.

Deviation of dose calculation between TPS Calculated Dose (Gy)and HEBD Report 229 Protocol Calculated Dose (Gy) for Point Rt Ais5.3%&Lt Ais7.3%for Ir192 Source.

Discussion

In This Study, the TPS dose has been completed with HEBD Report 229. Pretreatment dose verification is an important aspect of patient-specific quality assurance. A simple, fast, and accurate method of dose verification is required to fulfill this requirement. The dose deviation between TPS and HEBD Report 229 is 11.01% & 4.89% respectively for 60Co and dose deviation between TPS and HEBD Report 229 is 5.3%, 7.3% respectively for 192Ir. All reference points and OARs doses (TPS and manual) are within the tolerance level (±5%).

The dose is out of the tolerance limit. This difference is due to the error of the applicator insertion of the patients. But this difference can be minimized to some extent by careful application, proper packing, and proper fixation.

Conclusion

Dose calculation verification is one of the Quality Control (QC) for brachytherapy TPS commissioning. The HEBD Report 229 is a modified protocol of the AAPM TG-43U1 and considered more parameter for an accurate result.

With the implementation of these programmers at institutional and national levels in our country, we can significantly improve standards of care for millions of cancer patients in Bangladesh.

References

1 Gerbaulet,A ., et al. 2002. The GEC ESTRO handbook of brachytherapy. Leuven, Belgium: European Society for Therapeutic Radiology and Oncology.

2. Venselaar J., Baltas D., Meigooni A.,2013. Hoskin P. Imaging in Medical Diagnosis and Therapy, William R. Hendee, Series Editor. Comprehensive Brachytherapy: Physical and Clinical Aspects. CRC/Taylor & Francis Group, Boca Raton, New York, London.

3. Baltas D, Sakelliou L, Zamboglou N, 2007. The Physics of Modern Brachytherapy for Oncology. New York, London: Taylor and Francis.

4. DIN 6809-2. Klinische Dosimetrie; Brachytherapi Stoffen Berlin: Deutsches Institutfür Normung; 1993.

5. Azhari, H A, et al. 2012. Dosimetric verification of Source strength for Afterloading units with Ir-190 and Co-60 sources: Comparison of three different international protocols, Journal of Medical Physics, 37(4): 183-192.

6. Rivard M J, et al. Update of AAPM Task Group No: 43 Report: A revised AAPM protocol for Brachytherapy Dose Calculation.

7. Sultana N, et al. Verification of dose calculation for gynecological brachytherapy treated with Iridium 192 HDR source according to AAPM HEBD Report 229 and IAEA protocol.

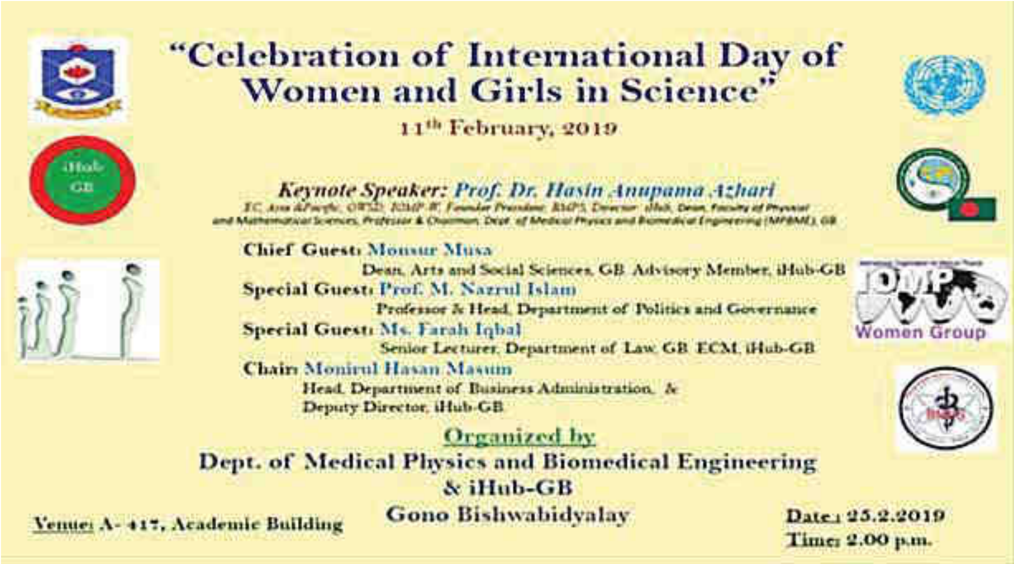
8. Nath R, et al. 1995. Dosimetry of interstitial brachytherapy sources: Recommendations of the AAPM Radiation Therapy Committee Task Group No. 43; 22:209-234.

9. Rivard M J, et al. Update of AAPM Task Group No : 43 Report : A revised AAPM protocol for Brachytherapy Dose Calculation

10. Jose Perez-Calatayud, et al. 2012.Dose Calculation for Photon-Emitting Brachytherapy Sources with Average Energy Higher than 50 keV: Full Report of the AAPM and ESTRO of the High Energy Brachytherapy Source Dosimetry (HEBD) Working Group-229; 1-124

Celebration of International Day of Women and Girls in Science

N Karmaker, T Mumtaz, M H Masum, H A Azhari
Department of Medical Physics and Biomedical Engineering, Gono University, Dhaka-1344, Bangladesh



Organized by

Held on 25th February, 2019 at 2:00 pm
In the Academic Building, Room No.:417, Gono Bishwabidyalay, Savar, Dhaka, Bangladesh.

History of Celebrating 11 February: International Day of Women and Girls in Science

Since 1968, the Royal Academy of Science International Trust (RASIT) has been working on Empowering Women in Science through Education, Employment and Recognition. RASIT's work focused on sustainable development programs in education, science, economy, environment and gender equality as well as the support of the marginalised and most vulnerable. Through its scholarship program, RASIT served and well prepared more than 10,500 female students from developing countries, and established the First International League for Women in Science in 1998. Further, in 2015, RASIT brought international recognition for women and girls in science and turned a dream into reality. In fact, in 2015, RASIT started writing the future's history for Women and Girls in Science.

The idea for an International Day of Women and Girls in Science was generated during the first High-Level World Women's Health and Development Forum organized by RASIT and the United Nations Department of Economic and Social Affairs (DESA), and it was held on 10-11 February 2015 at the United Nations Headquarters, with the participation of government, Ministers and representatives, UNESCO, UN-Women, WHO, UNRWA, UNICEF, UNFPA, Every Woman Every Child Initiative, etc.

In order to achieve full and equal access to and participation in science for women and girls, and further achieve gender equality and the empowerment of women and girls, the United Nations General Assembly adopted resolution/RES/70/212 declaring 11 February as the International Day of Women and Girls in Science.

Aims of this celebration

- To spread the background of 'International Day of Women and Girls in Science'
- To join the international community worldwide in celebrating the biggest day for women and girls in science.
- To make public awareness (Schools & Youth; Companies & Organizations; Universities & Institutions; Communities & Cities) about Women in Science
- To learn about the role of Women in Science in Sustainable Development
- To mobilize your networks! Message your friends about the International Day of Women and Girls in Science
- To promote female participation in Science & Technology professions.
- To increase the number of membership of women in science related organization e.g., OWSD

Organizers

- Organization for Women in Science for the Developing World (OWSD), Bangladesh Chapter.
- Dept. of Medical Physics and Biomedical Engineering, Gono Bishwabidyalay.
- iHub EC, Gono Bishwabidyalay
- Bangladesh Medical Physics Society (BMPS)
- International Organization for Medical Physics (IOMP) "IOMP Women Subcommittee" (IOMP-W)

Program details

The Program was conducted by Ms. Tania Ahmed (Lecturer, Dept. of Pharmacy, GB). At first the introductory speech on the background of 11 February celebration was delivered by program coordinator Ms. NupurKarmaker, (Lecturer, Dept. of Medical Physics and Biomedical Engineering (MPBME), GB; ECM: iHub; Joint Secretary: OWSDBD; Treasurer: BMPS). After that the following invited speakers presented their views on Int'l Day of Women and Girls in Science with reference to the role model of their respective field of expertise.

Ms. Tania Akter (Senior Lecturer, Department of Computer Science & Engineering (CSE), GB; ECM: iHub, GB) discussed about the historical development and contribution of women in Computer Science &Engineering in Bangladesh.

DilrubaAkterPansi (Lecturer, Department of Applied Mathematics, GB) presented a comparative views on the Past, Present and Future Status of Applied Mathematics in respect to the participation of women and also showed some women role models in Bangladesh from her related field.

KaziMahfuza Haque (Senior Lecturer, Ethics and Equity) focused on the increased participation of women in different sectors of Bangladesh and also welcomed male counterparts to take part in this progress.

NajmunNahar (Lecturer, Department of Microbiology, GB) presented her views on microbiological research and acknowledge the efforts and contributions of female faculty members in the department of Microbiology, DU during her study.

MasukaNasrin (Student, EEE, GB) and Kakoli Azad (Student, MPBME, GB) shared their feeling saboutthe importance of female students to join this type of programs.

Ms. Farah Iqbal(Senior Lecturer, Department of Law, GB. ECM, iHub-GB) as a Special Guestmentionedabout the movement of women in science to form BAWS, the first association for women scientists and encourage young researchers and graduates to be motivated.

Keynote Speaker: Prof. Dr. HasinAnupamaAzhari (EC, Asia & Pacific, OWSD; Member: IOMP-W, Founder President: BMPS; Director: iHub; Dean, Faculty of Physical and Mathematical Sciences; Chairman, Dept. of Medical Physics and Biomedical Engineering (MPBME)), GB inspired all students, faculty members and other participants by her excellent presentation. She has successfully addressed that the statistics of women in STEM in Bangladesh is unsatisfactory. The main reason is that after secondary education female students are reluctant to grab the opportunities for continuing the STEM education in tertiary level. She also emphasized that many organizations are providing opportunities to the female scientists for early carriers like OWSD, iHub GB. These ideas would be helpful for bringing the female students in the pathway of women empowerment. In specific subject area women are also trying to organize through different women organizations in their related fields for equal access in gender balance like IOMP-W.

Md. Karam Newaz(Chairman, CSE, GB) appreciated keynote speaker for giving a clear picture of the status of our women and showing the direction needed to move for the betterment of the current situation.

Prof. Dr. M. Nazrul Islam, Special Guest (Head, Department of Politics and Governance, GB)showed his own point of view that every human being should be considered as a component of politics. So equal participation of female and male citizens in casting vote for example can make a big impact on the nation. Bangladesh is heading towards developed countries and in order to achieve that gender equity and women empowerments are key factors for the success.

Participation of Dr. TabassumMumtaz, Principal Scientific Officer, IFRB, BAEC and 2019 OWSD-ELSEVIER-Award winner from Bangladesh increased the core motivation of the program. She shared her experience about her research career and explained how she had been able to get the position with the support from OWSD.

Prof. Monsur Musa, Chief Guest (Dean, Arts and Social Sciences, GB. Advisory Member, iHub-GB) delivered valuable speeches on this program. He also instructed to document all the discussions and views being presented in this program.

Chair: Assistant Prof. MonirulHasanMasum(Head, Department of Business Administration, &Deputy Director, iHub-GB) shared his experiences about the arrangement of this program. He also requested all the participants to give their valuable opinions regarding this program. At last, He thanked all the guests for their valuable time and making the program a successful one.

Through this program the participants agreed that women participation in STEM research is necessary for increasing the women contribution in science which will ultimately lead to ensure the women empowerment and gender balance in STEM fields.


Program highlights; Inaugural lecture by Nupur Karmaker (Top); keynote lecture by Prof Anupama (middle left), part of audience (middle right) and photos of closing ceremony

Design and Fabrication of Human Bone (Mandible) by using 3D Printer

Soma F J[1], Oni A R[1], Zakaria G A[1,2]
[1]Department of Medical Physics and Biomedical Engineering, Gono University, Dhaka-1344, Bangladesh
[1,2]Department of Medical Radiation Physics, Gummersbach Hospital, Academic Teaching Hospital of the University of Cologne, Germany

Three-dimensional (3D) printing is an additive manufacturing technique, which allows the fabrication of patient-specific scaffolds with high structural complexity and design flexibility, and gains growing attention. Human bone is very essential for medical study and research. However, human bone preservation is a complex and costly process and the preserved bone erosive with time. This research aims to design and fabricate human bone (Mandible) by Polylactic acid (PLA) material with the same geometry and anatomical structure by 3D printer. The anatomical structure and geometry of Mandible have been collected from CT data. The bone was designed by AutoCAD 3D by using CT data. After comparing designed bones with original bones, designed bone is converted to Stereo-lithographic file by a slicing software (breaks the model surface in slices) and then fabricated by a 3D printer. However, the fabricated bone is exactly similar to the real bones with the same anatomical structure and geometry.3D printed human bones are cheap, long-lasting and environmentally safe. This 3D printed bone enhances the medical study and research by its degrading behavior.

Introduction: 3D printing is an emerging manufacturing technology capable of fabricating complex shapes and manipulating material properties that are impossible with traditional manufacturing methods. This technology is supported by CAD software to build 3D physical models from a series of cross-sections that are automatically joined together to create the final shape [1]. The well-known 3D printing methods in the biomedical field are stereo-lithography, selective laser sintering, Inkjet 3D printing, electron beam melting, poly-jet photopolymer and fused deposition [2, 3].There are a variety of materials that can be used by these AM methods such as plastics, ceramics, metals and living cells [1, 4]. These materials are used by AM in the form of powders, filaments, and liquids [5]. It is difficult to use real bone for study and research because real bone erosion occurs day by day. Chemical substances are used for the preservation of real bone but Preserve bone is difficult. By 3D fabrication it is possible to design bone structure compare with real bone by this it is possible to minimize these difficulties and that will help vastly in academic study and research.

Materials and Method:

Materials: The following materials are used for this study-

1) AutoCAD: AutoCAD is a software application developed by Autodesk that enables computer-aided design (CAD) and drafting. AutoCAD software allows users to conceptualize ideas, produce designs and drawings to the required levels of technical accuracy, and even perform rapid design calculations and simulations; across a wide range of industries.

2) Slicing software (Cura 15.04.6 version): Cura is simple but powerful 3D slicing software produced by Ultimaker. . The software supports STL, 3MF and OBJ 3D file formats and also has a function that will import and convert 2D images (.JPG .PNG .BMP and .GIF) to 3D extruded models.

3) Polylactide (PLA) material: Polylactide (PLA) material is biodegradable and bioactive thermoplastic aliphatic polyester derived from renewable resources.

4) 3D Printer: A 3D printer is a type of material design printer that designs and builds 3D models and products of devices and components using an additive manufacturing process. 3D printers design three-dimensional prototypes and create the end product by directly building them using computer aided design (CAD) or software-created 3D design diagrams, figures and patterns.

Methods

Step 1: Firstly have to study many articles, journals, related books to it.

Step 2: Collected raw data of a mandible and designed it though auto CAD software with the AutoCAD it is easy to get the required specifications.

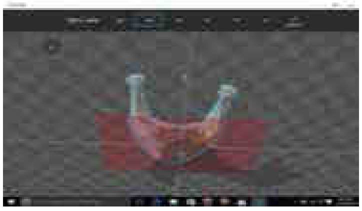
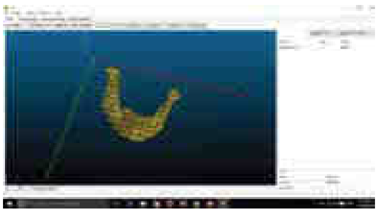
Step 3: Then analyses its standard with the real bone.

Step 4: After that slicing it with the slicing software Cura. Slicing software translates that 3D drawing into something that a 3D printer can understand and print it. The 3D printer needs the specifications of mandible that are designed to be translated into a language which it can interrupt.

Figure 1. Fabrication process of Mandible

Step 5: Need to choose which material will be best for achieving the specific properties required for the object. The variety of materials used in 3D printing is very broad. It includes plastics, ceramics, resins, metals, sand, textiles, biomaterials, glass, food and even lunar dust! Most of these materials also allow for plenty of finishing options that enable to achieve the precise design result, and some others, like glass, for example, are still being developed as 3D printing material and are not easily accessible yet. When the object is first printed, often it cannot be directly used or delivered until it has been sanded, lacquered or painted to complete it as intended.

Results:

Designed model: This file collected from CT data. The designed file is given below.  Figure: Designed model	Slicing model: This is the slicing file of the mandible. This file is sliced by the cura software to breakdown the model to prepare for printing.  Figure: Slicing model	Fabricated bone : This is the fabricated bone of mandible.  Figure: Fabricated bone (mandible)

Discussion:

The 3D-printing process consists of a highly complex procedure that combines hardware, software and material properties optimization. In this work, it is presented preliminary work on fabricating human bone (mandible) by using 3D printing. Various methods can be used for fabricating the bone (mandible) are also discussed. The selection of materials depends on the strength, cost and degrading behavior. In this area was focused on fabricated bone using PLA metals. There is no error in the design of the bone. To compare with real bone the anatomy of the fabricated bone is almost similar. By the using of improved technology and high-quality material, 3D printing can contribute much more to all the sectors in our country. Using this method of preparation, surgeons can gather a better idea of what the surgery entails – reducing the likelihood of error. Printed models are also a more cost-effective way for medical students to study anatomy. Instead of requiring cadavers to learn about the body, medical schools simply print models.

Conclusion:

In this study, CAD models of 3-dimensional PLA methods for bone fabrication were discussed. Various methods can be used for fabricating the bone (mandible) are also discussed. The selection of material depends on the strength, cost and degrading behavior. The fabricated models were dimensioned. The observed parameters were almost similar to the originals designs. The fabricated bone can be used for anatomical research in the future.

If this model can be printed with biodegradable, tissue equivalent and high-quality material then it can be used for implantation

References:

1. PrinceJD. 3D-Printing: An industrial revolution. Journal of Electronic Resources in Medical Libraries. 2014; 11(1):39–45.

2. Mazzoli A. Selective lasers intering in biomedical engineering. Medical & biological engineering & computing.2013; 51(3); 245-256.

3. Ho C.M.B., Ng S.H., YoonY-J. A review on 3D printed bioimplants. International Journal of Precision Engineering and Manufacturing.2015; 16(5):1035-1046.

4. Bhatia S.K., Sharma S. 3D printed prosthetics roll off the presses. Chemical Engineering Progress.2014; 110(5):28-33.

Observation of A Cardiac Angiogram in Bangladesh- Medical Physics Perspective

Chawdhury M[1], Azhari A H[1], Zakaria A G[2], Das K S[3]

[1]Department of Medical Physics and Biomedical Engineering (MPBME), Gono Bishwabidyalay (University), Savar, Dhaka, Bangladesh
[2]Departmen of Medical Radiation Physics, Gummersbach Hospital, Academic Teaching Hospital of the University of Cologne, Germany
[3]Biomedical Engineer, Sheikh Fazilatunnessa Mujib Memorial KPJ Specialized Hospital & Nursing College

In the present context, Interventional Radiology is a popular medical media all over the world. Subsequently, Bangladesh has gradually entered into this medical system. In Bangladesh, currently, 63 hospitals are used Cath lab for interventional radiology. Since Cath Lab is a radiation-based machine, that's because the medical physicist has an essential role in this field. Cardiac catheterization is an invasive diagnostic procedure that provides vital information about the structure and function of the heart. It usually involves taking X-ray pictures of the arteries supplying blood to the heart muscle (coronary arteries) using a technique called coronary angiography or arteriography. The primary purpose of this study is to know the general procedure of cardiac catheterization through the Cath Lab and Finding the parallelism with the international protocols and also radiation dose and lifetime risk of malignancy. Successively the main three deadly diseases in Bangladesh are Heart disease, Stroke, Cancer, and Indirectly or directly Cath-Lab are involving to cure this disease.

Introduction:

"Interventional Radiology" (IR) refers to a range of techniques which rely on the use radiological image guidance (X-ray fluoroscopy, ultrasound, computed tomography [CT] or magnetic resonance imaging [MRI]) to precisely target therapy. Most IR treatments are minimally invasive alternatives to open and laparoscopic (keyhole) surgery. As many IR procedures start with passing a needle through the skin to the target it is sometimes called pinhole surgery! Coronary angiography is an invasive diagnostic procedure in which radiocontrast is injected into the coronary arteries under X-ray guidance in order to display the coronary anatomy and possible luminal obstruction. [1] The first right heart catheterization in a human was performed by Werner Forssmann on himself in 1929. Diagnostic cardiac catheterization was introduced by André Cournand and Dickinson Richards in the early 1940s, and selective coronary angiography was described by Mason Sones in the early 1960s. [2] Cardiovascular disease (CVD) is a major public health problem throughout the world. It is the number one cause of morbidity and mortality world-wide. The economic impact of different types of CVD is enormous. Traditionally, Bangladesh is a developing country burdened with communicable diseases. However, like many other low-income countries in the world, she has been experiencing epidemiological transition; the prevailing disease pattern is changing from communicable diseases to noncommunicable diseases (NCD). [3] The rise in the frequency of interventional procedures over recent years is due to the significant benefits of interventional radiology. Patients may be treated as an out-patient for clinical conditions, which would have otherwise needed surgery, i.e., a more traumatic and expensive treatment. In some circumstances, for example in neuroradiology, the aneurysm may be inoperable surgically and interventional radiology is the only method of treatment. [4]

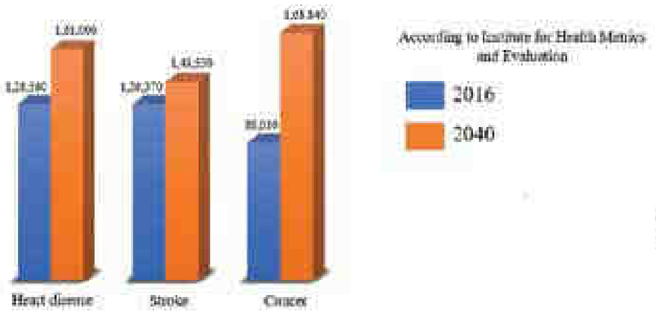


Figure-1. The top leading cause of death in Bangladesh

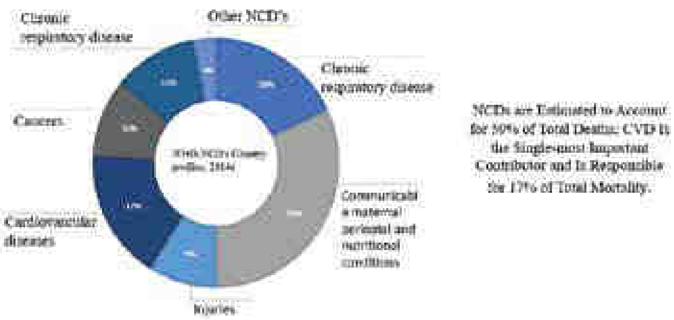


Figure-2. WHO-NCD's Country profiles, 2014c

Voice of BMPS

Material and Method:

1. Artis zee, SIEMENS
2. Angiography Needles (Stylet)
3. Defibrillator
4. Catheters (JL 3.5, and JR 4)
5. Contrast media injector
6. Wire (J-wire)
7. Sheath (Input TS)
8. Contrast agent- Omnipaque™ (iohexol)
9. Anesthesia machine (S6100X Superstar)
10. Suction apparatus (AlconTM)
11. Temporary pacemaker
12. Cap
13. Glove
14. Eyewear
15. Wearable Apron
16. Thyroid Collar
17. Ceiling-mounted Shield
18. Table lead skirt
19. Patient drapes

Coronary angiography is an invasive diagnostic procedure in which radiocontrast is injected into the coronary arteries under X-ray guidance in order to display the coronary anatomy and possible luminal obstruction. Despite the advances in other diagnostic methods, it remains to be "the golden standard" of coronary disease diagnostics. Although today the complication rate is far lower than previously, the possibility of complication still exists, and an invasive cardiologist must be able to complete the procedure flawlessly, and to competently deal with complications, should they occur. In order to be able to do that, he/she must master the proper techniques in performing the coronary angiography procedure, and be comfortable with all the available access-sites.[5] The procedure is performed in a specifically designed room, very much resembling the operating room, called the catheterization laboratory, or Cath lab (Fig.3). Recordings are made using a special X-ray machine, called cardio-angiograph (Fig.1). Just outside of the Cath lab is the control-station with monitors for an angiogram, patient data, electrocardiogram (ECG), hemodynamics etc. (Fig.4).

Figure-3: Catheterization laboratory

Figure-4: Control-station with monitors outside the catheterization laboratory

Coronary angiography is performed under local anesthesia. The procedure is sterile, and all potential access sites must be disinfected, shaved, and sterilized. At the beginning of the procedure, the patient lays down in supine position on the cardio angiograph table, and is prepared for the procedure in sterile conditions (Fig.5)

Figure-5: The patient in supine position on the cardioangiograph table

During the procedure, the patient must be monitored by several systems, and the ECG is absolutely essential. [6] Coronary angiography is performed with the use of specifically designed diagnostic catheters. More than 95% of all procedures can be completed using catheters Judkins left 4 (JL4), and Judkins right 4 (JR4). [7] The operator should always review his/her angiographic recordings before withdrawing the catheter, because standard projections used may not adequately reveal the condition of the coronary circulation, and additional shots may be necessary. The further therapeutic strategy should be considered (medical, surgical or interventional treatment). After the catheter is removed, and the procedure is finished, the patient is transferred out of the catheterization laboratory. Arterial sheath is removed, and manual pressure is applied onto the site of arterial puncture in order to stop the bleeding. That is followed by mechanical compression of that site in order to definitely stop the bleeding. The patient is later mobilized, and if there is no indication for the patient to stay in the hospital further, he/she is discharged on the next day, or sometimes on the same day after the procedure. [8] When connecting the catheter to the manifold, it is important to connect using the fluidagainst-fluid method, i.e. to let the blood back-bleed from the catheter, and at the same time to allow saline flush from the manifold. This manner of connecting the catheter to the manifold prevents air embolism from air bubbles from within the catheter, or from within the manifold. [9]

Left coronary artery engagement

Under fluoroscopic guidance, the catheter is advanced into the coronary ostium, and several recordings of the left coronary artery are taken. The most commonly used catheter diameters are 6 Fr, but diameters from 4 Fr to 8 Fr can also be used. Diagnostic and therapeutic coronary catheters are pre-shaped to suite specific aortic and coronary anatomy. The most commonly used diagnostic catheters for coronary angiography are JL4 (Judkins left 4 cm curve) for the left, and JR4 for the right coronary artery. Both types of catheters were ingeniously designed by Judkins, and are easy to use, because they can engage the coronary ostia with very little manipulation. In fact, Judkins himself said that "no points are earned for coronary catheterization – the catheters know where to go if not thwarted by the operator" (Judkins, 1968). When cannulating the left coronary artery, the catheter is supposed to be unfolded in en face position in the ascending aorta. The best view to see the coronary ostia (both left and right) and to perform the ostial coronary cannulation is left anterior oblique (LAO) 50°, because sinus of Valsalva and aortic root are not superimposed on either of the coronary ostia. Cannulating the left coronary artery (LCA) in anteroposterior (AP) position is not recommended because it is difficult to appreciate the ostium, and ostial Left Main Coronary Artery (LMCA) stenoses can be easily missed. For engagement of the LCA, the J-wire is advanced to the level of aortic valve. Then, the JL4 catheter is placed as low as possible facing the left coronary ostium. The guidewire is slowly withdrawn, and the catheter tip is already in the LMCA or just below it. If it is below the ostium, then it should be withdrawn ever so slightly, and it will fall into the LMCA ostium. Some operators fear that this method might be a bit risky, so they prefer to leave the catheter tip above the level of the left sinus of Valsalva, then withdraw the guidewire from the catheter, and thereafter advance the catheter tip downwards and into the LMCA ostium. This, on the other hand, carries some risk of scratching the surface of the aortic endothelium and embolizing atheroma's if they are located in catheter's path. If the catheter tip is at the level of the ostium, but not within the ostium itself, it is usually easily inserted into the ostium by a clockwise or counter-clockwise torque. An injection of 5-10 ml of contrast close to the expected location of the coronary ostium reveals the position of the catheter tip within the aortic root and facilitates a precise cannulation. If the aorta is dilated, a JL5 or JL6 catheters may be required, while in small individuals, or with small aortic arches, a JL3.5 or even JL3 catheters may be used to cannulate the left coronary artery. Multiple recordings are taken from different perspectives. The optimal positions for recording the left coronary artery are discussed later in the chapter. [10]

Right coronary artery engagement:

After recording the luminograms of the left coronary artery, the catheter is removed over the J-wire, and another catheter, the one for the right coronary artery (RCA) is inserted through the sheath and into the aorta, up to the right coronary ostium, also in the LAO position. After reaching the ascending aorta with the tip of the right coronary catheter and removing the guidewire from inside of it, the catheter is aspirated and connected to manifold. The JR4 catheter is advanced into the aortic root, some 2 cm above the valve level. Then, the operator applies a clockwise rotation with some traction to the catheter. The catheter is slowly rotated using the rotation swivel at the distal portion of the manifold, where the coronary catheter is attached. As the catheter rotates, the torque should be reduced, so that there is no overshoot of the catheter over the right coronary ostium. The catheter rotates and descends somewhat, thereafter cannulating the right coronary ostium. If the first rotation is unsuccessful in cannulating the artery, the catheter should be rotated counter-clockwise to the initial position as to avoid the kinking of the catheter. The problem to find the coronary artery is most commonly due to the origin of the RCA superiorly and more leftwards than usual. It may even arise from the left coronary sinus, close to the LMCA. Using an Amplatz left (AL) 1 or 2 coronary catheter can be helpful to perform selective cannulation of such an RCA. Usually two, but sometimes more right coronary artery luminograms from different projections are recorded, and the catheter is removed. If the right coronary artery ostium is oriented straight downwards, a multipurpose (MP) catheter may be required. In contrast, if the ostium is oriented upwards, a "shepherd's crook" (SC) catheter or internal mammary (IM) catheter may be required. The optimal positions for recording the right coronary artery are discussed later in the chapter. [11]

Contrast injection technique

The syringe with radiocontrast is held with the handle elevated so that any air-bubbles inside of the syringe can rise to the plunger, and are less likely to be injected into the patient's coronaries. A significant air-embolism into a coronary artery may result in asystole, and cardiac massage should be initiated. This usually reverts pretty quickly, as the air components of the bubble (nitrogen, oxygen, carbon dioxide etc.) are dissolved in the blood. Of course, the operator must previously make sure that there are no air bubbles inside the syringe. The radiocontrast must be injected vigorously enough to ensure that it temporarily replaces the blood in the coronaries, with a continuous back-flow into the aortic root. A weak injection may appear as a pulsatile contrast flow with filling-defects, and fail to display the coronary lumen adequately. It sometimes causes the operator to declare a coronary stenosis existence in a place where only a simple contrast filling defect exists. On the contrary, a too-forceful injection can, in extreme cases, cause a coronary dissection, although this event is extremely rare today. If there is no contrast back-flow to the aortic root, or if the back-flow is inadequate, there may be an ostial lesion present. [12]

Biological Effects of Ionizing Radiation

Biological effects resulting from radiation exposure are traditionally divided into stochastic effects and deterministic effects. The classification of some injuries (such as cataracts) as deterministic or stochastic is uncertain. Stochastic injuries (e.g., cancer induction) arise from disrepair of damage to the DNA. The result is a genetic transformation. The likelihood of stochastic effects increases with the total radiation energy absorbed by the different organs and tissues of an individual, but their severity is independent of total dose. The probability of a radiation-induced malignancy due to an invasive procedure is small compared with the baseline probability of developing a malignancy (Mettler et al. 2008).

Deterministic effects (also known as tissue effects or tissue reactions) are largely caused by the death or radiation-induced reproductive sterilization of large numbers of cells. This is not expressed clinically until these cells unsuccessfully attempt division or differentiation. The severity of the effect varies with radiation dose. A dose threshold usually exists. The threshold dose is subject to biologic variation (ICRP 2012). [13]

Results:

Currently, at 54 hospitals in Bangladesh are used Cath lab.

Manufacturers Name	Amount
Philips	16
Toshiba	02
Shimadzu	17
Siemens	08
General Electric	11

Table-1: Machine manufacturer name and amount at various hospitals in Bangladesh

Among whom five machines have not been available till now. Those are : 1. National Institute Cardio Vascular and Disease. 2. Chittagong Medical College and Hospital. 3. Rajshahi Medical College and Hospital. 4. Khulna Abu Naser General Hospital. 5. Mymensingh Medical College and Hospital.

The result of the Cardiac Catheterization Procedure

According to the international protocols, where radiation is used for treatment or diagnosis it is mandatory to have a medical physicist; however, till now, there is no medical physicist appointed in the field of Interventional Radiology. This treatment goes wrong without a medical physicist. Cardiac catheterization is relatively safe, but because they are invasive procedures involving the heart, several complications are possible. Serious and less common complications include: An allergic reaction to the dye, Cancer, Barn of the skin, Artery damage, Perforation of the heart wall, Sudden blockage of a coronary artery, which can lead to a heart attack, Extensive bleeding, Stroke, weakness.

Evaluation of cancer risk for numerous patients

Number	Gender	Age	NE	Screening time	Average Dose (mSv)	Risk (%)	Additional risk of cancer
1	Male	47	1	2.4 min	69	0.378925	1 in 264
2	Male	34	1	2.1 min	62	0.486806	1 in 205
3	Female	58	1	2.6 min	72	0.292188	1 in 342
4	Male	62	1	2.3 min	66	0.23994	1 in 417
5	Female	49	1	2.7 min	76	0.531472	1 in 188

Number of Exams (NE), 3 male and 2 female at a different age, Artis zee Fluoroscopy machine, Voltage 81 KV, Frame per second (f/s 15)

Table-o2: Evolution of cancer risk for numerous patient

The catheterization process takes almost 30 minutes to complete. In it, two to three minutes, the radiation enters the patient. Radiation access is closed at other times.

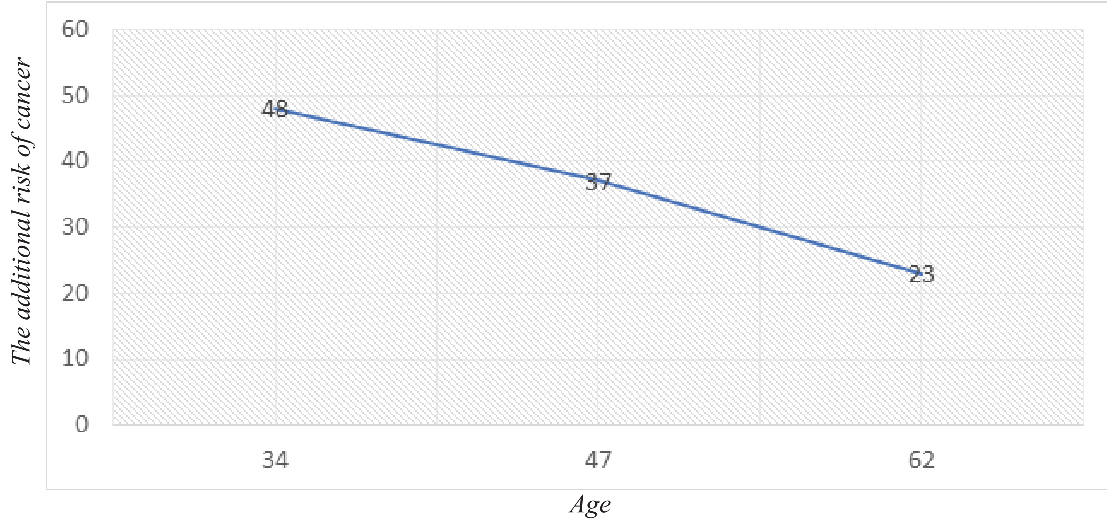


Table-o3: Young people with have an additional high risk of cancer

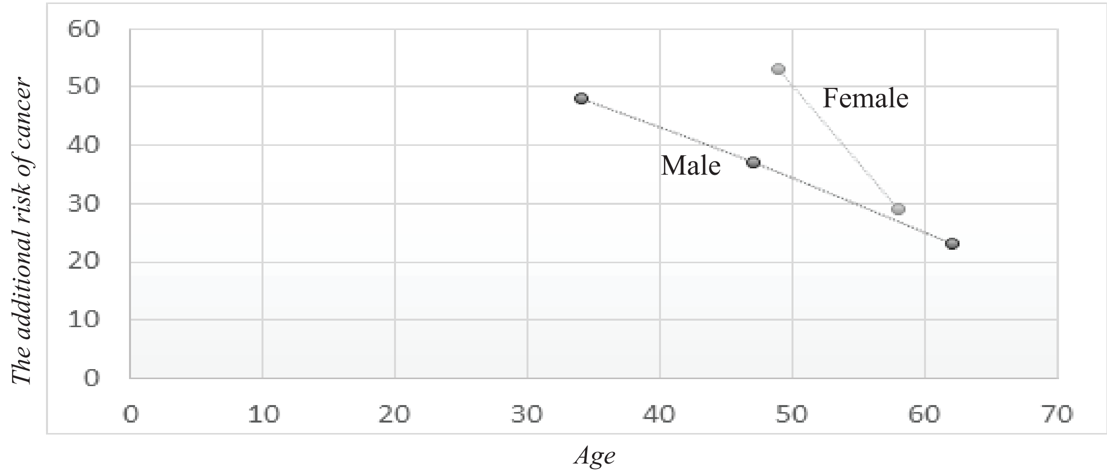


Table-o4: Female are more likely to have cancer than male

Measuring additional risk of cancer is a hypothesis. In all cases, it may not be true. These statistics are averages and do not predict what is going to happen. Data do not take into consideration individual risk factors including lifestyle (smoking, diet, exercise, etc), family history (genetics). The majority of cancers occur later in life and the average lifetime risk of dying from cancer is 25% (1 in 4).

Discussions

Since the patients get the high dose in interventional radiology. Because of this, the Medical Physicist must be in this field. Those hospitals that have a radiotherapy department to increase the medical physicist workforce so that they can provide proper treatment to the radiology department. All the hospitals which are not able to appoint medical physicist alone, they can appoint a medical physicist for multiple hospitals. "Bangladesh Atomic Energy Commission" should make a rule for having a medical Physicist in all radiological department.

Conclusions

Until now, no medical physicist has worked with International Radiology. In Bangladesh, the medical physicists should come forward in the field of interventional radiology to ensure the safe treatment of Patients and safe working places for Staff. There is a need to create awareness among patients and hospitals for interventional radiology.

References:

[1] Bsir.org. (2019). What is Interventional Radiology? | BSIR. [online] Available at: https://www.bsir.org/patients/what-is-interventional-radiology/ [Accessed 10 Jan. 2019].

[2] MG, B. (2019). The history of cardiac catheterization. - PubMed - NCBI. [online] Ncbi.nlm.nih.gov. Available at: https://www.ncbi.nlm.nih.gov/pubmed/16234881 [Accessed 18 Jan. 2018].

[3] Islam A., Mohibullah A. and Paul T. (2017). Cardiovascular Disease in Bangladesh: A Review. Bangladesh Heart Journal, 31(2), pp.80-99.

[4] Faulkner K., Vañó E., Ortiz P. and Ruiz R., Practical Aspects of Radiation Protection in Interventional Radiology, T-23-3, P-7-16.

[5] Vano E, Kleiman NJ, Duran A, Romano-Miller M, Rehani MM. Radiation-associated lens opacities in catheterization personnel: results of a survey and direct assessments. Journal of Vascular and Interventional Radiology 2013;24:197–204.

[6] Ciraj-Bjelac O, Rehani MM, Sim KH, Liew HB, Vano E, Kleiman NJ. Risk for radiation-induced cataract for staff in interventional cardiology: Is there reason for concern? Catheterization and Cardiovascular Interventions 2010;76:826–34.

[7] Jacob S, Boveda S, Bar O, Bre´zin A, Maccia C, Laurier D, et al. Interventional cardiologists and risk of radiation-induced cataract: results of a French multicenter observational study. International Journal of Cardiology 2013;167:1843–7.

[8] Rehani MM, Vano E, Ciraj-Bjelac O, Kleiman NJ. Radiation and cataract. Radiation Protection Dosimetry 2011;147:300–4.

[9] (ICRP) ICoRP. Statement on tissue reactions. ICRP ref 4825-3093-1464. 2011.

[10] Valentin J. The 2007 recommendations of the international commission on radiological protection. Elsevier Oxford; 2007.

[11] Leuraud K, Richardson DB, Cardis E, Daniels RD, Gillies M, O'Hagan JA, et al. Ionising radiation and risk of death from leukaemia and lymphoma in radiation-monitored workers (INWORKS): an international cohort study. The Lancet Haematology 2015;2:e276–81.

[12] Andreassi MG, Piccaluga E, Gargani L, Sabatino L, Borghini A, Faita F, et al. Subclinical carotid atherosclerosis and early vascular aging from long-term low-dose ionizing radiation exposure: a genetic, telomere, and vascular ultrasound study in cardiac catheterization laboratory staff. JACC: Cardiovascular Interventions 2015;8:616–27.

[13] Hansson, B. and Karambatsakidou, A. (2000). Relationships Between Entrance Skin Dose, Effective Dose and Dose Area Product for Patients in Diagnostic and Interventional Cardiac Procedures. Radiation Protection Dosimetry, 90(1), pp.141-144.

CONTINUOUS PROFESSIONAL DEVELOPMENT

BMPS

Involvement of Advisor Member BMPS in EFOMP Intelligence Task Group.

Sadia Afrin Sarah

A new EFOMP Working Group on Artificial Intelligence is launched on 15th May 2019. This group is generating for the development of Artificial Intelligence in Medical physics. The Working Group is ready to operate under Scientific Committee from June 2019 to April 2021. The chair of the WG is Dr. Federica Zanca (NL).

The basis of the WG: Big data and deep learning will intensely change various areas of professions and research in the future. This will also happen in medicine and medical imaging in particular. Quantitative aspects of data validation, QC and system modeling for the future AI methods are positioned firmly in the field of the Medical Physics profession. It is our interest to ensure that our professional education, continuous training, and competence will follow this significant global development

The number of members is limited to 10 (minimum 5). First of all, the balanced geographical distribution of members has to be guaranteed: the WG needs to be widely representative of the European community. As for the selection, the country in which the applicant works are considered.

Prof. Dr. Golam Abu Zakaria chairman and chief medical physicist of the independent Department of Medical Radiation Physics at Gummersbach Hospital of the KlinikumOberberg, an academic teaching hospital of the University Cologne. Who is the founder of Bangladesh Medical Physics is selected as a member of A new EFOMP Working Group on Artificial Intelligence? He is an Advisory Member of the Bangladesh Medical Physics Society. He has great involvement in Bangladesh Medical Physics education.

Members of Task Group

Consultants have also an active role in the group, but they are not eligible for reimbursement in case the WG is financially supported by EFOMP. The selection of consultants is based on CVs (with the limitation of 2 consultants per country).

Consultants of Task Group

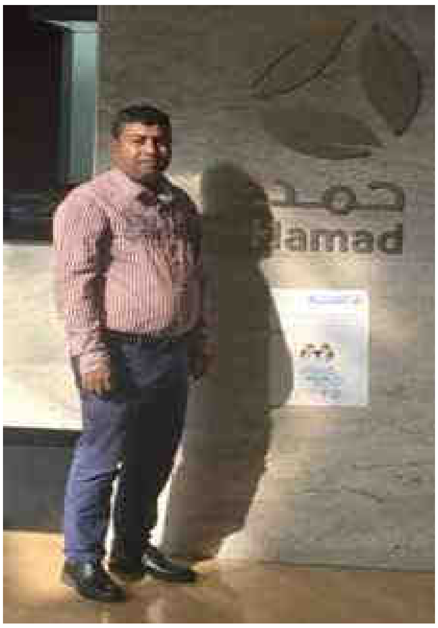
Observers have a less active role but they are required to attend at least one teleconference meeting and give comments/suggestions on the activities of the WG. The number of observers is not limited.

Observers of Task Group

BMPS President attend a workshop and the IMPCB part-III (Oral) examination in Doha, Qatar, 2019

Md. Anwarul Islam

Bangladesh Medical Physics Society President, Mr. Md. Anwarul Islam attended a workshop and International Medical Physics Certification Board (IMPCB) examination for part-III (Oral) which was held in Hamad Medical Hospital, Doha, Qatar from 20-24 October 2019. In two days workshop 40 participants from different countries took part and the principle and practice of imaging and radiotherapy physics are discussed. Late three days were for IMPCB examination. Mr. President of BMPS attended part-III Oral examination. He passed part-I & II IMPCB examination at Dhaka, March 2018 arranged by Bangladesh Medical Physics Society.



BMPS President, Mr. Md. Anwarul Islam

Clinical Training of Medical Physicists Specializing In Radiation Oncology First Time in Bangladesh

Under IAEA/RCA Project RAS/6/077 "Strengthening the Effectiveness and Extent of Medical Physics Education and Training"

MD. MOSTAFIZUR RAHMAN
CHIEF MEDICAL PHYSICIST & RCO
ENAM MEDICAL COLLEGE HOSPITAL

The a e, is an important component of the work of the IAEA. The responsibility for the increasingly technical aspects of this work are undertaken by the medical physicist. To ensure good practice in this vital area structured clinical training programmers are required to complement academic learning.

There is a general and growing awareness that radiation medicine is increasingly dependent on well trained medical physicists that are based in the clinical s for Asia and the Pacific. Consequently, a technical cooperation regional project (RAS6038) under the RCA program was formulated to address this need in the Asia Pacific region by developing suitable material and establishing its viability.

The IAEA has a long history of involvement in medical physics education and training and has recently developed a guide and other material to be used in the clinical training of the next generation of medical physicists specializing in radiation oncology.

In regards to that, IAEA conducted the first programme for radiation oncology medical physicists in Bangladesh in last 2016 with the collaboration of the National Institute of Nuclear Medicine & Allied Sciences (NINMAS), Bangladesh Atomic Energy Commission (BAEC). This course run by as per the Training Course Series 37 & online based Advanced Medical Physics Learning Environment (AMPLE) e-learning software.

The persons undergoing training in this program are referred to as residents (also known by other names including interns) who were under the supervision of supervisors. A Resident medical physicist is expected to be an employee of a hospital or clinical center working in a suitable Radiation Oncology Department and would contribute to the routine duties of medical physicists within that department under the supervision of senior medical physicist specializing in radiation oncology.

The main objective of the clinical training program for medical physicists specializing in radiation oncology is to produce an independent practitioner who is a life long learner and who can work unsupervised at a safe and highly professional standard.

The clinical training program is assisting this objective through:

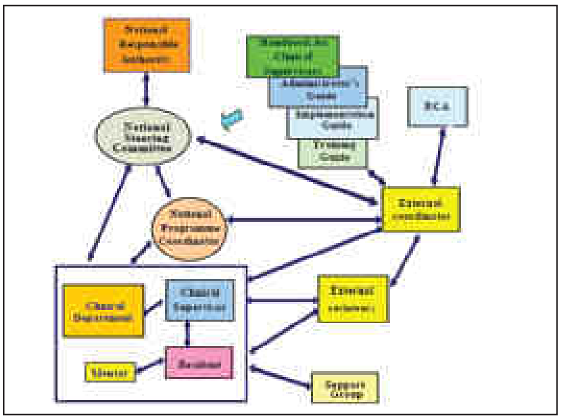
- Provision of this detailed guide to clinical training
- Provision of an implementation strategy to allow effective clinical training.
- Forming a basis for a national or regional qualification (education and clinical training) standard
- Providing assistance to national bodies and departments to deliver the training program through a pilot programme
- Promoting quality improvement of the program, and
- Strengthening of the national capacity to sustain such a clinical training programme after the initial introduction.

This IAEA Guide to Clinical Training in Radiation Oncology Medical Physics is divided into eight modules. Each module defines a unified portion of clinical knowledge or experience required of a Medical Physicist specializing in Radiation Oncology.

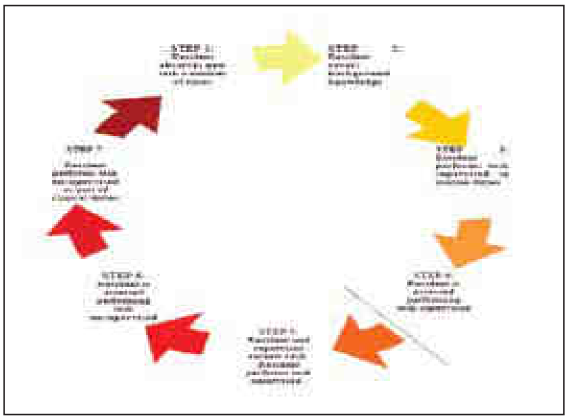
The eight modules are:

Module 1: Clinical Introduction

Module 2: Radiation Safety and Protection



Schematic showing the management structure and lines of communication within the RCA pilot clinical training programme.



Timeline of clinical training and competency assessment. Step 4 to Step 5 may occur after the Resident has had some experience

Module 3: Radiation Dosimetry for External Beam Therapy

Module 4: Radiation Therapy - External Beam

Module 5: External Beam Treatment Planning

Module 6: Brachytherapy

Module 7: Professional Studies and Quality Management

Module 8: Research, development, and teaching

The modules are further divided into sub-modules which address particular competencies. The sub-modules to be undertaken and the level of competency required to be achieved in each sub-module have been determined by the Responsible National Authority or its delegate. You should refer to the appendix "Competency Assessment" to determine the levels required.

In this program residents & supervisors invited from the different hospitals & centers in the country are given below:

Name of resident	Department	Specialty
1. Mr. A.K.M. Mizanur Rahman	INMAS, Dhaka Medical College Hospital Campus	NMMP
2. Mr. Md. MasudParvez	INMAS, Comilla Medical College Hospital Campus	NMMP
3. Md. RazibulHasan	INMAS, Cox's Bazar	NMMP
4. Mr. Md. Shariful Islam Chowdhury	INMAS, Rajshahi Medical College Hospital Campus,	NMMP
5. Ms. Mst. ShafalyKhatun	INMAS, Rajshahi, Medical College Hospital Campus,	NMMP
6. Ms. Mushfika Ahmed	Delta Medical College & Hospital	ROMP
7. Md. Shohel Reza	Delta Medical College & Hospital	ROMP
8. Md. Harun Or Roshid	Bangabandhu Sheikh Mujib Medical University Campus	ROMP
9. TaskinDilshad	Bangabandhu Sheikh Mujib Medical University Campus	ROMP
10. Md. Mostafizur Rahman	Ahsania Mission Cancer & General Hospital	ROMP
11. K. M. Masud Rana	Apollo Hospital, Dhaka	ROMP

Supervisor(s):	Institution	Specialty
Mr. Md. Selim Reza	INMAS, Dhaka Medical College Hospital Campus	NMMP
2. Mr. Md. NahidHussain	NINMAS, Bangabandhu Sheikh Mujib Medical University Campus	NMMP
3. Dr.Tanvir Ahmed Biman	NINMAS, Bangabandhu Sheikh Mujib Medical University Campus	NMMP
4. Md. Motiur Rahman	Delta Medical College & Hospital	ROMP
5. Md. Mohsin Mia	Delta Medical College & Hospital	ROMP
6. Mohammad MasudRana	Bangabandhu Sheikh Mujib Medical University Campus	ROMP
7. Dr. M Jahangir Alam	Ahsania Mission Cancer & General Hospital	ROMP

Ms. Kamila Afroj Quadir has selected as National Project Counterpart (NPC) & Dr. Md. Jahangir Alam has selected as National Project Coordinator (Radiotherapy).

Finally, the program closed by a national assessment conducted by the IAEA expert on 9-11 October 2019, organized by BAEC in Dhaka. The assessment procedures completed by the written examination and oral examination held at NINMAS, BSMMU and practical examination held at Ahsania Mission Cancer & General Hospital.

Bhaktapur Cancer Hospital, Nepal: A Commissioning Assistance from Bangladesh of their newly installed Linear Accelerator (LINAC)

Md. Anwarul Islam
Coordinator Medical Physicist, Square Hospital Ltd, Dhaka, Bangladesh.

Bhaktapur Cancer Hospital is a cancer hospital located in Bhaktapur, Province No. 3, Nepal run by the Nepal Cancer Relief Society (NCRS). The Nepalese Government and Rotary International support the hospital. The hospital has one telecobalt machine. Recently they installed Varian Clinic-IX Linear Accelerator in their department for modern radiotherapy. Each External Beam Radiotherapy (EBRT) machine undergoes commissioning procedures before starting the treatment. In this regard, Bhaktapur Cancer Hospital management is seeking a commissioning expert for the commissioning of their newly installed Linear Accelerator. Mr. Suresh Pawdel, Medical Physicist from Nepal and Ex-student of Department of Medical Physics and Biomedical Engineering (MPBME) Gono University, Bangladesh gave information to Dr. UjjwalChalise,Head of the Department of Radiation Oncology at Bhaktapur Cancer Hospital to contact with South Asia Centre for Medical Physics and Cancer Research (SCMPCR), Bangladesh for hiring a commissioning expert.

SCMPCR Chief Administrative Officer (CEO) Prof. Dr Hasin Anupama Azhari contact with me offering all expenditures including accommodation, travel, food and lump sum honorarium. As a private employee, it is difficult to arrange to leave at least for three weeks for this massive commissioning works. I proposed Dr Azhari write an official letter to my Human Resources Department (HRD) requesting leave for me. Here mention that there is a Memorandum of understanding (MoU) between SCMPCR and Square Hospitals Ltd, so my HRD grant my consent for three weeks from 15 July to 4 August 2019.

I started my journey on 15 July 2019 and visited the Bhaktapur Oncology department on the same day evening. The main commissioning measurements began 16 July, and within two weeks I finished all the measures for two-photon and five Electron energies. We successfully started the first patient on 29 July 2019. This day the Hospital authority celebrates by sacrificing a he-goat based on Hindu religious thought. Most of the newspapers of Katmandu cover this news. The rest of the days, I commissioned Portal Dosimetry (PD) for IMRT Patient-Specific QA and successfully evaluated the difference between TPS calculation and measured dose.

I must say thanks to the Head of Medical Physics Bidaypati Jha, Senior Medical Physicist Pramod Kumar Yadhav and Ganesh Subedi for their supports. I must also say thanks to all other staffs, especially radiotherapy technologists, for their operating support.

Katmandu is a beautiful capital city of Nepal embedded by hills. I have travelled some beautiful tourist spots like Bhaktapur Durbar Square, Nagarkot, Chandragiri Hill, and many temples. I was also invited to visit Nepal Cancer Hospital and Research Centre and Kathmandu Cancer Center. Their hearty hospitality delighted me more. In the end, I have tried to create good communications so that we can work together in future through SCMPCR.

Continuing Professional Development Programs in Bangladesh

Safayet Zaman

Improving one's skills and knowledge through Continuing Professional Development (CPD) is the responsibility of every professional across all platforms. Participating in the different CPD programs in the field of Medical Physics will enrich the clinical knowledge and will also estimate the objectives that have been met and what needs to be improved. Furthermore, the CPD points will help towards achieving the goal of being a Qualified Medical Physicist (QMP).

Bangladesh Medical Physics Society (BMPS) has been organizing workshops, seminars, national and international conferences to gather scientists, experts, and students to share knowledge and experiences in the field of Medical Physics.

South Asia Centre for Medical Physics and Cancer Research (SCMPCR) has been working hard for the development of Medical Physics in the entire South Asian region. Experts from across the world come to teach on different topics in the field of ionizing radiation, imaging, radiation protection, nuclear physics, and oncology.

A large number of members of BMPS have been participating in these Accredited programs and have been benefitted from the lectures by the foreign experts. The goal is to bring one or two experts from outside and educate a large number of people instead of sending one or two persons abroad for foreign training. This target has been achieving by SCMPCR to meet the requirements of Medical Physicists in Bangladesh and South Asian figure.

Figure: Participated in CPD training program

NEWS & EVENTS

BMPS

AOCMP 2021: Bangladesh

19th Asia- Oceania Congress of Medical Physics "AOCMP-2019" in conjunction with Engineering and Physical Scientists in Medicine Conference ESMP-2019 was held in Pan Pacific Perth, Australia from 28 to 30 October in 2019. Our advisory member Prof. Dr. Hasin Anupama Azhari of Bangladesh Medical Physics Society conducted the AFOMP council meeting as General Secretary. Japan and Bangladesh participated in the bid for hosting ACOMP-2021. Bangladesh won the bid for hosting through the voting process by AFOMP council members. It is a great achievement for BMPS and Bangladesh as 2021 will be celebrating the year 50th anniversary of Bangladesh.

ACOMP-2019 in Perth, Australia

19th Asia- Oceania Congress of Medical Physics "AOCMP-2019" in conjunction with Engineering and Physical Scientists in Medicine Conference ESMP-2019 was held in Pan Pacific Perth, Australia from 28 to 30 October in 2019. On behalf of AFOMP president Prof. Arun Chougule, GS AFOMP Prof. Hasin Anupama Azhari and on behalf of EPSM Ms Tegan Rourke inaugurated the opening ceremony of AOCMP 2019.

Inaugural Session in AOCMP-2019, Perth, Australia

Prof. Dr. Hasin Anupama Azhari acts as Chair in the session titled Image Guidance & Motion Management 2Also she conducts the council meeting as the executive meeting as General Secretary, AFOMP with AFOMP Excom officers. Besides this fruitful discussion had been done between AFOM and ACPESM excom.

AFOMP EXCOM: AOCMP 2019
Left to right: E. Bezak, H. Anupama, A Chougulae, K. Hoong Ng

AFOMP Council Meeting: AOCMP 2019

IAEA Training on Target Delineation and Plan Evaluation of IMRT for Head and Neck Cancer

The Department of Radiotherapy, Dhaka Medical College Hospital and Bangladesh Society of Radiation Oncologists (BSRO) have organized the IAEA Training on Target delineation and Plan evaluation of IMRT for Head and Neck cancer from 21-25 October 2019 at the Department of Radiotherapy, Dhaka Medical College Hospital. It is a program of IAEA RAS-6086: Strengthening cancer management programs in RCA States Parties through collaboration with National and Regional Radiation Oncology Societies. Professor Dr. Jai Prakash Agarwal, Head of Department of Oncology of Tata Memorial Hospital, Mumbai, India was the IAEA expert and lecturer of this program.

The first lecture was given by Professor Head of the Department of Radiotherapy, Dhaka Medical College Hospital on the topic of Evolution of Radiotherapy from

Voice of BMPS

2D to 3DCRT and IMRT. Professor Dr. Qazi Mushtaq Hussain is also the General Secretary of BSRO and the counterpart of this program and also one of the faculties. The inaugural session was presided by Professor Dr. Qazi Mushtaq Hussain. The respected guests were Principal of Dhaka Medical College, Professor Dr. Khan Abul Kalam Azad, Professor Dr. Sanowar Hossain, Member of Bio-science of Bangladesh Atomic Energy Commission, the Pioneer Oncologist of Bangladesh, Professor Dr. M A Hai, Professor Dr.Sk Golam Mostafa, President of BSRO, Associate Professor Dr.AliyaShahnaz, also one of the faculties were present along with all the participants.

Training participants from different hospitals

There were total of nineteen participants from different hospitals from across the whole country. Among them, eighteen participants were oncologists and one medical physicist, Safayet Zaman. He also took part in the program as a faculty also. The department of Medical Physics and Biomedical Engineering (MPBME), Gono University has provided two Treatment Planning Systems (TPS) for the contouring and planning sessions for this whole five-day program. The practical session was carried out at the Department of Radiotherapy, Ahsania Mission Cancer and General Hospital on 24 October 2019.

The five-day training program by the highly experienced Oncologist Professor Dr. J P Agarwal was quite successful in terms of learning of the target delineation and plan evaluation of IMRT for Head and Neck cancer for all the radiation oncologists and medical physicist.

AGM of Bangladesh Medical Physics Society (BMPS)

Annual General Meeting (AGM) of Bangladesh Medical Physics Society (BMPS) was held at the Department of Medical Physics and Biomedical Engineering (MPBME), Gono University, Savar, Dhaka on 11 October 2019.

A large number of BMPS members participated in the AGM including Professor Dr. Golam Abu Zakaria, from Germany also visiting professor of the department and Professor Dr. Hasin Anupama Azhari, Chairman of the department of MPBME. They have delivered their valuable speech for the society.

In the AGM, the new committee was formed for the next term of 2019-2021 in presence of the pioneer Medical Physicist of Bangladesh Professor Golam Abu Zakaria and Founder President of BMPS Professor Dr. Hasin Anupama Azhari. The following members were elected to be carried out BMPS activity from 2019 to 2021.The BMPS committee of 2017 to 2019, handover to lead the BMPS activity to the new executive committee.

Members of BMPS Executive Committee 2019-2021

Daylong Seminar & Alumni Association 2019

A Daylong seminar and Alumni Association was held on 11 October, 2019 in the dept. of Medical Physics and Bio medical Engineering, Gono Bishwabidyalay. Most of the Medical physicist, Biomedical Engineers, BMPS members and several members of the Alumni Association from the department of MPBME work on different field of medical physics, biomedical engineering and so on. They were present there and shared their working experience with the current students of the department. It was quite a motivational session for the youngsters in the field of Medical Physics and Biomedical Engineering.

Daylong seminar and Alumini Association 2019

Tanning on "CT" and "IVR-CT" at Fujita Health University in Japan: March 15 to June 14, 2019

Fujita Health University is a private university at Toyoake, Aichi, Japan. In 2017 Fujita Health University was Scanned the world's first patient by the area detector CT (AquilionONE™). Its capabilities are far beyond those of current MDCT scanners. Mr Masum Chawdhury student of Gono Bishwabidyalay, General Member of BMPS was invited in Fujita Health University as a visiting trainee for the prelude of three months (March 15 to June 14, 2019). This training had performed with the Collaboration of the South Asia Centre for Medical Physics and Cancer Research (SCMPCR) and German Government scholarship (DAAD). The primary purpose of this training was to developing knowledge in modern CT and Imaging, which will help the young generation for better research and treatment. The area detector CT scanner will improve diagnostic imaging dramatically and enhance the ability of physicians to diagnose serious diseases faster and more safely. Mr Masum Chawdhury had developed a handmade phantom for measuring of correct CT Value and experimental comparison of Ultra-High-Resolution CT and High-Resolution CT. This phantom also distinguished and measured the image quality and resolution. He also attended in Japan Radiology Congress (JRC).

Training at Fujita Health University

Participation in Bangladesh International Cancer Congress (BICC); October 2019

6th Bangladesh International Cancer Congress (BICC) was held in Dhaka, Bangladesh from 11 to 12 October 2019. This two-day event was held under by Oncology Club, Bangladesh. It is "a platform for all, fighting against cancer". Conferences arranged were often endorsed by ASCO, ESTRO, IAEA. This two-day congress had been designed to make a gathering of Physician, Medical Physicists and survivors fighting against cancer and will provide a wonderful forum to refresh our knowledge and explore the most up-to-date information regarding the advances in the treatment of cancer. Md. ZahidHasan, a student of higher graduation of Medical Physics and Biomedical Engineering, GonoBishwabidyalay (University) and member of BMPS had participated in the program.And being a speaker of the BICC conference 2019 has achieved a paper presentation Award 2019 at the 6th Bangladesh International Cancer Congress (BICC) as a titled "Comparison between 3D Volumetric Cone Beam Computed Tomography (CBCT) and 2D Kilo-voltage (KV) Orthogonal Imaging for Setup Errors Measurement in Radiotherapy" on 11th October, 2019 from the Chairperson- Prof. Dr. Mafizur Rahman and Dr. Md. Shakilur Rahman. The executive committee planned to offer educational lectures and sessions to deepen the knowledge in these research fields. This was a very good chance to watch global technological trends, let us broaden our horizon of experience, learning new things and improve our knowledge.

BICC paper presentation Award 2019

Meeting of BMPS Executive Committee; July 2019

Meeting of BMPS Executive Committee was held in each month in different hospitals. Action points are taken according to the decision executive members.

As medical physics situation is still in growing phase so BMPS EXCOM are trying hard to execute their decisions in different meetings. Different types of programs like training awareness seminar workshop are done through meeting decision accordingly. Also, quarterly meetings were held with all the members.

BMPS Executive comitee Meeting

BMPS Quarterly Meeting

Class on "Physics for Radiation Oncologists"; July 2019

Department of Radiotherapy, Dhaka Medical College and hospital (DMCH) organized a Class on "Physics for Radiation Oncologists" in July 2019. The Class was taken on 6th and 13th July by Dr. Kumaresh Chandra Paul Advisor of Bangladesh Medical Physics Society (BMPS) and Assistant Professor, Department of MPBME Gono Bishwabidyalay. Prof. Dr. Qazi Mushtaq Hussain, Head of Radiotherapy Department of DMCH organize the program.

Speech delivered by Dr. Kumaresh Chandra Paul

Department of radiotherapy arranged this class for MD specialized in radiotherapy. Six Medical officers including medical physicists attended this class

Harvard Global Health Catalyst (GHC) Summit; May 2019

Harvard Global Health Catalyst (GHC) Summit Held on 24-26 May in Boston. The Conference on the morning of the 21st attended by speakers, researchers, scientists from different countries of the world. Approximately 400-500 participants were present. Each session was a science-based and modern education system on how to improve the health sector. On the second day, a special meeting was organized by the expatriate Bangladesh, where the theme was to promote Bangladesh in health care. 23rd May Md. Jobairul Islam, student of Gono Bishwabidyalay, General Member of BMPS presented his dissertation Concept of E-Learning for Medical Physics: Collaboration with the Global Health Catalyst and the South Asia Center for Medical Physics and Cancer Research. One of the objectives of that research paper was to complete the Memorandum of Understanding between the South Asia Center for Medical Physics and Cancer Research and the Global Health Catalyst (GHC). To create skilled manpower for medical physics and cancer treatment in South Asia and Bangladesh using e-Learning technology.

Participants from BMPS in Global Health Catalyst (GHC)

Participation in Japan Society of Medical Physics (JSMP); April 2019

Md. Mokhlesur Rahman, Assistant Lecturer of Medical Physics and Biomedical Engineering, Gono University and member of BMPS has participated in the 117th Scientific Meeting of the Japan Society of Medical Physics (JSMP) held from Thursday, April 11, to Sunday, April 14, 2019, at PACIFICO Yokohama. This four-day event has been held as a joint congress (JRC2019) in conjunction with the 78th Annual Meeting of the Japan Radiological Society (JRS), the 75th Annual Meeting of the Japanese Society of Radiological Technology (JSRT), and the International Technical Exhibition of Medical Imaging (ITEM). The main theme of JRC2019 was "Innovative Radiology close to the patients." I looked over again whether the new radiological findings and technologies reported in scientific meetings and papers were being fully deployed for the benefits of patients in clinical practice. The meeting program has covered the wide range of medical physics from basic research to clinical application related to the advanced patient diagnosis, therapy, and radiation protection. Also planned were lectures on the leading edge of research, given by distinguished medical physicists from Japan and abroad. Mr. Rahman is a speaker of the JSMP conference 2019 has achieved an excellent paper presentation Award 2019 at the 117th Scientific Meeting of the Japan Society of Medical Physics (JSMP) titled “A Hybrid IMRT Technique for Treatment of Breast Cancer:A Dosimetric Study” on April 13th 2019 from the President ,Shinichi Minohara of JSMP. One of the joint symposiums was “Innovative Radiology with Artificial Intelligence.” While future prospects for AI vary widely from person to person, researchers pioneering in this field speak the latest trends. The executive committee planned to offer educational lectures and sessions to deepen our knowledge in these research fields. At ITEM, held in conjunction with the scientific meetings, the most advanced medical devices from numerous corporations around the world have been exhibited. This was a very good chance for us to watch global technological trends and refresh our knowledge. After the conference I have enjoyed with my friend Mr. PushpenChakraborty and his friends at PACIFICO Yokohama in Japan.

Receiving Excellent paper presentation award from President of JSMP 2019

President and Secretary of JSMP, & Japanese Student with Student of MPBME

Medical Physics Student from different countries in JSMP conference 2019

Schooling on Medical Physics for Radiation Therapy: Dosimetry and Treatment Planning for Basic and Advanced Applications; March 2019

The Abdus Salam International Centre for Theoretical Physics (ICTP) organized, with the support of the International Organization for Medical Physics (IOMP), the European Federation of Organizations for Medical Physics (EFOMP), the American Association of Physicists in Medicine (AAPM) and the Italian Association of Medical Physics (AIFM), a two-week School on Medical Physics for Radiation Therapy. The objective of the school is to contribute to the understanding of physics applied to radiation oncology and the development of competent medical physicists who can make a direct contribution to the improvement of health care in their countries through better radiation therapy. This will be achieved by providing participants with education and practical training to enhance their effectiveness as future disseminators of this knowledge, who can provide in turn educational and training opportunities to other medical professionals and students. The school was started on 25 March 2019 Ended 5 April 2019. KaziTowmim Afrin Supti, Joint-Secretary of Bangladesh medical physics society (BMPS) and lecturer Department of Medical Physics & Biomedical Engineering Gono Bishwabidyalay participated in this program. She has presented a poster presentation on “ Verification of Basal Dose and Treatment Dose for a Virtual tumor using Paris System in the Interstitial Brachytherapy” Topics of this school are Radiobiology, Dosimetry, Therapy equipment, Dosimetry algorithms, 3D conformal, advanced (IMRT, VMAT, SBRT) treatment delivery and brachytherapy, Treatment planning and its practical implementation, Treatment verification, Quality assurance, Case studies. It is to be mentioned that Prof. G. A. Zakaria was one of the course teacher of the program.

Ms K.T. Afrin Supti presenting her poster presentation

Participants with Course teacher Prof Zakaria

National conference on physics-2019; February 2019

Bangladesh Physical Society organized a National conference on physics on 7-9 February 2019 in the Department of physics University of Dhaka. Dr. Aminul Islam was the chair and Dr. Shakilur rahman was the co-chair of that conference. Students, professors & Medical Physicist of different Universities & Hospitals as the speaker. Prof. Dr. Hasin Anupama Azhari Founder President, BMPS was the keynote speaker. Md. Moklesur Rahman, Executive Member, BMPS had attended as an invited speaker. 4 students and 1 lecturer from Gono Bishwabidyalay were present as an invited speaker and they all delivered their speech on that conference.

Participant's National conference on physics-2019

BMPS Hands-on Seminar (HS-03) "Set-up Errors and CTV-PTV Margin"; February 2019

BMPS Hands-on Seminar (HS-03) "Setup Errors and CTV-PTV Margin" was held on 1 February 2019 in dept. of Radiotherapy, Enam Medical College and Hospital at 10:00 Am – 04:00 PM. Md. Anwarul Islam (coordinator Medical Physicist & (RCO) Square Hospitals Ltd) and Md. Mostafizur Rahman (Chief Medical Physicist & RCO, Enam Medical College, and hospital) have participated as a trainer on that occasion. That program was organized by the Bangladesh Medical Physics Society (BMPS) &Enam Medical College and Hospital (EMCH). 20 Participates from Radiotherapy Dhaka CMH, National Institute of Cancer Research and Hospital, Square Hospital, Ahsania Mission Cancer Hospital, Students From different universities and hospitals attended that seminar. Among them, 4 students from Gono Bishwabidyalay were present there who are also members of BMPS. The program was divided into two-part. 1st was a theoretical Part where trainers delivered their presentation on Setup Errors and PTV Margin's Mathematical Equation and Physical Concept. After that the participates are divided into two teams. In each team, there were 10 members. The participates were done practical work on Setup Error and PTV Margin by themselves and trainers supervised them. A technologist and a Chief Medical Physicist of EMCH had given brief discussion about the practical part of the whole training.

Participants and training in the hospital: Hand on Training Program

Bangladesh Medical Physics Society (BMPS) Quarterly Meeting was held on 21st December 2018 (Friday) at 10.00 am at the Department of Medical Physics and Biomedical Engineering, Gono Bishwabidyalay, Nolam Campus, Savar, Dhaka. The following agendas were discussed. Congratulate to Prof. Dr. HasinAnupamaAzhari to be a Secretary-General of Bangladesh Medical Physics Society, Quarterly Update of BMPS, Present Status of Medical Physicist, BMPS Membership Fees, Annual Conference 2019 and others. All young members of BMPS were present in the meeting.

16 test Xpo-Asian Forum for Materials Testing by Zwick Roell in Bangladesh

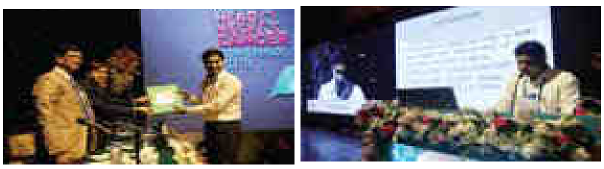
Asian Forum of Materials Testing (AFMT) introduces to you the latest trends and innovations from the world of component and materials testing since 15 years. AFMT organized from 18th to 22nd February, 2019 with an opening event in Chennai and thereafter a series of technical events across India and Bangladesh. As a part of this AFMT event, they planned to organize a technical seminar in Bangladesh on 20th February, 2019 (Wednesday), The Daily Star, 64-65, Kazi Nazrul Islam Avenue, Dhaka-1215. This event focused on latest trends and technologies for Material Testing. The international speakers for this event were: Mr. Robert Strehle, Industry Manager for Academia from ZwickRoell Germany and Mr. Ganesh Kumar, Vice President, Technical from ZwickRoell Singapore. Xenesis Innovations Ltd. was delighted to organize this event as exclusive agent in Bangladesh. Dr. Swapan Kumar Sarkar and Ms. Nupur Karmaker joined this program for sharing experience on materials used in biomedical engineering applications, new challenges and solution, research at the interfaces of sciences, technology and identify growing opportunities for Bangladesh and further steps with local and foreign experts. They focused on the educational, professional and career opportunity for biomechanics, biomaterials, and nanotechnology and biomedical engineering fields. Dr. Sarkar and Ms. Karmaker proposed to arrange next event with BMPS and MPBME by hands on training, awareness, seminar and conference. This jointly work will contribute to open job opportunity for MPBME students and BMPS members in Bangladesh and abroad.

All participants of 16 testXpo-Asian Forum for Materials Testing by ZwickRoell in Bangladesh

We are thankful to all of local and foreign participants, colleagues, contributors, organizing committee members, co-organizers, sponsors, scientists, researchers, students, and all others for their support of the program.

Dhaka Head and Neck Cancer Conference; November 2018

Dhaka Head and Neck Cancer Conference were held on November 16, 2018, In Pan Pacific Sonargaon, Dhaka. This Conference was organized by HEAD AND NECK ONCOLOGY GROUP And Supported by the National Institute of cancer research and Hospital, Dhaka and Bangladesh Society of Head and Neck Surgeons. Prof. Dr. M. A. Haiand Prof. Dr. Kamrul Hassan Tarafder was Patron of that conference. Prof. Dr. Qamruzzaman Chowdhury and Prof. Dr. Belayat Hossain Siddiquee were Program Chairman. The Program Secretary was Dr. MD. Salim Reza and Prof. Dr. Md. Abu Yusuf Fakir. 25 speakers from different countries like Australia, Singapore, India, Germany, the USA, Canada, and Bangladesh were given their valuable speech at that conference. Prof. Golam Abu Zakaria the Advisory member and Md. Nazmul Alim General Member of BMPS also participated as a speaker there. That Program Was divided into 5 sessions named Medical Oncology session, Head and Neck Surgical Oncology session, Radiotherapy in Head and neck Cancer session, radiotherapy in Head and Neck cancer practice, Free paper session. The program end with a cultural Program.



Participated as a Speaker

Dhaka Head and Neck Cancer Conference 2018

The Asia Oceania Congress of Medical Physics (AOCMP) 2018,11-14 November 2018, Kuala Lumpur, Malaysia

The 18th Asia Oceania Congress of Medical Physics (AOCMP) in conjunction with the 16th South-East Asia Congress of Medical Physics (SEACOMP) was held from 11-14 November 2018 in Kuala Lumpur, Malaysia. Prof. Dr. Hasin Anupama Azhari, the founder President of Bangladesh Medical Physics Society (BMPS) and Mr. Md Akhtaruzzaman, the Vice-President of BMPS were attended and presented their scientific paper in the congress. During the 4-days congress, there were about 400 participants from the different parts of the world and exchange their knowledge, experience, and buildup a network. The scientific program of the congress was composed of a full day Pre-Congress, Plenary Sessions, Invited Lectures, Oral, Poster and Vendor Presentations which was covered a wide range of Medical Physics.

Both Prof. Dr. Azhari Mr. Akhtaruzzaman have attended the AFOMP Council Meeting. In the council meeting, elaborate discussions were made regarding development and co-operation for Medical Physics education and training in the AFOMP region. All predefined agendas were discussed and approved by the council members. In the meeting, Australia and Thailand were attended in the bidding process for hosting AOCMP 2020.

Participants AFOMP 2018 Malaysia

Travel Awardee: BMPS Vice President

Thailand won the bid by vote to host AOCMP 2020 in Phuket. Another important agenda was to form the new AFOMP Executive Committee (EC) for the period of 2018-2021. It was a great pleasure that Prof. Dr. Hasin Anupama Azhari elected as the Secretary-General of AFOMP.

Council Meeting AFOMP 2018 Malaysia

Elected New EXCOM AFOMP: AOCMP 2018, Malaysia

Moreover, during the congress, a discussion was made among the Dr. Virginia Tsapaki, Secretary-General of IOMP, Dr. Ibrahim Duhaini, Treasurer of IOMP, Prof. Dr. KamilaAfrozQuadir, Ex-Director, Bio-Science Division, Bangladesh Atomic Energy Commission, Prof. Dr. HasinAnupamaAzhari and Md Akhtaruzzaman regarding the unification process between BMPS and Bangladesh Medical Physics Association (BMPA). All are agreed that a united professional body would be more beneficial and therefore, would work together for the medical physicist community.

Furthermore, it is notable to mention here that Mr. Md Akhtaruzzaman was one of the 6-Malaysia Convention and Exhibition Bureau (MyCEB) awardees among the 56 applicants for participating in the AOCMP 2018 congress.

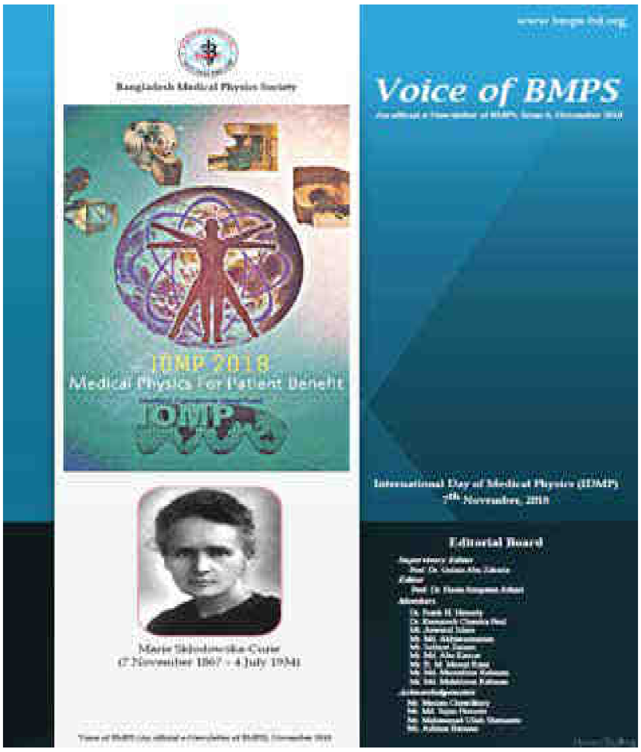
International Day of Medical Physics (IDMP)-2018: Celebrated by Bangladesh Medical Physics Society (BMPS)

The Bangladesh Medical Physics Society (BMPS) was founded in 2009 in Dhaka, Bangladesh to serve the purposes of medical physicists in Bangladesh. The purpose of this society is to foster and coordinate the activities of country medical physicists, promote scientific activities and to build a relationship with the national and international organizations. Currently, BMPS have about 250 national and international members who are working actively to improve the medical physics situation globally.

To move up the awareness of medical physics profession, International Day of Medical Physics (IDMP) is the initiative of the international organization of medical physics (IOMP) which take place on 7 November every year. On that day, Marie Skłodowska Curie was born who conducted pioneering research on radioactivity and her contribution is promoting us to fight against cancer today. Every year IOMP chooses different and logical themes to encourage medical physicists throughout the world. The theme of IDMP 2018 is 'Medical Physics for Patient Benefit'.

BMPS has done several activities including meeting, seminar, events, and campaign over the years. On this auspicious day, BMPS published their official e-newsletter every year. This year we published the issue number 6 of this newsletter, in the named 'Voice of BMPS'. The newsletter comprises articles, continuous professional developments, news & events, and awards & honor. All the activities throughout the year were focused on this article.

On 7 November 2018, we have arranged a seminar and rally in the department of radiotherapy, Dhaka medical college hospital which is the oldest and prestigious medical college in Bangladesh. At 12:00 pm a rally was held by participating the BMPS members, medical doctors and students from the universities. The main objective of the rally was to concern the general people about the medical physicist as it is the new concept in our country.



An official e-newsletter of BMPS, November 2018

IDMP celebration on 7 November 2018

After the rally, a seminar was arranged in the department of radiotherapy seminar room with the presence of doctors, oncologists, medical physicists, and students. The keynote speaker of this seminar was Prof. Dr. Quazi Mushtaq Hossain, Head, Department of radiotherapy, Dhaka medical college hospital. In his speech, he pointed out the role, responsibilities, and importance of medical physicists in cancer treatment. He expresses his desire to work with BMPS and encourage us to work more for the cancer patients. Among the other speakers, Mr. Anwarul Islam, president; Mr. Abu Kausar, Secretary and Mr. Safayet Zaman, vice president of BMPS were delivered their speeches.

IDMP Seminar

Acknowledgments
We are acknowledged to the Department of Radiotherapy, Dhaka Medical College Hospital (DMCH) for giving us the opportunity to cooperate in this program and BMPS members for their valuable support.

Breast Cancer Awareness Program; 31st October 2018

Breast Cancer Awareness Month (BCAM), is an annual international health campaign organized by major breast cancer charities every October to increase awareness of the disease and for research into its cause, prevention, diagnosis, treatment, and cure. Last year Bangladesh Medical Physics Society (BMPS) had organized a breast cancer awareness program on 31st October 2018 in "Glorious school and college" Joypura, Dhamrai, and Dhaka. These awareness campaigns of BMPS intend to educate about the importance of early screening, test and more. This program was presided by Mr. Anwarul Islam, President of BMPS. The keynote speaker was Prof. Dr. Hasin Anupama Azhari, founder president of BMPS. The general secretary, joint secretary, treasurer, and executive member were present there. The students came along with their parents in this program. The elaborate program covered aspects like Probable Symptoms that cause breast cancer; ways to identify it in early stages, the factors causing cancer, self-examination of the breast was demonstrated by the keynote speaker which was very fruitful for the female participant.

Breast Cancer Awareness Programme

AWARDS & HONORS
BMPS

Global Radiation Oncology Distinguished Leader Award 2019

Prof. Dr. Golam Abu Zakaria

BMPS Advisory Member, Prof. Dr. Golam Abu Zakaria achieved on the Global Radiation Oncology Distinguished Leader Award 2019 by Global Health Catalyst of the Harvard Medical School.

Global Radiation Oncology Distinguished Leader Award 2019

IDMP AWARD WINNER 2018 & AFOMP General Secretary: Prof. Dr. Hasin Anupama Azhari Bangladesh; November 2018

Since 2013, medical physicists from all over the world have celebrated the "International Day of Medical Physics (IDMP)" on November 7, the birthday of Marie Sklodowska-Curie. The IDMP award of 2018 was given to one Medical Physicist from each IOMP Regional Organization and recognizes excellence in Medical Physics with a particular view of promoting medical physics to a larger audience and highlighting the contributions medical physicists make for patient care.

Hasin Anupama Azhari, AFOMP FROM BANGLADESH in ASIA OCEANIA Region

Also she was the first woman elected as a General Secretary, of Asia Oceania Federations of Organizations for Medical Physicists (AFOMP). At present she is working as a Dean, Faculty of Physical and Mathematical Sciences and Professor & Chairman, Dept of Medical Physics and Biomedical Engineering (MPBME) Gono Bishwabidyalay (University), Savar, Dhaka, Bangladesh. She is also the founder President of Bangladesh Medical Physics Society (BMPS).

BMPS Award 2019

Bangladesh Medical Physics Society (BMPS) has awarded a BMPS Award 2019 to BMPS Advisory Member, Prof. Dr. G A Zakaria on 11 October 2019 for his contribution to continuous development in the field of Medical Physics relevant activity beyond south Asia in Africa. The President of Bangladesh Medical Physics Society (BMPS), Md. Anwarul Islam handover the crest of this award to Prof. G A Zakaria. Global Health Catalyst of the Harvard Medical School awarded Global Radiation Oncology Distinguished Leader Award 2019 to G A Zakaria.

BMPS award 2019

AMPICON Award November 2019

Md. Zahid Hasan

The 40th Annual Conference of Association of Medical Physicists of India (AMPI), AMPICON-2019, is being organized in Kolkata from 7th to 9th November 2019. Netaji Subhash Chandra Bose Hospital, Kolkata is organizing this conference supported by Eastern Chapter (EC) of AMPI. The main theme of the conference is "Medical Physics in patient care". The scientific program of the conference will be designed to contain recent information in medical physics, radiation oncology, radiology, radiation biology, radiation dosimetry, nuclear medicine, radiation safety, and all other related topics and hence the conference will be beneficial for medical physicists (clinical, teaching and research), radiation oncologists, radiologists, nuclear medicine professionals, radiation safety professionals, regulators, bio-medical engineers, radiation dosimetry professionals, etc. Md. Zahid Hasan, a student of higher graduation of Medical Physics and Biomedical Engineering, Gono Bishwabidyalay (University) and member of BMPS will participate in the program. And being a poster presenter of the AMPI conference 2019 has gotten a Travel Award from the Eastern Chapter (EC) of AMPI members at the 40th Annual Conference of Association of Medical Physicists of India (AMPI), AMPICON-2019 titled "Comparison between 3D Volumetric Cone Beam Computed Tomography (CBCT) and 2D Kilo-voltage (KV) Orthogonal Imaging for Setup Errors Measurement in Radiotherapy". The practice of Medical physics involves the application of physics principles in medicine to achieve the goal of patient care. Daily, medical physicists fulfill a variety of roles behind the scenes that ensure the safe and effective delivery of medical diagnosis and radiation treatment. This means that medical physicists directly impact the health and lives of many patients who on a regular basis receive medical care using radiation. This conference will provide unique opportunities for collaboration across the diverse, global aerospace community and provide rich networking opportunities that spark innovation and allow aerospace professionals to engage with each other about topics of mutual interest.

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:

Md. Anwarul Islam
President

Md. Mostafizur Rahman
Vice President

Safayet Zaman
Vice President

Md. Akhtaruzzaman
General Secretary

Md. Jobairul Islam
Joint Secretary

Mst. Zinat Rehana
Treasurer

Lt. Md. Khairul Islam
Member

Md. Sajan Hossai
Member

Md. Nazmul Islam
Member

Md. Shahidul Miah
Member

Sadia Afrin Sarah
Member

Sujan Mahamud
Member

BMPS FOREIGN MEMBER
2019

Name	Designation and Working Place	Country	Image
Dr. Murugan Appassamy	Chief Medical Physicist Radiation Oncology Department Apollo Hospitals Dhaka	India	
Mr. Pramod Kumar Yadav	Senior Medical Physicist Bhaktapur Cancer Hospital	Nepal	
Abdul Sattar Khalid	Medical Physicist The Christie NHS Foundation Trust	UK	
Mohamathu rafic.K	Lecturer in Radiation Physics Christian Medical College	India	

SOUTH ASIA CENTRE FOR MEDICAL PHYSICS AND CANCER RESEARCH

SCMPCR

MESSAGE FROM CHAIRMAN

Cancer affects people in all countries regardless of their age, gender or socio-economic conditions. According to 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. The South Asia region with its eight countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka) has approximately one-fourth of the world's and 40% of Asia's population. This region is presently experiencing a shift in infectious disease to an increasing incidence of non-communicable diseases like cardiovascular and cancer. South Asian countries face a big challenge in all four key components of cancer control such as prevention, early detection, diagnosis and treatment. With respect to the global context, about 24.59% populations are present in South Asian area where the incidence of new cases is 10.23 % and the the burden of cancer death is 68.85%. This well-known fact indicates that this region of the world requires improvement strategies in cancer management.

For a better oncologic care, a team consisting of physicians, medical physicists and technicians is necessary. However, unfortunately, in some countries including Bangladesh of this region, still medical physicists are not mandatory personnel in the public hospitals, which will lead to inaccurate diagnosis and treatment. In order to create awareness of the importance of medical physicists in cancer treatment, medical physics education starts through some seminars at the Bangladesh University of Engineering and Technology (BUET) in 1996 in cooperation with the Task Group 16 "Medical Physics in the Developing Countries" of the German Society for Medical Physics (DGMP). As a result, a fully-fledged "Department of Medical Physics and Biomedical Engineering (MPBME)" is established in 2000 at Gono University, Dhaka, which offers a two-year Master and a four-year Bachelor course in Medical Physics and Biomedical Engineering presently.

In that time, there was a huge lack of potentials and resources to continue this new subject. Therefore, a collaboration programme between Gono University and Heidelberg University started under the financial support of German Academic Exchange Programme (DAAD) in 2002. Until now, 90 manpower (teachers, physicians, medical physicists, technologists, PhD & MSc students) has already been received training through this collaboration. In addition, from the beginning of the MPBME, German experts have been visiting Gono University for a standard period to strengthen medical physics education and train the respective personnel involved in cancer care.

However, being professional in medical physics discipline in South Asia region we have a long way to go compared to developed countries. Accreditation and certification of medical physicists is apivotal issue nowadays, which requires defined residency training, qualified medical physicist (QMP) and accredited center in the respective country or region. Among the South Asian countries, medical physicist professionis well recognized in both public and private hospitals only in India. Although medical physics education has already been established in Bangladesh and number of medical physicists is increasing gradually, still it is far from the goal due to the lack of national recognition and defined training programme. Therefore, in order to address the aforementioned issues, South Asia Center for Medical Physics and Cancer Research (SCMPCR) started its journey in July 2018with a mission to advance cancer care practice in Bangladesh, other countries in South Asiaby disseminating scientific and technical information, fostering the educational and professional development and promoting the highest quality medical services for patients. It will also expand its activities in other developing countries.

WE OFFER

- *To organize awareness, prevention and screening program for cancer disease.*
- *To provide adequate training to the all personnel associated with cancer treatment.*
- *To establish the clinical residency training program for medical physicists.*
- *To develop the infrastructure of e-learning and library.*
- *To establishment Welfare Home for poor cancer patients.*
- *To promote building of Self-help Groups of cancer patients.*
- *To establish a team, who will assist in the management and quality control (QC) procedure for the diagnostic radiology equipment in the districts level.*
- *To conduct research for cancer prevention by developing nutritional medicine and medical plant.*

MISSION

TO Achieve UNDP SDG-goal 3 & 4

OUR VISION

TO

PROVIDE QUALITY SERVICES IN CANCER TREATMENT BY 2021 THROUGH TRAINING, EDUCATION INCLUDING E- LEARNING IN RADIOTHERAPY AND IMAGING DISCIPLINES.

GOALS OF SCMPCR

Major activities of SCMPCR are to produce skilled manpower, enhance health education and establish a welfare home for cancer patients.

UNDP SDG-goal 3 (Good Health & Well-being)

Awareness program for the mass people for different communicable and non-communicable diseases, especially for cancer patients.

UNDP SDG-goal 4 (Quality Education)

Arranging and conducting training programs to develop skilled manpower. It realizes the need to educate specially; women regarding the screening and prevention of cancer treatment under UNDP SDG-goal 4.

OUR MOTTO

QUALITY EDUCATION AND HEALTH SCIENCE FOR PATIENT BENEFIT

SCMPCR

PROJECT of ALO BHUBON TRUST (Alo-BT)

FIND US

C-17, Anandopur, Thana Stand, Savar
Dhaka 1340, Bangladesh

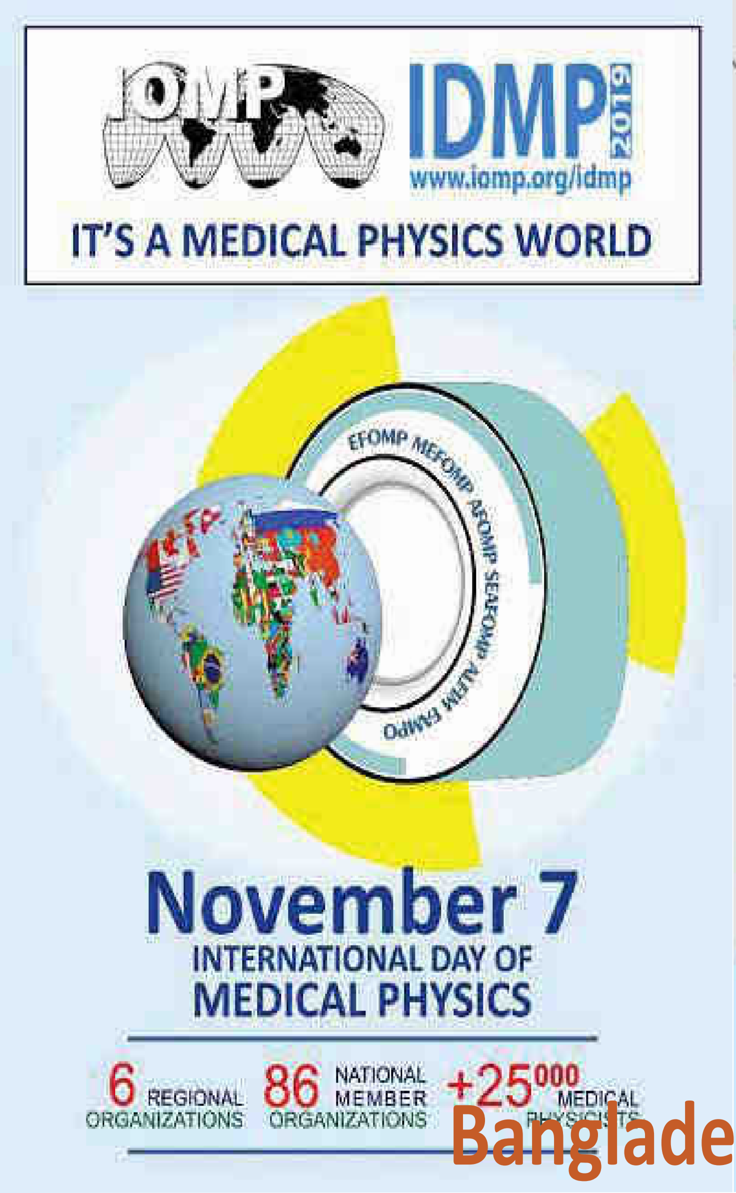
info@scmpcr.org

+8801711-841063

www.scmpcr.org

CELEBRATION OF

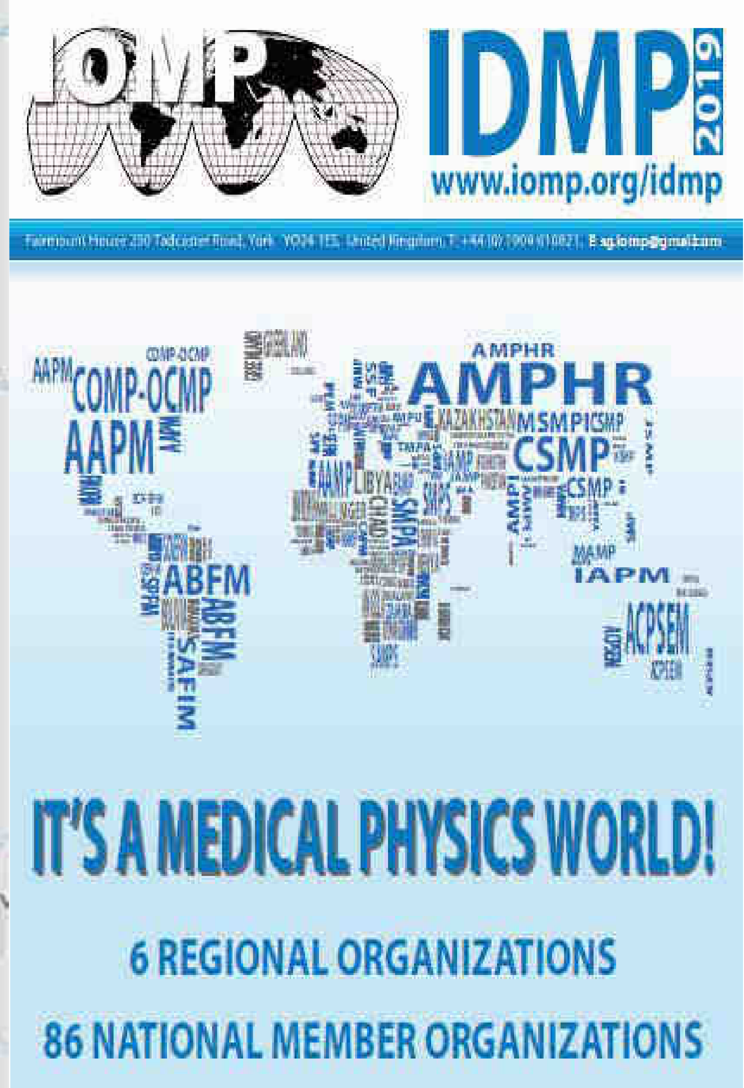
INTERNATIONAL DAY OF MEDICAL PHYSICS (IDMP)



7TH NOVEMBER 2019

VENUE: Gono University

Organized by



Bangladesh Medical Physics Society (BMPS)

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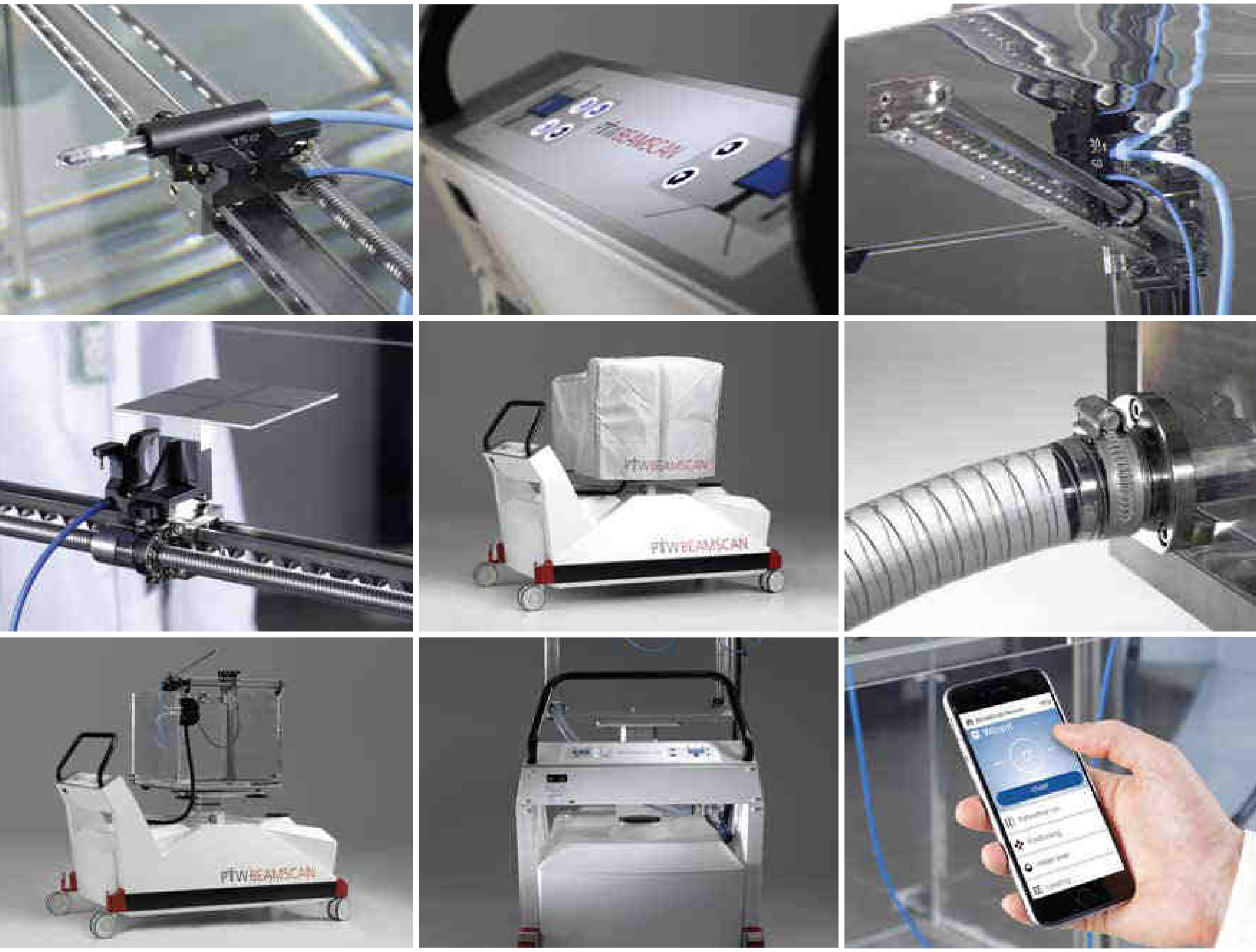

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tradehs@dhaka.net

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AOCMP 2021

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