MEDICAL PHYSICS GAZETTE

NEWSLETTER OF ASOCIATION OF MEDICAL PHYSICISTS OF INDIA (AMPI)

An affiliate of India National Science Academy and International Organisation for Medical Physics

Volume 4, No. 1 January 2020

Editorial Office :
Medical Physics Unit,
Dr. B.R.A. IRCH,
AIIMS, New Delhi-110029
(M) 9810197511
(R) 26589983, (O) 26594448
E-mail: drpratikkumar@gmail.com

Editorial

Covid-19 pandemic: What should be our response?

We all are in the midst of pandemic of the illness COVID-19 (**Co**rona**vi**rus **D**isease-20**19**) caused by a virus called SAR-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2) which is a novel virus of a known family called Coronavirus. Human to human transmission of SAR-CoV-2 virus occurs mainly through respiratory droplets. However, other routes of possible transmission like through tears, feces, blood etc. are under investigations but the potential seem low at present. In fact we are trying to understand this novel virus, attempting to design vaccines against it and striving to discover its effective treatment. There are more things unknown than known about this virus. One thing which we have to realize that the disease as such will remain with us till we get some effective vaccine against SAR-CoV-2 and hence we have to content with a new normal for the quality and type of our lives. In this write-up we attempt to summarize the requirements of our present situation and our probable response to the challenges faced. We have to keep in mind that due to novelty of SAR-CoV-2 virus and resultant COVID-19 illness the information (and inferences) are based on the limited and often varied experiences which may be changing fast with time and geography and hence newer outlook may emerge in due course.

Cancer patients and COVID-19

Patients with cancer have weak immune system due to disease and its treatment. Chemotherapy interferes with the ability of the bone-marrow to make white cell which is the vital component of our immune system. This makes cancer patients a vulnerable lot for any infection including coronavirus. Some cancers like leukemia, lymphoma, myeloma etc. directly affect our immune system. Therefore, it is essential for Health Care Workers (HCW) to identity the symptoms of COVID-19. It will help them to monitor the patient, himself/herself and any other colleague. A continuous cough, high temperature, body-ache, weakness and difficulty in breathing are the symptoms of COVID-19. Cancer patients who are undergoing chemotherapy, radiotherapy for lung cancer, immunotherapy, antibody treatment of cancer, targeted treatment like protein kinase inhibitors and the patients who have undergone bone marrow or stem cell transplants are more at risk of being seriously ill if they contract Covid-19.

Radiation oncology and COVID- 19

Department of Radiation Oncology in general and Medical Physics in particular have to devise a short term as well as long term plan. In the hospital and the department Covid-19 free and suspected areas should be identified and work flow should be directed in such a way that sanctity of such safe (Covid free) areas be maintained by ensuring all barriers and sanitations. For example, medical physicist working in planning may not pass through the department or laboratories. In planning area, full PPE (Personnel Protection Equipment like gloves, mask, face-shield, gown etc.) should be provided as the professional service-providers may work close to the patients. All patients to be considered infected unless two tests spaced at 3 days turn out Covid-19 negative. If the patient turns out Covid-19 positive, sanitization of the planning room and treatment room has to be carried out and the next patients may be taken only after 12 hours. It is obvious that the Medical Physicists will work with segregated staff (in weeks and months to come to avoid crowding in a room) and hence working remotely (work from home) may be explored. Routine QA may be done as usual. Immobilization devices are a tricky entity since during immobilization of head, the patient may not wear any respiratory masks and hence extreme precaution on the part of the medical physicist and the radiation technologists is needed. The immobilization devices have to be cleaned / disinfected after the use. This pandemic is also the opportune time to explore the possibility of remote planning and remote verification of QA results.

Radiology and COVID-19

Department of radiodiagnosis has the burden of diagnosis of Covid-19 as well and may expect a tremendous increase in the load of symptomatic and asymptomatic patients among

(continued on Page No. 2)

the general patients. At many places extra mobile x-ray units have been deployed to cater to the increased work-load. All machines should undergo QA tests as usual. CT scan of symptomatic Covid-19 patients is likely to increase manifolds. There must be some Standard Operating Procedures (SOP) in place regarding the mandatory masking of the patient, patient's attendant(s) and radiology staff. The Staff who interacts with the patients must use N95 masks and face-shield in addition to gown/apron. All requisitions for radiology tests by the referring physician must be accompanied with the declaration of Covid-19 status (positive, suspect or negative) of the referred patient. Department must designate the radiology machines for Covid-19 positive and suspect patients. Such machines must undergo disinfection after each scan. Referring department must ensure that papers sent by them are filled with proper care and are not contaminated if there is no e-reference. Frequent hand sanitization should be ensured by the department by installing the disinfectant dispensers at all x-ray units. The screening of asymptomatic population using CT scan needs further discussion as negative predictive value of CT for Covid-19 may not be very high. The lift and passage for the Covid-19 positive and suspected patients may be identified and periodically sanitized. There must be a Departmental control team so that prompt action may be decided and taken in case of any untoward incident of infection to the staff. Some institutions have come-up with the idea of chest x-ray imaging through a glass partition (or glass door) so that the machine is separated from the patient and the whole machine need not undergo disinfection frequently. Only the detector (or cassette) has to be disinfected every time. Of course, the physicist has to work-out the increase of the parameters due to attenuation of x-rays due to glass partition. For a mobile x-ray unit used in the Emergency Department and the ward the scatter may be measured from the chest of the patient (and compared with background radiation for the rationalization of the distance between two beds) since in the Emergency Department the patients' bed may not be at required 2 meter distances from other beds. One report suggests that the scatter at 1 meter may be about 0.25 μSv if 120 kVp is used. We should keep in mind that 2 μSv dose signifies half day background radiation and may be considered negligible. The technologist operating the mobile x-ray may stand at 2-3 meters by using the exposure switch with extendable coiled coil and may wear lead apron as well. All periodic QA tests on x-ray units may be carried out as usual and verifications of the results by seniors may be done remotely using communication gadgets like email, WhatsApp and other picture/video sharing platforms. Medical Physicists may team up with the engineers of the imaging equipment to develop these facilities and applications. All image guided interventional procedures which may generate aerosol or present the risk of contamination with the body fluid of the COVID-19 patients or suspects must be done with full PPE (Personal Protective Equipment) kit. All participants like radiologists, anesthesiologists, nurse attendants, assistants, etc. should use full PPE kit with proper donning and doffing training in designated areas. In fact, proper disposal of such PPE kits and masks must be undertaken by the administration as they are likely to pose a major environmental hazard. These masks and disposable wears are generally made of non-woven fabric made from plastic polypropylene or other non-biodegradable materials.

Research Opportunities in COVID-19

Covid-19 pandemic has renewed the interest of possible treatment of viral pneumonia due to Covid-19 using low LET and low radiation dose. In early 20th century, the pneumonia was treated by x-ray doses of less than 100 rad with about 20% reductions in mortality. It may be examined now with even lower doses to decrease pro-inflammatory cytokines.

UV sterilization to make PPE kits and masks re-usable is another area where Medical Physicists are working. Exploring reusability of these gadgets without compromising their functionality may save money and the environment. There are other sterilization methods as well like using Hydrogen Peroxide, Ozone etc. with their attached positive and negative sides. These methods may also be combined to achieve the optimum results.

Use of artificial intelligence and machine learning for the diagnosis of COVID-19 from chest –x-ray images or CT images has shown sudden jump in the literature as this provides an opportunity to make it well-established for the diagnosis or as the monitoring tool.

Knowledge is essential to avoid panic

There are some cardinal principles to deal with any pandemic and the same applies to COVID-19 as well. We may call it Hygiene, Time (exposure time), Distance (social distancing) and Shielding (barrier created by mask, face-shield etc.). We must adopt these principles and their applications as procedures as we may face the sustained spread of the infection in the community for quite some time. It has been suggested to wash hands with soap and water frequently for at least 20 seconds. But how frequently is the right frequency? A study has shown that washing hands 5 times a day cut the infection by 45% and washing hands 10 times a day cuts it further. Every time we go or come out from group environment or we indulge in any other risky action we should sanitize our hands. The increased frequency of disinfecting the common touch surfaces also helps. There are varied suggestions for the survival time of coronavirus on various surfaces. For steel surface, the viruses may be active for 2-3 days but 50% of them may become inactive just after 6 hours. On copper surface, they remain active up to more than 4 hours but 50% may become unviable within 2 hours. Plastic surface may harbour them for 3 days and 50% may become inactive after 7 hours. Viruses may last for one day on the paper and fabric and 50% of them may become inactive after 5 hours. In fact, paper and fabric may cause the virus to dry up faster due to their natural absorbing nature and hence destroy the virus relatively faster. An experimental study with another coronavirus SARS in 2005 found that virus survived on the paper and fabric from 5 minutes to 24 hours depending upon the viral load.

SAR-CoV-2 virus which causes Covid-19 spreads through respiratory droplets during coughing, sneezing, talking or even simply exhaling. Loud talking generates more droplets than quiet talking. This makes the physical distancing (of at least 6 feet) quite important when we meet somebody. This distance of 6 feet is from a study of streptococcus infection carried out by CDC (Centers for Disease Control and Prevention, USA) in 1948.

The time of exposure is an important parameter. At present, our knowledge about the safe exposure time is limited. Larger the time of exposure to coronavirus, higher is the probability to catch it. It is surmised that spending less than 10-15 minutes with an infected person may not spread the infection. However, the basis for such inference is not known. The median incubation period after getting infected with SARS-CoV-2 virus is 5 days (range 1 to 13 days) and Reproductive Rates Ro [(pronounced R naught) which indicates the number of person who would get infected from the patient)] is 2 to 3. Therefore, we should introduce the daily screening of all staff, patients, attendants and visitors for any single symptom like new fever, cough, sore throat, breathlessness, loss of taste and smell, nasal congestion, runny nose, persistent pain/ pressure in chest, mental confusion and discoloration of lips/ face. Though fever is present for less than half time but about 90% symptomatic patients of Covid- 19 develop fever.

Asymptomatic carriers of Covid-19 are also infective and hence it makes the use of masks with social distancing an important step towards the control of the infection. Masks should be used by all, be it patients, staff or visitors. Surgical masks worn by the infected person with right fit may block 99% of droplets expelled by the wearer. Surgical masks are made of polypropylene fabric which are charged by the machine called corona charger. The electrostatic charge captures the infection droplets. However, surgical masks don't fit as tight as N95 respirator masks do. N95 masks are more efficient than surgical masks but N95 masks with valve should not be used in pandemic. The valve makes it easier to exhale without filtering the outward flow of the air and is designed for the industrial use.

Last but not the least is our immunity. An estimate puts that 25% to 50% of the infected people may not show any symptom and recover without getting any knowledge of the infection contracted. This speaks volumes about the significance of the immunity status of our bodies. Good life styles which include healthy food, restful sleep, regular exercise, yogasana, pranayam, meditation and cheerful and positive outlook boost up our immunity. A few traditional herbs and spices are also considered to improve the immunity of the body.

Pratik Kumar

CLINICAL IMPLEMENTATION AND ADVANTAGE OF VOLUNTARY DEEP INSPIRATION BREATH HOLD TECHNIQUE (VDIBH) FOR BREAST RADIOTHERAPY

P. Mohandass, Chief Medical Physicist, Department of Radiation Oncology, Fortis Hospital, Mohali – 160062, Punjab

The most common cancer occurring in women in India is Breast Cancer. In 2018 alone, a total of 1, 62,468 new cases and 87,090 deaths were reported for breast cancer. As reported by Health Ministry, at least 17, 97,900 women in India may have breast cancer by 2020. A recent review of optimal radiation therapy utilisation rates suggested the proportion of breast cancer patients in whom radiation therapy should be recommended is 87%. The purpose of the radiotherapy is eradication of microscopic residual disease adjacent to the tumour site as well as the elimination of any evidence of multi centre disease.

Usually external beam radiotherapy is provided for the treatment of breast cancer. Although, the benefits of postoperative radiotherapy are well known, the treatment may be associated with the number of complications which may affect the quality of life and possibly survival of patients. Radiation therapy can result in complication such as cardiac and lung damage, lymphoedema, brachial plexopathy, impaired shoulder mobility and second malignancies. A reduction in the radiation dose to heart will lower the incidence of heart disease in breast cancer. A retrospective population study by Darby et al. (2013) evaluated risk of heart disease for 2168 breast radiotherapy patients. Their results revealed that relative risk of ischaemic heart disease increased by 7.4% for every 1 Gy in mean heart dose. Similarly, authors reported that patient without cardiac comorbidities, receives a dose of 2Gy to the heart during left breast radiotherapy, the absolute 30 year risk of death related ischemic heart disease would be less than 0,1% (Clarke 2005). However, the eminent risk of these complications, have decreased with the introduction of modern technologies. Therefore, the treatment techniques which reduce dose to heart such as deep breath-hold inspiration (DIBH) are very important.

At present, there are two commonly used techniques for DIBH such as voluntary DIBH (vDIBH), and moderate DIBH. The DIBH is a technique which uses the equipment known as Active Breathing Control (ABC - Elekta, Stockholm, Sweden). This device uses a spirometer to track air flow throughout the respiratory process and to interrupt air flow at a fixed rate, which allows the patients to hold their breath in order to maintain this volume. The equipment required to implement this technique is quite costly but the Heat Spare study (2013) and Jensen et al.(2014)have provided the option ofa low cost alternative in vDIBH. Alternatively, patients may be subjected to vDIBH, where respiratory motion is controlled, and the patient is advised to hold their breath at certain points during the process. The tools that used to track the breath hold position during the simulation process was the RPM (Real-time position management) marker block while a 3D surface imaging system (AlignRT; Vision RT Ltd., London, UK) was used to track the real-time patient position in treatment delivery.

DIBH Scientific details

The vDIBH involves the inspiring particular threshold and then holding that level of inspiration during entire course of radiotherapy. The selection of patients for DIBH breast radiotherapy is considered as an important factor. The patients who are able to perform consistent breath hold during simulation and delivery are chosen for this technique. During simulation procedure patient is trained for breath hold and explained vDIBH technique to the patient in detail by experienced radiation therapists. The patient setup is performed on CT couch using breast board in supine position with both arms elevated and supported. The patient's breath hold is tested for adequacy whilst a marker is placed at the level of the patient's lateral tattoo. The level of marker is measured from both free breathing (FB) and vDIBH and this measurement is recorded for treatment. These positions are marked usingskin markers, room laser alignment, and breast board scale positioning. All the data related to patient setup are noted down in the patient setup sheet.

The vDIBHpatient is trained to practice taking a deep breath in and hold it for different interval of 5 Sec, 10 Sec, 15 Sec and 20 Sec. In order to maintain consistency of breath hold, patients were instructed by radiation therapist to breath in and out twice before asking them to hold their breath for 20 Sec. During CT scan they communicate with the patient through an intercom system when to hold breath and when to release it, during this procedure the patient was under continuous monitoring. Planning scans were performed with a 64 slice CT scan unit, using 3 mm slice thickness.

DIBH planning

The action of holding breath during treatment inflates lungs and pushes heart away from chest wall and away from area being treated as shown in figure 1. In this regard, many studies confirmed that this technique could reduce the radiation 80-90% dose to the heart during left breast

irradiation. Use of DIBH can dramatically reduce mean heart dose immobilising chest wall and optimisation of distance from heart. The dose prescription to target volume is based on standard protocol, clinical trials or institution protocol. Mostly, the prescription dose to target volume is 50Gy in 25 fractions or 40.05Gy in 15 fraction. All target volumes and organ at risk volumes were contoured by a radiation oncologist followed by experienced radiation oncologist approval. Many treatment planning systems are used to generate different radiotherapy techniques for breast DIBH delivery. For example, a 3-dimensional conformal radiation therapy (3D-CRT) technique was used for plan generation which consisting of 2 opposing tangential beams and additional beam segments (Field-Filed in technique) as shown in figure 2. Similarly, advanced techniques such as intensity modulated radiotherapy (IMRT) and volumetric modulated arc therapy (VMAT) are also used with vDIBH treatment delivery.

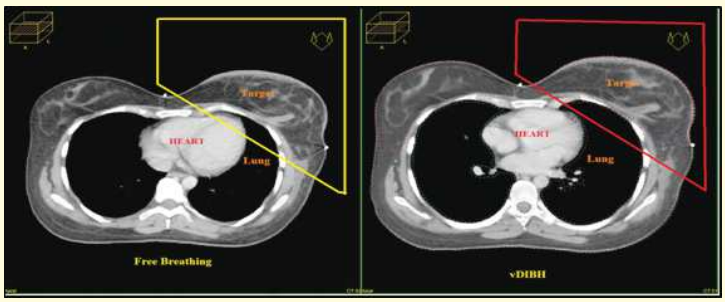


Figure 1. Comparison of free breathing with vDIBH for breast radiotherapy

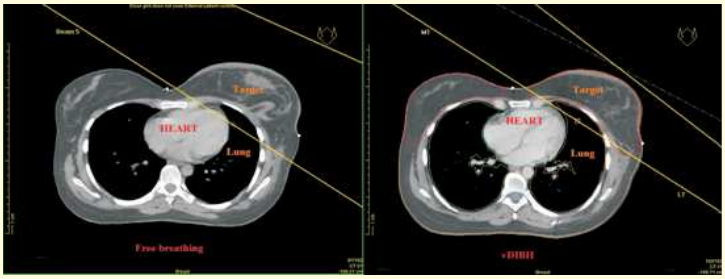


Figure 2. Comparision of left breast 3DCRT plan between free breathing and vDIBH

Treatment delivery

The treatment setup performed normally then the recorded measurement between FB and VDIBH planning CT scan is marked on the patient scan. In order to reduce patient setup uncertainties before treatment delivery different imaging modalities such as 2D or 3D image verification were performed. Patient setup verification is performed with 2D portal images using electronic portal imaging device (EPID). Similarly, cone beam computed tomography (CBCT) scans are used for positioning accuracy. After correct position of patient is setup,the radiation therapist then asked the patient hold the breath and release it several times until they are satisfied with the position. Further, the patient is asked to hold the breath when the radiation therapist are ready to switch on the radiation beam once the in-room lasers reach the same level as the reference mark on the patient's skin. During treatment delivery, the radiation therapists are watching room the room camera which is focussed on the laser mark alignment. Again the patient is asked to release the breath when the radiation beam is completed. This is repeated several times until the treatment is finished. During treatment delivery while one radiation therapist monitors the patient position another switches on the radiation beam. If patient releases the breath without being told to do, it alerts radiation therapists who will then switch the radiation off.

Advantages of vDIBH

The DIBH is quite comparable to ABC-DIBH on various levels. The UK HeartSpare study compared these two techniques using crossover study, the findings showed consistency for both methods over all treatment times. However, the vDIBH was correlated with reduced simulation time as well as daily setup error. In addition, patients as well as radiation therapists expressed greater satisfaction with the vDIBH technique. Similarly, a study conducted by Eldredge-Hindy et al. (2014) found that 18 per cent of the 112 patients involved in the study did not tolerate ABC. On the crux of the matter, vDIBH is able to provide better heart-sparing for left-sided breast radiotherapy. In addition, this vDIBH technique is a unique, easy to understand, no risk and short time required implement in any radiotherapy department. Moreover, the investment cost is relatively less which can enable many radiotherapy departments to install and implement this technique.

References

1. Yi A, Kim H, Shin H, Huh M, Ahn S, Seo B. Radiation-Induced Complications after Breast Cancer Radiation Therapy: a Pictorial Review of Multimodality Imaging Findings. Korean Journal of Radiology. 2009; 10(5):496.
2. Effects of Radiotherapy and of Differences in the Extent of Surgery for Early Breast Cancer on Local Recurrences and 15-Year Survival: An Overview of the Randomised Trials. Breast Diseases: A Year Book Quarterly. 2006; 17(3):242.
3. Darby SC, McGale P, Taylor CW, Peto R. Long-term mortality from heart disease and lung cancer after radiotherapy for early breast cancer: prospective cohort study of about 300,000 women in US SEER cancer registries. Lancet Oncol. 2005; 6:557–65.
4. Darby SC, Ewertz M, McGale P, et al. Risk of ischemic heart disease in women after radiotherapy for breast cancer. N Engl J Med. 2013; 368:987–98.
5. Clarke M, Collins R, Darby SC, Davies C, Elphinstone P, Evans V et al. Effects of radiotherapy and of differences in the extent of surgery for early breast cancer on local recurrence and 15-year survival: an overview of the randomized trials, Lancet 2005; 366:2087–106.
6. Ippolito E, Fiore M, Di Donato A, Silipigni S, Rinaldi C, Cornacchione P et al. Implementation of a voluntary deep inspiration breath hold technique (vDIBH) using Brain Lab ExacTrac infrared optical tracking system. PLOS ONE. 2018; 13(5):e0195506.

7. GLOBOCAN 2012 (IARC), Section of Cancer Surveillance (15/1/2015)
8. Latty D, Stuart K, Wang W, Ahern V. Review of deep inspiration breath hold techniques for the treatment of breast cancer. Journal of Medical Radiation Sciences 2015; 62(1):74-81.
9. Bergom C, Currey A, Desai N, Tai A, Strauss J. Deep Inspiration Breath Hold: Techniques and Advantages for Cardiac Sparing During Breast Cancer Irradiation. Frontiers in Oncology. 2018; 8.
10. Estoesta, R.P, Naehrig D, Attwood L, Claridge- Mackonis, E, Martin D.P, Pham, M, Toohey J, Carroll S. (2015). Voluntary Deep Inspiration Breath Hold vs. Free Breathing in Left Breast Radiotherapy. 2015 ASM/R-0081.
11. Eldredge-Hindy H, Duffy D, Yamoah K, Dicker A, Skowronski J, Simone N et al. Ischemic Heart Disease (IHD) Following Left Breast Irradiation With Active Breathing Control (ABC): 10-Year Outcomes and Risk Modeling. International Journal of Radiation Oncology Biology Physics. 2014; 90 (1):S168-S169.

THREE CHEERS !!!

Dr. Sridhar Sahoo, Scientific Officer-E, Radiological Physics and Advisory Division, Bhabha Atomic Research Centre, Mumbai has been awarded Ph.D. in Medical Physics (Health Sciences) by Homi Bhabha National Institute, in July 2019. The topic of his thesis was "**Dosimetry studies for brachytherapy sources**". Congrats !!

Dr Pankaj Tandon, Head, IATS, Radiological Safety Division and CPIO, Atomic Energy Regulatory Board, Mumbai has been promoted to Scientist 'H' in October 2019. Congrats!!

Dr. Vijendra Kumar, Medical Physicist & RSO, Command Hospital, Air Force, Bengaluru has been awarded Ph.D. by Maharaja Ganga Singh University, Bikaner, Rajasthan in October 2019. The topic of his thesis was "**A Study of Soliton Dynamics in Laser Matter Interaction**". Congrats !!

Dr. Ghanshyam Sahani and his colleagues **Mr. R.K. Chaturvedi, Mr. Manoranjan Dash, Dr. Rajib Lochan Sha, Ms. Rajeshri H. Pai, Mr. Ashish Ramteke and Ms. Pampa Modak**, Medical & Research Applications Section have been awarded with Group Achievement Award for the year 2018 by AERB in Nov. 2019 for the contributions on strengthening regulatory control, radiation safety and simplification of regulatory processes in diagnostic radiology practice. Congrats !!

Mr. P. Mohandass, Chief Medical Physicist, Fortis Hospital, Mohali was awarded ESTRO Mobility Grant to fund his visit to Imperial College Health Care NHS trust, London, U.K. for a fortnight during October 2019. The visit was focused on the advanced treatment planning and implementation of deep inspiration breath-hold (DIBH) technique used for breast radiotherapy. Congrats!!

A NOVEL DEVICE CYTOTRON FOR CANCER THERAPY ADDED FROM CENTRE OF ADVANCED RESEARCH, BENGALURU – CAN IT BECOME A MEDICAL PHYSICS DOMAIN?

R. Ravichandran, Chief Medical Physicist & RSO, Cachar Cancer Hospital and Research Centre, Silchar, Assam

Tissue engineering by Cybernetics is related to molecular biology, which focuses at cellular level. A new device called Cytotron had been added in the last year, based on research led by Dr Rajah Vijaya kumar DSc in Scalene Center for Advanced Research and Development (CARD), Bengaluru. based on his 27 years of intensive research, in tissue engineering. Cytotron was investigated originally to look at the possibility of in-vivo manipulation of cells of humans, animals or implants for correcting cellular disorders. Unlike chemo-therapy, Cytotron communicates with cells with fast radio waves, for regulating specific proteins, to deal with liver, pancreatic and breast cancers. By negotiating with the cells, they could be selectively destroyed. Normal functionality could be achieved by correcting the sorregate proteins. It is heartening to note that this has been cleared for human use by 9 countries in Europe, UK, South America, and Asia. It is heartening to note that on trial basis this will be introduced in India soon, by initially applying it for non-healing cancers, arthiritis, cerebral palsy and ligament regeneration, by modifying cell functions.

This machine is based on rotational field quantum magnetic resonance (RFQMR) which utilizes high complex electromagnetic field in the RF controlled by MRI image guidance. The beams are precisely controlled and focused on tissues to alter the cell membrane potential of the target tissue cells which in turn simulates cartilage growth in case of degenerative diseases like osteo-arthiritis or triggers programmed cell death in cancer growth. Following the messages received, it is thought that the chromosomes result in variations of potential (-70 to -90mV normal, -40 to 60mV when infected, -20 to -30mV in cancer and 0mV when dead) in the cytoplasmic membrane, a stress response activated through electro mechanical effects, regulating cell dynamics as well as mitochondrial activities of ATP production. From biophysics point of view, Cytotron appears to modulate functions in tissue Voxels (volume elements) addressing them by image based targeting. It appears complex in routine applications but could be very effective in clinical applications. Specific targeting the ultimate aim, sparing normal structures, similar to cytotoxic action by ionizing radiations. Therefore for assuring reproducibility, and accuracy, this will add to complexity in technology management in routine applications. Therefore, as a health care team member in hospitals, clinical medical physicists may be called upon in future for implementation and further process managements. In radiation therapy and chemotherapy we focus on cell killing, and in this innovation appears ' re-formatting' normal function in diseased cells. After image reconstructions algorithms originally contributed from Bengaluru, this sounds like another major contribution to health sector from basic science research in India. It appears that this domain may attract medical physics interest in future patient care in hospitals similar to imaging and quality managements.

Reference

ElitaIndia: Cytotron.Http://www.elitaindia.com/cytotron.html; healthcare@elitaindia.com


RayStation
RaySearch Laboratories
HARMONIZE YOUR TREATMENT PLANNING
Multiple modalities. Diverse treatment machines. Numerous software systems. There's a lot to orchestrate if you want to reach the highs in treatment quality and efficiency. If that sounds like a familiar tune, take a look at RayStation*. Now you have one control center for all your treatment planning needs – any equipment composition, any scale. RayStation has always led the way when it comes to technology integration. If that's music to your ears, visit raysearchlabs.com/
* Subject to regulatory clearance in some markets.
ADVANCING CANCER TREATMENT
RaySearch India Private Limited
S - 327, Lower Ground Floor,
Greater Kailash – II, New Delhi – 110048, India.
Contact Info : +919995611361
parameswaran.subramanian@raysearchlabs.com
www.raysearchlabs.com

REPORT OF AAPM – ISEP – 2019

Dr. Ajai K Srivastava, Program co-director, AAPM – ISEP – 2019, Delhi

International Symposium on Medical Imaging Physics and Image Guidance in Radiotherapy was organized during December 16-19, 2019 at Auditorium Maulana Azad

Medical College. New Delhi. This scientific program was organized under International Scientific Exchange Program (ISEP) in collaboration with American Association of Physicists in Medicine (AAPM), International Organization for Medical Physics (IOMP) and Association of Medical Physicists of India (AMPI). This program was also endorsed by AFOMP. Considering a vital role of medical imaging in improving public health care through different imaging modalities and goal of image guidance during radiotherapy is to ensure proper targeting and delivery of radiation dose, this teaching program in diagnostic imaging Physics was titled as "International Symposium on Advances in Medical Imaging Physics & Image Guidance in Radiotherapy". AAPM had provided five distinguished faculties from USA namely, Dr Tony Seibert, Professor. Imaging Physics who had served as president of AAPM and also recipients of highest awards of RSNA 2019; Dr John Boone, Professor & Vice Chair of Radiology and Professor of Biomedical Engineering at University of California Davis, and is a founding member of the UC Davis Comprehensive Cancer Center. Dr John Boone had served as president of AAPM and received its highest awards the William D. Coolidge Award and the Gold Medal. Both Tony and John are co-author of the book called Physics of Medical Imaging; Dr Osama Mawlawi, a tenured Professor of Imaging Physics and the Section Chief of Nuclear Medicine Physics at the University of Texas MD Anderson Cancer Center; Dr Indra J Das, New York University USA; Dr Kalpana Kanal, Professor, Diagnostic Imaging Physics, University of Washington, Seattle. Dr T.S. Kehwar, Thomas Jefferson University, USA was invited by the host co director. Local speakers were Dr Arun Chougule, SMS Medical College, Jaipur; Dr S.D. Sharma, Bhabha Atomic Research Centre (BARC); Dr Ghanshyam Sahni, Atomic Energy Regulatory Board (AERB); Dr Shobha Jayaprakash, BYL Nair hospital Mumbai and Dr Ajai Srivastava UCMS & GTB Hospital Delhi. The said program was organized jointly by the Department of Radio-diagnosis of the University College of Medical Sciences (University of Delhi) & GTB Hospital Delhi & Department of Radiotherapy, MAMC & Lok Nayak Hospital New Delhi. About 250 participants including 178 registered participants and 15 vendors attended this teaching program.

Practicing Medical Physicists, graduate students, Radiology student's post-doctoral researchers, and residents from all over India were the core attendees. The meeting program consisted of one Keynote Address by Dr Indra J Das. The said program was inaugurated by Prof Sushil Kumar (Dean,MAMC) as chief Guest and Prof.A.K.Jain (Principal UCMS) and Prof. Kishor Singh (Medical Director Lok Nayak Hospital). Dr S.D.Sharma President, Association of Medical Physicists of India (AMPI) briefed about activities of AMPI and the contribution of AMPI in organizing this teaching course by funding of Rs. 2 lacs. Prof Arun Chougule (President AFOMP) spoke at this function and briefed about the activities of AFOMP. Entire teaching program was well planned and it consisted of total 25 lecturers of 50 minutes each and eleven abstracts selected by the scientific committee were presented in the meeting in the form of posters presentation in the span of four days. First day of this program consisted of six lecturers of 50 minutes each.

John Boone (on Basic Principle of computed Tomography and engineering details), Tony Seibert (on CT DR and PACS fundamentals, Dr Kalpana Kanal (on digital fluoroscopy), Dr S.D. Sharma (on IGRT patient Dosimetry), Dr Ajay Srivastava (Duel Energy CT) and Dr

Arun Chougule (Medical Physics Education from academics to recognition) spoke at this program. Dr Indra J Das spoke on three topics (Role of Imaging in RT, Imaging in Proton Therapy and MR Linac. Dr John Boone spoke on four topics (Principle of computed Tomography and engineering details, Breast CT, Dosimetry in radiography, fluoroscopy and CT and CT a new approach of QA). Dr Tony Seibert spoke on four topics (CT, DR and PACS fundamentals; Digital Image: Display Perception and Quality; MRI Physics: Fundamentals and MRI Physics Advanced Techniques and Artifacts respectively). Dr. Osama Mawlawi spoke on three topics (Fundamentals of PET & PET-CT, Fundamentals of SPECT & SPECT–CT and Advances in PET, SPECT and QA /QC in PET and SPECT). Dr Kalpana Kanal spoke on three topics (Basics of Fluoroscopy, Digital Image: Display Perception and Quality and Radiation Dose Management in Diagnostic Radiology). Apart of these lectures Dr Kehwar spoke on two topics (Basic Radiobiology and dose fractionation in Radiotherapy and Radiobiology of Stereotactic Body Radiotherapy / Radio-Surgery) Dr Shobha J Prakash spoke on mammography QA/QC and Dr G Sahni spoke on Regulatory Aspects in Radiotherapy and Radiology in India. Dr Rajesh Harsh was invited to speak on indigenous LINAC and MRI by SAMEER under make in India program. Feedback from the participants were taken and it is satisfying that participants gave their feedback on teaching program as excellent.

THREE CHEERS !!!

Dr. Ritu Raj Upreti, Tata Memorial Hospital, Mumbai have received **Best Oral Presentation Award** at 17th South-East Asia Congress of Medical Physics (SEACOMP) at Bali, Indonesia in August 2019 for the paper entitled "Coverage with Dosimetric Concordance Index (CDCI): A tool for evaluating dosimetric impact of interobserver target delineation variability in radiotherapy". Before that, he was awarded with Ph.D. By Homi Bhabha National institute (HBNI) in June 2019. The title of his Ph.D. thesis was **"Investigation of geometrical, clinical uncertainty and dosimetric studies in 3D interstitial brachytherapy of radical breast implants".** Congrats !!

Dr Sukhvir Singh, Scientist D and **Dr Pradeep Goswami**, Scientist D, Institute of Nuclear Medicine and Allied Sciences, DRDO, have been awarded **"Technology Group Award-2019"** in Feb 2020 consecutively the second year, for their contribution in various R&D activities of the Institute. Congrats !

WHO'S WHERE

Dr Biplab Sarkar has joined Department of Radiation Oncology, Apollo Gleneagles Hospitals, Kolkata as Chief Medical Physicist from 1st Nov. 2019. Earlier he served at Manipal Hospitals, Delhi.

Mr. Mohamathu Rafic K has joined as Senior Medical Physicist, Dept. of Radiotherapy, Government Rajaji Hospital, Madurai in October 2019. Earlier he served as Lecturer in Radiological Physics at Dept. of Radiation Oncology, Christian Medical College, Vellore.

Mr. Sahil Gupta has Joined as Junior Medical Physicist in Deptt. of Radiation Oncology, Govt. Medical College, Jammu in July 2019.

CURATED FOR CORONA

Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.

-Marie Curie

If you shed tears when you miss the sun, you also miss the stars.

-Rabindranath Tagore

It is our attitude at the beginning of a difficult task which, more than anything else will affect its successful outcome.

-William James

Life imposes things on you that you can't control, but you still have the choice of how you're going to live through this.

-Coline Dion

Your work is going to fill a large part of your life, and the only way to be truly satisfied is to do what you believe is great work. And the only way to do great work is to love what you do. If you haven't found it yet, keep looking. Don't settle. As with all matters of the heart, you'll know when you find it.

-Steve Jobs

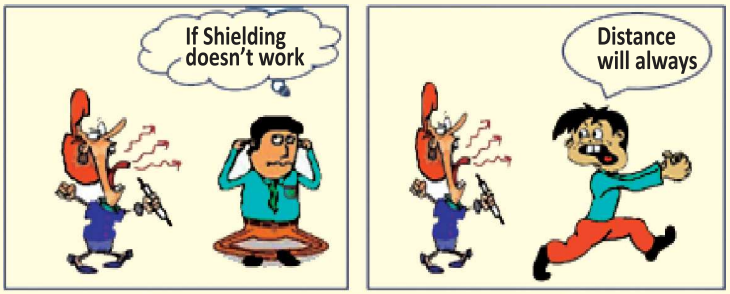
Only a life lived in the service to others is worth living.

-Albert Einstein

We can complain because roses have thorns, or we can rejoice because thorns have roses.

-Unknown

MEDICAL PHYSICS FUN TIME



Ranjna Agarwal, Surat

One more application of ALARA Principle