AROI NEWSLETTER

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From the office of AROI

Dear Friends,

"Wish you and your family a joyful, bright, healthy, and prosperous New Year (in advance) and hoping that we all are safe and sound in these testing times.

Due to the ongoing Covid-19 pandemic, we were forced to cancel most of our conference meetings and other academic activities. But with your active support and motivation, we were able to conduct most of our remaining academic activities and conduct them in the form of webinars. It was all made possible with the initial step of Dr. Neeraj Jain who came up with the idea of conducting a webinar for "Best of Astro-2020". Before conducting these webinars virtually we had already organized two conferences of Young radiation oncologist conference and AROI ESTRO- Gyn teaching program. We extend our greatest appreciation to our faculty and their efforts especially the office bearers of ICRO Dr. Satyajeet Pradhan, Dr. D.N.Sharma, and Dr. V. Srinivasan, without whom it would not have been possible to conduct these programs. It definitely would not have been possible to conduct these online conferences and meetings had it not been for the joint efforts and support of Mr. Arvind Suri of Sun Pharma and Mr. Manoj Kumar of Intas Oncology. Since then, we had successfully conducted Radiobiology Masterclass, Prodvance-2020, and ICRO-PG teaching courses.

We are holding the fellowship programs of the selected candidates to give a one-year extension to complete their fellowship in 2021.

In New Year 2021 AROI executive committee has decided to publish new AROI directory.

We hope from 2021 we will recover from Covid-19 and this year we will be able to start our teaching programs, courses, and other activities in actual.

Dr. Rajesh Vashistha
President AROI

Dr. G.V. Giri
Secretary General AROI

Dr. Manoj Gupta
President Elect AROI

IN THIS ISSUE

Dr. Rajesh Vashistha
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AROI Directory
All AROI members are requested to send the updated CV to drvashistha@gmail.com for updating AROI Directory

SEASON'S GREETINGS

FLASH Radiotherapy
Magic bullet or Hyped technology

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Introduction

Significant advancement in the medical technology and imaging has changed the carpet of radiation therapy in last couple of decades. Hard on heels technology like Intensity modulated radiotherapy (IMRT), image guided radiotherapy (IGRT), volumetric modulated arc radiotherapy (VMAT) and stereotactic radiotherapy has come in common use and revolutionized the treatment landscapes, reducing the treatment uncertainties and improving the therapeutic index. However, tumor and physiological organs at risk motion jeopardizes the precision owing to slowness of the conventional clinical LINACs mandating the use of several advanced techniques to manage the same and in return increasing the complexity as well uncertainty in the delivery of radiation therapy. Also, while the tumor control may have improved for certain tumor sites, the acute and late toxicities of conventionally fractionated radiotherapy remains a debilitating concern.

An innovative solution to this has emerged in the last few years in terms of a novel treatment delivery technique which entails ultra-rapid radiation treatment with dose rate more than approximately 40 Gray/second as opposed to the current modern linear accelerators which operates at 10 Gray/minute under clinical conditions (in the flattening filter free mode) and 24 Gray/minute under calibration. This ultra-fast delivery of RT with dose rates several orders of magnitude greater than conventional LINACs is termed as 'FLASH radiation therapy'. Interestingly, this technique has also demonstrated reduced normal tissue toxicity whilst maintaining anti-tumor response and this biological effect is referred to as 'FLASH effect'. Thus, in essence FLASH is both a physical and radiobiological entity and we would discuss the clinical physics, radiobiology, clinical application and the future of this new "silver bullet" in the armamentarium of radiation oncologist.

Innovations in Medical physics technology for delivering FLASH radiation

The physical effect of FLASH RT has been more extensively researched with clinical MeV electron beams by pioneers at Lausanne University (Switzerland), Stanford University (USA) and Lund University (Italy). The MeV electron LINAC (named Oriatron 6E) at Lausanne delivers electrons at dose rate ranging from few Gray/min to >1000 Gray/second. The Elekta LINAC at Lund university uses a triggered thyratron with pulse-by-pulse control to deliver >1000 Gray/second. Recently, the FLASH RT is also being researched to be delivered with

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synchrotron KV X-ray at European Synchrotron Radiation Facility (Grenoble, France). The researchers at University of Maryland modified Varian ProBeam (>100 MeV protons) to produce FLASH proton radiotherapy.

One of the challenges of FLASH RT technology was that it required a dedicated machine with modifications to produce this physical effect. With the advancement and better understanding of the physical principles behind the generation of FLASH-RT, centers such as Stanford (USA) have modified the existing LINAC to generate high dose rate RT by increasing beam current, RF power etc. increasing the output by around 450%. The existing machine could be utilized in FLASH and clinical mode and this is an exciting development.

It has been seen that the FLASH effect can be achieved with either electron, photons or protons and the effect is not specific to any particular radiation type. However, in order to achieve a FLASH effect, several of the physical parameters may have to be met else this effect might not be produced at all. Important parameters to note are dose rate in pulses, beam on time, number of pulses delivered etc. [1, Figure 1]. Strict quality assurance and dosimetric checks are prerequisites for the successful delivery of these high dose rates RT.

Characterizing radiobiology of FLASH-RT

The holy grail of radiation therapy has always been to widen the curve between normal tissue complication probability and tumor control probability. One of the traditional ways of doing this is by using for instance, hyper-fractionation (HFRT) treatment strategy. However, HFRT has its own limitations and one of the novel ways of doing so is with FLASH RT. Investigative use of ultra-high dose rate RT on normal tissue toxicity in 1970s [2] have risen from the oblivion yet again in the form of FLASH RT. The interest in FLASH RT has been rekindled from experiments by Favaudon et al [3] who showed in mice models that thoracic radiation in mice at dose rates (40-60 Gray/second) induced less pulmonary fibrosis than the same doses at conventional rates.

FLASH RT does not induce normal tissue toxicity at doses which trigger the same with conventional RT while preserving anti-tumor response and this is also known as “FLASH effect”. This was initially noted in several animal models across different organ sites like gut, skin, lung, brain etc. and postulated to be due to sub-millisecond pulses of radiation eliciting less genomic instability than the continuous protracted radiation therapy course. Recent reports from mouse models also suggests that FLASH RT does not induce microglial activation or neuro-inflammation and thus leading to less neurocognitive decline and less neurodegeneration as compared to conventional RT [4] On contrary, there are some researchers who could not achieve the FLASH effects in their experiment and the reason is speculated to be due to variation is physical parameters as discussed above [1, Figure 1]

One of the postulated mechanisms for the FLASH effect is oxygen depletion (by triggering local oxygen consumption) leading to transient protective local hypoxia (leading to decrease in the level of reactive oxygen species, ROS), thus leading to lesser normal tissue toxicity. This could be understood by the fact that the change is oxygen concentration is very rapid as they are more oxygenated normally and this large, rapid change pushes them transiently in a state of ‘radioresistance’ as compared to tumor tissue [1, Figure 2]. This may also be due to intrinsic difference between normal tissue and tumor tissue`s response to the ROS.

Clustered DNA damage owing to very high dose rate single fraction FLASH RT along with difference in DNA repair pathway and factors induced by DNA damage (through cGAS-STING-HER2 pathway) are supposed to be responsible for the differential effect on tumor versus normal tissues. Another mechanism of FLASH RT is researched to be due to immunogenic response of greater magnitude with activation of immune cells and modification of micro-environment. Clustered DNA damage owing to very high dose rate single fraction FLASH RT along with difference in DNA repair pathway and factors induced by DNA damage (through cGAS-STING-HER2 pathway) are supposed to be responsible for the differential effect on tumor versus normal tissues. Another mechanism of FLASH RT is researched to be due to immunogenic response of greater magnitude with activation of immune cells and modification of micro-environment. Experimental data also suggests sparing of stem cells including epidermal, neural and intestinal stem cells [5] The biological mechanism of FLASH RT is a

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continued area of research and there is still a lot to understand in this domain.

Clinical results

Owing to the presumed radiobiological advantage, FLASH RT could be used in broadly in two clinical indications: does escalation for radioresistant tumors and normal tissue protection in tissues where conventional RT is already effective. Mostly, "a single high dose of RT is delivered" to the tumor tissue to get this FLASH effect. Researchers are also evaluating the use of fractionated FLASH RT albeit with limited benefit and more work needs to be understood in this regard.

The first clinical FLASH RT was delivered in a patient of muti-resistnat CD30+ve T-cell cutaneous lymphoma with single dose of 15 Gray with 5.6 MeV Electrons in 90 milliseconds demonstrating its feasibility, safety as well as efficacy. At 3 weeks, there was a brisk erythema and epithelitis and complete resolution of tumor at 5 months [6, Figure 3]. This patient`s other skin lesion earlier treated with conventional RT served as a control in this case and in those treated lesions the radiation reactions were more pronounced and took 3-4 months to subside with inadequate tumor response.

Hypofractionation already has made a comeback and the recent published results of a 19 Gray single fraction prostate SBRT (ONE SHOT trial) albeit not with FLASH RT exemplifies the advancements in radiation therapy technologies that we have already made [7]. Translation of high dose per fraction at ultra-high dose rate appears a feasible and deliverable technique producing a FLASH effect. Enthusiastic and promising results have also been reported in pre-clinical models with proton beam radiotherapy and studies in human patient may soon be reported

PHASERing way to FLASH radiation therapy: futuristic view

One of the limitations of the current LINACs delivering FLASH RT for deep seated tumor is that they require increase in dose rates of over 300-400 times leading to slow delivery. In this context, USA researchers have developed a PHASER (Pluridirectional high-energy agile scanning electronic radiotherapy) platform for the delivery of FLASH RT. PHASER is a compact (fits inside a standard shipping container), energy efficient (may run on solar power and battery storage) and low-cost novel technology utilizing X-ray intensity modulation (SPHINX), RAPiD networking and stationary DRAGON LINACs [5]. The PHASER platform may in near future allow instantaneous "blink and miss" delivery of highly conformal radiotherapy virtually freezing organ and tumor motion potentially exploiting the superior FLASH radiobiological therapeutic index [8, Figure 4]

Conclusion

Overall, the FLASH-RT is a conjoint of radio-physical parameters producing a unique radiobiological FLASH effect with a potential to be used for dose escalation as well as normal tissue sparing. The ultra-short treatment time often shorter than 0.1-0.2 seconds would further help in reducing/eliminating intra-fraction motion issues, virtually freezing the tumour during treatment. This may also allow smaller tumor margins to be used, essentially reducing the normal tissue toxicities. The radiobiological effects of FLASH RT are real but still needs a lot of work before translation into routine clinical practice. However, there is no denial that FLASH RT is emerging as one of the promising 'silver lined magic bullet' having potential to revolutionize cancer care in near future.

References

1.Wilson JD, Hammond EM, Higgins GS, Petersson K. Ultra-High Dose Rate (FLASH) Radiotherapy: Silver Bullet or Fool's Gold? Front Oncol. 2020 Jan 17; 9:1563

2.Berry RJ, Hall EJ, Forster DW, Storr TH, Goodman MJ. Survival of mammalian cells exposed to x rays at ultra-high dose-rates. Br J Radiol. 1969 Feb;42(494):102-7.

3.Favaudon V, Caplier L, Monceau V, et al. Ultrahigh dose-rate FLASH irradiation increases the differential response between normal and tumor tissue in mice. Sci Transl Med. 2014 Jul 16;6(245):245ra93

4.Simmons DA, Lartey FM, Schüler E, et al. Reduced cognitive deficits after FLASH irradiation of whole mouse brain are associated with less hippocampal dendritic spine loss and neuroinflammation. Radiother Oncol. 2019 Oct; 139:4-10

5.Guangming Zhou. Mechanisms underlying FLASH radiotherapy, a novel way to enlarge the differential responses to ionizing radiation between normal and tumor tissues. Radiation Medicine and Protection; 2020 (1): 35-40

6.Bourhis J, Sozzi WJ, Jorge PG, et al. Treatment of a first patient with FLASH-radiotherapy. Radiother Oncol. 2019 Oct; 139:18-22

7.Zilli T, Franzese C, Bottero M, et al. Single fraction urethra-sparing prostate cancer SBRT: Phase I results of the ONE SHOT trial. Radiother Oncol. 2019 Oct;139:83-86.

8.Maxim PG, Tantawi SG, Loo BW Jr. PHASER: A platform for clinical translation of FLASH cancer radiotherapy. Radiother Oncol. 2019 Oct;139:28-33

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Figure 1: Physical parameters to be met for FLASH-RT [1]

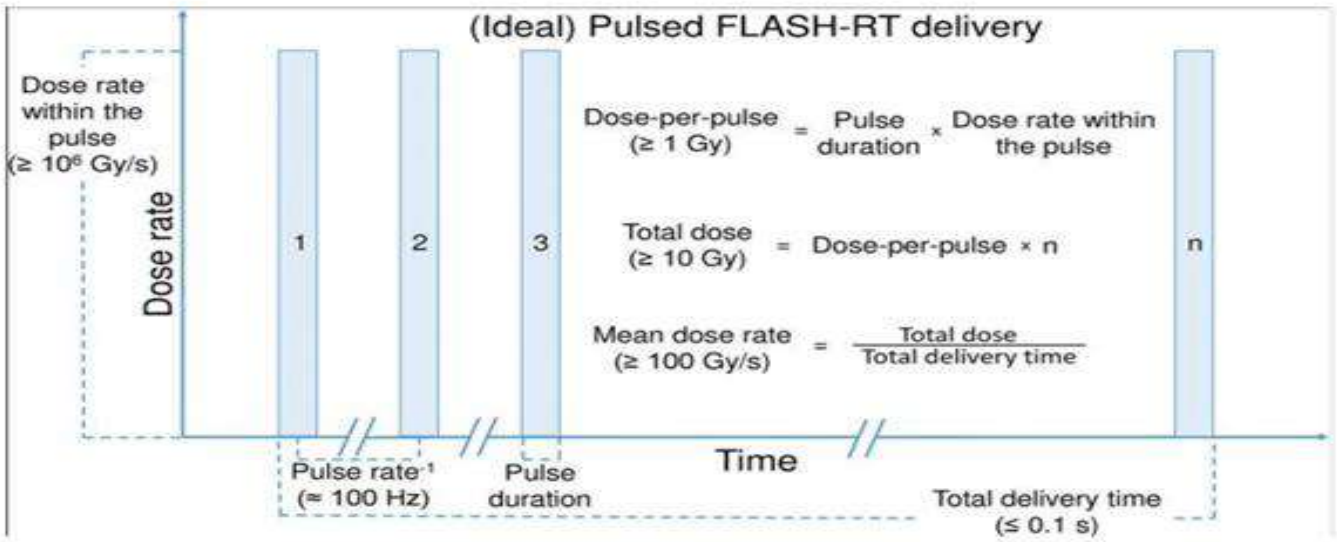

Figure 2 : "Oxygen Depletion" theory for FLASH-RT [1]

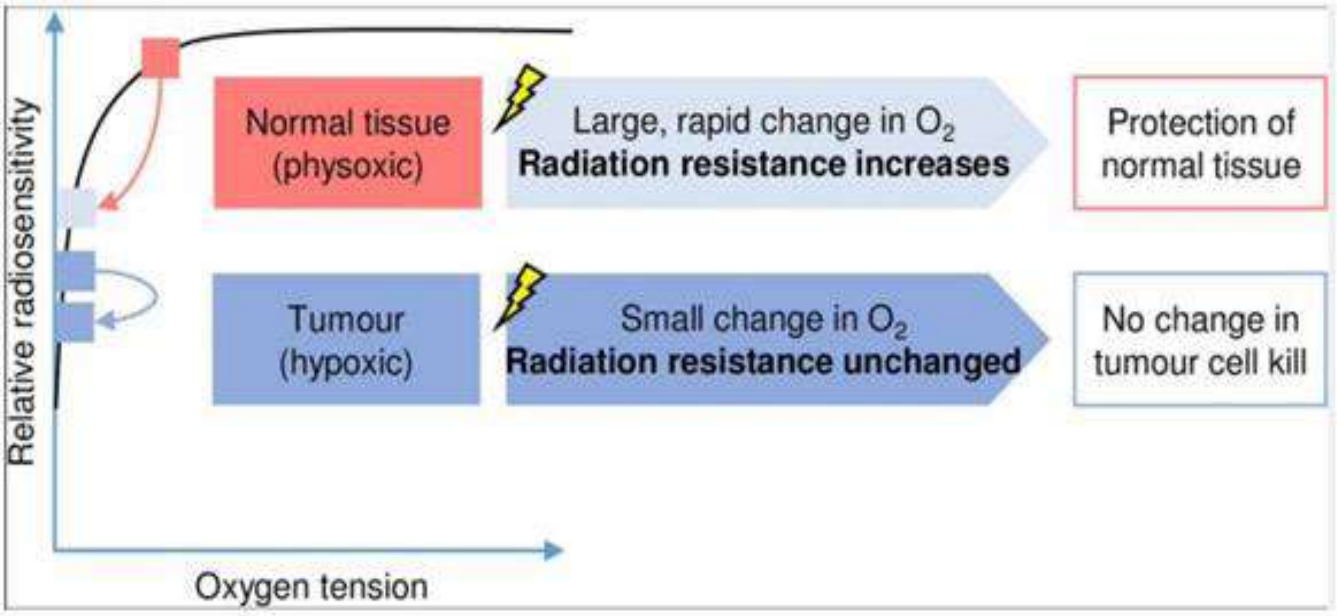

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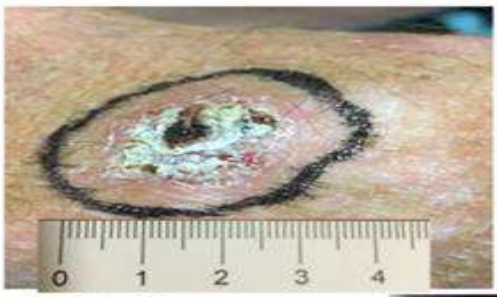
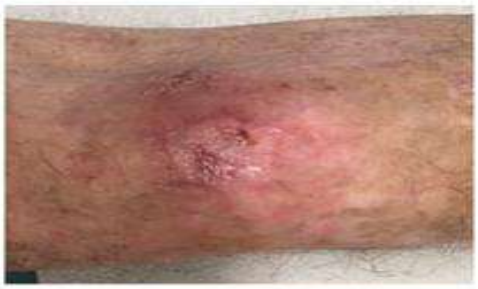
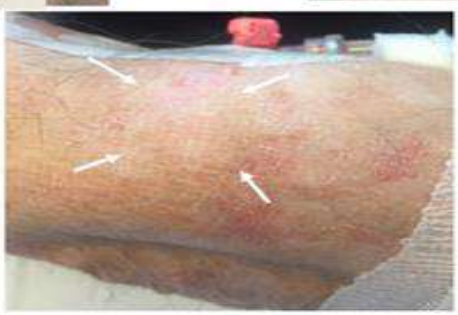
Figure 3: Clinical result of first patient treated with FLASH RT [6]



1a : Day 0

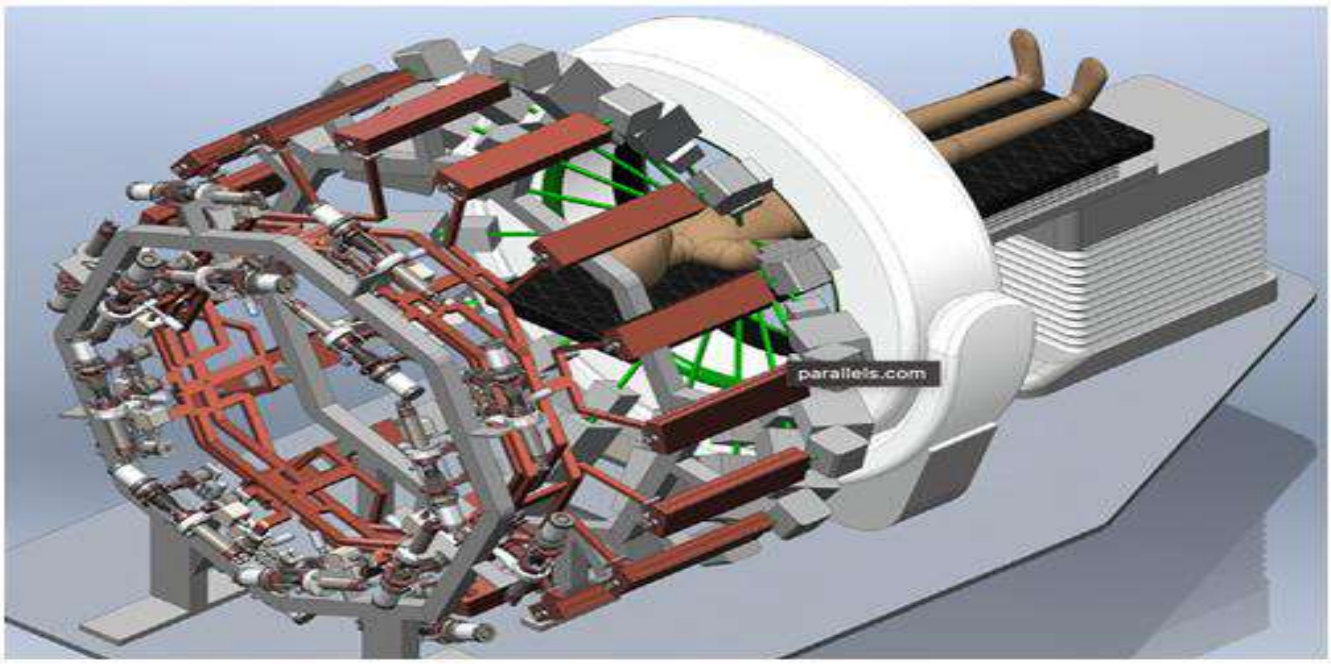


1b : 3 weeks



1c : 5 months

Figure 4: PHASER platform for delivery of FLASH RT [8]



Changing paradigm of radiation oncology post graduate teaching in India

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Opening the door , widening the horizon

It was an event . We gathered in the residents' room , all of us , all the residents ,to watch the video our senior Dr Bisth captured during his outside posting in AIIMS for 15 days . It was a video of the console monitor of a linear accelerator showing how MLCs move during IMRT . I know after one and half decade it might sound weird to new radiation oncology residents. Now there is hardly any resident who has not seen this including those working at the remotest place , if not live at least in the internet. That was a time , , limited access to internet and its contents . There were minimal interaction between departments . The residents used to depend completely on his or her departmental teaching program which we all know that varies according to the work load , exposure to modern equipments and many other things . There used to be few big conferences, very few skill development programs and few CMEs which was not very easy for a resident to attend most of the time and mostly the events were not meant for residents too . The lucky resident who got a chance to attend used to seat with a vacant look thinking about something else. The situation changed drastically with a fantastic initiative by AROI and ICRO . They started formal classes for residents. It opened up the door. Residents of different departments could interact with each other and could listen to the best teachers of India. For the first time a structured teaching program pan India started and it gradually increased and improved over time. This was the first step of opening the door.

IT revolution :From local to global

After the success story of ICRO many other institutes started teaching programs, which helped a lot of residents over time because ICRO teaching programs had limited capacity, there was need of having more classes like that. By that time internet became part and parcel of our life . There was revolution in IT industry and online educational contents became easily available . It started with Telemedicine program in some institutes , as for example SGPGI Lucknow and KGMU Lucknow were connected via telemedicine and the regular teaching classes , tumour board meetings and seminars were transmitted via internet and residents from both the institutes could attend that. But that too needed a lot of technological support and resource. The situation changed rapidly and people became more internet friendly and social media became an integral part of life. Different social media groups created and started discussing various topics and sharing educational material . The first generation of these kind of groups were web based or via email groups. I can remember few names like " Isocenter" and " Share knowledge" among those popular residents forums . Slowly it became easier and other App based platform started sharing educational material and extensive academic discussion started . Residents pan India and also abroad could communicate with each other and learn. Teachers also got involved in this and started sharing their views on various topics . Thus the informal sector of teaching and sharing knowledge started and keeping the pace AROI started online teaching Platform " Chartrounds India " in collaboration with "chartrounds USA " which became a very popular teaching platform rapidly . Physical teaching programs were also increasing substantially and more and more departments , organizations started conducting teaching and training programs for residents, even in big conferences organizers started allotting dedicated time for residents' teaching . And then this pandemic of COVID 19 started, stopping all physical academic activities but by that time people became smarter and more techno savvy

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Radiation Oncology community very rapidly shifted to virtual platforms and many people and groups started organizing classes for residents which were relatively easy to organize and more number of people could join the classes . After only few days of initial hiccups it became very easy to manage for both organizers and the participants. Nobody could imagine that morning rounds in Tata memorial hospital can be attended virtually from Nagaland or from Gujarat . It is exciting no doubt and it broke all the barriers , people gave lecture from the USA or from Europe and students from India, Bangladesh , Indonesis , Nepal attended together, this is phenomenal but with this a new problem arose . Problem of too many resources.

Tsunami of information , choosing wisely

It has now become a routine to get notification of multiple classes, webinar and web conferences in each single day . From paucity of information to too much of information can potentially create crisis.
First of all the web meetings are mixed bag , and mostly not structured teaching like ICRO classes or any academic event organized by a department or organization . Preparatory work sometimes minimal because of easy logistics. As getting acceptance from eminent faculties has become easy (They don't need to travel anymore, they can seat in their study and deliver their lecture) people are trying to discussed topics which are more complicated and may be appropriate for practitioners rather than residents . During residency the aim is mainly to teach a student the basics of oncology practice so that his or her practice is safe for the patient . After passing the exam the next few years are for fine tuning the knowledge , analyzing the available evidences meticulously , finding lacunae in published practices changing literatures and modifying the practice accordingly and also getting involved in research work more actively and independently . So the information a practitioner needs are a bit different than the students . The web based classes are not always targeting a particular group so sometimes the students may waste valuable time and energy attending lectures that may be less important for him or her . So here comes the importance of choosing wisely . Among multiple classes a students should be able to choose wisely which is important for him or her .

Patients care and clinical skills can not be downloaded or learned online

The most important aspect of this web based teaching is it has a potential to make a student self complacent and over confident. This can lead to neglect in clinical skill development . Medicine is based on skills and practical application of knowledge in real world not on theoretical knowledge gathered from virtual platform. Clinical skill development, spending more and more time with the patient, observing and participating more and more in patient management and care is the key to success to become a good clinician. The importance of working in his or her own department with utmost sincerity is what matters at the end of the day . The direct supervision and guidance of a teacher can never be replaced by online classes.

Balance is not something you find it is something you create

Over the past decade the PG teaching in India has seen a paradigm shift . Technology is no more a distant dream . All modern radiotherapy technology is available in India including Proton therapy . Both online and offline teaching has improved in quality and quantity . Formal classes by ICRO , AROI has increased in number ,simultaneously many other very enthusiastic radiation oncologists in Government and private sectors are organizing regular classes for students which are of top quality , at the same time online classes are plenty , social media has become a very important tool to share knowledge and thoughts . Now it's the time to strike a balance between theoretical knowledge gathering and developing clinical skills . Students must be involved as much as possible in patient care in his or her own department to develop clinical skills and communication skills. After the pandemic is over it seems online teaching will not fade away because of its convenience. The future looks bright. The technology is no more inaccessible, the study materials are abundant, there are online educational portals like "national Cancer grid online educational portal", online and offline classes ,

Changing paradigm of radiation oncology post graduate teaching in India

skill development programs and over time it is expected that it will become more structured , categorized ,and oriented . Now it's on the students to strike a balance and acquire the appropriate amount of information and blend it with skill to deliver best possible patient care . Radiation oncology community is increasing in size in India , more and more people are getting interested to teach and share knowledge . Now is the time to make India an educational hub for Radiation Oncology students from all over the world.

Obituary

Professor. Gurunath Kilara

17 January 1952 to November 2020

Professor Gurunath Kilara (LM-26) was born on 17th January 1952. He did his under graduation from St Johns Medical College and Postgraduation in Radiation Oncology from PGI Chandigarh.

He joined Kidwai Memorial Institute of Oncology as a faculty and worked till 1990 when he retired as Professor. During his stay at KMIO, he brought many modern radiotherapy practices in place, changed the scenario from radiology oriented and brought an identity to Radiotherapy. He also did his Leads fellowship.

He was one of the founder members of the first private Oncology center, 'The Bangalore Institute of Oncology'. He was the chief Radiation Oncologist at the Curie Institute of Oncology in the campus of St Johns Medical College between 1995 and 2007. Subsequently he became the Medical director of MSR HCG center and served till 2019 when he retired from active practice.

He has been a great teacher which was evident during the academic programmes both at MSR and HCG. He was an examiner to many students and encouraged them to rise to their maximum potential. He was known for his everlasting smile, elegant dress sense, oratory skills, ability to convey his points, interest in research and many more. In addition, he was a great singer and we all enjoyed his ghazals very much.

He was a part of organising many national and international conferences and gave many orations the latest during ICC at Bengaluru in 2017. He encouraged his younger colleagues to do more and more and guided them at right time to reach to greater heights.

He was committed to the subject and has many accomplishments to his credit. He did the first Iridium implant in India, brain brachytherapy, the first IMRT in Karnataka, stereotactic radiosurgery.

He was instrumental in linking all the physics departments of HCG chain of oncology centers under one Central physics. He took exceptional care and considered all the members of the center as a family which was evident during Christmas and new year celebrations.

He is survived by his wife Prof Nalini Kilara and two daughters. There are lots to learn from his illustrious life and he will be fondly remembered forever.

Radiotherapy in carcinoma pancreas Current trends

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Pancreatic ductal adenocarcinoma (PDAC) is one of those malignancies that carry a dismal prognosis with very limited available effective therapeutic options1,2. Adding to the aggressive biology of the disease, most of the patients present late with either in the loco-regionally advanced state (35-40% of patients) or with metastases (30-40% of patients) and only 20-25% of patients present with a resectable situation1. Management of PDAC is always being a challenge for clinicians with surgical resection is the only possible curative treatment1. However, even after surgical resection, recurrences occur within 6 months with distant failures are far more common and manifest as the first site of recurrence3. This indicates necessity of an additional systemic management in form of either an adjuvant treatment or neoadjuvant treatment (NAT). Over the several years neoadjuvant chemotherapy (NACT) has become an initial standard of treatment in PDAC, as it has inherent advantages in form of effective initial treatment for micrometastases, appropriate selection of responding patients for a relatively morbid surgery, and a lower rate of postoperative complications as compared with adjuvant treatment4.

Multi-agent chemotherapy comprising a combination of either 5-fluorouracil, oxaliplatin, irinotecan (FOLFIRINOX) or gemcitabine and nab-paclitaxel (GnP) has been the effective and widely accepted initial regimens 5,6. Historically, resection rates in locally advanced pancreatic cancer (LAPC) following FOLFIRINOX chemotherapy is the in range of 13-61%69. Resection rates with GnP appear to be lower as much of the literature on GnP has used a combination of GnP either with other chemotherapy agents or with external beam radiotherapy(EBRT)10,11.

A subgroup of LAPC patients shows a limited vascular encasement rendering them upfront unresectable or marginally resectable. The term marginally resectable pancreatic cancer was first proposed in 200112 and at present various consensus guidelines exist to define borderline resectable pancreatic cancer (BRPC)13~~1~~6. BRPC is defined on the basis of the degree of encasement with venous structures of superior mesenteric vein and portal vein as well with arterial structures of superior mesenteric artery, celiac artery and common hepatic artery. Adequate sequential treatment of BRPC is still debatable with high chances of getting a positive margin with an upfront surgical resection5,17.

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However, the role of NAT consisting of either NACT alone or with EBRT(NACT-RT), has been evaluated in multiple historical series and their meta-analyses have shown a resection rate of 33-76% post NAT1820. Even though the R0 resection rate was higher in the range of 79-84%, the reported median overall survival (OS) was still not encouraging (10 to 18 months)1820.

Following the recent advancements in systemic treatment protocols specifically with evolution of FOLFIRINOX 21, along with technological advancements in the delivery of EBRT 22 led a significant improvement in clinical outcomes. The earliest reported evidence is from a prospective, multicenter, feasibility study of 14 member institutes of the National Clinical Trials Network23. Alliance A021101 trial evaluating 4 cycles of FOLFIRINOX (FOLFIRINOX) followed by capecitabine and 50.4 Gy in 28 fractions of EBRT, prior to pancreatectomy has shown resection rate of 68% with R0 resection of 93%. Median OS was 21.7 months. Another study evaluating the role of total neo-adjuvant treatment in the setting of BRPC has shown a promising result. In this study, 48 patients had received 8 cycles of FOLFIRINOX followed by response assessment24. Those who showed resolution of vascular involvement had received short course EBRT (25 Gy in 5 fractions) along with concurrent capecitabine (27 patients, 56%) and those who had a persistent vascular involvement received long course EBRT (50.4 Gy in 28 fractions) with concurrent capecitabine or 5-FU (17 patients, 35%). R0 resection was observed in 97% (n=31) of patients who had undergone surgery (n=32). Median progression free survival (PFS), 2 years PFS and 2 years OS were 14.7 months and 48.6 months, 43% and 55%, 56% and 72% amongst all eligible patients and all patients who had undergone resection respectively. The median OS of the entire population was 37.7 months longer than that of the historical series.

Apart from FOLFIRINOX, gemcitabine-based chemo-radiotherapy has been studied extensively in the neoadjuvant setting for BRPC. The first randomized trial comparing neoadjuvant gemcitabine and cisplatin-based chemotherapy and EBRT followed by surgery with upfront surgery followed by adjuvant gemcitabine-based chemotherapy showed that NACT-RT is safe in terms of toxicity, peri-operative morbidity and mortality25. No difference in OS was demonstrated; however, the study was terminated early due to slow accrual. Another phase II/ III multicenter randomized study from Korea where patients with BRPC were randomized to neo-adjuvant gemcitabine-based chemotherapy with EBRT followed by surgery and upfront surgery followed adjuvant chemo-radiotherapy have shown that R0 resection rates and 2 year median OS was significantly higher in NACT-RT arm 51.8 versus 26% and 21 months versus 12 months respectively26. Another study from Dutch pancreatic cancer group randomizing 246 resectable and BRPC patients in two arms of neoadjuvant 3 cycles of gemcitabine-chemotherapy with EBRT (36 Gy in 15 fractions) prior to surgical resection followed by 4 cycles of adjuvant gemcitabine and to second arm of upfront surgery followed by 6 cycles of adjuvant gemcitabine27. Median OS with intention to treat analysis was 16 months in NACT-RT arm versus 14.3 months in immediate surgery arm (p=0.096). R0 resection rates, disease free survival, loco-regional failure free interval, pathologically positive nodal rate, perineural invasion and venous invasion were significantly better with NACT-RT. Along with that a subgroup analysis has shown that median OS of patients who underwent tumor resection and started adjuvant gemcitabine was significantly higher in NACT-RT arm (35.2 v 19.8 months; P=.029). Therefore, NAT is an acceptable initial treatment approach in BRPC and NCCN 2019 recommends the use of NAT 28. Advancements in delivery radiation with more conformal coverage of target volume and relative sparing of adjacent dose-limiting critical organs led investigators to use hypofractionated schedules in management of vast majority of cancers including abdominal malignancies. Stereotactic radiosurgery (SRS) and stereotactic body radiotherapy (SBRT) are amongst those techniques that allow delivery of higher dose per fraction in either single or limited 2-5 fractions. SBRT has advantages over long course radiotherapy in form of quickly delivery of an effective local treatment and limiting off chemotherapy time and better tolerance with limited target volume29. Large body of evidence for use of SBRT in PDAC comes from unresectable LAPC. Historically various fractionation schemes have been used from 25Gy in single fraction to 25-33Gy in 5

Radiotherapy in carcinoma pancreas Current trends

fractions. Reported 1 year local control was in the range of 61-100%, with acceptable grade 3 or more toxicity30,32.

Data is emerging in support of SBRT even in BRPC patients. A retrospective experience from Lee Moffitt cancer center, using simultaneous integrated boost (SIB) technique 5-6 Gy per fraction was delivered to the tumor and area surrounding the vessel encasement was given a higher 7-10Gy per fraction33. SBRT was delivered following NACT in non-metastatic LAPC (n=16, 22%) and BRPC patients (n=57, 78%) in 5 consecutive daily doses. Following SBRT, 56.1% of BRPC patients had surgical resection and R0 resection was observed in 96.9% patients. BRPC patients who had R0 resection showed a significantly longer median OS (19.3 versus 12.3 months; p=03), 1-year OS (84.2% versus 58.3%; p=.03), and 1-year PFS (56.5% versus 25.0%; p<0.0001). Late ≥ grade 3 toxicity was 5.3%. An updated analysis was published subsequently in 201534. In 159 patients with 110 BRPC, resection rate was 51% and R0 resection was observed in 91% patients. Median OS was 34.2 months in surgically resected patients. Those patients who had received FOLFIRINOX chemotherapy had underwent R0 resection more often than other chemotherapy recipients (5 of 21 vs. 0 of 28, p=0.011).

The combination of more effective chemotherapy in form of either FOLFIRINOX or GnP along with modern EBRT technique in form SBRT appears to be feasible and likely to provide optimal clinical outcomes. However, optimal chemotherapeutic regimen, adequate SBRT dosages, timing of surgery following NAT needs to be addressed. Ongoing studies likely to give a further insight in the effective management of BRPC35,37.

Conclusion:

Effective chemotherapy regimen along with modern radiotherapy has shown significantly higher resectability rates in borderline resectable pancreatic cancer resulting in improvement in clinically meaningful outcomes.

References:

1. Heestand GM, Murphy JD, Lowy AM. Approach to patients with pancreatic cancer without detectable metastases. J Clin Oncol. 2015;33(16):1770-1778. doi:10.1200/JCO.2014.59.7930.
2. Saif MW. Pancreatic Neoplasm in 2011: An Update. JOP J Pancreas. 2011;12(4):316-321. doi:10.6092/1590-8577/3071.
3. Gnerlich JL, Luka SR, Deshpande AD, et al. Microscopic margins and patterns of treatment failure in resected pancreatic adenocarcinoma. Arch Surg. 2012;147(8):753-760. doi:10.1001/archsurg.2012.1126.
4. Cheng TY, Sheth K, White RR, et al. Effect of neoadjuvant chemoradiation on operative mortality and morbidity for pancreaticoduodenectomy. Ann Surg Oncol. 2006;13(1):66-74. doi:10.1245/ASO.2006.02.003.
5. Oba A, Ho F, Bao QR, Al-Musawi MH, Schulick RD, Chiaro M Del. Neoadjuvant Treatment in Pancreatic Cancer. Front Oncol. 2020;10:245. doi:10.3389/fonc.2020.00245.
6. Suker M, Beumer BR, Sadot E, et al. FOLFIRINOX for locally advanced pancreatic cancer: a systematic review and patient-level meta-analysis. Lancet Oncol. 2016;17(6):801-810. doi:10.1016/S1470-2045(16)00172-8.
7. Barenboim A, Lahat G, Geva R, et al. Neoadjuvant FOLFIRINOX for locally advanced and borderline resectable pancreatic cancer: An intention to treat analysis. Eur J Surg Oncol. 2018;44(10):1619-1623. doi:10.1016/j.ejso.2018.07.057.
8. Byun Y, Han Y, Kang JS, et al. Role of surgical resection in the era of FOLFIRINOX for advanced pancreatic cancer. J Hepatobiliary Pancreat Sci. 2019;26(9):416-425. doi:10.1002/jhbp.648.
9. Nanda RH, El-Rayes B, Maithel SK, Landry J. Neoadjuvant modified FOLFIRINOX and chemoradiation therapy for locally advanced pancreatic cancer improves resectability. J Surg Oncol. 2015;111(8):1028-1034. doi:10.1002/jso.23921.
10. Reni M, Balzano G, Zanon S, et al. Phase 1B trial of Nab-paclitaxel plus gemcitabine, capecitabine, and cisplatin (PAXG regimen) in patients with unresectable or borderline resectable pancreatic adenocarcinoma. Br J Cancer. 2016;115(3):290-296. doi:10.1038/bjc.2016.209.
11. Reni M, Zanon S, Balzano G, et al. A randomised phase 2 trial of nab-paclitaxel plus gemcitabine with or without capecitabine and cisplatin in locally advanced or borderline resectable pancreatic adenocarcinoma. Eur J Cancer. 2018;102:95-102. doi:10.1016/j.ejca.2018.07.007.
12. Mehta VK, Fisher G, Ford JA, et al. Preoperative Chemoradiation for Marginally Resectable Adenocarcinoma of the Pancreas. J Gastrointest Surg. 2001;5(1):27-35. doi:10.1016/S1091-255X(01)80010-X.
13. Bockhorn M, Uzunoglu FG, Adham M, et al. Borderline resectable pancreatic cancer: A consensus statement by the International Study Group of Pancreatic Surgery (ISGPS). Surg (United States). 2014;155(6):977-988. doi:10.1016/j.surg.2014.02.001.
14. Callery MP, Chang KJ, Fishman EK, Talamonti MS, William Traverso L, Linehan DC. Pretreatment assessment of resectable and borderline resectable pancreatic cancer: Expert consensus statement. In: Annals of Surgical Oncology. Vol 16. Springer; 2009:1727-1733. doi:10.1245/s10434-009-0408-6.
15. Katz MHG, Pisters PWT, Evans DB, et al. Borderline Resectable Pancreatic Cancer: The Importance of This Emerging Stage of Disease. J Am Coll Surg. 2008;206(5):833-846. doi:10.1016/j.jamcollsurg.2007.12.020.
16. Tempero MA, Malafa MP, Al-Hawary M, et al. Pancreatic adenocarcinoma, version 2.2017: Clinical practice guidelines in Oncology. JNCCN J Natl Compr Cancer Netw. 2017;15(8):1028-1061. doi:10.6004/jnccn.2017.0131.
17. Vadgaonkar R, Talapatra K. Resurgence of role of radiotherapy in neoadjuvant treatment of pancreatic cancer. J Curr Oncol. 2019;2(1):19. doi:10.4103/jco.jco_23_18.
18. Versteijne E, Vogel JA, Besselink MG, et al. Meta-analysis comparing upfront surgery with neoadjuvant treatment in patients with resectable or borderline resectable pancreatic cancer. Br J Surg. 2018;105(8):946-958. doi:10.1002/bjs.10870

Radiotherapy in carcinoma pancreas Current trends

19. Dhir M, Malhotra GK, Sohal DPS, et al. Neoadjuvant treatment of pancreatic adenocarcinoma: A systematic review and meta-analysis of 5520 patients. World J Surg Oncol. 2017;15(1). doi:10.1186/s12957-017-1240-2.

20. Gillen S, Schuster T, Büschenfelde CM Zum, Friess H, Kleeff J. Preoperative/neoadjuvant therapy in pancreatic cancer: A systematic review and meta-analysis of response and resection percentages. PLoS Med. 2010;7(4). doi:10.1371/journal.pmed.1000267.

21. Conroy T, Desseigne F, Ychou M, et al. Randomized phase III trial comparing FOLFIRINOX (F: 5FU/leucovorin [LV], irinotecan [I], and oxaliplatin [O]) versus gemcitabine (G) as first-line treatment for metastatic pancreatic adenocarcinoma (MPA): Preplanned interim analysis results of the PRODIGE 4/ACCORD 11 trial. J Clin Oncol. 2010;28(15_suppl):4010-4010. doi:10.1200/jco.2010.28.15_suppl.4010.

22. Chapman BC, Gleisner A, Rigg D, et al. Perioperative outcomes and survival following neoadjuvant stereotactic body radiation therapy (SBRT) versus intensity-modulated radiation therapy (IMRT) in pancreatic adenocarcinoma. J Surg Oncol. 2018;117(5):1073-1083. doi:10.1002/jso.25004.

23. Katz MHG, Shi Q, Ahmad SA, et al. Preoperative modified FOLFIRINOX treatment followed by capecitabine-based chemoradiation for borderline resectable pancreatic cancer alliance for clinical trials in oncology trial A021101. JAMA Surg. 2016;151(8). doi:10.1001/jamasurg.2016.1137.

24. Murphy JE, Wo JY, Ryan DP, et al. Total neoadjuvant therapy with FOLFIRINOX followed by individualized chemoradiotherapy for borderline resectable pancreatic adenocarcinoma: A phase 2 clinical trial. JAMA Oncol. 2018;4(7):963-969. doi:10.1001/jamaoncol.2018.0329.

25. Golcher H, Brunner TB, Witzigmann H, et al. Neoadjuvant chemoradiation therapy with gemcitabine/cisplatin and surgery versus immediate surgery in resectable pancreatic cancer. Strahlentherapie und Onkol. 2015;191(1):7-16. doi:10.1007/s00066-014-0737-7.

26. Jang JY, Han Y, Lee H, et al. Oncological Benefits of Neoadjuvant Chemoradiation With Gemcitabine Versus Upfront Surgery in Patients With Borderline Resectable Pancreatic Cancer: A Prospective, Randomized, Open-label, Multicenter Phase 2/3 Trial. Ann Surg. 2018;268(2):215-222. doi:10.1097/SLA.0000000000002705.

27. Versteijne E, Suker M, Groothuis K, et al. Preoperative Chemoradiotherapy Versus Immediate Surgery for Resectable and Borderline Resectable Pancreatic Cancer: Results of the Dutch Randomized Phase III PREOPANC Trial. J Clin Oncol. 2020;38(16):1763-1773. doi:10.1200/JCO.19.02274.

28.NCCN Clinical Practice Guidelines in Oncology. https://www.nccn.org/professionals/physician_gls/default.aspx. Accessed December 18, 2020.

29. Ghaly M, Gogineni E, Saif MW. The Evolving Field of Stereotactic Body Radiation Therapy in Pancreatic Cancer. Pancreas Open J. 2019;3(1):9-14. doi:10.17140/poj-3-110.

30. Koong AC, Le QT, Ho A, et al. Phase I study of stereotactic radiosurgery in patients with locally advanced pancreatic cancer. Int J Radiat Oncol Biol Phys. 2004;58(4):1017-1021. doi:10.1016/j.ijrobp.2003.11.004.

31. Mahadevan A, Miksad R, Goldstein M, et al. Induction gemcitabine and stereotactic body radiotherapy for locally advanced nonmetastatic pancreas cancer. Int J Radiat Oncol Biol Phys. 2011;81(4). doi:10.1016/j.ijrobp.2011.04.045.

32. Moningi S, Dholakia AS, Raman SP, et al. The Role of Stereotactic Body Radiation Therapy for Pancreatic Cancer: A Single-Institution Experience. Ann Surg Oncol. 2015;22(7):2352-2358. doi:10.1245/s10434-014-4274-5.

33. Chuong MD, Springett GM, Freilich JM, et al. Stereotactic body radiation therapy for locally advanced and borderline resectable pancreatic cancer is effective and well tolerated. Int J Radiat Oncol Biol Phys. 2013;86(3):516-522. doi:10.1016/j.ijrobp.2013.02.022.

34. Mellon EA, Hoffe SE, Springett GM, et al. Long-term outcomes of induction chemotherapy and neoadjuvant stereotactic body radiotherapy for borderline resectable and locally advanced pancreatic adenocarcinoma. Acta Oncol (Madr). 2015;54(7):979-985. doi:10.3109/0284186X.2015.1004367.

35. SBRT Pre-operatively for Pancreatic Cancer - Full Text View - ClinicalTrials.gov. https://clinicaltrials.gov/ct2/show/NCT02308722. Accessed December 20, 2020.

36. Borderline Pancreas Study: FOLFIRINOX +SBRT - Full Text View - ClinicalTrials.gov. https://clinicaltrials.gov/ct2/show/NCT01992705. Accessed December 20, 2020.

37. Katz MHG, Ou FS, Herman JM, et al. Alliance for clinical trials in oncology (ALLIANCE) trial A021501: Preoperative extended chemotherapy vs. chemotherapy plus hypofractionated radiation therapy for borderline resectable adenocarcinoma of the head of the pancreas. BMC Cancer. 2017;17(1):1-8. doi:10.1186/s12885-017-3441-z.

Important

AROI Directory

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CONFERENCES

12th SRMS Contouring Classes
7th – 8th November, 2020, Bareilly

Update from : Dr. Piyush Kumar

In prevailing Covid pandemic, conducting a workshop was a challenging task. The workshop was divided into two sessions, one week apart, conducted on 31st October-1st November and 7th – 8th November, 2020. The theme was "Contouring of Head & Neck Malignancies". The workshop aims to teach faculty and residents about the latest radiotherapy techniques.

Dr. Piyush Kumar, Professor and Head of Department was Course Chairman and

Dr. Arvind Kumar Chauhan (Professor), Dr. Pavan Kumar (Asso Prof) & Dr. Ayush Garg (Asst Prof) were Course Coordinators. Senior Resident and Junior Residents from S. N. Medical College (Agra) and KGMC (Lucknow) attended this workshop.

At the end of this workshop the delegates were able to identify the normal structures and OARs of Head & Neck. Moreover the delegates were able to delineate various clinical target volumes of Head & Neck region.

The Medical Physics team demonstrated the IMRT planning of Cancer Pyriform Fossa which was followed by the live demonstration of delivery of Radiotherapy by IGRT technique. The delegates appreciated the efforts taken by the Medical Physics and technical team to come on a holiday and provide a visual impact of the IMRT and IGRT technique.

The Instructors for the course were Dr. Vishwadeep Mishra and Dr. Ankita Mehta (Senior Resident) along with four tutors Dr. S. K. Azharuddin, Dr. Naina Gupta, Dr. Prachi Upadhyay and Dr. Rashmi Yadav.

The workshop was well appreciated by delegates and the feedback was very motivating. The resident from Lucknow Dr. Shwetima, who attended this contouring session for the 2nd time, commented "Attending contouring classes helps a lot to understand the basics of contouring. It improves our knowledge and the effort given by faculty, JRs and SRs are appreciable. I would like to attend future classes.".

With every forthcoming session, the department is trying to improvise on the contents of practical teaching. A compact disk consisting of a collection of relevant books, articles and contouring guidelines is also being provided to the delegates along with a booklet for reference.

WEBINARS

1st FARO webinar on "Radiation Oncology Services in Asia"

25th SEP 2020

Update from : Dr. Ajeet Kumar GAndhi

The Federation of Asian Organizations for Radiation Oncology (FARO) has been the guiding force for bridging communication and sharing expertise amongst radiation oncologist professional throughout Asia since 2014. The COVID-19 pandemic has brought multiple challenges for the delivery of healthcare with several common as well as diverse issues unique to the countries. The unprecedented circumstances have led to adoption of changes in radiation therapy services by centres across the globe to safeguard the patients as well as physicians, physicists, technologists and staffs. The FARO council envisioned this webinar series on "Radiation Oncology services in Asia" with an aim to strength the communication amongst radiation oncology professionals throughout the Asia who are facing adversity in the wake of COVID-19 pandemic.

The 1st FARO webinar series was conducted on 25th September 2020 with participation from representatives of radiation oncology association of India, Singapore, China, Myanmar, Bangladesh, Japan and Malaysia. The session started at 17:00 Hrs IST with introductory remarks by Prof Shyam Shrivastava (President of FARO) followed by opening comments from FARO moderator Prof Miriam Calaguas from Philippines (Vice President of FARO). This was followed by presentation by each country representative and ended with closing remarks from moderators. Dr Ajeet Gandhi (Associate professor, Radiation Oncology, Dr RMLIMS, Lucknow) presented on behalf of AROI under the mentorship of Dr Rajesh Vasishta (AROI President), Prof GV Giri (AROI Secretary General) and Prof Manoj Gupta (AROI-President Elect). This was attended by more than 500 participants from different countries.

AROI presentation was done on "Strategic changes and adaptation of radiation oncology services amidst COVID-19 pandemic: Indian Perspective". This was based on the collected data from 256 institutions in the form of a questionnaire to understand the challenges and adaptation faced by different centres across India. Each FARO member country has been facing challenges of their own kind and in this context, the FARO webinar series on "Radiation Oncology Services in Asia during COVID-19 pandemic era" has been an excellent initiative by the FARO council. This webinar highlighted the specific issues faced by each country and this exchange of information have surely helped us in learning safe and effective radiotherapy options amidst COVID-19 pandemic from each other for the benefit of our patients as well as radiation oncology community.

WEBINARS

35th ICRO SUN PG TEACHING PROGRAMME - 2020

5th SEP 2020

Update from : Dr. Ajeet Kumar GAndhi

The AROI-ICRO Executive committee decided to teach our PG students in the form of WEBINARS which is the new normal in teaching now. In this context the 35th ICRO SUN PG Teaching Program is being conducted as a Webinar on Brachytherapy for 2nd year and 3rd year MD /DNB Radiation Oncology Students to participate.

Brachytherapy is considered to be an ultimate form of Conformal Radiation therapy.Brachytherapy fulfils all the goals of modern day radiotherapy in terms of favorable efficacy and reduced toxicity. Brachytherapy treatment is now available with the state-of-the-art technology, high patient acceptability, cost-effectiveness, and a personalized treatment approach, proves to be a preferred mode of treatment.

The 35th ICRO SUN PG Teaching Webinar is designed in such a way that students can understand the basics as well as the advancements in Brachytherapy for different sites. They can also have live interactions with the Faculties who are experts in the field of Brachytherapy during the webinar and get their queries answered.

We chose the 29th, 30th and 31st of October 2020 for the program, three consecutive days and six lectures everyday and planned from 5.00pm to 8.00 pm. While there were many Webinars being done every other day in India, We had an astonishing 200 paid registrations including students from FARO countries like Indonesia and Srilanka.

This Webinar covered the basic Radiobiology and Brachy physics aspects along with the recent advancements in Cervical Cancer Brachytherapy on day one. The next day,advancements in Brachytherapy of Breast and Head & Neck Cancers with video demonstrations of implant procedures was done. On the final day we covered the role of Brachytherapy in GI Malignancies, Extremity Sarcomas, Prostate and in Paediatric population.

It was designed in such a way that the students sit at home and learn about BRACHYTHERAPY which would help them to perform well in their Examinations.

All the speakers did an excellent job and the participants were very happy and interactive and were firing questions for every lecture. The final day we organised the ICRO Quiz and selected the top three and they will be honoured in our next Annual National Conference of AROI apart from being sponsored completely to attend the Conference.

Winners were:

First-Dr. Ayesha Zulaiha A, AIIMS, New Delhi.

Second-Dr.Megha Prem Paramban, Medical College, Kozhikode.

Third-Dr. Tasneem Taiyabbhai Nalawala, GCRI, Ahmedabad.

The three day Webinar ended in a happy note with all the lectures completed on time and lots of appreciations from the students saying that they are looking forward to such programmes.

Last but not the least our sincere thanks go to Mr.Arvind Suri, SUN oncology who was a strong pillar of support in doing this Webinar and to Webstream World Communications.

Important

AROI Directory

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Nutrition Song by - Dr. Kanhu Charan Patro

NUTRITION NUTRITION NUTRITION
VERY IMPORTANT DURING RADIATION [1]
BEFORE RADIATION ASSESSMENT
DURING RADIATION MANAGEMENT
POST RADIATION SURVEILLANCE
ALL ARE IMPORTANT GUIDANCE [2]
MIXED CAUSES IN NUTRITIONAL ALTERATION
LOCAL FACTORS DUE TO RADIATION
CONCURRENT CHEMO ADDS VOMITING AND SENSATION
SYSTEMIC FACTORS DUE TO TUMORIZATION [3]
MUCOSITIS, DYSPHAGIA AND ASPIRATION
XEROSTOMIA, DYSGEUSIA IN ADDITION
CREATE PROBLEM FOR NUTRITION
THAT HAPPENS DURING RADIATION [4]
ASK THE PATIENT TO DRINK WATER
COUGHING IS A SIGN TO SUFFER [5]
COUGHING IS A SIGN OF ASPIRATION
NEEDS THE FEEDING TUBE INSERTION [6]
EVERYDAY WEIGHT MEASUREMENT
IT IS THE ONE STEP NUTRITION MANAGEMENT [7]
TRY TO MAINTAIN A DIET CHART
IT SHOULD BE IN THE RADIATION CART [8]
PATIENT NEED HIGH PROTEIN DIET
NO NEED TO RESTRICT FAT & CARBOHYDRATE [9]
EGG, NUTS, PANEER, CHICKEN AND MUTTON
THESE ARE THE HIGH PROTEIN NUTRITION [10]
THE ROLE OF GLUTAMINE IS NOT FOR SURE
SOME STUDIES SHOWED MUCOSITIS CURE [11]
MULTIVITAMIN AND MINERALS
NOT RECOMMENDED MORE THAN ALLOWANCES [12]
WHEN MUCOSITIS HINDERS THE FLOW
TO DRINK BEST USE A STRAW [13]
PROTEIN NEED IS ONE GM PER KG PER DAY
ENERGY IS 30 CALORIE PER KG PER DAY [14]
THERE ARE VARIOUS ASSESSMENT TOOLS
ANY ONE IS OK FOR TO KEEP YOU COOL [15]
TRY TO AVOID PARENTAL NUTRITION
NOTHING CAN REPLACE ENTERAL NUTRITION [16]
ANOTHER FACTOR IS ORAL CANDIDIASIS
NEEDS ANTIFUNGAL TO ERADICATE THIS CRISIS [17]
PERIODIC GARGLING IS REQUIRED FOR HYGIENE
TRY MAGIC MOUTH WASH OR BENZYDAMINE [18]
SODA SALT GARGLE DISSOLVES THE STICKY SUBSTANCE
TOPICAL ANESTHETICS HAS ITS OWN IMPORTANCE [19]

Nutrition Song by - Dr. Kanhu Charan Patro

ANOTHER SEQUEL IS ELECTROLYTE IMBALANCE
NEEDS DURING AFTER RADIATION SURVEILLANCE [20]
OAR AND TARGET HINDER NUTRITION
NEEDS EXTRA CARE DURING DELINEATION [21]
MEDIAL BORDER AT MEDIAL OF CAROTID
NODAL CONTOURING ARTICLES ARE THE GUIDE [22]
KEEP UPPER BORDER AT C1 TRANSVERSE IN L2 NODE
UNLESS YOU ARE TREATING RP NODE [23]
WHEN ADDRESSING RETROPHARYNGEAL NODE
DO NOT INCLUDE MEDIAL RETROPHARYNGEAL NODE [24]
BOT, SUPRAGLOTTIS AND CONSTRICTORS
THEY ARE SWALLOWING SUPPORTERS [25]
PAROTID IS NOT THE ONLY MOIST TARGET
OTHER MOIST STRICTURES ARE NOT TO FORGET [26]
IF YOU WANT TO IMPROVE THE NUTRITION
TRY TO IMPROV
E PLAN OPTIMIZATION [27]
OC, VC AND PC
PLEASE COUNT ON CC [28]
STILL, THERE IS A VALUE OF MIDLINE BLOCK
IN 2D PLANNING TRY TO USE THAT BLOCK [29]
TRY TO COLLAPSE THE BRIDGE OVER VC & PC
IMPORTANT DURING NON-LARYNGOPHARYNX [30]
PLANNING TUMORS OF NON-ORAL CAVITY
AVOID LOW DOSE SPILLAGE OVER ORAL CAVITY [31]
WE SHOULD NOT BE HAPPY WITH IMRT
HOPE WE WILL PLAN DO IMRT [32]
TAKE CARE OF THE NUTRITION DURING RADIATION
WEIGHT LOSS FORCES ADAPTIVE RADIATION [33]
SWALLOWING EXERCISES DURING AND AFTER RADIATION
YOU TUBE DEMO GIVES BETTERVISUALIZATION [34]
MENDELSHON, MASAKO AND SHAKER MANEUVERS
THESE EXERCISES INCREASE NUTRITION TURNOVERS [35]
IMPORTANT POST RT SURVEILLANCE
CORRECT THE FLUID ELECTROLYTE IMBALANCE [36]
XEROSTOMIA AND POST CRICOID STENOSIS
THESE ARE THE IMPORTANT LATE CRISIS [37]
ARTIFICIAL SALIVA, PILOCARPINE AND STIMULATION
SOME PATIENTS NEED ENDO DILATATION [38]
RESTRAIN YOURSELF GIVING MORE CONSTRAIN
OTHERWISE TUMOR WILL SUSTAIN [39]
NUTRITION NUTRITION NUTRITION
VERY IMPORTANT DURING RADIATION [40]

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HOD, Radiation Oncology
Mahatma Gandhi Cancer Hospital & Research Institute
Viskhapatnam

Awards

WINNERS OF FELLOWSHIPS 2019

Note – Due to the pandemic of Covid -19 time limit to complete fellowship was extended for one year, all are requested to complete their fellowship before July 2021

Above 50 Years Fellowship	
• **Dr Manish Gairola**	Rajiv Gandhi Cancer Institute & Research Centre,Sector-5 Rohini, New Delhi-110085
• **Dr. Pamela Alice Jeyraj**	Christian Medical College & Hospital, Ludhiana- 141008
Waiting	
• **Dr Suparna Gosh**	Calcutta National Medical College & Hospital Kolkata
Fellowship (40-50 years)	
• **Dr Sunil Chaudhary**	Institute of Medical Sciences Varanasi -221005
• **Dr Gautam K Sharan**	M N B Cancer Institute,Inlaks & Budhrani Hospital Koregaon Park, Pune
Fellowship (35-40 years)	
• **Dr Supriya Mallick**	AIIMS-New Delhi
• **Dr Abhishek Basu**	R. G. Kar Medical College & Hospitals, Kolkata
• **Dr Tiranjan Basu**	HCG Cancer Centre,Borivali (W), Mumbai
Waiting	
• **Dr Divya Khosla-**	PGIMER, Chandigarh
Fellowship (30-35years) Overseas	
• **Dr Ayush Garg**	Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly
• **Dr Ritika Harjani**	P. D. Hinduja Hospital, Mumbai
• **Dr Soumya Pruthviraj**	Vadamalayan Integrated Cancer Centre, Madurai.
• **Dr Rohit Singareddy**	Indo American cancer hospital and research institute, Hyderabad
Waiting	
• **Dr Koustav Majumder**	Mohonananda cancer hospital Durgapur

Awards

WINNERS OF FELLOWSHIPS 2019

Note – Due to the pandemic of Covid -19 time limit to complete fellowship was extended for one year, all are requested to complete their fellowship before July 2021

Less Than 35 years within India	
• **Dr Subeera Khan**	GMCH, Nagpur ,Maharashtra
Waiting	
• **Dr Saikat Bhowal-**	PGIME&R Chandigarh
Neil Joseph Fellowship	
• **Dr Ajitesh Aviash**	A.H.R.C.C., Cuttack
• **Dr Kuntal Ray**	R.G. Kar Medical College, Kolkata – 700004
• **Dr Hambir Chaudhary**	R G Kar Medical College & Hospital, Kolkata
• **Dr Bhanu Vashishta**	CMC Medical college & Hospital, Ludhiana
• **Dr Kavita Sherawat**	MAMC & LNH, Delhi
• **Dr Kumar Prabhat**	MAMC & LNH, Delhi
• **Dr Ankita Mehta**	Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly
• **Dr Arya Pradhan**	A.H.R.C.C., Cuttack
Waiting	
• **Dr Nidhi Sharma**	AIIMS Rishikesh
• **Dr Vinod Kumar Selvaraj**	Basavatarakam Indo American Cancer Hospital and Research Institute, Hyderabad
Fellowship -Medical Physicist	
• **Mr. Gaganpreet Singh**	PGIMER, Chandigarh

UPCOMING…

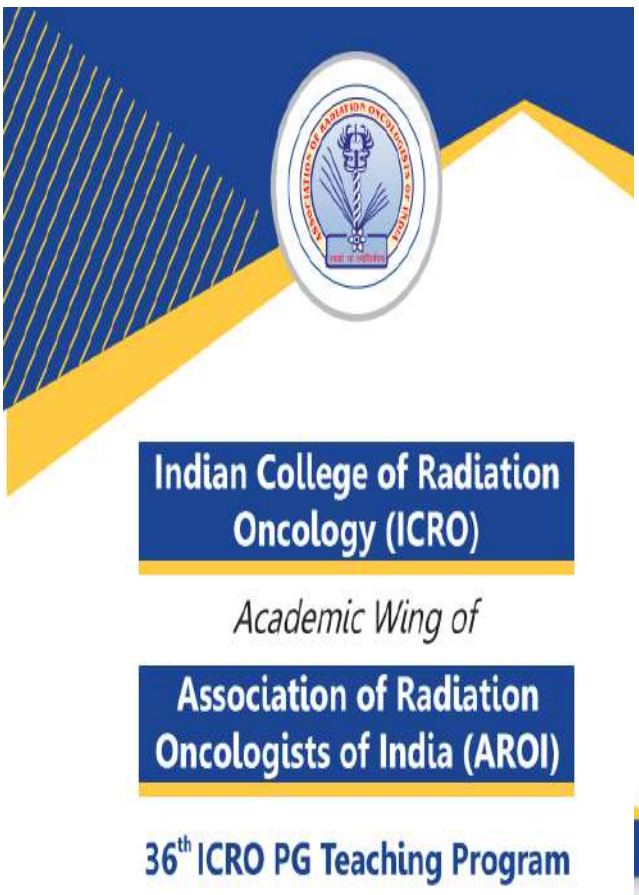
AROI-ICRO TEACHING PROGRAM -2021		
PROGRAM	**PLACE**	**ORGANIZERS**
AROI ICRO SUN -2021	AIIMS, Rishikesh	Dr. Manoj Gupta
	Sri Shankara Hospital Bangalore	Dr. G V Giri
	MGM Med College, Indore	Dr. Preety Jain
PRODVANCE- 2021	SZ-MIOT, Chennai	Dr. V.Srinivasan
	EZ -AHRCC, Cuttack	Dr. S N Senapati
	WZ-Kokilaben Dhirubhai Ambani Hospital and Medical Research Institute	Dr. Kaustav Talaptra
	NZ -Army hospital RR Delhi cantonment, NewDelhi	Dr.(Col.) Ashok Kumar
Radiobiology -2021	EZ -Paras Hospital Patna	Dr. Shekar Khesri
	WZ-SMS, Jaipur	Dr. Shantanu Sharma
	NZ-AIIMS, Rishikesh	Dr. Manoj Gupta
	SZ-MVRCC, Calicut	Dr. Dinesh Makuny
AROI ESTRO ADVANCED TECHNOLOGY COURSE 2021	Apollo Hospital, Kolkata	Dr. Tanweer Sahid
Best of ASTRO 2021	Ruby Hall, Pune	Dr. Sumit Basu
Medical Physics Class	March 1st Week (Tentative)	

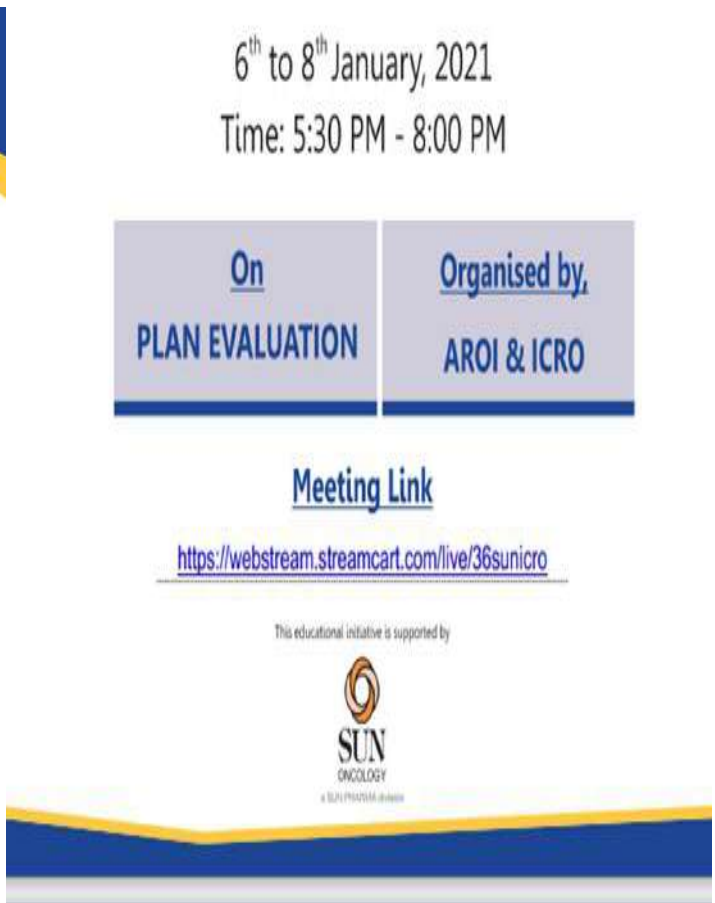
AROI-ICRO TEACHING PROGRAM -2022		
PROGRAM	**PLACE**	**ORGANIZERS**
AROI ICRO SUN -2022	TMH, Varanasi	Dr. Satyajeet Pradhan
	SGRD, Amritsar	Dr. Neeraj Jain
	Med College, Thiruvananthapuram	Dr. Mahadevan R
PRODVANCE -2022	NZ –Royal cancer Institute, Kanpur	Dr. Anu Tiwari
	EZ – IGMC, Patna	Dr. Pritanjali Singh
	WZ – Aruni Hospital,Rajkot	Dr. Hemendra Mod & Dr. Vipul Nautiyal
	SZ - HCG Bangalore	Dr. P S Sridhar
AROI ESTRO GYNEC COURSE 2022	R G Kar Medical College For 23rd to be decided in conference	Dr. Chandan Das Gupta
AROI ESTRO ADVANCED TECHNOLOGY COURSE 2022	TO BE DICIDED IN CONFERENCE	
YROC 2022	Dr Ram Manohar Lohia Institute of Medical Sciences, Lucknow	Dr. Ajeet Gandhi

For more information please visit www.aroi.org

UPCOMING…

AROI-ICRO TEACHING PROGRAM -2020 – completed successfully		
PROGRAM	**PLACE**	**ORGANIZERS**
AROI-ESTRO Gyn. Teaching course	TMH Mumbai-	Dr. Umesh Mahantashetty
YOUNG RADUIATION ONCOLOGY MEETING	Kovai Medical center & hospitals	Dr. Madhu Sairam & Dr. Swapnendu Basu
As Webinars		
PROGRAM	**DATE**	**TOPIC**
PRODVANCE 2020	25th to 27th June 2020	Radiosurgery Master Classes
AROI-ICRO SUN PG teaching program		
	34th ICRO teaching course 30th July to 1st August 2020	Genitourinary Malignancies
	35th ICRO teaching course 29th to 31st October 2020	Brachytherapy
	36th ICRO teaching course 6th to 8th January 2021	Plan Evaluation
Radiobiology course (AIIMS Rishikesh)	26th to 29th August, 2020	13th AROI ICRO Radiobiology Teaching Course





MEETING

FARO COUNCIL MEETING

5th DEC 2020

On line (zoom meeting) FARO Council meeting was held on December 5, 2020 under chairmanship of Dr. Shyam Srivastava (President FARO).

It is proud of us; one of our senior will head FARO.

Meeting Highlights –

- Regional FARO-ESTRO collaboration
- Making FARO education & teaching committee to improve teaching of members & to hold webinars of FARO every month by one of the member's country (we request all of you to suggest topic & month to hold the meeting from AROI side)
- To start sub continental oriental Research Program
- Virtual meeting & FARO in Philippians.

Requesting to young members they should be ready for their paper & presentation in FARO

NEW MEMBERS

Total Number of new AROI Members this year	**287**
West Bengal	46
Kerala	38
Maharashtra	41
Bihar	1
AP	10
North Zone	28
UP	25
Nepal	1
Tamilnadu & Podicherry	22

Telangana	29
Karnataka	17
Gujrat	6
Jharkhand	1
MP	15
North East	2
Rajasthan	5

Total Number of new ICRO Members this year	**13**

This issue is brought to you by
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On behalf of Association of Radiation Oncologists of India (AROI)