AROI Newsletter

Dec 2023 Vol.19, Issue 4

From the office of AROI

Dear All,

Greetings from AROI !!!
Once again it was successful year for AROI. As we close out this year, we want to congratulate each of you upon successful completion of part of your journey with AROI. We acknowledge the great support, guidance, and cooperation rendered by all AROI members in the advancement of the AROI which we earnestly look forward to in the years to come too. We believe our appeal as a association rests in our strong sense of togetherness, the values we celebrate, our commitment to our students and providing a balanced education that addresses the academic, social, emotional, physical, and spiritual aspects of our members lives. We also lost few members this year, and AROI condoles the demise of heroes that left us.

Academic meetings including AROI-ICRO teaching Programs, AROI-ESTRO courses and various chapter meetings were successfully conducted by our esteemed AROI & ICRO members. The year ended with successful 3rd Indian Cancer Congress held at Mumbai from 2-5 November 2023. AROI sincerely thank Sun Pharma & INTAS pharmaceuticals and all other organisations for the support provided to AROI in its academic endeavour.

We are open to all creative and innovative suggestions from everyone as to how to improve & collaborate for the betterment of AROI. Let us all together march ahead in our academic journey with an indomitable spirit of solidarity and sincerity in achieving the objective of our association.

AROI wish you a happy and healthy new year
Best Wishes

Dr. Rajesh Vashistha
Chair AROI

Dr. Manoj Gupta
President AROI

Dr. V Srinivasan
Secretary General AROI

Dr. S N Senapati
President Elect AROI

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From the office of AROI

Secretary – ICRO
Dr. Gautam Sharan

Vice Chairman – ICRO
Dr. Mahdup Rastogi

Chairman - ICRO
Dr. Rakesh Kapoor

Editor in Chief – JCRT
Dr. D N Sharma

AROI Newsletter

From the office of AROI

In this issue

Dr. Vikas Jagtap

Vice President - North East AROI

ICRO Joint Secretary (East)

Deputy Medical Superintendent

Additional Professor & HOD

Department of Radiation Oncology

NEIGRIHMS, Shillong

Newsletter Editor

GBM Minutes

3 Nov 2023 (7-8:30pm)
43rd AROICON, Mumbai

1. The Secretary General AROI- Dr V Srinivasan invited Dr Manoj Gupta President AROI & Dr S N Senapati President-Elect AROI to the dias. President AROI – Dr Manoj Gupta requested Dr V Srinivasan to start the meeting at 7:10pm.

2. Attendance register was circulated to each & every one present in the hall.

3. Welcome address was given by the President AROI Dr Manoj Gupta & Secretary General AROI Dr V Srinivasan.

4. Dr V Srinivasan, Secretary General AROI expressed his condolences to the departed members in this year (Dr K T Bhowmik, Dr R Mahadevan, Prof G. SelvaLuxmy & Dr Pravas Manjiri Pattanayak) & homage was paid by observing a silence for 1 minute.

5. Minutes of previous GBM held in 2022 was read out by Dr V Srinivasan. It was passed in the GBM, and was proposed by Dr Neeraj Jain & seconded by Dr Manish Chandra.

6. New AROI members list (from LM 4428-4719 as of 31st Oct 23) was ratified & approved by the house proposed by Dr Kishore Singh & seconded by Dr Rakesh Kapoor.

7. Dr V Srinivasan congratulated ICRO team & President- Elect Prof Senapati for their outstanding contribution in ICRO Teaching activities in 2023.

8. New ICRO members list (from LM324-364 as of 16th Oct 23) was ratified by the house.

9. 43rd and 44th ICRO SUN PG Teaching programs were successfully conducted and this was informed to the house. 45th ICRO SUN PG Teaching Programme is scheduled on Dec 16/17th 2023 at Trivandrum.

10.Secretary General informed that ICRO Pre conference workshop on the previous day was a grand success with around 20 spot registrations & more than 100 members attended. Also informed that AROI was the only association amongst the other four who had organized workshop on 1st Nov 23.

11. ICRO- INTAS Radiobiology course – House was informed about Radiobiology courses occurred on 2023 & last course will happen on 6th Jan 2024 at Tirupati. Henceforth only one Radiobiology course will be conducted at AIIMS, Rishikesh as it is available on the You Tube. It was passed by the GBM.

12. ICRO- SUN Prodvance courses–All the Prodvance courses are over for this year. Henceforth ICRO- SUN Prodvance course will not be conducted due to less registrations in 2023 instead we will have 2 programs in North & South zones in 2024 on AI & Stereotaxy. Chitranjan cancer centre will be awarded if willing to conduct one of these prodvance courses at their centre in 2024.

13. Dr V Srinivasan gave details about AROI-ESTRO & Best of ASTRO courses done in 2023. Also announced ICRO quiz winners for ICRO- SUN PG Courses held.

14. Dr V Srinivasan announced FICRO awardees for 2023 & it was passed by the GBM. Also informed about successful conduct of FERN workshop by Dr. Supriya. He also announced all the awards & travel grants that our AROI members bagged in FARO 2023 at Seoul, Korea. Appreciation was done by the house for all the awardees.

15. Dr Francis's proposal for change in name of Dr Rangi Prasad Memorial Lecture to Prof M Krishnan Nair Memorial oration. EC had approved this proposal hence Kerala chapter has paid 12 Lakhs during the EC meeting. It was proposed by Dr Giri & seconded by Dr Vijay Anand Reddy in the house.

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16. Dr Manish Pandey's proposal of change in name of Dr G C Pant Best paper to Dr K T Bhowmik Best paper, however it was decided if he pays INR 7Lakhs for the same, name will be changed or else the same name will be continued.

17. Secretary General Dr V Srinivasan gave open proposal to all for change in name of Dr Neil Joseph fellowship. Any state / zonal chapter can propose this by paying INR 7 Lakhs. Discussion on increasing this amount to INR 10 Lakhs was raised by Dr Rajesh Vashistha- Chair AROI as we give 6 fellowships (INR 20,000 each fellowship – INR 1,20,000) every year. It will be considered one-time payment for 10 yrs. If no proposal / payment received till next 6 months, name will be changed to AROI National fellowship & cost will be borne by AROI central. It was passed by the GBM.

18. Dr Rajesh Vashistha Chair AROI proposed silver plate which was given to orators to be replaced by Gold coin with AROI logo on it along with simple steel plate. It will be within INR 40,000. Also suggested Silver/ Gold Medal to be replaced by simple bronze medal & prize money to be increased by INR 2000 each for Best papers. It was passed by GBM.

19. AROI ESTRO course directors will be replaced every 5 years. Hence ESTRO Coordinator & Director (Gynae course) Dr Umesh Mahant shetty will be replaced by Dr Supriya Chopra, Mumbai, &
Director (Advanced Technology course) Dr A. K. Anand will be replaced by Dr. Indranil Mallick, Kolkata. Director (H & N course) Dr Sarbani Ghosh Laskar took over last year. Hence she will be the course director for the next 4 yrs.
Old Directors will remain as advisors to new Directors. It was approved by the GBM.

20. Honorarium to AROI for using AROI logo - For small conferences –INR 50000 & large conference – INR 1 Lakh. Double the amount (INR 2 lakhs) if request is from non-member. Dr Vijay Anand Reddy suggested even if other associations use our logo, they need to share scientific material with AROI working committee. It was passed by the GBM.

21. Equipment's- Cyber Knife & Gamma Knife equipment's will be under Radiation Oncology department. Dr Manoj Gupta President informed that the letter was sent to respective authority & we have received positive reply from them. He will circulate the letter received from them.

22. Dr V Srinivasan proposed an appointment of new Chief Election Officer- Dr Kishore Singh. There was a suggestion of publishing articles only related to Radiation Oncology & fresh articles needs to be added. Dr Suresh suggested to add articles related to chemotherapy. Dr D N Sharma clarified he was clearing the back log since COVID time. Henceforth only fresh articles will be published along with articles related to Radiation & Chemotherapy. It was passed by the GBM.

23. Journal contribution to be paid by all the states/ zones by 31st March of respective year. It was passed by the GBM.

24. Dr V Srinivasan informed that letter dated 7th Sep 23 was sent to NMC regarding exclusion of MD (Radiation Oncology) as a pre-qualification to take up DM Medical Oncology. It was passed as regulation on 18th Oct 23 and he thanked all the Members for their swift action. House appreciated the efforts.

25. Dr V Srinivasan informed that Dr Manish Pandey, Organizing Secretary of AROICON 2022 from North Zone had submitted rough account details on 1st Nov 23 projecting a net loss of INR 17 Lakhs plus.EC had decided to give him 3 more months to pay INR 25 Lakhs & submit an audited accounts. General body decided to stay with the EC decision. Dr. Giri raised a concern what if he doesn't pay. Dr Manoj Gupta informed then there will be an expedited meeting with EC after 3 months to take the final decision.

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Dr. Sabarinath had given suggestion of helping Dr Manish Pandey to conduct another meeting & help him out to raise funds. Dr Francis has shown that there was no such rule in 1st GBM minutes happened at Jaipur mentioning suspension of organizing secretary in case he fails to pay the dues, but it was explained to him that it was a decision taken during that time and it is true and the same is mentioned in the new AROI Directory clearly.
Dr Manish Chandra suggested to give some rebate to Dr Manish Pandey. Dr Suresh suggested we should see what exactly happened for this delay in payment & then decide-Dr.V.Srinivasan reiterated that we are waiting for the final audited accounts.
Dr J P Agrawal advised to reduce or omit the sponsorship for past presidents & secretaries to reduce financial burden. It was decided to form a sub-committee to decide how we can reduce the orators & office bearers expenses in the subsequent meetings and to make changes in the constitution.

26. Dr Supriya Chopra gave FARO Research proposal for funding of INR 2- 5 Lakhs from AROI, on which house decided to give funding of INR 2 lakhs from AROI as a beginning. Proposed by Dr Neeraj Jain & seconded by Dr Rakesh Kapoor.

27. Dr V Srinivasan informed about the AROI-ICRO Teaching course & ESTRO Courses, Best of ASTRO & YROC to be held in 2024. AROI ICRO SUN PG course will be video recorded henceforth & put up on the website. 44th AROICON will be at KMC, Mangaluru.
Dr Srinivasan requested Dr Athiyamaan Organizing secretary of 44th AROICON 2024 to pay 50% of INR 25 Lakhs contribution to central AROI just before the conference & he promised to follow all the AROI norms & will try to pay as much as possible before the conference. Passed and appreciated by the house.

28. Dr V Srinivasan informed about bids received so far for 2025.
AROICON 2025-
Bid by Dr Suman Mallik through Dr Abhishek Basu, WB chapter for AROICON 2025 at
Narayana Superspeciality Hospital Howrah, WB- Approved by the GBM
ICRO SUN PG 2025-
1.Vydehi Institute of Medical Sciences, Bengaluru through Dr Ravindra Ganganna, KA state
chapter for AROI-ICRO PG teaching Course 2025.
2.Prof. Manoj Gupta, AIIMS- Rishikesh
3.Dr Shaleen Kumar of SGPGI, Lucknow for AROI ICRO SUN PG Teaching Course in 2025- Approved by the GBM
AROI-ESTRO TEACHING COURSES 2025:
PGIMER, Chandigarh - Dr. Rakesh Kapoor (Advanced Technologies)
Dr Francis V James, RCC, Trivandrum (Head & Neck).- Approved by the GBM
Now bid only for AROI – ESTRO Gynae Teaching courses 2025 is open.

29. Dr V Srinivasan informed about Fellowships given in 2022 which was completed by all in 2023, except 6 who will complete it before the end of this year.

30. Dr V Srinivasan explained about AROI- Current, Saving & ICRO account details. He also showed proposed budget for 2024 & estimated income in this year. AROI FD's are around 4.2 Crore & ICRO FD's around 70 Lakhs. Proposed by Dr Sabarinath & seconded by Dr J K Singh. Accounts & Budget were passed by the GBM.

31. Reflection on the NMC guidelines to be followed was presented to all.

32. Others issues with the President's approval that were discussed like-Dr Shaleen from SGPGI Lucknow discussed about DM program to be of 6 yrs & not 3 yrs as 3 yrs program is not been recognized. On which Dr Manoj Gupta said 2 DM programs were already approved (DM in Head & Neck as well as DM in Genitourinary) and going on.

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Dr. Srikanth Rao suggested whether we can add oncology as syllabus for NEET PG exam as most of the questions are asked from General Medicine, hence MD Radiation Oncology students are failing. It was decided that a letter to be written in this regard & followed up with NMC.

33. PG curriculum to be followed with NMC. Dr Francis suggested PG curriculum is of low quality. Dr Manoj Gupta said a sub-committee to be appointed which can modify PG curriculum. Dr Sabarinath suggested that he will share the new NMC guidelines regarding MD/DM courses.

Dr. Ravindra Ganganna suggested to appoint Young Radiation Oncology Representatives only for 2 yrs tenure.

34. Dr. Sabarinath raised concern for lengthy process to get AROI membership where other associations membership can be obtained easily in an online way-Dr. V. Srinivasan agreed to see the feasibility of the same.

35. GBM was dissolved with Vote of Thanks by the Secretary General.

How to write a good research paper

Prof (Dr). Kishore Singh
Former Editor in Chief, JCRT
Professor and Head, Dept.. of Radiation Oncology, Subharti Medical College, Meerut, UP.

At the outset I wish to thank AROI for inviting me to deliver the 17th Dr. Rangi Prasad memorial lecture at third ICC, Mumbai. The inaugural lecture given by Dr. Ajmal Puthawala in 2003, incidentally this is the last lecture. I was editor in chief (EIC) of JCRT for almost six years. During that period I used to review almost 5 – 7 manuscripts a day. Many of them got rejected because of poor quality. Therefore, I have decided to share my experience through this forum to discuss do's and don'ts of writing a good paper.

Research papers are an integral part of our professional life. A research paper is a written document that presents the findings of a study or investigation conducted by a researcher or a group of researchers. It is a formal and structured piece of academic or scientific writing that communicates the research process, results, and conclusions to the scholarly community and the public. They facilitate the improvement of existing theories, and the generation of new ideas. All in all, they also play a crucial role in shaping our understanding of the world and driving progress in various fields.

'The purpose of research is to publish'—Michael Faraday, English Physicist and Chemist (1791–1867). Scientific publication began in 1660 with the Journal de Scavans in France and the Philosophical Transactions of the Royal Society of London (Fig.1). To get to know, to discover, to publish—this is the destiny of the scientist —Francois Arago, French Mathematician, Physicist and Astronomer (1786–1853). Unfortunately, we have 17.7% of the world's population, but contribute only 1.6% of all the articles to the medical literature (1998–2008). We are living in the era of publish or perish. The reasons for publication can be summarized in a 'SULTAN pyramid'(Fig.2):

- **S—Study requirements for obtaining degrees like Doctor of Medicine or Master of Surgery (MD/MS), Diplomate of the National Board of Examinations (DNB), or Doctor of Philosophy (PhD).**
- **U - Requirement for higher faculty posts in acdemic institutions, salary hikes, or to improve career prospects.**
- **L—Long-term sustainability of an academic career—called 'tenure' in America.**
- **T—Achieving a position like a departmental head, dean, and director.**
- **A—Advancement of health, education, and economic policies.**
- **N—Name and fame in society and among one's family and colleagues.**

Writing a research paper is an iterative process. Which can be broken into three steps:

1. Research and planning 2. Writing 3. Revision

1. RESEARCH AND PLANNING

First and foremost, thing in planning a paper is selecting a research question. This is the critical step towards biomedical research. The research question is a signpost that sets the direction of your study and it should be based on the gaps in our knowledge, in other words, choose a topic carefully that is interesting and relevant to you, remember "you reap is what you sow". Here are some steps to help you in choosing a topic:

- **Brainstorm Your Interests:**
  - **Start by thinking about your interests and passions. What topics or subjects fascinate you?**
  - **What issues or questions do you find engaging?**
  - **Consider your academic and career goals**
  - **Is there an area in your field of study that you want to explore in-depth?**
- **Narrow or Broad?**

Determine whether you want to explore a broad area or focus on a specific aspect within a broader field. Sometimes, starting broad and narrowing down as you research is also a good approach.

● Research Existing Literature:
Conduct a preliminary literature review to get a feel of what has already been available in your field of interest. Look for gaps, controversies, or unanswered questions in the existing literature that you might address.
● Consult with Professors or Mentors:
Never shy to consult professors, advisors, or mentors. With their experience, they can provide valuable insights and suggest research topics that align with your interests and are the current need of your field. They can really separate the 'wheat from chaff'.
● Consider Relevance:
Think about the relevance and significance of your potential topics. Will your research address a problem, question or issue that is important to your field, society, or a particular community?
● Feasibility:
Assess the feasibility of your chosen topic in the light of necessary resources, data, or equipment, to conduct research on it?
Consider the time frame available for your research and whether it aligns with the complexity of the topic or tenure of your training / residency.
● Ethical Considerations:
Ensure that your research topic and proposed study comply with ethical guidelines of the institution. Need to avoid topics that could harm or exploit individuals or communities.
● Pilot study:
If you are in doubt about the feasibility or interest level of a topic, consider conducting a small pilot study to test the waters.
Remember that selecting a research topic is an iterative process, and you need to do course correction as you gather more information and insights.
Tip
➔ Use FINER Criteria to develop a research question:
F—Feasible
- Adequate number of subjects
- Adequate technical expertise
- Affordable in time and money
- Manageable in scope
I—Interesting
- Getting the answer intrigues investigator, peers and community
N—Novel
- Confirms, refutes or extends previous hypothesis
E—Ethical
- The study complies with the Institutional Review Board's requirements.
R—Relevant - To scientific knowledge
-
To clinical and health policy -
To future research
➔ Ensure research question follows
PICOT Format:
P Patients (Population) - What specific patient population are you interested in
I Intervention - What is your investigational intervention
C Comparison group - What is main alternative to compare with intervention
O Outcome of interest - What do you intends to accomplish, measure, improve or affect
T Time - What is appropriate follow up time to assess outcome
Next critical step in conducting a clinical study is estimation of sample size. Power and sample size estimations are used by researchers to determine how many subjects are needed to answer the research question (or null hypothesis). It must be planned carefully to ensure that the research time, personnel effort, and costs are not wasted. It is not uncommon that a study fails to detect even large treatment effects because of insufficient sample size.
To Calculate Sample Size, you need to:
● Determine the population size (number) (if known).
● Determine the confidence interval (margin of error given in ±).
● Determine the confidence level (1 - α) [α (alpha) value of $p < 0.05$; $1 - 0.05 = 0.95$ means 95%]
● Determine the standard deviation (variance of 0.5)
● Convert the confidence level into a Z-Score (Z for 90% = 1.645, for 95% = 1.96 and for 99% = 2.576).

Population size: the minimum number of individuals required to represent your selection. Designate your margin of error (confidence interval): a margin of error indicates how much you are willing for your sample mean to differ from your population mean. The most common confidence levels are 90%, 95%. The confidence level tells you how sure you can be. It is expressed as a percentage and represents how often the true percentage of the population would pick an answer that lies within the confidence interval. The 95% confidence level means, you are confident that 95 out of 100 times the estimate will fall between the upper and lower values specified by the confidence interval. The confidence interval is the plus-or-minus figure. Standard deviation (SD) tells you, on average, how far each value lies from the mean. Use the standard deviation of 0.5 to make sure your group is large enough. Several free as well as commercial software/calculators are available that can help in the calculation of sample size for various study designs. It is a good idea to calculate Sample Size both for known and unknown population (Fig.3 & 4).

2. WRITING

A research paper consists of eight sections coupled with addition of table and figure legends (Table. 1). Case reports do not have methods and results but case summary. Dissertation has literature review also. A limit of 3000 words is observed by JCRT for an original article.

2.1 Title

Before you start writing a paper, think of the title first. It is the face of the research article. Title reminds me of a famous dialogue from Shakespeare's play 'Romeo and Juliet': What's in a name? That which we call a rose by any other name would smell as sweet. However, in biomedical research, the title or name of the article is without any reservation the most important and the most read part of the paper in the journal. It should sum up the main notion of the experiment / research in such a way that in the fewest possible words one can summarize the facts of the paper and attract the reader as well. In other words, you have to fill in "Gagar main Sagar".

2.1.1 Do's: Being precise, and meticulous is the key for planning a title. Time should be spent in writing the title. It is important to remember that editors often reject an article based on its title. Need to check that title has to be Informative, Attractive, Accurate, Concise, Clear and Specific. It should be composed of key substantive words, which may include the characteristics and geographical location of research, the sample population as well as a hint of the result. One may use the following important information while designing the title:

- The aim of the research project.
- The type of the study.
- The methodology used in the project.
- PICOT: population/problem, intervention (test, drug or radiotherapy), control/comparison and time.

Sometimes journals will ask for a short running title that is published on top corner of each page.

2.1.2 Don'ts: The title should not be very lengthy and also should not contain several unnecessary words. One should avoid the following:

- Avoid using abbreviations and symbols in the title.
- Exceed the word count to >15.
- Do not include 'study of', 'analysis of' or a similar assembly of words.
- Avoid using unfamiliar jargon not used in the text.
- The title should not be misleading.
- Amusing titles conceivably taken less seriously by readers and maybe cited less often.

If your title packs the punch, it will engage the readers and compel them to read your paper.

2.2 Abstract

It is a brief statement of the paper's main objectives, methods, results, and conclusions. It should be crisp, clear, concise, condensed, critical, and has to be the best part of a research manuscript. It breaks down why research was completed as well as the findings and what those findings mean. It is like a trailer to a movie, if the trailer is good, it stimulates the audience to watch the movie. The reader should get the gist or essence of paper. Although the abstract is the first paragraph of the manuscript it should be written last when all the other sections have been addressed. The abstract should be written from scratch and not 'cut –and-pasted'.

The structured abstract is preferred (case report uses unstructured abstract), it contains subheading in IMRaD format:
I: The introduction in the opening line should state the problem you are addressing.
M: Methodology - what method was chosen to finish the experiment?
R: Results - state the most important findings of your study.
A: And
D: Discussion—discuss why your study is important.

2.2.1 Do's:
- Mention important results with the statistical information.
- Put all information in a chronological order.
- In the last state the recommendations (implications of study / future research).
- The abstract should be written in the past tense.
- Keep it general and observe the word limit is 250 for structured and 150 for unstructured (according to the journal's guidelines).
- Abstract should always be written in the end.
- Don't forget to revise it.

2.2.2 Don'ts:
- Do not include quotations, abbreviation, table, figure or references.
- Do not repeat any information.
- It includes >5 or >one-third of the references in the whole paper.

2.2.3 Importance of abstract: It also helps the article getting indexed. The fate of a paper both before and after publication often depends upon its abstract. Most readers decide if a paper is worth reading or not on the basis of the abstract. Additionally, the selection of papers in systematic reviews is often dependent upon the abstract.
2.2.4 Key words: These are important words that are repeated throughout the manuscript and which help in the indexing of a paper. Depending upon the journal 3 –10 key words may be required which are indexed with the help of MESH (Medical Subject Heading).
2.3 Introduction
Introduction is a miniature review article. It lays the foundation of biomedical writing. It is the first portion of an article according to the IMRaD pattern (Introduction, Methodology, Results and Discussion). It provides the flavor of the article and many authors have used phrases to describe it for example — 'like a gate of the city' and 'the beginning is half of the whole'. A good introduction helps captivate the reader early. A good introduction will 'sell' an article to a journal editor, reviewer, and finally to a reader.
It should contain the following information:
- The known—The background scientific data
- The unknown—Gaps in the current knowledge
- Research hypothesis or question
- Methodologies used for the study

The known consist of citations from a review of the literature whereas the unknown is the new work to be undertaken. This part should address how your work is the required for missing piece of the puzzle.

2.3.1 Do's: The following points are important to consider:
- The introduction should be written in simple sentences and in the present tense.
- Many of the terms will be introduced in this section for the first time and these will require abbreviations to be used later.
- The references in this section should be to papers published in quality journals (e.g., having a high impact factor).
- The aims, problems, and hypotheses should be clearly mentioned.
- It has to move from a general to a specific research topic and must include the need for the present study.
- Start with a generalization on the topic and go on to specific information relevant to your research.
- The Introduction should include data from a literature search, i.e., what is already known about this subject and progress to what we hope to add to this knowledge.

2.3.2 Don'ts:
- Writing a literature review
- Missing the knowledge gaps, which are key to helping the reader understand why your study is important and why it will be significant.

● The research question is missing (or purpose) – research question is the heart of your paper. The introduction needs to funnel to it, and the remainder of the paper needs to refer back to it. Logically, it should follow the knowledge gaps and lead to the objectives of the study.

2.4 Material and Methods

The Methods has been defined as the 'particular procedures for accomplishing or approaching something'. In this segment, you should describe exactly and in detail how you did the study so that the readers will be able to:

● Assess how the research was done.
● How they might repeat the study in future.

You must mention 'what', 'how much', 'how often', 'where', 'when' and why' clearly to provide a step-by-step tutorial for your reader. One of the more common reasons for rejection of a manuscript is that the reviewers cannot fully understand how the study was conducted. Most journals will also ask for clearance from an ethical committee or an Institutional Review Board (IRB) for studies involving human subjects and this should be recorded here. Describe which experimental animals, patients, volunteers or control subjects will be included. For a drug, mention dose (mg/m2), how the drug was taken and through which route it was administered stating the name of the source and the supplier in brackets. For immunological tests the technique used and the name of the manufacturer should be mentioned. The reagents used should also be mentioned in this section. For technique, describe how it was different from a standard one in some detail. For radiotherapy give details of technique like overall time, total dose, dose per fraction, number of fractions etc. In this section avoid writing stories, use of flow charts helps in conveying the message. A five-step approach is helpful in writing this section (Fig.5). While reporting a trial CONSORT (Consolidated Standards of Reporting Trials) flow diagram may be a useful guide at this stage (Fig.6). Whereas for Systematic Reviews and Meta-Analyses, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram, an evidence-based minimum set of items focusing on the reporting of reviews evaluating randomized trials and other types of research is used (Fig.7).

2.4.1 Do's: Organize your methodology as what was the first step and then what were the subsequent steps. All the methodology should be written in the past tense preferably in an active voice. Accordingly, you should use verbs like 'investigated', 'evaluated' or 'performed'. Recently, terms showing the ownership of the investigation as 'we performed', 'we evaluated', 'we implemented' have taken priority. Points which should not be missed in methodology section include:

● Date of initiation and termination.
● Inclusion and exclusion criteria.
● Outcome measure with the definitions.
● Describe in detail the statistics used in the study.
● Type of study design.

2.4.2 Don'ts: Common Errors Seen in this Section are:

- Mingling the results with the methods. Results should be discussed and analyzed in a subsequent section.
- Including explanatory information and background—save these for the discussion section.
- Writing the pros and cons of the technology used to study the experiment in this section.

2.5 Results

Results are means of communicating the findings of the study. This is the core of the paper, describing to the reader the outcome and findings of the research paper. The observations are usually tabulated, graphed, or charted after conducting a study. The interpretation of the observations is called the results. Here, you should include all the data in the form of tables, charts, graphs, and figures. Then analyze this data explaining its meaning in sentences. The results should provide information on how the data was collected and the participants recruited. Secondary outcomes and subgroup analyses should also be included. There is no one way to represent the results but graphic representation is probably the easiest to understand.

Commonly used forms are line graphs, bar charts, pie diagrams, and histograms.

2.5.1 Do's:

The Ten Steps for Presenting the Results are: -

Step 1: Organize your draft in such a way that it gives maximum communication to the readers. Frame simple sentences in past tense to achieve this. This should be the shortest section of the paper.

Step 2: Start with an opening sentence like "our result shows" and restate the research questions.

Step 3: Follow this by the number of patients screened, number enrolled and who were included and excluded (give reasons of exclusion).

Step 4: State the principal findings. Focus on relevant observations to draw the reader's attention to the most important results. Some of the non-essential data are published as an appendix in online edition.

Step 5: All Tables and Figures should be numbered according to the order in which they appear in the manuscript. All tables should have a descriptive caption on the head. The figures and tables should require a minimum amount of explanation in the results or discussion section.

Step 6: Check for the language and scientific mistakes and revise your draft constantly to achieve the best results. Make sure that the graphs and figures are all correct and no values of the observations have been wrongly copied.

Step 7: Refer to the Instructions to Authors given on the journal website about this section. This will help you to reframe the manuscript according to their guidelines.

Step 8: Include all the positive as well as the negative results which are statistically significant.

Step 9: Make sure that the results section jells with the other sections and does not look like a stand-alone piece. Check for grammar and tense at this stage.

Step 10: Any data which has not been mentioned in the results section cannot be discussed later. If there are too many results then try and categorize them further into subheadings.

2.5.2 Don'ts: There are a few common pitfalls to be avoided while drafting this part of your scientific paper:

- Converted data are the data that have been analyzed, usually summarized, and presented in such a way that only the information pertinent to the objectives of the study is presented. Raw data refers to results of individual replicate trials, individual observations, chart records, and other information that comes directly from the laboratory.
- Once you have presented converted data, do not present the same data in a different way. For example, if the data are plotted, then don't include a table of data as well. Present a figure (such as a graph) if appropriate. If the data are better represented by a table, then use only a table. The caption with any figure or table should include all pertinent information. One should not have to go into the body of the paper to find out the results of statistical tests on the data, or the rationale behind a curve fit.
- Raw data are not usually included in your results.
- Use an appropriate number of decimal places (if you need decimal places at all) to report means and other measured or calculated values. The number of decimal places and / or significant figures must reflect the degree of precision of the original measurement. Since the number of significant figures used reflects the level of precision of the measurement or calculation, there is never any need to qualify a measurement or calculation as 'about' or 'approximate.'
- Graphs and other pictures that represent data are called figures, and are numbered consecutively. Tables are distinguished from figures, and are numbered consecutively as well. For example, a paper with two graphs, a reproduction of a segment of chart record and two tables will have figures 1, 2, and 3, and tables 1 and 2. Do note that everything with gridlines is not a graph. Graphs are analytical tools, while Chart records are raw data (which may be presented in results as an example, if appropriate).
- Do not draw conclusions in the results section. Reserve data interpretation for the discussion.

2.6 Discussion

The discussion section is one of the final parts of a research paper, in which an author describes, analyses, and interprets their findings.

They explain the significance of those results and tie everything back to the research question(s). Many authors, and editors, think this is the most difficult part of a paper to write well and have described it variously to be the 'narrating the story of your research, the movie or the main scientific script' and the 'proof of the pudding'. The idea of a discussion is to communicate to the readers the importance of your observations and the results of all your hard work. In this section, you are expected to infer their meaning and explain the importance of your results and finally provide specific suggestions for future research.

There are three major portions for the discussion of a manuscript.

The first paragraph should broadly state the key findings of your research.

The middle portion should consist of the body of the discussion. This section interprets the important results, discusses their implications and explains how your data is similar to or different from those that have been published previously. An explanation should be offered on how your work is similar to others or how it is different from the others. This should be followed by a review of the core research papers. The results should now be divided thematically and analyzed. The discussion should also contain why the study is new, why it is true, and why it is important for future clinical practice.

The final paragraph should include a 'take home message' (about one or two) and point to future directions for investigation that have resulted from this study.

The discussion can be concluded in two ways:

- By again mentioning the response to the research question or
- By indicating the significance of the study

Most importantly you should remember that the last paragraph of the discussion should be 'strong, clear, and crisp' and focus on the main research question addressed in the manuscript. This should be strengthened by the data which clearly states whether or not your findings support your initial hypothesis.

2.6.1 Do's:

General Considerations for discussion

- Start the discussion with the 'specific' problems and move to the 'general' implications
- The discussion should not look like a mass of unrelated information. Rather, it should be easy to understand and compare data from different studies.
- Include only recent publications on the topic, preferably from the last 10 years.
- Make certain that all the sources of information are cited and correctly referenced.
- Check to make sure that you have not plagiarized by using words quoted directly from a source.
- The sentences should flow smoothly and logically. The written text should be easily understood, crisp, and brief, written in the present tense.
- The author's own work is critically analyzed in comparison with that of others.
- The limitations and strengths of the study are highlighted.

2.6.2 Don'ts:

- You need not refer to all the available literature in the field, discuss only the most relevant papers.
- Long descriptive and informal language should be avoided.
- Most journals do not mention any limits for discussion as long as it is brief and relevant. As a rule, 'The length of the discussion section should not exceed the sum of other parts-introduction, materials and methods and results. In any good article, the discussion section is 3–4 pages, 6–7 paragraphs, or approximately 10 paragraphs and 1000–1500 words.
- Only re-hashing what's already been said in the Results section. There's a temptation to simply restate some or most of the values reported in the Results section. This is so pervasive, in fact, that some journals specifically call it out in their author instructions by cautioning: "don't just re-state the results." While you want to highlight the main results, you also need to provide some interpretation and context so that the reader understands why these results are important or useful.

Interweaving results from previously published articles is as much an art as a science, and if not done well it can feel clunky and forced. Start by highlighting a main finding, but then explain why it is important and consider its implications in light of what's been published previously. When researching the previous studies, don't focus only on their results sections – read and consider the interpretation those authors offer within their own discussion sections.

- Mentioning something NOT in the results. Anything you talk about in the discussion section should have previously appeared in the results section. Never introduce new data or results in the discussion. If it's important, then it should be presented with the rest of the results. This is true for sub-analyses; if they are necessary for the interpretation you offer in the discussion then they need to first appear in the results section.
- Not placing the results in context. Interpreting the results requires more than just talking about the specific setting, participants, and situation of your individual study or project. Are your results generalizable to other groups or settings? If you observed results that differ from previous studies, can you explain why? What implications do your results have – if any – for how care should be provided (or what else needs to be investigated before one can make such claims regarding patient care)?
- Overstating strengths or understating limitations. You need to be realistic and transparent about both the strengths and the limitations. No one is expecting you to have conducted the perfect study or to have written a seminal paper. Allow the work to stand on its own merits with all of its imperfections and weaknesses. Just skip the part about your study being "the first one to" do anything. That doesn't impress reviewers, and the real test of a paper whether it is effective and useful is how it is read and cited years into the future, not its original publication date.

2.7 Conclusion

The conclusion is the last, yet not the easiest part of a research paper. It is the powerful and meaningful end piece of the script. Here you should briefly summarize the key arguments made in the body, showing how each of them contributes to proving your thesis. It sums up your main argument and provides closure for your reader.

2.7.1 Do's: Three points of a conclusion are:

1. Starts with an opening statement by stating "in conclusion," "to conclude," or "in sum" (often a restatement of the thesis and show how it has been developed through the body of the paper).
2. Briefly summarize the key arguments made in the body, showing how each of them contributes to proving your thesis. The bulk of the conclusion should synthesize—not summarize—the main points of your paper.
3. Recommendations for further studies or applications, and a closing statement to answer the "so what" question: why is this research relevant? Who should care about your argument and why?

Finally, you'll want to end your conclusion with a closing statement that wraps up your concluding section.

2.7.2 Don'ts:

- Don't present any new arguments nor details about your research or topic. The conclusion is aimed to only summarize what has been written before.
- Don't apologize. Never express concerns about results of your research or your authority. Avoid such phrases as "this is only my personal opinion", or "I don't know for sure". Never use the first person at all. Writing in the first person is too informal and cannot be used for academic papers.
- Make sure that your thesis is stated not only in the conclusion but also in the introduction and in the body part of your paper.

2.8 Acknowledgement

The acknowledgements section is your opportunity to thank those who have helped and supported you personally and professionally. Among all the sections of a typical research paper, the acknowledgements section is the easiest to write. Yet, acknowledgements can be politically tricky.

By forgetting to acknowledge those whom you should have acknowledged, you risk offending them; but even those whom you have acknowledged in your paper can take offense at the manner in which this is done. As a rule of thumb, anyone who directly contributed to your research process, from figuring out your topic to your final proofread, should be mentioned.

Even if you feel your chair didn't help you very much, you should still thank them first to avoid looking like you're snubbing them. Be sure to follow academic conventions, using full names with titles where appropriate. If several members of a group or organization assisted you, mention the collective name only. Remember the ethical considerations around anonymized data. If you wish to protect someone's privacy, use only their first name or a generic identifier (such as "the interviewees").

2.8.1 Do's:

- Write in first-person, in a professional language.
- Thank your professional contacts first.
- Include full names, titles, and roles of professional acknowledgements.
- Include personal or intangible supporters, like friends, family, or even pets.
- Mention funding bodies and what they funded.
- Appropriately anonymize or group research participants or non-individual acknowledgments.

2.8.2 Don'ts:

- Use informal language or slang
- Go over one page in length
- Mention people who had only a peripheral or minor impact on your work

Limit the section to a single short paragraph of about half a dozen lines.

2.9 Citation and References

Citation means acknowledging and documenting the source of information that has been used in a study. Citation does not provide complete details of the source but a link to where this information has been accessed. A reference provides complete details about the article's author(s), the journal in which it was published, the year it was published, the volume, and page numbers. The article can also be from a website, book, or thesis. The references are cited in the text in the serial order of their appearance and the same order is then followed for the reference list at the end. There are different types of reference systems that need to be followed according to a journal's requirements. It is expected that the authors have read the references and include only accurate information in the manuscript. Accuracy and thoroughness are paramount in reference lists, and, as much as possible, the style and content of the references should remain consistent throughout the list.

Referencing allows you to acknowledge or give credit to the writers and researchers from whom you have borrowed words and ideas, thereby avoiding plagiarism. It allows readers to trace the sources of information you have used. Referencing is a way to provide evidence to support the assertions and claims in your own assignments.

Role of references:

1. Demonstrate the foundation of the study – to establish the research question.
2. Support the novelty and value of the study.
3. Link one study to others creating a web of knowledge that carries meaning.
4. Allows researchers to identify work as relevant in general and relevant to them.
5. Create values that are internal to science (e.g., relevance, credit).
6. Create values that are external to science (e.g., provide avenues to determine accountability and researchers or funding performance).

The JCRT follows NLM in Index Medicus formats, here references should be numbered consecutively in the order in which they are first mentioned in the text (not in alphabetical order). Identify references in text, tables, and legends by Arabic numerals (1,2,3,4,5,6.) in superscript with square brackets after the punctuation marks, like this [1]. The titles of journals should be abbreviated according to the style used in Index Medicus (Year YYYY; volume number: page numbers.). Use the complete name of the journal for non-indexed journals. Avoid using abstracts as references. Information from manuscripts submitted but not accepted should be

cited in the text as "unpublished observations" with written permission from the source. Avoid citing a "personal communication" unless it provides essential information not available from a public source, in which case the name of the person and date of communication should be cited in parentheses in the text. For other types of references such as newspaper items please refer to ICMJE Guidelines (https://www.icmje.org/ or https://www.nlm.nih.gov/bsd/uniform_requirements.html).

2.10 Plagiarism

It has been derived from the Latin word 'Plagiare' which means 'to kidnap or abduct'. In scientific literature, it means the 'wrongful appropriation' and 'stealing and publication' of another author's 'language, thoughts, ideas, or expressions' and depicting it as one's own creative work.

All good journals and many universities check the manuscripts for this through online checking systems which are now widely available. Papers get rejected if it crosses the tolerance limit of plagiarism. The University Grants Commission (UGC) has a regulation, dated 31 July 2018 regarding promotion in academic institutions and on the prevention of plagiarism. It defines 20 terms like plagiarism, author, academic integrity, script, source, etc. It also describes a penalty for a plagiarized thesis and dissertation. It also mentions that all students should submit a soft copy of their theses or dissertations to some central information and library center. The areas which are excluded from plagiarism are:

- Quoted statements (quoted work can be reproduced with all the necessary permissions).
- References/Bibliography.
- Table of Contents.
- Preface/Acknowledgements.
- Standard symbols/Generic terms.

When it is an original paper, the author should aim at zero plagiarism. However, in many journals, a similarity of up to 15% is allowed. For a chapter in a book, this limit is about 5% and, in a thesis, less than 10% is accepted. Once you finish the paper you can check for plagiarism on many sites that are either free or paid. Grammarly©, Whitesmoke©, Prewriting aid©, Duplichecker©, Plagiarism© Check.org©C, Quetext©, small SEO plagiarism checker©, copytext©, viper©, checkforplagiarism.net©, Wordpress Plugin©, Plagium©, etc.

.10.1 Do's:

- Plan to finish your project well in time before submission.
- Recognize the concept behind the manuscript you need to cite.
- Never do 'copy–paste', it seems to be a shortcut but eventually it takes double the time to correct the mistakes.
- Use your own language to build up the manuscript.
- Use an online plagiarism device to check before final submission.

2.11 Bibliometrics

Bibliometrics, or research impact, is the quantitative method of citation and content analysis for scholarly journals, books and researchers. The quantitative impact of a given publication is appraised by measuring the number of times a certain work is cited by other resources. Classical or traditional scores are based on the number of citations each article gets and are well known to the majority of us, for example: the Impact factor of a journal, citation score and the H-index. Besides this there are many alternative metrics like: SCImago (SJR), the Eigenfactor score (ES), the source-normalized impact per paper (SNIP) called simple metrics or hybrid metrics such as Altmetrics and Plum analytics have evolved. These take into consideration newer factors like the number of downloads, social media mentions and post-publication reviews. These scores have their own strengths and limitations.

2.11.1 Journal impact factor

The Impact factor of a journal is calculated by Clarivate analytics once in a year and depicts the performance of the journal in the previous 2 years. It is often used to rank the relative importance of a journal within its domain; journals with higher

impact factors are often deemed to be more important than those with lower ones. The Impact Factor is calculated in any given year, as the frequency of citations, received in that year of manuscripts published in that journal during the two preceding years, divided by the total number of 'citable items' (original articles and reviews) printed in that journal during the 2 preceding years. The impact factor provides a general understanding of a journal without giving importance to individual articles (Table - 2).

2.11.2 Cite Score

The cite score is the average number of citations that a biomedical manuscript received over the last 3 years. This score was started by Elsevier Publishers in 2016. In contrast to the impact factor, this score is given to all cited articles including editorials, letters to editors, conference papers and other articles indexed by Scopus. Elsevier believes that the cite score provides a comprehensive, transparent view of the journal.

2.11.3 h-index

The h-index is also known as the 'Hirsch index' and was introduced in 2005. The 'h-index' is an author-level metric. if a researcher has an h-index of 10 it means that he has published at least 10 papers for which they have received at least 10 citations. The h-index for an author is a score that measures the productivity and citation impact of the publications by a scientist. An h index of 20 is good, 40 is outstanding and 60 is truly exceptional. It is a more specific method of finding the impact of a scientist using citation analysis which measures not only the quality but also the quantity of his publications.

2.11.4 ORCID

It is Open Researcher and Contributor's Identification. It is given at the time of registration and submission of an article online. This helps to track all articles with the same number and also tracks the article's responses on social media.

3. REVISION

Before submission you need to review and revise your paper for clarity, coherence, and grammar. Check for consistency in formatting and citation and finalize your paper.

S. No.	Section		
	Original Paper	Case Reports	Dissertation
1.	Abstract	Abstract	Introduction
2.	Introduction	Introduction	Review of literature
3.	Methods	Case summary	Methods
4.	Results	Discussion	Results
5.	Discussion	Conclusion	Discussion
6.	Conclusion	Acknowledgement	Conclusion
7.	Acknowledgement	References	Acknowledgement
8.	References	----	Dissertation

Table - 1. Outline of research paper

S No.	Parameter	JCR IF	Cite Score
1.	Evaluation period (Years)	2	3
2.	Database	JCR	Scopus
3.	Number of indexed journals (March 2022)	20,994	27,057
4.	Access	Subscriber	Anyone
5.	Evaluated items	Original articles and reviews	All publications

Table - 2. Bibliometric scores

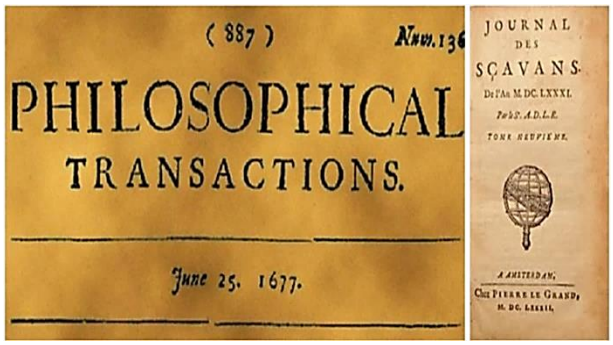

Fig. 1

Fig. 2

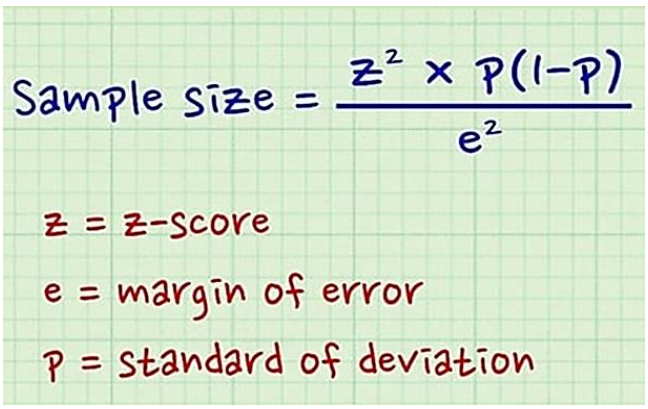

Fig. 3 Sample Size Unknown Population

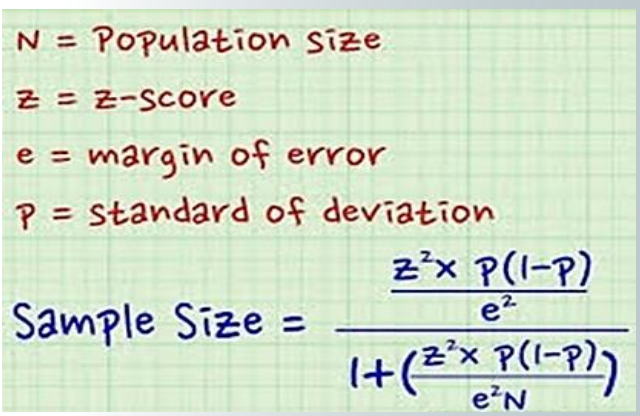

Fig. 4 Sample Size Known Population

Fig. 5 – Five Step Approach

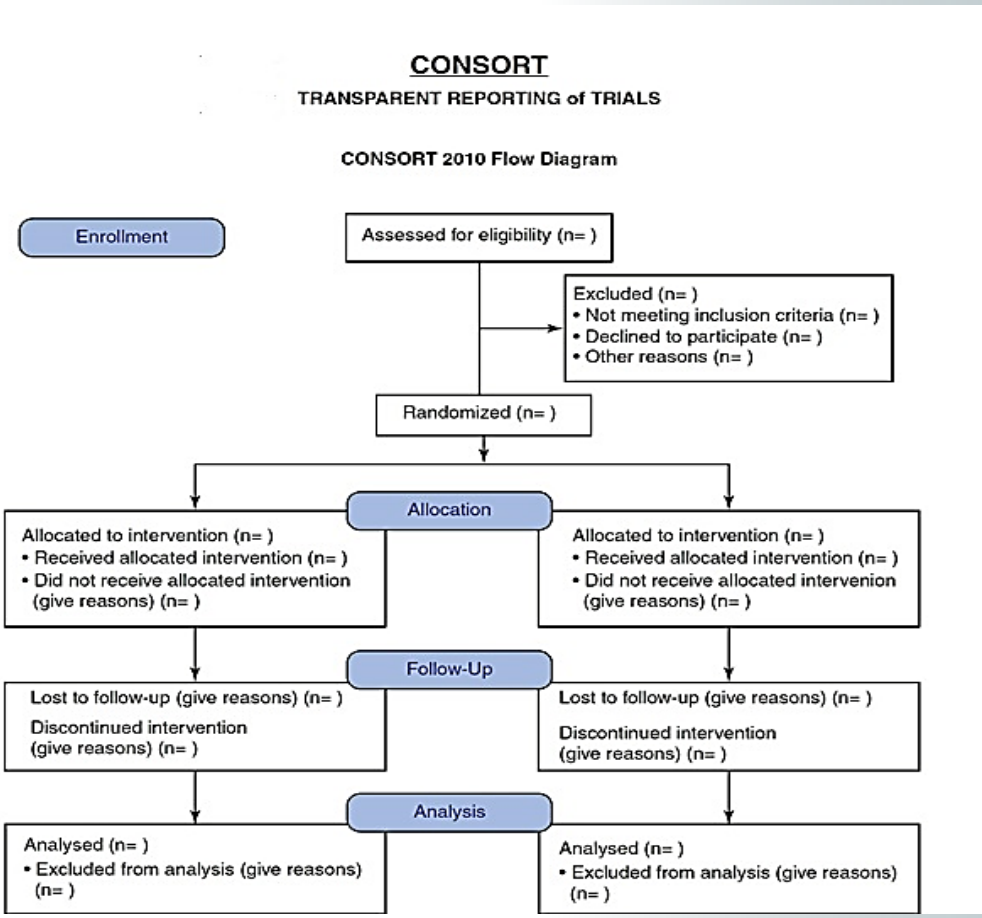

Fig. 6 – CONSORT

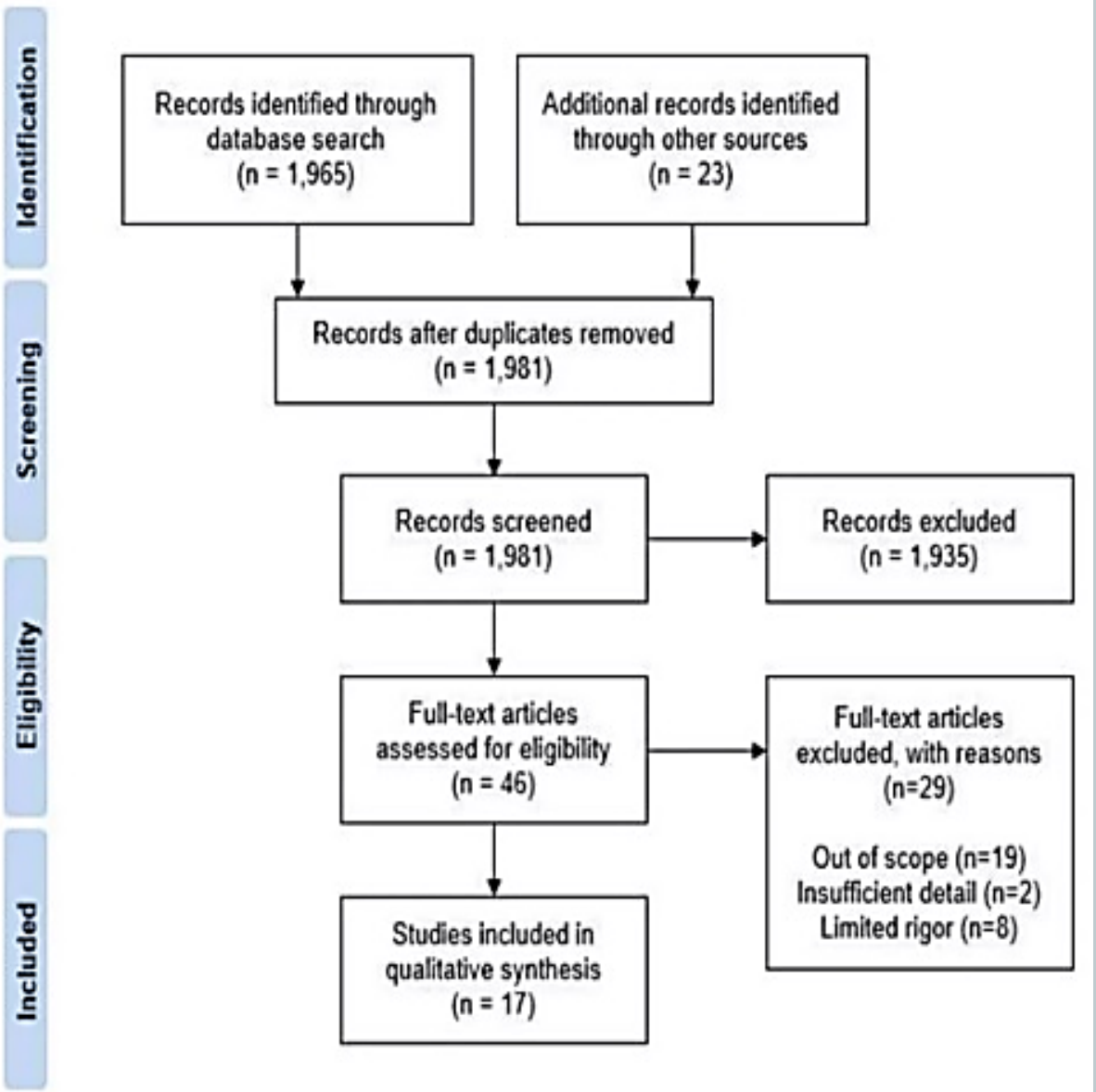

Fig. 7 – PRISMA Flow Diagram

Evolution and Contemporary Management of Locally Advanced Rectal Cancer

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The incidence of colorectal cancer (CRC) is on the increase in India, in line with Western trends. From 2004 to 2014, CRC incidence rates in India increased by 20%. During 2004-2005, the incidence rate of CRC was 5.8 per 100,000 persons. It increased to 6.9 during 2012-2014 [1]. Worldwide, a similar trend is noticed, with an estimated increase of 124% in the young (20-34 years) population incidence of rectal cancer by 2030 [2]. This brings attention to optimising treatment, which has improved over the past decades, leading to better oncologic outcomes. For many years, the lack of locoregional control of the disease was a significant source of morbidity and mortality for patients treated with surgery alone. The advent of total mesorectal excision (TME) [3] and the addition of neoadjuvant chemoradiation (CRT) significantly reduced local recurrence [4]. Today, the current standard of care for the treatment of non-metastatic locally advanced rectal cancer (LARC) includes preoperative CRT, TME and adjuvant chemotherapy (AT), though strategies are rapidly evolving. This review aims to highlight the major trials that have led to the modern era of management of LARC and to summarise the latest developments and possible future changes in the way we treat locoregional disease [1-10], (Figure 1).

Evolution of the Surgical Approach

Curative surgery for the LARC consists of TME, ideally with an R0 resection [3]. TME encompasses the removal of the mesorectal tissue containing all perirectal lymph nodes. The circumferential margin, which should be greater than 2 mm [2], is the most important predictor of local recurrence. Distal margins are more debatable. Typically, if one cannot achieve a 1-cm distal margin during a low anterior resection (LAR) for a low rectal tumour, an abdominoperineal resection (APR) is indicated. However, some data does suggest that distal margins <5 mm are not associated with higher pelvic recurrence rates [2].

Recently, alternative surgical strategies with an organ preservation approach for lower-grade rectal tumours (<T2, N0), are emerging to avoid the morbidity associated with TME. The TREC trial (Transanal Endoscopic Microsurgery [TEM] and Radiotherapy in Early rectal Cancer) showed that short-course CRT followed by TEM was able to achieve high rates of organ preservation, excellent compliance, and improved HR-QoL compared to TME alone [5].

Emergence of Adjuvant Modalities

The Gastrointestinal Tumor Study Group compared the effects of postoperative radiation therapy (RT), chemotherapy (5-Fluorouracil (5-FU) and semustine), and CRT on tumour recurrence and overall survival (OS), demonstrating significantly less local recurrence and longer DFS with adjuvant therapy, with most profound benefit with CRT [12].

Hypoxia is hypothesised to be crucial in the tumour response to RT in pre versus postoperative settings [13,14].

In 1997, the Swedish Rectal Cancer Trial was the first RCT to demonstrate a clear benefit of neoadjuvant RT compared to surgery alone [4,5,15]. Patients were randomised to receive either short-course preoperative RT (25 Gy in 5 fractions delivered in 1 week) followed by immediate surgery or surgery alone. This study showed a significant reduction in local recurrence rates and improved 5-year OS in patients treated with preoperative RT [5]. The Swedish Rectal Cancer trial stands alone amongst RCTs of neoadjuvant therapy for rectal cancer, revealing an OS benefit in addition to the more standard improved local control. The Swedish Rectal Cancer trial was undertaken when TME approaches were still not widely applied; therefore, neoadjuvant RT may have partially compensated for these suboptimal surgeries, portending a survival benefit. Similarly, the Dutch Colorectal Cancer trial comparing neoadjuvant RT versus surgery alone, with TME as standard, showed incremental benefit of RT with better local control [5,6]. Local control is further improved by adding 5-FU-based chemotherapy to preoperative RT [16,17].

The advances in CTRT and TME considerably improved the rates of locoregional recurrence. However, they did not address still a pessimistic distant metastasis rate of about 30%, leading to the majority of disease-related deaths [18,19]. Adjuvant chemotherapy trials such as EORTC 22921, Chronicle trial and others failed to demonstrate a significant dent in DFS, and OS. Among several factors discussed related to the inefficacy of adjuvant chemotherapy, the most important include a low rate of regimen completion. In EORTC 22921, Italian and CHRONICLE trials, the compliance rates were 43%, 55%, and 48%, respectively [16,20,21]. Many patients did not receive the recommended dose of chemotherapy in the appropriate time interval because of multiple factors, including toxicity, delays in starting treatment secondary to postoperative complications, disease progression and patient refusal.

The role of adjuvant remained controversial until 2004, when the German Colorectal Study Group provided a major turning point in treating patients with LARC. In this trial, patients with LARC were randomised to preoperative or postoperative CRT, with both groups also receiving AT [22]. The investigators demonstrated significantly less local recurrence, lower toxicity, better overall compliance, and a better sphincter preservation rate in patients with low-lying tumours treated with preoperative CRT [22]. They could not show a significant difference in OS. This study was widely accepted and helped shape the standard of care for treating LARC. For the past 20 years, the standard of care for treatment of LARC has consisted of preoperative CRT followed by TME and AT. With the above trials, although it was demonstrated that there was a consistent reduction in local recurrence and distant metastasis (table 1), survival rates did not improve. Also, increasing rates of side effects (toxicity of CRT and surgical adverse events) and likely overtreatment of some patients. For example, an end-colostomy or a low pelvic anastomosis, are can both drastically impact and impair a patient's QoL. LAR syndrome is a collection of symptoms that patients may develop after surgical resection of the rectum, with symptoms including increased urgency, frequency, and sexual dysfunction. The overall prevalence of LAR syndrome ranges from 20-50% in various studies [22].

Another prominent question in the LARC management field is the efficacy of long- vs. short-course RT and the optimal timing of surgery. The Stockholm III trial comparing long-course RT with the standard expected delay for surgical treatment (4-8 weeks), short-course RT without delay, and short-course RT with delay showed no difference in local recurrence, distant metastasis or OS. However, They did demonstrate significantly fewer postoperative complications in the groups that had delayed surgical treatment. With this concept and clues, I developed a paradigm to give neoadjuvant chemotherapy post-SCRT in the waiting period for TME in high-risk patients. This concept is known as total neoadjuvant therapy (TNT) and was studied in the RAPIDO and PRODIGE trials.

2.576).

Total Neoadjuvant Therapy (TNT)

The conceptualization of providing all treatment modalities (including CRT and chemotherapy) before surgery is known as TNT. The rationale includes early systemic treatment, facilitating early targeting of micrometastatic disease, better compliance, less toxicity, and better tumour regression [30-33]. The complete disappearance of all tumour cells in the surgical specimen (pathologic complete response, or pCR) has been observed in up to 25% of patients who received TNT, compared to 12% who received the conventional preoperative CRT [3]. Higher pCR rates create an increased possibility for organ preservation in select populations.

Early studies include, Polish study comparing preoperative SCRT followed by chemotherapy, to standard LC-CRT, demonstrating similar DFS (43% vs. 41%, respectively, P=0.65) and OS (49% both groups) outcomes at eight years [34]. In the Spanish GCR-3 randomized phase II trial, patients were randomized to receive CAPEOX either before chemoRT or after surgery. Similar pathologic complete response rates and 5-year DFS and OS were seen, and induction chemotherapy appeared to be less toxic and better tolerated. This was followed by RAPIDO (short-course radiotherapy; 5 Gy × 5 fractions, followed by chemotherapy before TME vs preoperative chemoradiotherapy, TME, and optional adjuvant chemotherapy in LARC) trial which mainly included MRI-staged high-risk feature patients (cT4, +EMVI, cN2, or mesorectal

fascial involvement) [8,9]. A statistically significant lower rate of disease-related treatment failure was observed in the experimental group (20% vs. 26.8%), primarily due to the reduced rate of distant metastasis [8]. The pCR rate was 28% in the experimental group vs. 14% in the standard group (P<0.001), with similar OS [8]. Although recent long term data has shown some increased local recuurences associated more commonly with non-IMRt patients but overall results remain unchanged. It may be wise to explore identification of non reonders early for surgery or increase local radiotherapy dose with improved technique which may be able to address the issue of long term local control with this regimen.Serious adverse events occurred in 38% of the TNT group and 34% in the standard treatment group.

A pooled analysis of two phase II trials, EXPERT and EXPERTC, assessed the safety and efficacy of neoadjuvant chemotherapy followed by LC-CRT and surgery. Of the 269 patients who were included, 91.1% completed chemotherapy, 88.1% completed CRT, and 89.2% underwent curative surgery. Five-year PFS and OS rates were 66.4% and 73.3%, respectively. Another phase II trial comparing response rates in patients with stage II–III rectal cancer treated with chemoRT alone or chemoRT followed by increasing durations of FOLFOX prior to resection found that delivery of FOLFOX was independently associated with higher rates of pathologic complete response, with the highest complete response rate (38%) following six cycles of neoadjuvant FOLFOX and the lowest (18%) in the group that received chemoRT alone. However, it is difficult to determine if the higher pathologic complete response rate with FOLFOX was due to the increased duration of FOLFOX, the longer duration of time between chemoRT and surgery, or some combination of the two.

The PRODIGE 23 trial similarly compared the LC-CRT (2Gy × 25 fractions), followed by TME, to first administering neoadjuvant chemotherapy, followed by CRT, TME. The neoadjuvant regimen consisted of oxaliplatin, leucovorin, irinotecan, and 5-FU (mFOLFIRINOX). The investigators demonstrated a statistically significantly higher pCR of 27.5% in the experimental group vs. 11.7% in the standard group. Also, th DM-free survival at three years was also significantly better in the experimental arm, at 78.8% vs. 71.7% in the standard treatment group, though there was no difference in OS [9]. These two instrumental trials established TNT not only as a safe strategy for the treatment of LARC but also as one that could reduce the incidence of distant metastases, an important goal over the last few decades. It is not established whether it is better to start with chemotherapy, then follow with chemoRT, or vice versa when following a TNT approach. Results from the phase II Organ Preservation in Rectal Adenocarcinoma (OPRA) trial suggest that initiating treatment with chemoRT may improve TME-free survival, as discussed later.

The German group (CAO/ARO/AIO-12) investigated 2 TNT regimens to elucidate the optimal schedule of preoperative CRT and chemotherapy, comparing induction (FOLFOX followed by CRT with 5-FU plus oxaliplatin followed by TME) with consolidation therapy (up-front CRT with 5-FU plus oxaliplatin followed by FOLFOX then TME) [35]. The results showed a higher pCR in the consolidation group (25% vs. 17%) and better compliance and lower toxicity. A secondary analysis reporting long-term (median, 43 months) results from the CAO/ARO/AIO-12 study showed similar long-term outcomes between the two groups, including 3-year DFS (73% for both groups; HR, 0.95; 95% CI, 0.63–1.45), 3-year incidence of local recurrence (6% vs. 5%), and distant metastases (18% vs. 16%). Chronic toxicity of grade 3 or higher occurred in 11.8% of patients who received chemotherapy first compared to 9.9% who received chemoRT first. Collectively, these data suggest that the TNT approach of chemoRT followed by chemotherapy results in a higher rate of pathologic complete response while showing no significant differences in DFS, locoregional recurrence, distant metastases, or toxicities. It is important to note that the trials evaluating TNT with FOLFIRINOX or FOLFOXIRI compared the TNT regimen to a standard preoperative chemoRT approach, not to a TNT strategy using FOLFOX; therefore, there is insufficient data to compare FOLFOX to FOLFIRINOX in this setting.

It has been theorised that induction chemotherapy could reduce the efficacy of subsequent CRT by selecting radioresistant tumour cell clones [35-37]. The consolidation therapy has the advantage of a higher pCR rate, lower toxicity, and better compliance with CRT without affecting the subsequent chemotherapy. With the treatment goal of curative resection, avoiding an abdominoperineal resection in low-lying tumours, and/or achieving organ preservation, TNT with the consolidation strategy may be preferable.

Organ preservation

The complete clinical response (cCR) turning into a successful wait and watch or NOM management is achieved in 15-25% with the LCRT dose of 45-50Gy [38]. Through dose-response studies of large prospective studies by escalating dose in selected cohort of patients, a direct relationship between radiotherapy dose and local tumour response rates is extrapolated. More than >100 BED Gy10 is needed for cCR in >80% of tumours [39]. The boost dose administered to the residual tumour, 6-24 weeks after completion of standard external beam radiotherapy (EBRT) dose. Among various techniques for local boost (intracavitary, papillon superficial X-ray or EBRT), endorectal brachytherapy has been routinely used for the last decade in our institution [40]. With LCRT and brachytherapy (BT), we generally give a BED of 90-96 Gray10, with which we have achieved a cCR of 50% with only 12% developing Grade 2 late rectal toxicity and none higher. A Phase II study by T Vuong has reported, using weekly 10 Gy x 3 fractions image-guided adaptive endorectal BT boost after a schedule of EBRT 40 Gray/16# (total BED 110 Gy10) resulted in 2-year TME- free survival of 77% and pCR rate of 90% when 22.5 % of patients developed grade III or more late rectal toxicity [10]. Currently, NOM management is one of the standard treatment approaches in suitable patients as per various international guidelines like NCCN [41].

With improved treatment response using intensified TNT based treatment strategy has raised curosity in improving possibilities of avoiding surgery in patients acheiving good clinical CR (cCR/nCR) and going for organ preservation or wait and watch. A retrospective study aimed to evaluate the oncologic outcomes of patients with LARC who received TNT (n=308) compared to those who received traditional CRT with AT (n=320) [42] showed that more patients in the TNT group could reach cCR beyond 12 months compared (22% vs 6%). This was followed by randomised data emerging with OPRA trial as level one evidence. In this study, it was hypothesis that the patients treated with TNT and TME or WW will have better 3-year DFS compared to patients treated with neoadjuvant CRT, TME and adjuvant therapy [39].

Patients with MRI stage T2-3, N0 or T-any, N1-2 resectable rectal cancer were randomised to receive induction FOLFOX/CAPOX before CRT or the reverse (consolidation FOLFOX/CAPOX given after CRT). Both groups were re-staged at 8-12 weeks after completing all neoadjuvant therapy. All participants underwent an extensive response evaluation via several different modalities, which included flexible sigmoidoscopy, digital rectal exam and MRI. At a median of three years, the DFS and OS was found similar, though WW was used more frequently acheived in the consolidation group. They concluded that WW in patients who achieve a cCR is a viable treatment strategy, using LC-CTRT followed by consolidation chemotherapy.

A New Era of Care

The introduction of TNT has revolutionised the landscape for the treatment of LARC and has laid the groundwork for establishing a new standard of care. The administration of neoadjuvant FOLFOX or CAPOX after short-course RT, or LC- CTRT or upfront FOLFIRINOX followed by long-course CRT followed by surgery (consolidation or induction, respectively), are treatment strategies that have been confirmed by phase III RCTs. With wider adoption of wait and watch especially with radiotherapy dose escalation using papillon techniques in phase III RCT and emerging data with newer TNT based protocol is further exciting. Role of immunotherapy and its fitment in wait and watch will be another corner to look at in future. Some of the furtistic studies from our group in this direction are ongoing (CTRI/2023/04/051458, NCT05856305)

	Swedish rectal cancer trial			Dutch colorectal study group trial			German colorectal study group trial		
Parameter	Radiotherapy plus surgery n=553	Surgery alone n=557	P-value	Radiotherapy plus surgery n=897	Surgery alone n=908	P-value	Preoperative chemoradiotherapy n=415	Postoperative chemoradiotherapy n=384	P-value
Local recurrence, n (%)	63 (11)	150 (27)	0.001	2.4	8.2	0.001	6%	13%	0.006
Distant metastases, n (%)	84 (19)	65 (14)	-	14.8	16.8	0.87	36%%	38%	0.84
Both local and distant recurrence, n (%)	19 (4)	47 (10)	-	16.1	20.8	0.09	32%	35%	0.32
overall survival (%)	58 (5 yr)	48 (5 yr)	0.004	82 (2 yr)	81.8 (2 yr)	0.84	74%	76%	0.80

Table 1. Historical Rectal cancer trials

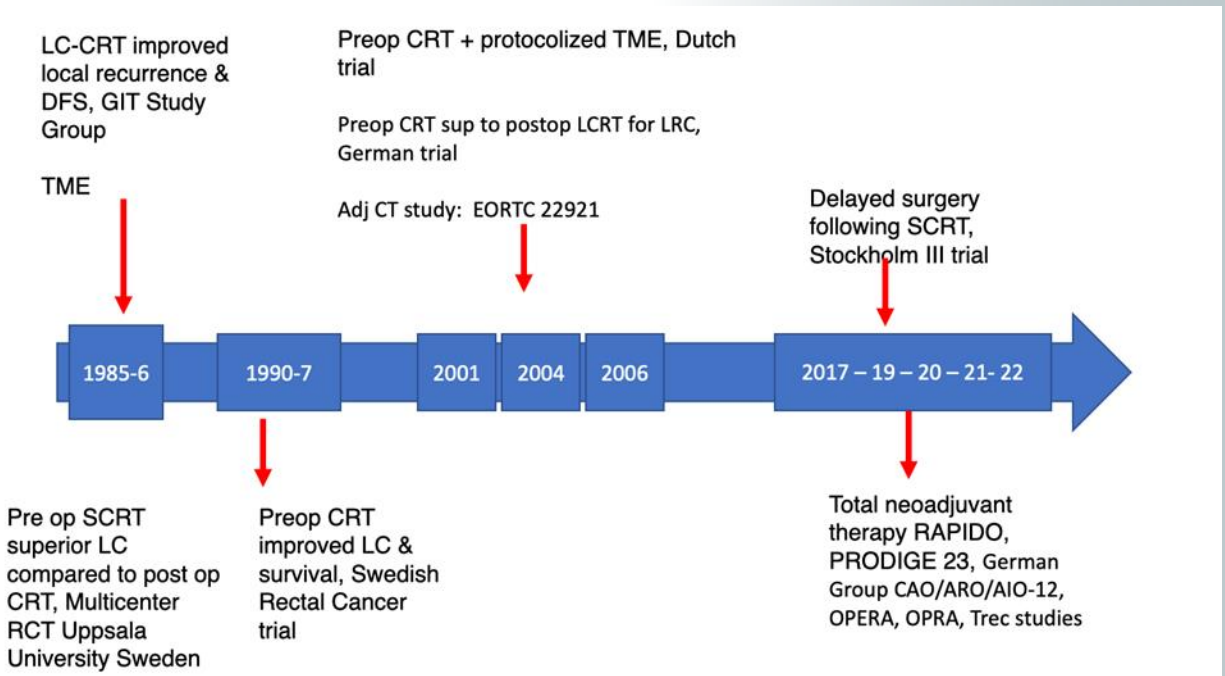

Fig: Evolution of locally advanced Rectal Cancer treatment Paradigm

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ICRO PRODVANCE 2023 (West Zone)

7 - 8 Oct 2023
Aaruni Hospital, Rajkot

Update from
Dr Hemendra Mod

ICRO PROADVANCE 2023, West Zone was successfully held at Hotel Fern, Rajkot on 7th and 8th October, 2023. It was organized by Aaruni Hospital Rajkot.

The programme was inaugurated by Dr S N Senapati, President Elect AROI, Dr Madhup Rastogi Vice Chairman ICRO, Dr Gautam Sharan Secretary ICRO, Dr Nitin Tolia Director Aaruni Hospital, Dr Vipul Patel Director Aaruni Hospital and Dr Hemendra Mod Organising Secretary and Director Aaruni Hospital.

Experienced faculties from across the country participated in the event which was conducted over one and half days. Students from Gujarat, Maharashtra and even West Bengal joined the event for very interactive sessions.

The theme this year was "Targeted Therapy /Immunotherapy Concurrent with Radiation"; which was well appreciated and discussed pro-actively by the attendees. The entire proceedings of the academic meet were highly appreciated by the attending audience.

The vote of thanks was given by Dr Madhup Rastogi Vice Chairman ICRO & the program Director, Dr Hemendra Mod.

The conference concluded with thanks to Dr R Vashistha Chair AROI, Dr Manoj Gupta President AROI, Dr V Srinivasan Secretary General AROI and Dr Rakesh Kapoor Chairman ICRO for their guidance and moral support and special thanks to Sun Oncology for their participation in terms of sponsorship & organizing the event

Breast cancer awareness month

Odisha Chapter

11 Oct 2023

Sadguru Cancer Hospital, Cuttack

Update from
Dr Sanjukta Padhi

On 11th October, 2023, AROI Odisha state chapter in collaboration with Sadguru cancer hospital, cuttack , organized Breast cancer awareness month with the theme “Keeping her in the picture”.
This event was organized to help draw attention to the prevalence of breast cancer and to create greater awareness of it among people.
The importance of early detection and preventive measures were stressed upon, and a variety of health tip were shared to help reduce its risk. This was followed by a scientific meeting which was attended by specialists from the field of oncology who discussed various aspects of cancer management and treatment protocols.
The discussion was centred on how breast cancer affects women differently as compared to men, and how women can take measures to reduce their risk. The experts discussed the importance of regular mammograms, self examination techniques, ad lifestyle modifications that can go a long way in help reduce the risk of developing breast cancer. They also focused on various types of treatments available today that can help increase the chances of survival among those who are diagnosed with it.

The experts emphasized upon the need for greater support for women suffering from breast cancer- not just in terms of medical care but also in terms of emotional support and mental strength. They highlighted the need for better work-life balance and supportive environments that help women stay strong in their fight against this disease. The experts spoke about various public health initiatives being taken by the government and private organizations to create greater awareness about breast cancer among women and their families.
Finally, this event concluded with a call for action from all participants- a call for action to make sure that women are given more opportunities to participate in decision-making process and that those suffering from breast cancer can access quality healthcare without facing any stigma or discrimination.
It was an important day- one that reminded us of our responsibility towards asking sure that women are always kept “in the picture”.

Conferences

3rd ICC

2 - 5 Nov 2023
Mumbai

Update from
Dr. Kaustav Talapatra

Radiation Oncology

The Third Indian Cancer Congress was held at Mumbai (The City of Dreams), from 2nd to 5th of November 2023, and attended by an estimated 6000 oncologists from India and across the globe. The theme being 'Continuum of Care in Cancer', it was organized by Four Societies named AROI, ISO, IASO AND ISMPO.

A Pre-conference ICRO Workshop was conducted on the 1st of November and inaugurated in presence of the national committee members – Dr Rajesh Vashishtha, Dr Manoj Gupta, Dr Srinivasan, Dr Senapati, Dr DN Sharma; ICRO committee members Dr Rakesh Kapoor, Dr Gautam Sharan, Dr Madhup Rastogi, Dr Ashwini Buddrukar, and local committee members Dr JP Agarwal, Dr Sarbani Ghosh Laskar and Dr Kaustav Talapatra. The theme of ICRO this time was SRS and SBRT.

Inauguration ceremony on the 2nd of November, kick started the AROI programme of ICC in the presence of executive committee members.

The Dr.BD Gupta oration was delivered by Dr Rajesh Vashishtha, Dr.KA Dinshaw memorial oration by Dr Howard Sandler and Dr. Rangi Prasad memorial lecture by Dr Kishore Singh.

On Day 1, Head neck cancers and gynaecological cancers formed the bulk of the sessions and interesting topics such as management of Oligometastatic HNSCC and endometrial cancers. YROC session was held on information technology in radiation oncology. GI cancers and lung cancers were discussed too, a session on biology and genomic based radiotherapy in lung cancers rounded off the evening.

On Day 2, The updates in classification of glioma and management were discussed along with many more CNS sessions along with the Panel discussion on management of CNS tumors entertained the packed room. Paediatric solid tumors management with radiotherapy sessions were held towards the evening. Management of prostate cancers and Recent advances in radiotherapy and flash therapy rounded off the day.

On Day 3, Management of oligometastatic lung cancers was discussed. Discussions on regional nodal irradiation, SBRT and management of elderly breast cancer captivated the audience. Important discussions on management of upper GI tumors dominated the afternoon sessions. APCC proton symposium was held late in the evening to round of the day.

On the final day, Artificial intelligence in oncology kicked off the proceedings. Discussions on rare gynaecological malignancies, future of adaptive radiotherapy and paediatric malignancies were held. The valedictory function on the final day rounded of the proceedings of the 3rd edition of ICC, leaving everyone academically satiated after a 5 day long programme conducted at the Jio World Convention centre.

Dr. JP Agarwal
Organizing Chairman

Dr. Sarbani Ghosh Laskar
Organizing vice Chairman

Dr. Kaustav Talapatra
Organizing Secretary

3rd ICC at Glance

2 – 5 Nov 2023, Mumbai

ICC inauguration

Various Events

3rd ICC at Glance

2 – 5 Nov 2023, Mumbai

Dr. Rajesh Vashistha
Director, Radiation Oncology & Medical Advisor
Max Superspeciality Hospital, Bathinda
Chair, AROI
Vice President, FARO

BD Gupta Oration
3rd Nov 2023

Dr. Kishore Singh
Former Editor in Chief, JCRT
Professor and Head, Dept.. of Radiation Oncology,
Subharti Medical College, Meerut, UP.

Dr. Rangi Prasad Memorial Lecture
3rd Nov 2023

Dr. Howard M. Sandler,
USA (ASTRO President)

Padmashri
Dr. K. A. Dinshaw Memorial Oration
4th Nov 2023

10th AROI ESTRO Teaching course

30 Nov - 3 Dec 2023
Hyderabad

Update from
Dr. P. Vijay Karan Reddy

AROI Telangana chapter would like to sincerely thank AROI for giving us the opportunity to host the 10th AROI ESTRO Teaching course on Advanced Technologies in Radiation Oncology at Hyderabad from Nov 30th to Dec 3rd' 2023.

We hosted the course at the Auditorium, Apollo Medical College, Apollo Hospitals, Hyderabad. The total number of registrations for the course were 104 plus a total of 14 faculty. The course extensively covered all the aspects involving the implementation of all the advanced technologies of Radiation oncology including IMRT, IGRT, SRS, SBRT in our clinical practice along with the pros ands cons of MRI Linac and Proton therapy. The course also included a clinical contouring session and workshop and a break out session specially for the physicists. We had also hosted a Gala dinner for all the delegates and faculty on Dec 2nd' 2023 at The Park Hyatt hotel, Hyderabad.

The elaborate 4 day course was well attended on all days and greatly appreciated.

We are grateful to the National AROI Executive body for their support and encouragement throughout the event. However, we deeply missed your presence.

We would also like to extend our gratitude to Dr Anil K Anand, Dr Indranil Mallick from AROI and Dr Ben Heijmen, Dr C Rausch, Dr Andrew Hope and Mr Miika Palmu from ESTRO for their able guidance and support which helped us make this a successful and fruitful course.

Herewith sharing a few snapshots of the course. Please let us know if there any specific pictures required.

ICMP-2023

25th International Conference on Medical Physics

6 – 9 Dec 2023
Mumbai

Update from
Prof. Sunil Dutt Sharma

Radiological Physics and Advisory Division (RPAD) of Bhabha Atomic Research Centre in collaboration with Association of Medical Physicists of India (AMPI) organized the International Conference on Medical Physics 2023 (ICMP-2023) at DAE Convention Centre, Anushaktinagar, Mumbai during 6 to 9 December 2023. The theme of the conference was "Innovations in Radiation Technology & Medical Physics for Better Healthcare". ICMP-2023 is the 25th International Conference of the International Organization for Medical Physics (IOMP) and it is a kind of world congress in medical physics where delegates/ invitees/ experts of 33 countries participated (more than 1300 from India and abroad) in this conference. International Conference on Medical Physics of IOMP is a triennial event which was brought to India for the first time. The 44th Annual Conference of AMPI (AMPICON-2023), 23rd Asia Oceania Congress on Medical Physics (AOCMP-2023) and 1st International South-East Asian Congress on Medical Physics 2023 (ISEACOMP 2023) were also held along with ICMP-2023.

Dr. Sudeep Gupta, Director, Tata Memorial Centre was the chief guest for inaugural function of this conference. Dr. D. K. Aswal, Director, Health Safety and Environment Group, BARC; Dr. John Damilakis (Greece), President, IOMP; Dr Eva Bezak (Australia), President, AFOMP; Dr. Chai Hong Yeong (Malaysia), President, SEAFOMP; Dr. B. K. Sapra, Head, RPAD, BARC and Dr. S. D. Sharma, President, AMPI were also on the dais during the inaugural function.
The scientific committee was jointly chaired by Dr. S. D. Sharma, India; Dr. M. Mahesh, USA and Dr. S. Fukuda, Japan. The programme of the conference was very comprehensive and it included almost all the topics of recent interests for deliberations such as artificial intelligence and medical physics, technology and techniques of radiation oncology, treatment planning, emerging and newer techniques of radiation therapy, imaging in radiation oncology, technology and techniques of medical imaging, emerging and newer techniques of medical imaging, radiation dosimetry and radiation safety, targeted therapy, radiation biology, modeling and simulation, translational research, education/training and certification in medical physics.

The scientific schedule of the conference comprised of 82 sessions including plenary sessions, special symposiums on topics of recent interests, scientific sessions with invited talks of experts from India and abroad, debates and medical physics quiz competition. 102 proffered oral and 359 posters (total abstracts 461 in addition to invited, plenary and symposium talks) were also presented in this conference. A few photographs of scientific sessions are included in this report. Total deliberations of the conference included 233 oral presentations (invited and proffered) and 359 poster presentations.
The YOGA in the mornings of 2nd, 3rd and 4th days of the conference was of special interests to many and it has been well appreciated. I am hopeful the Yoga session started from ICMP-2023 will be the part of many other conferences in India and abroad.
The social evenings of the conference were equally attractive. Cultural program in the evening of first day and dinners in the evenings of 1st, 2nd, and 3rd days along with the arrangements for music and dancing were highly appreciated by all

ICMP-2023

25th International Conference on Medical Physics

The live telecast of the scientific deliberations was made through YouTube and links for all the deliberations are made available at the conference website www.icmp2023.org. In addition, links of all the presentations have also been communicated to IOMP, AMPI, AFOMP, and SEAFOMP for uploading at their websites. I take this opportunity to thank all the associations, trade exhibitors, invitees, experts, delegates, chairpersons for participating in this conference. ICMP-2023 was the biggest ever mega event of medical physics which has created a few records to serve as reference for organizers of future ICMPs

Prof. Sunil Dutt Sharma
President, Association of Medical Physicists of India (AMPI)
Co-Chair, Conference Organizing Committee of ICMP-2023

34th UPARIOCON

16 -17 Dec 2023
Dept. of Radiation Oncology, JNMCH, AMU

Update from
Dr. Md Shadab Alam

The 34th Chapter of UPARIOCON was held on 16-17 Dec 2023, organized by Dept. of Radiation Oncology, JNMCH, AMU. Professor Mohammad Akram was the organizing chairman, Dr Shadab Alam was co organizing chairman, Dr Mohsin Khan was the organizing secretary and Dr. Bilal Hussain was the joint organizing secretary of the conference. Professor Shaleen Kumar from SGPGI Lucknow and Professor Surabhi Gupta from SN medical college Agra were the UPAROI office bearers.

The conference, adorned with the theme "Glorious Past, Emerging Future," drew the participation of approximately 230 discerning delegates. Out of these, around 60 Resource Persons from diverse corners of India lent their brilliance to this scholarly gathering.

Dr. Prashant Mathur, the Director of NCDIR, ICMR, graced the occasion as the Chief Guest, casting a spotlight on the cancer burden in India. The Vice Chancellor of AMU Professor Muhammad Gulrez presided as the Chief Patron, while the Dean Faculty of Medicine at JNMCH was Guest of Honour.

An innovative Art Gallery, collaboratively designed by MBBS students with the support of the Organizing Chairman, Professor Mohammad Akram and his team, showcased models and paintings reflecting the conference theme. A self-exploring diary, created without relying on external sources, was released during the conference.

The conference also featured the release of a souvenir containing scientific content, with Dr. Bilal Husain, a faculty member of the Department of Radiation Oncology at AMU, serving as the editor. The scientific sessions included engaging panel discussions and lectures by distinguished speakers. Competitive sessions, including oral paper presentations, poster sessions, and onco quiz, were organized for residents, medical physicists, and young faculty members, fostering enthusiastic participation.

Winners of the competitive sessions were felicitated during the valedictory session. Professor Shahid Ali Siddique, the former chairman of the Department of Radiation Oncology at AMU, was honored for his significant contributions to the department during this session. The conference successfully blended scientific discourse, creative expression, and recognition of outstanding contributions in the field.

Dr. Mohsin Khan (Organizing Secretary)
Prof. Mohammad Akram (Organizing Chairman)

34th UPARIOCON

16 -17 Dec 2023

Dept. of Radiation Oncology, JNMCH, AMU

Update from
Dr. Md Shadab Alam

UPAROICON-2023 Results of various competitions

Sl. No.	Award		Category	Name of the Winners
1.	Best Scientific Paper Award	Resident	WINNER	Dr. Bushra Khalid (KGMC)
			1ST RUNNER UP	Dr.Arshida P (JNMCH, AMU)
			2ND RUNNER UP	Dr. Aditi Agarwal (JNMCH, AMU) Dr. Areeba Aziz(JNMCH, AMU)
		Young Faculty	WINNER	Dr. Samreen Zaheer(JNMCH, AMU) Dr.Suboohi Jafar(Apex Institute, Varanasi)
		Medical Physicist	WINNER	Dr. Syed Mohamed Shajid (IMS, BHU)
2.	Best Scientific Poster Award		WINNER	Dr. Aditi Agarwal (JNMCH, AMU)
			1ST RUNNER UP	Dr.Laya K Sathyan (SRMSIMS, Bareilly)
			2ND RUNNER UP	Dr.Samapika Bhaumik (MPMMCC, Varanasi)
3.	Onco Quiz Award		WINNER	Team RML Dr. Tenzing Dahla Dr. Preeti Kumari Dr. Vaishali Baliyan
			1ST RUNNER UP	Team MPMMCC, Varanasi Dr.Samapika Bhaumik Dr. Pritam Mondal Dr. Shubham Dokania
			2ND RUNNER UP	Team SGPGI Dr. Vanshika Rastogi Dr. Chandan Mundra Dr.Shreshtha Jaiswal

45th ICRO SUN Teaching Course

16 -17 Dec 2023

Dept. of Radiation Oncology, Trivandrum

Update from
Dr. Bindu S M

The 45th ICRO-Sun teaching program on Hypofractionation was held on 16th and 17th December, 2023 by the Department of Radiation Oncology, Medical College, Trivandrum, in the Old Auditorium. It was attended by over 110 students and 20 local and visiting faculties.

The program started on December 16th at 9.30 AM with a welcome addressed by ICRO Secretary, Dr. Gautam Kumar Sharan which also included the introduction of the participants. After the first two academic sessions, formal inauguration was done starting with a prayer song by Dr. Nandhini and a welcome address by the Program Coordinator Dr. Bindu S.M, Additional Professor, Department of Radiotherapy, MCH, Trivandrum followed by lighting the lamp by the dignitaries on the stage including Dr. Rajesh Vashistha (Chair AROI), Prof. Dr. Manoj Gupta (President, AROI), Dr. V. Srinivasan (Secretary General, AROI), Prof. Dr. Rakesh Kapoor (Chairman, ICRO), Prof. Dr. Madhup Rastogi (Vice Chairman, ICRO), Dr. Gautam Kumar Sharan (Secretary, ICRO), Dr. Sivaramakrishnan (HOD, Dept of Radiation Oncology, Trivandrum), Dr. Bindu S.M (Additional Professor, Dept of Radiation Oncology, Trivandrum), and Mr. Arvind Suri (Senior General Manager, Sun Oncology). Dr. Sivaramakrishnan thanked the gathering for their gracious presence. Afternoon sessions were over by sharp 5:30 PM. The academic treat was followed by a sumptuous dinner arranged for PGs and faculties in South Park Hotel, Trivandrum.

The course provided orientation and fundamental principles of Hypofractionation, treatment planning, and execution and was very well received as evidenced by keen participation and many intelligent doubts and questions of the participants. The teachers who conducted the classes did excellent work by giving the latest and precise information about their subjects quoting the latest trials. A quiz competition was conducted including the topics taught and discussed. The winners were Dr. Mahak Gupta of KMC Manipal winning the first prize and Dr. Ankur Mahajan of AIIMS, Bhubaneswar winning the second. The winners and all participants were felicitated by giving certificates of merit and participation. The program concluded with a vote of thanks by Dr. Bindu S.M appreciating the enthusiastic involvement of the attendees and Sun Pharma for logistics and other support.

5th AROI Bihar Chapter Conference

23 -24 Dec 2023

State Cancer Institute, IGIMS, Patna

Update from
Prof (Dr). Rajesh Kumar Singh

On 23rd & 24th December 2023, a two-day conference of "8th ONCOCON and 5th AROICON 2023 (Bihar Branch)" was organized under the aegis of State Cancer Institute, IGIMS, Patna.

As the theme of this year's conference is "Never Give Up" our effort is to present integrated learning and update from the world's leading cancer specialists, Forums, and Institutions for introspection, analysis, and practice. The scientific program was revolving around all the related areas of sessions that have been meticulously designed to improve our understanding, perceptions, and actions in the field of cancer treatment and patient care. This conference have given a chance to the researchers to present their latest findings and learn about all the important developments in cancer research. Many Oncologists from National have been participated in this conference. Dr. Amit Jain of Meerut given his talk about the treatment with Cyberknife, which can be an alternative to surgery. Dr. Abhishek from AIIMS New Delhi, Dr. Sushma Aggarwal from SGPGI, Lucknow, Dr. S K Verma from Indore, Dr. Anoop from RIMS Ranchi, Dr. T.M. Singh from Bokaro, Dr. Sameer Hazra from Dhanbad gave their excellent lectures. Dr. Manisha Singh, Dr. R K Goswami, Dr. Amit, Dr. Ridu, Dr. Shiv Shankar Mishra, Dr. Arvind Kumar, Dr. S. Sirkar, Dr. Vineeta Trivedi, Dr. Rita Rani, Dr. Miraj, Dr. Rajiv, Dr. Zeenat, and Dr. Richa have contributed their lectures.

The session was chaired by Dr. (Prof.) Binde Kumar, Dr. Prem Kumar, Dr. Seema, Dr. Sanyal, Dr. Sudhakar, Dr. Naresh, Dr. Rajeev, Dr. Sahi, Dr. Keshari, Dr. Vinod, Dr. Santosh, and Dr. Dinesh.

Lifetime Achievement Award for outstanding contribution in the field of cancer treatment was given to Dr. Bishwajit Sanyal, Dr. J.K. Singh, Dr. Sudhakar Singh and Dr. P.N. Pandit.

A special lecture was organized in the memory of world-renowned cancer doctors and son of soil Dr. A.D. Singh and Dr. Rangi Prasad. Dr. T.M. Singh spoke on the latest challenges in radiation oncology and Dr. S. K. Verma on the role of radiation on ovarian cancer. Discussed the topic in detail.

Director of the institute, Dr. Binde Kumar, while emphasizing on the availability of modern facilities in treatment for cancer patients, talked about providing more facilities in the near future.

During the conference, various competitions were also organized in which junior and senior residents participated enthusiastically and prizes were also distributed to the winning participants. In Poster presentation 1st prize has been given to Dr. Puja Bhagat, 2nd to Dr. Deepali B Patil, and 3rd to Dr. Raina Rana. In Slogan writing competition 1st prize has been given to Mr. Anil Kumar Singh, 2nd to Dr. SK Monirul Mondal, and 3rd to Dr. Puja Bhagat. In Quiz competition 1st prize has been given to Dr. Kaniz Fatima, 2nd to Dr. Priti Minakshi, and 3rd to Dr. Rohit Saini.

At the end, Secretary cum Chief State Cancer Institute, Dr. (Prof.) Rajesh Kumar Singh, proposed vote of thanks and thanked everyone for successfully organizing the Conference.

5th AROI Bihar Chapter Conference

23 -24 Dec 2023

State Cancer Institute, IGIMS, Patna

Update from
Prof (Dr). Rajesh Kumar Singh

Poster Presentation Competition

1. 1st Prize – Dr. Puja Bhagat, SR, Radiation Oncology, SCI, IGIMS, Patna
2. 2nd Prize – Dr. Deepali B Patil, Medical Physics, SCI, IGIMS, Patna
3. 3rd Prize – Dr. Raina Rana, JR Radiation Oncology, SCI, IGIMS, Patna

Slogan Writing Competition

1. 1st Prize – Mr Anil Kumar Singh, Medical Photographer, IGIMS - For " NEVER GIVE UP "
2. 2nd Prize – Dr. SK Monirul Mondal, JR3, Radiation Oncology, SCI, IGIMS - For “The 'CAN' in CANCER indicates than we 'CAN' beat it. Let's beat it together”
3. 3rd Prize – Dr. Puja Bhagat, Radiation Oncology, SCI, IGIMS - For "Life Long or Short, We are here to alleviate the pain"

Quiz Competition

1. 1st Prize – Dr. Kaniz Fatima, JR Radiation Oncology, SCI, IGIMS, Patna
2. 2nd Prize – Dr. Priti Minakshi, JR Radiation Oncology, SCI, IGIMS, Patna
3. 3rd Prize – Dr. Rohit Saini, SR AIIMS, Patna

Congratulations

UPARIOCON

Newly elected Office Bearers

President
Dr. Pavan Kumar
(Professor, Radiation Oncology, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh
pawan.mehrotra12@rediffmail.com
Mobile - 9873405967.

General Secretary
Dr Md Shadab Alam
Assistant Professor & Consultant, Department of Radiation Oncology, JNMC, AMU, Aligarh).
roshanshadab@yahoo.co.in
Mobile - 9634464879.
.

Treasurer
Dr Kailash Mittal
Professor and Head, Department of Radiation Oncology,
UTTAR PRADESH UNIVERSITY OF MEDICAL SCIENCES,
Saifai, Etawah (U. P.)
drkkmittal@gmail.com

FARO Fellowship Experience

Dr Dipalee Borade, DMRT, DNB.
Department of Radiation Oncology,
Apollo Hospitals Navi Mumbai, India

It is my pleasure to share my experience at SNUH, South Korea during my visit as an international fellow. Professor Hong-Gyun Wu, initiated a fellowship at Seoul National University Hospital (SNUH), South Korea for FARO (Federation of Asian organisations for Radiation Oncology) member countries. While working with Prof. S.K. Shrivastava, I had heard about FARO and its activities and actually sir pushed me to pursue the fellowship. I applied for the fellowship in 2019 and I was fortunate to get selected for fellowship starting March 2020. Unfortunately, due to Covid-19 menace the fellowship was put on hold. Later, finally in February of 2023, I was pleasantly surprised to receive an email if I was still interested in the fellowship and I accepted it happily.

South Korea has an excellent national screening program. National insurance policy for cancer treatment provides high-quality patient care in high-volume centre like SNUH. Seoul National University Hospital is a 1751 bed state-of-the-art national tertiary care referral institute that provides speciality and super speciality services in Seoul. The radiotherapy department is part of a National Cancer Institute with six Linear Accelerators (One TrueBeam STx, Two Halcyon, One Vital beam, Two Trilogy, One MR Linac ViewRay) and HDR brachytherapy machine. The institution is practicing site-wise radiotherapy treatment and has strong research and academic programme.

After I joined my fellowship, I met Prof Jin Ho Kim, who is deputy chairperson of the radiation oncology department. Prof Kim was kind enough to guide and help me to complete the administrative procedure and introduced me to all the faculty members and residents at SNUH. He meticulously organised a schedule for me to follow which included different academic lectures and joint interdisciplinary tumor board meetings besides observation of routine patient planning and care. The number of patients simulated daily was 20-25, treating about 350 patients daily, with daily 12 to 15 cases with SBRT. My special interest was in Stereotactic body radiotherapy treatment for different sites like liver, pancreas, lung, bone and prostate and the fellowship programme was tailored to accommodate these areas.

Amongst the important and one of the most interactive academic sessions were tumour board discussions. The one such joint meet called 'Sarcoma and Spine conference', which used to be start at 7:00 am sharp with a full house of all faculty member from different specialities like radiology, pathology, surgery, oncology, orthopaedics come together to discuss the cases. Another to mention is radiation oncology departments 'Radiotherapy Planning Meet' and the 'new research paper discussion' meetings which were quite educative and interesting.

Prof Wu and Prof Kim also helped me to visit proton therapy at National Cancer Institute (NCI) Seoul, where Prof Sung Ho Moon helped me to get acquainted about proton by arranging meet with clinical professors and physics professors.

I was accompanied by a final year resident Dr. Jun Yeong Song throughout my fellowship, so the interaction with the radiation therapist (RTT), dosimetrist and medical physicist to overcome the language barrier. At SNUH, I was given access to the clinical history and the radiotherapy planning, which helped me to evaluate the SBRT plans and to discuss them with the respective faculty members. Prof Wu, Prof Kim, Prof Lee, Prof Jang, Prof Hak Jae Kim, Prof Chie, Prof Shin helped me to improve my understanding about SBRT and also suggested relevant literature about SBRT for different sites. The physics discussions with Prof Seong Moon Jung and Prof Geum Bong Yu were very helpful.

Fellowships

Along with the primary aim of learning SBRT, I was fortunate to learn and see the Total Marrow lymphoid Irradiation (TMLI). This international fellowship program has definitely improved my understanding in the subject and gave unique perspective in this early phase of my carrier.

I would strongly recommend such visits for young radiation oncologist to learn from the experiences of experts from different part of the world. I would suggest for the fellows to get some knowhow regarding the language and culture of South Korea before starting the fellowship. Staying in SNUH campus hostel or nearby will be convenient which requires applying beforehand in advance. The application for fellowship is available on AROI website.

Lastly, I would also like to mention, Seoul is a beautiful, smart and vibrant city with a strong cultural background. The sincerity, punctuality and humility of people leaves a lasting impression!

I would like to thank FARO committee members, AROI executive body, Prof S.K. Shrivastava and Prof Hong-Gyun Wu for this opportunity to me. I will always cherish my memories at SNUH, Seoul.

Acknowledgements:
- Prof Hong-Gyun Wu, Director Cancer Hospital, Director Gijang Heavy Ion Therapy, Professor, Department of Radiation Oncology, Seoul National University Hospital (SNUH), President Korean Society for Radiation Oncology, South Korea
- Prof Jin Ho Kim, Deputy Chairperson & Clinical Professor Department of Radiation Oncology, Seoul National University Hospital (SNUH), South Korea,
- Dr Shyam K. Shrivastava, Director Radiation Oncology, HCG Khubchandani Cancer Hospital, Mumbai, Former President: Federation of Asian Organisations for Radiation Oncology (FARO), Former Prof. & Head, Radiation Oncology, Tata Memorial Hospital, India

FICRO Awards - 2023

Congratulations

Dr. Sushmita Pathy

Dr. Swarupa Mitra

Dr. Rohini Khurana

Dr. Saikat Das

Dr. Pooja Nandwani Patel

Overseas – Dr. Sushil Beriwal

AROI fellowship Awards - 2023

43rd AROICON 2023 AT MUMBAI DURING 3rd ICC- 2-5 NOV 2023

>50YRS CATEFORY - (1): 1.5 LAKH (1.2 LAKH) – ABROAD

1. Dr Punita Lal – SGPGI, Lucknow

41-50 YRS CATEGORY - (2)- ABROAD

1. Dr Shraddha Raj – IGIMS, Patna
2. Dr (Col) Sankalp Singh – Army Hospital, New Delhi
3. Waiting list: Dr Pramod Kumar Gupta – Kalyan Singh Cancer Hospital, Lucknow

35-40YRS CATEGORY- 1,00,000/- (85,000/-)-ABROAD

1. Dr S D Shamsundar – KMIO, Bangalore
2. Dr Bharath Chandra G – Yashoda hospital, Hyderabad
3. Dr Renu Madan – PGIMER, Chandigarh
4. Dr Himanshi Mishra – IMS BHU, Varanasi
5. Waiting list: Dr K Shruthi – Amrita Institute, kochi

30-35 CATEGORY – (1,00,000/- & 30,000/-) 1ST 4 ABROAD & 5TH ONE NATIONAL – INTERNATIONAL

1. Dr Ankita Mehta – HBCH & RC, Vizag
2. Dr Bhavya Patneedi – Mahavir cancer Sansthan, Patna
3. Dr Janmenjoy Mondal - GMC, Kolkata
4. Dr Sankalp Naidu – MNJ Cancer Institute, Hyderabad

NATIONAL

1. Dr Himanshi Khattar – SRMSIMS, Bareilly
2. Waiting list: Dr Suman Dhabal – Burdwan medical College, Kolkata

NEIL JOSEPH FELLOWSHIP-20K- FOR PG STUDENTS FOR FELLOWSHIP WITHIN INDIA

1. Dr Rahi Das – R G Kar Medical college, Kolkata
2. Dr Vrushab Rao – Ruby Hall Clinic, Pune
3. Dr Seenu Vishwanathan – Burdwan Medical College, Kolkata
4. Dr Aakriti Bhardwaj – KMC, Manipal
5. Dr Smita Priyadarshinee – AHPGIC, Cuttack
6. Dr Pallavi Jain – BHU, Varanasi
7. Waiting list
    1) Dr Vysakha k – R G Kar Medical College, Kolkata
    2) Dr Mahak Gupta – KMC, Manipal

AROI fellowship Awards - 2023

43rd AROICON 2023 AT MUMBAI DURING 3rd ICC- 2-5 NOV 2023

AROI FELLOWSHIP FOR RT Technologist (<45yrs) : 10,000/- IN INDIA

1. Mr P. Johnson – MIOT International, Chennai

MEDICAL PHYSICS FELLOWSHIP (<40yrs) - 30,000/- IN INDIA

1. Dr Atul Mishra – UPUMS, UP

Best Proffered paper for senior members (>40yrs)

1. Dr Shagun Misra – SGPGI, Lucknow

Best Proffered paper for senior members (<40yrs)

1. Dr Shirley Lewis Salins – KMC, Manipal

DR M S GUJRAL GOLD MEDAL

1. Dr Mahak Gupta, KMC, Manipal

DR M C PANT GOLD MEDAL

1. Dr Arpan Ghosh, R G Kar MC, Kolkata

DR G C PANT YOUNG DOCTOR AWARD

1. Dr Vaishali Kataria, PGIMER, Chandigarh

TRAVEL GRANT :

1. Dr Aivee Sarkar -R G Kar MC, Kolkata
2. Dr Vysakha K - R G Kar MC, Kolkata
3. Dr Arijit Sinha - R G Kar MC, Kolkata
4. Dr Debanjan Kundu - R G Kar MC, Kolkata &
5. Dr Pallavi Jain – IMS BHU, Varanasi

Gold Medal Medical Physics

1. Dr Atul Mishra - UPUMS, UP

ICC abstract winners

DAY 1

1. Dr Pramod Kumar Gupta – KSSSCI, Lucknow
2. Dr Mahak Gupta – KMC, Manipal

DAY 2

1. Dr Aditi Jain – KMC, Bangalore
2. Dr Angshuman Roy – IPGMER &SSKMH, Kolkata & Dr Vrushab Rao – Ruby Hall Clinic, Pune

DAY 3

1. Dr Hannah Mary Thomas – CMC, Vellore
2. Dr (Col) Sankalp Singh – Army Hospital, Delhi &
   Dr Nimmya Sathish Kumar – Amrita IMS, Ernakulam

Congratulations

45TH ICRO Winner

1st

Dr. Mahak Gupta
Institute- K M C, Manipal
Guide - Dr. Shirley Lewis Salins

2nd

Dr. Ankur Mahajan
Institute: AIIMS - Bhubaneswar
Guide: Dr. Sandip Kumar Barik

AROI Academic Calender 2024

AROI-YROC-2024				
AIIMS-Jodhpur	20 – 21 Jan , 2024	Dr. Puneet Pareek Dr. Bharti Devnani	8003996890 8860728352	drpuneetpareek@gmail.com bhartidevnani@gmail.com

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AROI-ESTRO				
Gynae Teaching Course				
HBCH & MPMMC, VARANASI	14 – 17 March 2024	Dr. Satyajit Pradhan	94152 28261	satyajit.pr@gmail.com
Head & Neck Teaching course				
MIOT INT. HOSPITAL, CHENNAI	6 – 8 June 2024	Dr. V. Srinivasan	9841022366	secretaryaroi@gmail.com
Advanced Technology teaching course				
AIIMS, PATNA	5 - 8 Dec, 2024	Dr.Pritanjali Singh	9334931395	drpritanjalis@gmail.com

AROI-ICRO Sun PG Teaching course			
Jawaharlal Nehru Cancer Hospital, Bhopal	Dr. Gautam K Sharan	9326323109	dr.gautamsharan@gmail.com
Max Super Speciality Hospital, Bathinda	Dr. Rajesh Vashistha	9316911970	drvashistha@gmail.com

AROI-ICRO Sun PRODVANCE Course			
NZ- PGIMER, Chandigarh	Dr. Rakesh Kapoor	7087009396	drkapoor.r@gmail.com
EZ- C N C I , Kolkata	Dr. Tapas Maji	9432244844	tapasmaji60@gmail.com
WZ- Sterling Cancer Hospital, Ahmedabad	Dr. Pooja Nandwani Patel	9825739897	drpoojanandwani@gmail.com
SZ- RCC Trivandrum	Dr. K. Ramadas	9447042309	ramdasrcc@gmail.com

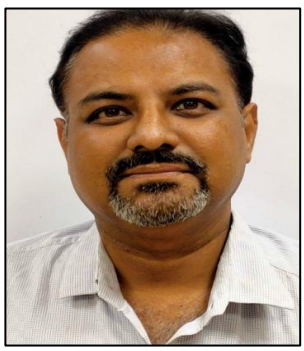
AROI-ICRO INTAS RADIOBIOLOGY COURSE 2024			
AIIMS-RISHIKESH	Dr. Manoj Gupta	9816137344	presidentaroi.manoj@gmail.com
Rest Courses – Yet to be decided			

Best of ASTRO- 2024			
RMLIMS, Lucknow	Dr. Madhup Rastogi	9418155955	drmadhup1@gmail.com

AROICON 2024				
KMC, MANGALORE	28 Nov to 1 Dec,2024	Dr. M.S. Athiyamaan	8892118848	athiyamaan.ms@manipal.edu

Obituary

Dr. Nabeeza Begum L , AROI LM – 2502
D.O.B- 14.09.1990, D.O.D- Nov. 2023
Dr. Nabeeza Begum L, Consultant at Pondicherry Cancer Trust Hospital, departed for her heavenly abode in November 2023 after suffering from cancer at the age of only 33. She completed MBBS from Sri Venkateswara Medical College and Research Institute in 2012 and MD - Radiation Oncology from Kidwai Memorial Institute of Oncology ,Bengaluru in 2017. She worked as a Senior Resident from 10.10.2017- 01-02-2019 in AIIMS, Bhubaneswar & for the tenure of 20.02.2019 – 19.01.2020 gave her full contribution in AIIMS, New Delhi . Dr. Nabeeza
Begum was diagnosed with GIST in 2015 and had a progressive disease. Her contribution during the tenure was quite commendable.



Dr. Vikas Madholia, AROI LM- 1468
DOB- 14/09/1976, DOD - 08/11/2023
Dr Vikas Madholia was a Professor in the Radiation Oncology at VMMC and Safdarjung Hospital till he passed away. After doing MBBS from MAMC Delhi and MD from Safdarjung Hospital, he worked as a faculty at MAMC and VMMC & Safdarjung Hospital. With his death, we have lost a wonderful colleague and a friend . Also, the patients have lost an empathetic doctor.

Prof VG Sudhakaran, 83 years
DOD - 11/12/2023
Dr V.G.Sudhakaran was born in 1942 in a village near Kayamkulam of Alleppey district Kerala State. He joined for MBBS course in prestigious Govt. Medical College Trivandrum in 1964 batch. In 1980, he joined in the Radiology dept of Govt Medical College Trivandrum and with the guidance of late Padmashri Dr. Krishnan Nair, he joined for Post graduate course in MD Radiotherapy at Post graduate institute of Medical Sciences at Chandigarh.
He joined as Assistant professor in Radiotherapy at Govt Medical College Calicut in 1984 and continued his service to become the head of department in the 1990 s. He was also the superintendent of the Govt Medical college hospital during the period. In 1998 he retired. He was a good teacher for the undergraduates and post graduates and a clinician par excellent. Post retirement he did not stop the clinical work and continued at Govt Medical college Pariyaram (Near Kannur) and in 2005 moved to one of the earliest cancer centres in south India -the International Cancer Centre at Neyyur, Kanyakumari district, Tamilnadu. He has been seeing patients and planning radiation treatment even a few days before his demise on 11th December 2023.
He was a great artist and has acted in 3 malayalam films in major roles . He was an active participant in the drama section of of All India Radio Calicut.
He was a great artist and has acted in 3 malayalam films in major roles . He was an active participant in the drama section of of All India Radio Calicut.
We will carry his memories in our hearts.

7 R's of Radiobiology

Dr. Kanhu Charan Patro
Prof. and HOD,
Dept. of Radiation Oncology
Mahatma Gandhi Cancer Hospital and Research Institute
Vishakhapatnam, Andhra Pradesh

Dr. Ajitesh Avinash
Registrar,
Dept. of Radiation Oncology
SUM Ultimate Medicare,
Bhubaneswar, Odisha

Let us learn the 7 R's of Radiobiology due to radiation.
6 R's are Reoxygenation. Repopulation, Redistribution
Repair, Radiosensitivity and Radio immunomodulation
To this group, Reinforcement is the recent addition.

Let us recapitulate cell cycle redistribution.
G2M-phase is most sensitive to radiation.
Late S phase is more resistant to radiation.
Cells in G2M get killed with a bout of radiation.
Cells in Late S phase wait till G2M conversion.
Repetition of this cycle is called Redistribution.

In a fraction of radiation, there occurs cell damage
Either by sub lethal or lethal cell damage
Sub lethally damaged cells get repaired.
But tumor and normal cells both get repaired.
There are many mechanisms of cell repair.
Mostly, it occurs by single and double strand Repair.
Oxygen is required for cell killing by radiation.
Euoxic cells are more sensitive to radiation.
After oxic cell killing, hypoxic cells now get oxygenenation

The repetition of this process is called Reoxygenation.
Tumor cells regrowth is seen in radiation interruption

It is the effect of surviving clonogen multiplication

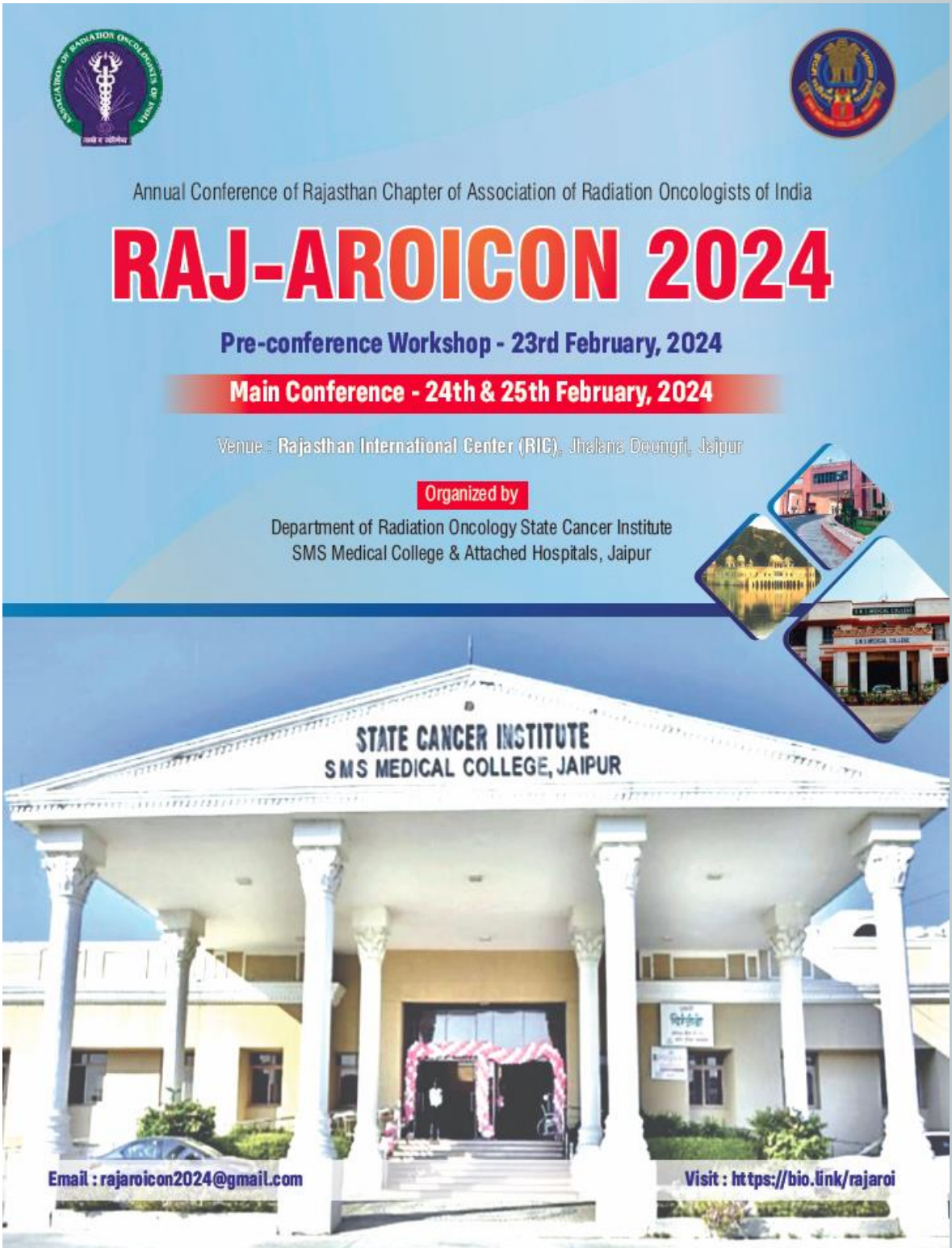
This phenomenon is known as Tumour cell Repopulation.

Intrinsic radiosensitivity means sensitivity differentiation.
Some have more reaction, and some get less reaction.
With similar dose of radiation and having no explanation.

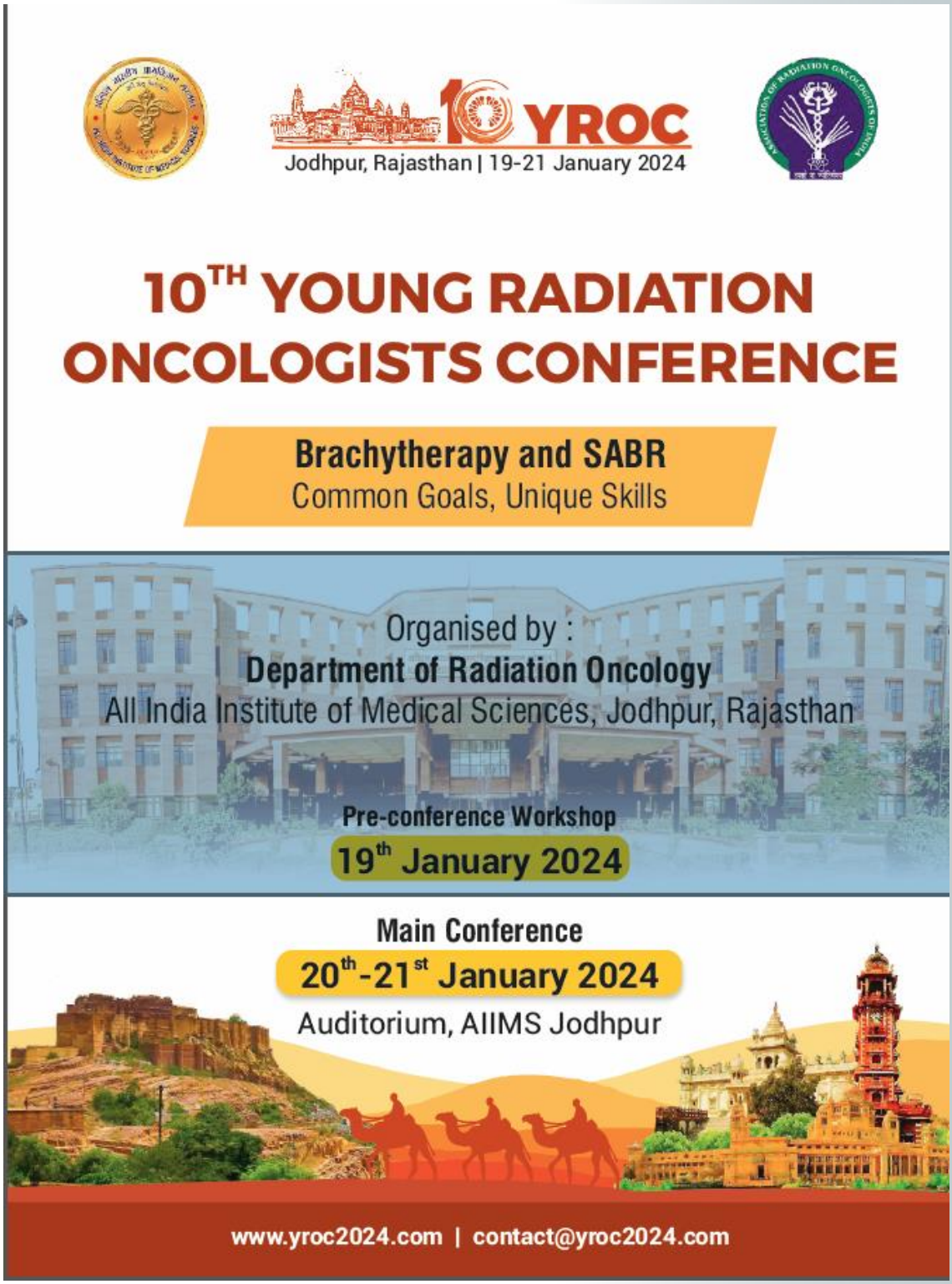
Radiation also causes immunomodulation.
Either by immune-suppression or activation
This happens due to antitumor reactivation.
Which is known as Radio Immunomodulation.

In the microscopic ecosystem of cancer cells,
Complex crosstalk occurs between cancer and non-cancer cells.
This leads to tumour progression, survival and resistant to treatment. Cytokines in this micro-environment are the main determinant.
This process is known as Reinforcement,
which is due to tumor microenvironment.
Summarising, radiation causes various changes in cellular biology.
Together, they are known as the 7 R's of radiobiology.
Rodney, Boustani, Farzad and Steel,
Credit goes to these scientists for their researching zeal

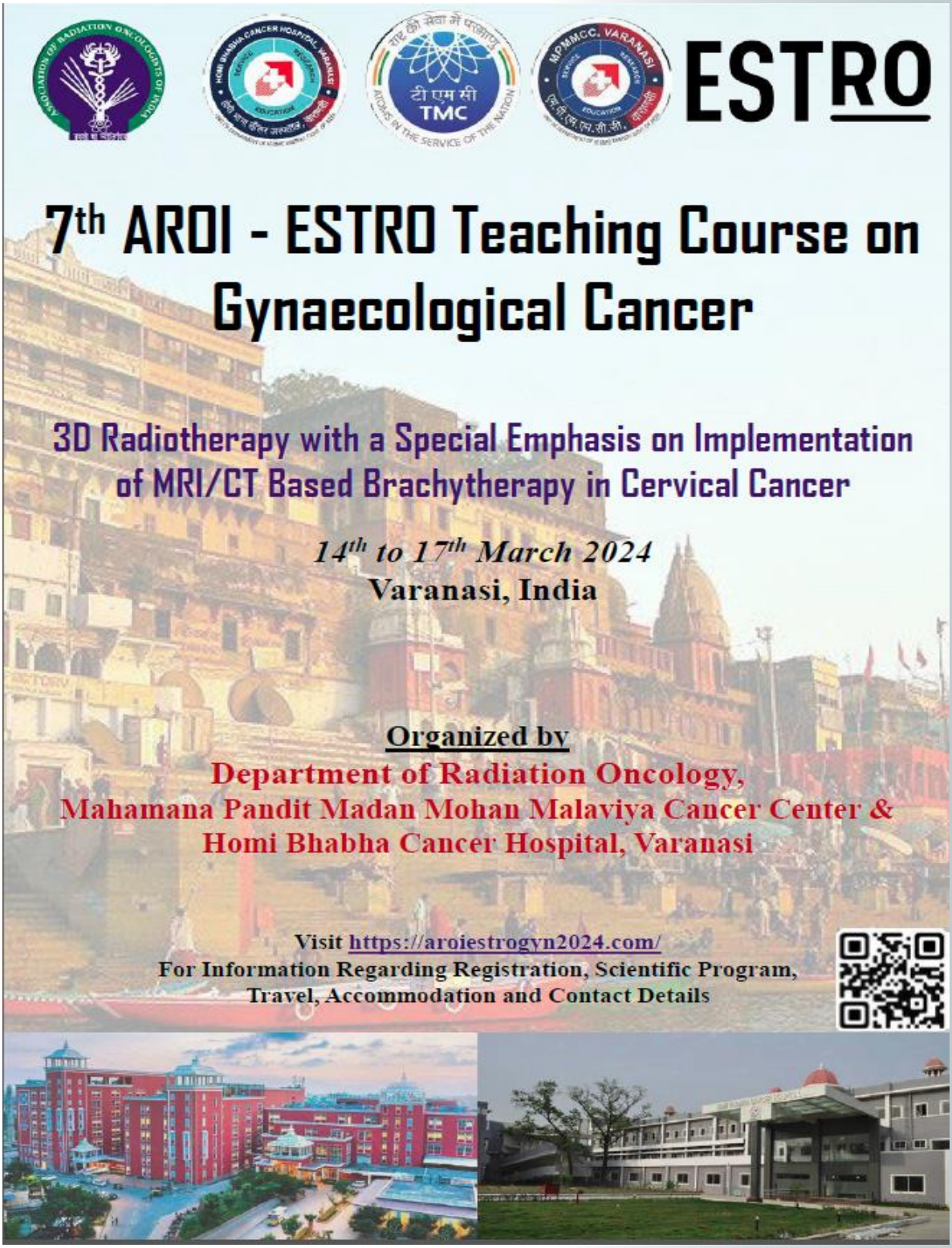
Events to attend



Events to attend



Events to attend



Events to attend

ESTRO

MIOT International

2nd AROI ESTRO

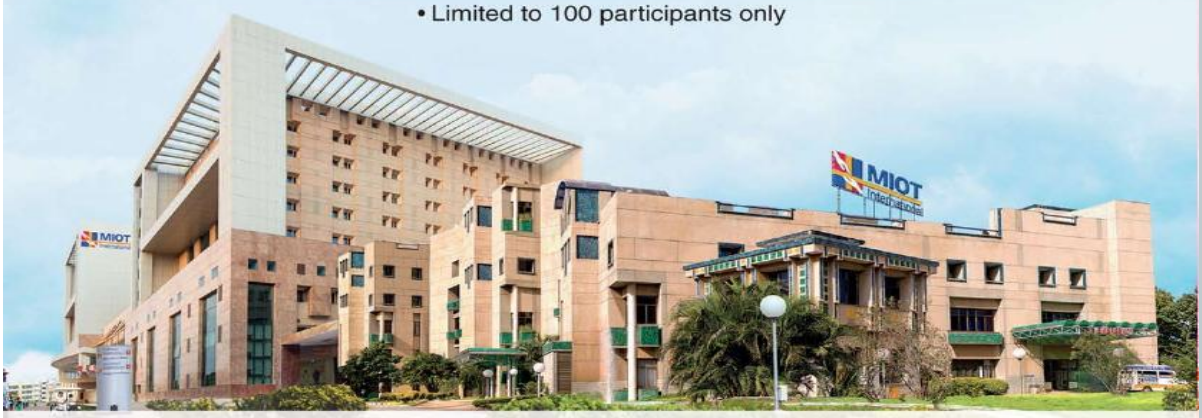
HEAD & NECK TEACHING COURSE

Theme: Oropharynx & Nasopharynx
Date: 6th to 8th June 2024
Venue: Retreat Auditorium, MIOT International, Chennai, India.

SAVE THE DATE

COURSE HIGHLIGHTS

- Lectures by eminent faculty from AROI and ESTRO
- Evidence Based Management and recent updates in Head & Neck Cancers: Oropharynx & Nasopharynx
- Interactive contouring and live treatment planning sessions
- Radiation Oncologists and Medical Physicists can apply
- Limited to 100 participants only



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Events to attend