



Workshop Report: Radiation-Based Techniques for Imaging and Therapy of Cancer

Date: April 5, 2025

Venue: 9th Floor Auditorium, School of Biotechnology and Bioinformatics, DY Patil Deemed to be University, Navi Mumbai

Organized by: Society for Radiation Research (SRR) in association with School of Biotechnology and Bioinformatics, DY Patil Deemed to be University, Navi Mumbai

Number of Participants: 110

The workshop was hosted by the School and was organised under the aegis of Society for Radiation Research (SRR). Dr. B. N. Pandey, Vice- President SRR and Scientific Officer, BARC gave an insightful overview of all the activities of SRR and the achievements achieved in the last 10 years. The workshop on “Radiation-Based Techniques for Imaging and Therapy of Cancer” brought together eminent experts, researchers, students, and faculty to delve into the cutting-edge advances in cancer imaging and therapy using radiation. A total of 110 enthusiastic participants attended this knowledge-enriching event.

Talk 1: Radiation Biology in Cancer Radiotherapy

Speaker: Dr. Amit Kumar, Scientific Officer G, BARC

Dr. Amit Kumar commenced the session with an inspiring message, drawing parallels between scientific determination and the metaphorical crossing of bridges, encouraging students to remain resilient and focused in their careers. He traced the historical evolution of radiation biology, spotlighting the pioneering contributions of Madame and Pierre Curie in the discovery of radioactive elements and the early development of X-ray technology.

He elaborated on the distinct biological effects and medical applications of alpha, beta, and gamma radiation, detailing how each type interacts with biological tissues and its significance in cancer diagnostics and radiotherapy. He discussed radiation-induced DNA damage, emphasizing the necessity of understanding cellular repair mechanisms to optimize therapeutic outcomes while minimizing side effects.

The talk further explored different modalities of radiotherapy, including external beam radiotherapy and brachytherapy, and their clinical implications in treating various cancers. Dr. Kumar concluded with a thought-provoking discussion on emerging research areas, particularly the underexplored pathways of radiation-induced cell death such as necroptosis and autophagy, and the need for greater interdisciplinary collaboration to address these gaps.

Talk 2: Artificial Intelligence in Cancer Imaging and Therapy

Speaker: Dr. Nagraj Huilgol, Chief Radiation Oncologist, Dr. Balabhai Nanavati Hospital

Dr. Huilgol's session focused on the intersection of Artificial Intelligence (AI) and Dr. Huilgol presented a dynamic session on the integration of Artificial Intelligence (AI) in cancer diagnosis and treatment. He began by outlining the historical development of AI and introduced contemporary tools like ChatGPT as examples of AI's growing influence in medicine. He emphasized the transformative potential of AI in oncology, particularly in imaging, diagnosis, decision-making, and personalized treatment planning.

Highlighting the significance of radiomics, he explained how AI leverages complex image data to extract features not visible to the human eye, aiding in early detection and outcome prediction. He showcased his research on "CT texture-based radiomics analysis as a predictor of response in head-and-neck cancer treated with chemoradiation and hyperthermia," illustrating the power of AI in stratifying patient response and tailoring therapies accordingly.

He also provided an overview of advanced segmentation techniques, including atlas-based segmentation, statistical modeling, machine learning algorithms, hybrid auto-segmentation, and multi-modal image segmentation. These methods, he noted, significantly improve the precision of tumor boundary identification and radiation delivery. However, Dr. Huilgol also addressed ongoing challenges such as inter-

observer variability, data standardization, and ethical concerns related to data use and AI-based decision-making.

Talk 3: Evolution of Nuclear Imaging and Therapy in Cancer

Speaker: Dr. Sandip Basu, Prof. & Head, Radiation Medicine Centre (Tata Memorial Centre)

Dr. Basu offered an in-depth analysis of the evolution of nuclear medicine over the last two decades, emphasizing its integral role in the diagnosis, staging, and therapeutic monitoring of cancer. He provided a historical overview of radiopharmaceutical development and discussed the clinical applications of nuclear imaging techniques such as PET-CT and SPECT in a range of malignancies.

He presented compelling case studies, including those involving colon and thyroid cancers, demonstrating how functional imaging provides unique insights into tumor biology and metabolic activity. Dr. Basu highlighted the transition from diagnostic imaging to theranostics — combining therapy and diagnostics — particularly using radiolabeled molecules like Lutetium-177 and Iodine-131 in targeted radionuclide therapy. The speaker also addressed the concerns of radiation exposure, both to patients and healthcare professionals, emphasizing the importance of ALARA (As Low As Reasonably Achievable) principles and proper safety protocols. He concluded by urging the next generation of researchers to focus on optimizing dose delivery and exploring novel radiopharmaceuticals to enhance therapeutic efficacy while minimizing toxicity.

Felicitation and Conclusion

At the conclusion of the academic sessions, the speakers were felicitated by **Prof. Debjani Dasgupta**, Director of the School of Biotechnology and Bioinformatics, for their valuable contributions and insights. The event was efficiently coordinated and hosted by **Dr. Kanchanlata Singh**, **Ms. Samiksha Garse**, and **Dr. Sunita Singh**, ensuring smooth conduct throughout the workshop.

A warm vote of thanks was delivered by **Dr. Sunita Singh**, expressing deep appreciation to the speakers, organizing committee, SRR, and all participants for making the event a meaningful and engaging platform for academic exchange.

Dr Kanchanlata Singh,
Assistant Professor, Biotechnology

Ms. Samiksha Garse
Assistant Professor, Bioinformatics

Dr. Sunita Singh
Section Head- Biotechnology

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From Right to left : Distinguished Speakers- Dr Basu, Dr. B. N. Pandey, Dr Amit Kumar, Dr Sunita Singh, Prof. Dr T. Marar , Dr Kanchan and the Participants for the Lecture Workshop



DR B. N. Pandey, Vice- President, SRR and Head, Radiation and Cancer Biology Section, Radiation Biology and Health Sciences Division, BARC felicitated by Director, Dr. Debjani Dasgupta.



Dr. Amit Kumar, Scientific Officer G, BARC (left) and Dr. Nagraj Huilgol , Chief Radiation Oncologist, Nanavati Hospital (right) and felicitated by Director Dr. Debjani Dasgupta



**Dr. Sandip Basu, Prof & Head, Tata Memorial Centre Annexe, felicitated by Director Dr .
Debjani Dasgupta**



From left to Right: Prof. T. Marar, Dr Sunita Singh, Dr. Debjani Dasgupta, Dr Nagraj, Dr. Sandip Basu, Dr Amit Kumar and Dr B. N. Pandey



Dr. Amit Kumar delivering talk on Radiation Biology in Cancer Radiotherapy



Dr. Nagraj Huilgol, delivering insights on Artificial Intelligence in Cancer Imaging and Therapy



Student's interactive session post talk by Dr. Nagraj



Students interactive session post talk by Dr Amit Kumar