

ANNUAL REPORT

2023



TATA MEMORIAL CENTRE
Advanced Centre for Treatment, Research
and Education in Cancer (ACTREC)

Advanced Centre for Treatment, Research and Education in Cancer





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Best Wishes from Dr. Rajendra A. Badwe
Former Director, Tata Memorial Centre



Message from the desk of the Director, ACTREC

I am pleased to present the ACTREC Annual Report for 2023 - a year marked by significant advancements in innovation, expansion of services, and strengthened patient-centered care.

ACTREC continued to scale its clinical capacity with enhanced operating rooms, expanded inpatient services, upgraded diagnostic platforms and specialized units across surgical, medical, radiation, and supportive care.

The inauguration of the **National Hadron Beam Therapy Facility - India's first public-sector proton therapy centre by Hon'ble Prime Minister of India, Shri Narendra Modi ji**, stands as a landmark achievement, reinforcing our commitment to precision oncology and equitable access to advanced treatment. Our diagnostic and research laboratories introduced new technologies including SNP microarray testing, advanced FISH panels, novel therapeutic formulations, and innovative bioanalytical tools, while maintaining stringent NABL-accredited standards. ACTREC's research ecosystem demonstrated strong national leadership through high-impact publications, patents, translational discoveries, and multi-institutional collaborations spanning molecular oncology, radiobiology, immunotherapy, and precision diagnostics.

In the domain of research, ACTREC upheld its position as a national leader in cancer science. Our investigators contributed to impactful discoveries spanning translational oncology, structural biology, radiopharmaceuticals, immunotherapy, nano-formulations, multi-omics approaches, and precision diagnostics. The development of next-generation CAR-T technologies, high-value patents, participation in multi-centric national studies, and extensive publication output in high-impact journals demonstrate the depth and breadth of our research ecosystem. Education and capacity building remained a priority, with ACTREC training a diverse cohort of residents, scholars, nurses, technologists, and visiting trainees through structured academic and hands-on programmes.

These achievements reflect the dedication of our clinicians, scientists, nurses, technical staff, administrators, and students. I extend my sincere appreciation to all members of the ACTREC community, our collaborators, and our patients whose trust drives our mission.

As we move forward, ACTREC remains committed to **innovation, patient-centred excellence, and research leadership**, ensuring world-class, accessible cancer care for the nation.

Dr. Sudeep Gupta
Director, ACTREC – Tata Memorial Centre



Message from the desk of the Director, CCE

It gives me great pleasure to present the Annual Report of the Advanced Centre for Treatment, Research and Education in Cancer (ACTREC) for the year 2023. This year has been one of the steady progress, collaborative growth, and meaningful scientific contributions toward understanding, preventing, and managing cancer in India.

The Centre for Cancer Epidemiology, a unit of TMC continued to serve as a national leader in population-based cancer research. Its contributions this year span across cancer surveillance, early detection, risk assessment, prevention, and evidence-based policy support. The Population-Based Cancer Registries (PBCRs) and Hospital-Based Cancer Registries (HBCRs) managed by CCE continued to provide high-quality data that inform India's national cancer control strategies. The registry teams achieved excellent coverage and data completeness, enabling more accurate estimates of cancer burden and trends across regions.

A major milestone this year was the expansion of the Indian Study of healthy Aging (ISHA) Cohort Study, integrating lifestyle data with biospecimens to explore genetic and environmental determinants of cancer. This initiative continues to be one of India's most valuable long-term population health resources.

As we reflect on 2023, it is clear that CCE's strength lies in its ability to integrate clinical care, laboratory sciences, and population-level research. The evidence base required to guide cancer prevention.

We are better positioned to guide India's cancer prevention and control strategies in the coming years.

I extend my gratitude to all faculty, staff, and collaborators whose dedication drives ACTREC's progress and impact.

Dr. Rajesh Dikshit

Director, Centre for Cancer Epidemiology
Tata Memorial Centre



Message from the desk of the Deputy Director, CCE

Cancer epidemiology forms the foundation of evidence-based cancer control, linking disease patterns in populations to prevention, early detection, and health system planning. During 2023, the Centre for Cancer Epidemiology (CCE) at Tata Memorial Centre continued to strengthen this foundation through systematic data generation, analysis, and sustained public health engagement.

A major thrust of the year was on enhancing the depth and usability of cancer surveillance data. Continuous improvements in population-based and hospital-based cancer registries enabled more accurate assessment of cancer incidence, survival, mortality, and temporal trends across diverse regions of the country. These datasets remain critical for understanding regional variations, identifying priority cancers, and evaluating the impact of screening and treatment strategies.

CCE also expanded its work beyond incidence measurement to include survivorship studies, cause-of-death analysis, and special population surveillance. Such epidemiological insights are essential for capturing the long-term burden of cancer, informing resource allocation, and guiding prevention-focused interventions. Methodological strengthening, standardization of procedures, and capacity building of registry personnel were integral to sustaining data quality and comparability.

By integrating epidemiological evidence with clinical and laboratory research, CCE continues to support a comprehensive approach to cancer control that emphasizes prevention, early diagnosis, and outcome evaluation alongside treatment advances. This population-level perspective remains indispensable to achieve equitable and effective cancer care.

I acknowledge the dedication of CCE's faculty, registry teams, data managers, and collaborators whose meticulous work underpins national cancer statistics and policy decisions. Their collective efforts ensure that epidemiology remains central to shaping India's cancer control strategies.

Dr. Pankaj Chaturvedi

Deputy Director, Centre for Cancer Epidemiology
Tata Memorial Centre



Message from the desk of the Deputy Director, CRC

The year 2023 has been a period of consolidation and forward momentum for the Clinical Research Centre (CRC) at ACTREC. Our collective efforts have been directed toward strengthening the foundation of clinical science while improving the quality, efficiency, and scope of our research activities.

A major highlight of 2023 has been the structured expansion of early-phase and translational clinical research, enabling smoother integration between laboratory discoveries and patient-focused studies. We enhanced our capabilities in protocol development, trial design support, and biostatistics, which has substantially improved study initiation timelines and scientific rigor.

Significant progress was also made on the upgradation of clinical research facilities. This included the refurbishment of dedicated research consultation spaces, optimization of pharmacy and sample-handling workflows, and the implementation of strengthened data-management systems in accordance with global Good Clinical Practice (GCP) standards. These improvements have helped streamline patient flow and have elevated the overall research experience for participants.

In 2023, we also commissioned new services supporting clinical investigations, including expanded capacity for digital pathology review within clinical studies, improved biospecimen processing services, and standardized training programs for research coordinators and nursing staff. These additions have contributed meaningfully to the quality and consistency of clinical research operations.

I extend my sincere appreciation to our clinicians, scientists, research staff, and administrative teams for their dedication and commitment. Their patient centric collaborative spirit is at the heart of every achievement. As we move forward, we remain committed to fostering scientific innovation while ensuring that patient welfare and ethical integrity remain central to our mission.

Dr. Navin Khattry
Deputy Director, CRC, ACTREC



Message from the desk of the Deputy Director, CRI

The Cancer Research Institute's 2023 overview report captures a year of diverse scientific progress, reflecting the collective strength of its laboratories and core facilities. Each group advanced knowledge in its domain while contributing to the institute's broader mission of translating discovery into therapeutic potential.

Research on tumor progression, therapy resistance, apoptotic pathways, immune evasion, oncogene regulation and biomarker discovery all moved forward in parallel, with technical milestones such as the purification of complex protein assemblies and the expansion of sequencing and proteomic pipelines underscoring the institute's capacity for innovation. Ongoing research helped in better understanding of tumor-immune interactions, applications of checkpoint inhibitor in overcoming therapy resistance. The Genomics and proteomics teams enhanced infrastructure and data integration, enabling discoveries across multiple projects. Contributions from structural biology, in silico characterization of protein models and proteomics driven protein interaction studies ensures a balanced portfolio of fundamental and applied research.

Several new tools and techniques were developed to understand the mechanism of some of the aggressive cancers and for nano medicine. Beyond individual achievements, the institute fostered cross-disciplinary collaborations that bridged basic science and clinical application, published high-impact papers in international journals, and upgraded core facilities in sequencing, imaging, and proteomics.

Training programs for young researchers and doctoral students reinforced CRI's role as a center for talent development, ensuring sustainability of progress. Taken together, the report conveys an institution deeply engaged in unravelling cancer biology while simultaneously laying the groundwork for clinical translation. By maintaining a uniform emphasis across its laboratories, CRI demonstrates that its strength lies not in isolated breakthroughs but in the synergy of diverse research programs, positioning the institute as a hub of excellence, innovation, and education in the global fight against cancer.

During 2023, fifteen PhD scholars successfully completed their doctoral programmes and secured five prestigious awards. In CRI Investigators collectively published 51 scientific publications in peer-reviewed reputed journals. These accomplishments highlight the strength of CRI's research ecosystem and its sustained commitment to excellence in doctoral training and scientific advancement.

I am confident that, with collaboration and perseverance, we will reach new milestones in our shared vision of overcoming cancer.

Dr. Prasanna Venkatrman
Deputy Director, CRI, ACTREC



Annual Events



Dr. Sudeep Gupta, Director, ACTREC during Republic Day Celebrations



Directors and dignitaries escort towards flagpost on Republic Day



Dr. Navin Khattry, Deputy Director, CRC greeting Dr. Prasanna Venkatraman, Deputy Director, CRI on the Womens Day Celebrations (08 March 2023)



Observance of Womens' Day (08 March 2023)



Dr. R A Badwe hoisting the National Flag on Independence Day



Clean the Campus: Swachh Bharat Abhiyan (02 October 2023)



Pledge taking on Rashtriya Ekta Diwas (31 October 2023)



Dr. Sudeep Gupta, Director, TMC ACTREC lighting the lamp on the occasion of 8th National Ayurveda Day (10 November 2023)



Mr. M Y Shaikh, Chief Administrative Officer, taking pledge on the occasion of Samvidhan Diwas (26 November 2023)

ACTREC Overview:

The Advanced Centre for Treatment, Research and Education in Cancer (ACTREC), a key constituent of the Tata Memorial Centre, continues to serve as a national hub for cutting-edge cancer research, translational science, and population-based cancer control. In 2023, ACTREC strengthened its unique continuum that spans fundamental discovery (CRI), clinical and translational research (CRC), and population-level epidemiology and prevention (CCE), ensuring that laboratory insights meaningfully translate into improved patient outcomes and public health impact.

Clinical Research Centre

Overview: In 2023, the Clinical Research Institute at ACTREC advanced a broad portfolio of clinical, translational, and laboratory research, reflecting strong interdisciplinary collaboration and a deep commitment to improving cancer diagnostics, therapeutics, and supportive care. Across departments, studies combined methodological rigour with direct clinical relevance, strengthening ACTREC's role as a national leader in oncology research.

The Cancer Cytogenetics Department completed an ICMR-funded project characterising the incidence and cytogenetic–molecular profile of the B-other ALL subgroup in India. Using conventional karyotyping, FISH, and SNP microarray technology, the team generated one of the first comprehensive national datasets for this clinically challenging subgroup, enabling improved diagnostic precision and risk stratification for both pediatric and adult patients. Their parallel work in quality assurance strengthened cytogenetic standardization across Indian laboratories.

The Clinical Pharmacology Laboratory reported major translational progress, including regulatory approval for two indigenously developed products. Studies evaluating a recombinant radioprotective nutraceutical and a herbal formulation for mitigating graft-versus-host disease demonstrated promising safety and immunomodulatory effects. Alongside these trials, the laboratory expanded therapeutic drug monitoring research using HPLC and LC-MS/MS, refined antifungal and immunosuppressant dosing strategies, and advanced collaborative work on chemotherapy-induced toxicity, microbiome modulation, and quality-of-life assessment for cancer patients.

In parallel, the Composite Laboratory supported high-throughput oncology diagnostics and contributed several national and international publications focused on tumour markers, hematology, and biochemistry, improving the interpretation of routine laboratory indicators used in oncology decision-making.

The Clinician Scientist Laboratory led several mechanistic and molecular studies. Investigations into hypoxia biology identified variability in common reference genes under hypoxic stress in breast and lung cancer models, underscoring the need for validated normalization controls in qRT-PCR hypoxia research. Further work showed that hypoxia triggers AP-1-mediated proliferative responses, offering insights into how surgical hypoxic stress may accelerate tumour aggressiveness. Proteogenomic profiling of triple-negative breast cancer revealed distinct tumour signatures with potential biomarker relevance, while contributions to the Indian Cancer Genome Atlas expanded national efforts to map genomic diversity among Indian breast cancer patients. The laboratory also advanced next-generation sequencing assays to enhance circulating tumour DNA detection for non-invasive disease monitoring.

The Department of Transfusion Medicine conducted prospective studies evaluating operative transfusion indicators and donor-related variables in platelet apheresis, generating evidence to refine transfusion triggers and strengthen donor safety. Their support for indigenous CAR-T and NK cell development pipelines represents a crucial contribution to India's emerging immuno-oncology ecosystem.

The Microbiology Department advanced three major projects using broth micro-dilution and surveillance-based methods to profile antifungal susceptibility in *Aspergillus* isolates, characterise urinary tract infection pathogens in cancer patients, and document antibiotic resistance trends. These findings support improved antimicrobial stewardship in immunocompromised populations.

The Nursing Department strengthened practice-driven clinical research, undertaking studies on nurses' knowledge of extravasation management, retrospective analyses of donor lymphocyte infusion outcomes, and coping strategies among post-HSCT patients. These projects highlighted opportunities for targeted training, improved psychosocial support, and enhanced patient safety practices.

Together, the year's research output demonstrates ACTREC's growing emphasis on translational impact, evidence-based patient care, and national scientific leadership.

Cancer Research Institute

Overview: The CRI core research aligns with the vision and mandate of the Institute – that is excellence in research education and training. There are 19 principal investigators and about 100 PhD students on campus, immersed in understanding the causes of various cancer, mechanism of tumor progression, therapy resistance and identification new therapeutic targets and drugs. Their work involves model systems that vary across scales- from molecules at atomic resolution to cell lines, small animal models to and patients. Throughout the year several 100 young students from colleges get trained here in research, analytical thinking, acquisition of new skills, to conduct their dissertation projects mandatory to full fill their degree courses. There are investigators who work within various thematic groups, i.e, Biomolecular Structure Function and Alteration, Therapy resistance and stem cell biology, c) Tumor cell biology, d) Genomics, epigenetics and precision medicine, e) Tumor immunology and Immunotherapy and f) Theranostics and Clinical Pharmacology.

Some of the salient findings covered under this year are as follows:

Tumor Progression: a) contribution of substrate stiffness to cell morphology and aggressiveness in glioblastoma relating the cellular structure to cancer progression; b) role of ECM stiffness-regulated exosomal thrombospondin-1 in promoting cellular networking in breast cancer; c) ability of Lipocalin 2 to inhibit actin glutathionylation, promoting invasion and migration of colon cancer cells; d) regulation of breast cancer stem cells differentiation and the metastatic potential of Secretory phospholipase (sPLA2-IIA) ; e) the role of the miR-944/MMP10/AXL-axis in lymph node metastasis in tongue cancer and f) the mechanism of action of progesterone in breast cancer progression.

Biomolecular structure, function alteration: a) potential pathogenic role of mutations in conserved regions of secretory clusterin, determined through in silico analysis; b) role of VRK2A and Bcl-xL protein-protein interaction in its anti-apoptotic role in cancer; c) the structure-based assessment of mutations in the Eph-ephrin class of proteins associated with non-small cell lung cancer and d) in silico approaches to classify variants of uncertain significance (VUS) in BRCA2 in cancer risk assessment.

Genomics and epigenomics: a) determination of genome-wide DNA methylation profiling of HPV-negative leukoplakia and gingivobuccal complex cancers for biomarker identification

in disease progression; b) the consequence of mitochondrial dysfunction and chromatin changes in doxorubicin-resistant cancer cell lines in therapy resistance.

Tumor Immunology: a) analyses of eosinophil and basophil indices in glioblastoma patients and their correlation with survival was indicative of the role of immune cell involvement in glioblastoma tumor biology; b) anti-viral and anti-inflammatory effects of 6-Shogaol in COVID-19, were traced to the modulation of NLRP3 inflammasomes in xxx. C) CD26 levels were found to associate with clinical outcomes post-allogeneic stem cell transplantation.

Developments of tools and techniques: a) engineering of degradable cobalt nanoparticles; b) Triple reporter assay: A non-overlapping luciferase assay for the measurement of complex macromolecular regulation in cancer cells using a new mushroom luciferase-luciferin pair; c) A modified protocol was established for the purification of hetero-oligomeric protein variants of HtrA2 a proapoptotic protein; d) a tool was developed to remove the interference from hemolysis to enhance diagnostic accuracy for oral cancers.

Diagnosis: a) Immunohistochemical expression of H3.3K36M and DOG1 was tested for its utility in the diagnosis of chondroblastomas; b) Translationally controlled tumour protein (TCTP) was found significantly overexpressed in oral premalignant lesions, oral tumours and oral dysplastic and cancer cells versus normal oral mucosa and also in recurrent versus non-recurrent oral tumours.

Research done in CRI is facilitated by excellent infra structure that hosts many routine and state of art instruments within its centralized facilities. Here is the essence of each of ACTREC's facility's which summarizes their functions and highlights their key achievements in 2023. The Anti-Cancer Drug Screening Facility (ACDSF): ACDSF at ACTREC plays a crucial role in anti-cancer drug development in India by offering in vitro and in vivo drug screening assays. With over 20 human tumor cell lines and 10 murine tumor models, the facility received 1122 compounds in 2023 from over 100 clients across India, testing 1080 for in vitro activity. It conducted 21 in vivo studies on 42 compounds, contributing to significant projects on herbo-mineral formulations and anti-cancer properties. Notably, one staff member qualified for a PhD program, and research findings were presented internationally at IUIS-2023 in Cape Town. Bioinformatics and Computational Biology Facility: This facility supports bioinformatics needs through multi-omics analysis of macromolecules using advanced statistical techniques. In 2023, it provided access to high-performance computing resources and facilitated training for 8 B.Tech and M.Sc. students. The facility is set to offer credit courses for PhD students,

further enhancing its educational contributions. ACTREC Biophysics Facility: The Biophysics Facility specializes in the molecular-scale characterization of biological macromolecules. In 2023, it provided services for various research projects, facilitating the analysis of macromolecular properties and interactions. The facility supported external users from multiple universities, generating income from services. ACTREC Biorepository Facility: This facility collects and distributes biological samples for research, managing samples from 1068 cases in 2023, primarily from head and neck tumors. It supplied 5328 stained and 28636 unstained slides to various research labs and is involved in biobanking efforts, contributing to significant research projects. Common Instrument Room: The Common Instrument Room optimizes the use of essential scientific equipment available 24/7 for staff and students. It supports maintenance and procurement of laboratory equipment, ensuring minimal downtime. The facility houses 116 pieces of equipment, essential for routine research activities. Imaging Facility: The Imaging Facility provides advanced imaging capabilities for biological samples, enhancing its infrastructure to meet research needs. It continues to support multiple research groups and has been instrumental in training users for imaging studies using different state of art confocal microscopes. Recombinant DNA Facility: This facility offers genotyping services using various PCR methods. In 2023, it analyzed 500 transgenic mice and performed cell line authentication on 22 cell lines, showcasing its vital role in genetic research. Electron Microscope Facility: Equipped with a high-resolution electron microscope, this facility provides ultrastructural analysis services. In 2023, it processed 702 samples for electron microscopy and conducted 164 negative staining analyses, contributing to significant research findings. Flow Cytometry Facility: The Flow Cytometry Facility supports over 105 researchers across 24 labs, offering technical assistance for various analyses. It conducted extensive studies on cell profiles and trained 10 PhD students in 2023, maintaining its crucial role in cellular analysis. Laboratory Animal Facility (LAF): The LAF breeds and supplies laboratory animals for research, providing 10,391 normal and various specialized mice to researchers. It performed extensive quality control tests and contributed to multiple research projects in 2023. Histology Facility: The Histology Facility processed 4461 tissue samples in 2023, supplying a large number of stained and unstained slides to research laboratories, thereby supporting extensive histological research. Mass Spectrometry Facility: This facility conducted various applications in mass spectrometry, profiling complex protein mixtures and performing label-free quantification for numerous samples, enhancing proteomics research. Molecular Imaging Core Facility: Celebrating its

tenth year, this facility upgraded its imaging equipment and introduced a user-friendly online booking system. It supported multiple research activities, contributing to significant publications and patents in 2023. **Preclinical Imaging Facility:** The Preclinical Imaging Facility focuses on animal imaging and evaluating radiopharmaceuticals. It conducted numerous imaging studies and surgeries for pet animals with spontaneous cancers, emphasizing its commitment to comparative cancer research. **Macromolecular and X-ray Diffraction Facility:** This facility specializes in X-ray diffraction analysis and crystallization, analyzing 16 crystals in 2023. It supports users with data processing and structure refinement, facilitating significant structural biology research.

Centre for Cancer Epidemiology

The **Centre for Cancer Epidemiology (CCE)** remained central to ACTREC's mandate of reducing cancer burden through **surveillance, prevention, early detection and health systems strengthening**. In 2023, CCE oversaw a wide spectrum of activities spanning preventive oncology, cancer registries, survival studies, molecular epidemiology and national capacity-building initiatives

The **Department of Preventive Oncology** expanded clinic- and community-based screening services for cervical, breast and oral cancers at Mumbai and rural spoke centres, while conducting extensive awareness and tobacco-control initiatives. During the year, **1,124 health professionals were trained**, and thousands of participants benefitted from screening camps, awareness sessions and national health observances. Preventive oncology research progressed through **13 ongoing studies** and multiple national and international publications

The **Division of Medical Records and Cancer Registries** strengthened India's cancer surveillance infrastructure, managing **11 population-based cancer registries covering ~22 million population** and delivering the **National Tobacco Quitline Service**, which received **61,951 calls** in 2023 and enabled measurable tobacco cessation outcomes. Several registries achieved international recognition with data accepted into *Cancer Incidence in Five Continents, Volume XII*

Hospital-based cancer registries and **Patterns of Cancer Care and Survival Studies (POCSS)** expanded to additional Tata Memorial Centre sites, generating high-quality survival data and peer-reviewed outputs. The **Division of Molecular Epidemiology and Population Genetics** advanced large-scale community screening and biomarker-based risk stratification, while the **Cancer Surveillance for Special Populations** division maintained real-time registry operations

across nuclear power plant locations, accruing data on approximately **20,000 cancer cases annually**

Flagship national initiatives such as the **Unit for Strengthening Cause of Death Data (USCOD)** and the **Access to Affordable Cancer Care for One and All** project further amplified ACTREC's public health footprint through capacity building, governance support and decentralisation of cancer care services.

PERFORMANCE STATISTICS 2023		
Cancer Data	2022	2023
Number of Online Registrations		37
Smart Card Transactions		332143
Amount transacted through Smart Card (service)		196,926,919.28
(dispensary)		
Utilization of subsidized schemes:		
AB Scheme		559
MMCRKS (Punjab)		SNA
MPJAY		2523
Yuvajana Smarika Rythu (YSR) Aarogyasri scheme		SNA
Other Schemes		NA
Patient Registrations		
General New Patient Registrations (1)	2440	3850
Not TMH Transfer (2023)		
Private New Patient Registrations (2)	378	632
Not TMH Transfer (2023)		
(3) = 1+2: Total New Patients	2818	4482
Patient Referrals for Investigations (4)	2657	695
Patients Referred for Consultation (Expert Opinion) (5)	371	517
Total Referral Patients (4+5)		1212
Preventive Oncology Patients (6)		SNA
Preventive Oncology Patients (2023)		
(3+4+5+6) = Total Patient Registrations	5846	5694
Total in Previous Year (2023)		
Teleconsultations		SNA
Police Data		0
RMC Registrations		SNA
Transfusion Medicine Registrations		2982
Number of patient deaths		233
Deaths of patients registered in year 2023		233
Inpatient Services		
Bed Strength	300	322
Number of Admissions	7603	12225
Number of Admissions (2023)		
Average Length of Stay (Days)	4.62	5.14
Bed Occupancy (Percentage)	80	71%
Surgical Oncology		
Major Operative Procedures	2890	4696
Minor Operative Procedures	582	2909
Robotic Surgeries performed (2023)	NA	SNA
Total Surgeries performed		7605

Medical Oncology		
Day Care: General patients	26316	43662
Day Care: Private patients	4272	8120
Total Day-care patients		51782
Total Day-care patients (2023)		
Bone Marrow Transplants performed	58	152
Total Bone Transplant patients (2023)		
Digestive Diseases & Clinical Nutrition		
Endoscopies	21	119
Nutrition Clinic	22386	26014
Anesthesiology, Critical Care & Pain		
Number of (ICU) Admissions	3106	6913
Patients in Recovery Ward	2653	4486
Pain Clinic (IPD)	1142	1860
Radiation Oncology		
External Beam Therapy (patients)	1074	1244
Brachytherapy (applications)	247	313
Total Radiotherapy patients		1557
Treatment Planning / Beam Modification	1550	1752
Imaging Services		
Conventional Radiography	5119	8541
Ultrasound / Color Doppler	4961	8610
Mammography	2494	3180
C.T. Scan (Diagnostic)		
(2023)	10079	24415
C.T. Scan (for Radiotherapy Planning)		
M.R.I Scan	4691	8658
Interventional Radiology	1860	2446
Total Radiodiagnosis patients		55850
Total Radiodiagnosis patients (2023)		
Nuclear Medicine		
PET-CT Scan	3905	5456
SPECT-CT Scan	SNA	SNA
SPECT Scan	SNA	SNA
High Dose Therapy	SNA	SNA
Isotope Therapy	SNA	SNA
Total Nuclear Medicine patients		5456
General Medicine		
Electrocardiography (ECG)	4604	6920
Echo Cardiography	2922	5203
Pulmonary Function Test (PFT)	SNA	456
Laboratory Diagnostics		

Pathology: Histopathology (slides) + IHC (slides) + Frozen Section (numbers performed)	101493	175362
Biochemistry	905	1001664
Cytopathology: FNAC+Gynec+non Gynec+cell blocks		1755
Molecular Pathology	SNA	SNA
Microbiology	21668	
Bacteriology	10883	17251
Mycobacteriology	82	146
Mycology	176	207
Serology	7332	12121
Virology		SNA
Clinical Microbiology	3195	4970
Molecular Microbiology		504
Hematology	72173	110502
Cytogenetics	26871	8330
Flow Cytometry & Molecular Hematopathology		
Bone Marrow Aspiration Morphology	6154	6183
Flow Cytometric Immunophenotyping	7366	9595
Molecular Hematopahtology	10838	10745
Human Leukocyte Antigen (HLA) Laboratory		
HLA Typing	6108	6936
Antibody Screening	197	215
Total of all Laboratory investigations		1366486
Total of all Laboratory investigations (2023)		
Transfusion Medicine		
Blood Components Prepared [Whole Blood + Packed Red Cells + Platelets (Random Donor Platelet) + Fresh Frozen Plasma + Cryoprecipitate + Factor VIII Deficient Plasma].	5220	14061
Single Donor Platelets (SDP) prepared	1314	1878
Specialized Procedures (Irradiation of blood Products + Granulocyte Harvest + Therapeutic Leukapheresis + Therapeutic Plasma Exchange).	5425	8992
Laboratory Investigations (Blood Grouping + Cross matching + Antibody Detection).	28482	58838
Blood Units Collected	3568	6008
Platelet Pheresis	1314	1878
Total of Transfusion Medicine		91655
Total of Transfusion Medicine (2023)		
Other Clinical Services		
Central Venous Access Device (CVAD) Clinic	SNA	30750
Stoma Clinic	SNA	4423
Occupational Therapy	SNA	1355
Physiotherapy	8673	15721

Speech Therapy	SNA	5592
Psychiatry and Clinical Psychology	SNA	SNA
Dental Services		
General Dentistry	4900	7599
Prosthetics Services	192	663
Tissue Bank		
Allografts Produced		SNA
Palliative Medicine		
Number of Patients		3936
Home Care Visits		648
Medical Social Service		
Number of Beneficiaries for Financial support	995	1694
Number of Beneficiaries for Accommodation	1493	3646
Total Social Service Beneficiaries		5340

NA – Not Applicable

SNA – Services Not Available

Clinical Research Centre





CLINICAL RESEARCH CENTRE
Dr. Sudeep Gupta (Director, ACTREC)
Dr. Navin Khattry (Dy. Director, CRC-ACTREC)

Anesthesiology, Critical Care and Pain

Dr. Reshma Ambulkar
Dr. Bhakti Trivedi (OIC)
Dr. Amol Kothekar
Dr. Malini Joshi
Dr. Ketan Kataria
Dr. Ashwini Rane
Dr. Anjana Wajekar

Cancer Cytogenetics

Dr. Dhanlaxmi Shetty (OIC)
Ms. Hemani Jain

Cancer Genetics

Dr. Rajiv Sarin

Clinical Pharmacology

Dr. Vikram Gota (OIC)
Dr. Manjunath Nookla

Clinical Research Secretariat, ACTREC

Dr. Jayant Goda Sastri (OIC)
Mrs. Sadhana Kannan

General Medicine

Dr. Prafulla Parikh
Dr. Sujit Kamtalwar
Dr. Ashwini More

Hematopathology

Dr. Subramanian Ganesan (OIC)
Dr. Nikhil Patkar (Clinician Scientist)

Microbiology and Composite Laboratory

Dr. Vivek Bhat (OIC)
Dr. Preeti Chavan (OIC)

Nursing

Dr. Meera Achrekar (Dy Nurs Superint)

Pathology

Dr. Epari Sridhar (OIC)
Dr. Asawari Patil
Dr. Swapnil Rane

Radiation Oncology

Dr. Tejpal Gupta
Dr. Vedang Murthy
Dr. Supriya Shastri
Dr. Jayant Goda Sastri
Dr. Tabassum Wadasadawala
Dr. Sangeeta Kakoti
Dr. Priyamvada Maitre
Dr. Shwetabh Sinha
Dr. Jifmi Jose
Dr. Revathy Krishnamurthy

Radiodiagnosis and Interventional Radiology

Dr. Nitin Shetty (OIC)
Dr. Amit Kumar Janu
Dr. Kajari Bhattacharya
Dr. Daksh Chandra
Dr. Nivedita Chaktaborty

Heamtology

Dr. Prashant Tembhare (Clinician Scientist)

Surgical Oncology

Dr. Sudhir Nair (OIC)
Dr. Gaurav Chatterjee
Dr. Sweta Rajpal
Dr. Shruti Choudhary
Dr. Swapnali Joshi
Dr. Sajid Qureshi
Dr. Aliasgar Moiyadi
Dr. Vinay Shankhdhar
Dr. Vineet Kumar
Dr. Prakash Shetty
Dr. Vineet Kumar
Dr. Manish Pruthi
Dr. Parthiban Velayutham

Medical Administration

Dr. Prashant Bhat (Medical Superintendent)
Mrs. Chital Naresh

Translational Research Laboratory

Dr. Indraneel Mittra (Dr. Ernest Borges Chair)
Dr. Ranjan Basak
Dr. Kavita Pal
Dr. Raghiram GV
Mr. Naveen Khare

Medical Oncology

Dr. Sudeep Gupta
Dr. Navin Khattry
Dr. Amit Joshi (OIC)
Dr. Anant Gokarn
Dr. Sachin Punatar
Dr. Sumeet Mirgh
Dr. Akansha Chichara

Medical Physics

Dr. Jamema S V
Ms. Reena Phurailatpam
Mr. Kishore Joshi
Ms. Jeevanshu Jain

Clinician Scientist Laboratory

Dr. Sudeep Gupta

Transfusion Medicine

Dr. Shashank Ojha (OIC)
Dr. Sumati Hiregoudar
Dr. Minal Poojary
Dr. Suryatapa Saha

ANESTHESIOLOGY, CRITICAL CARE AND PAIN DEPARTMENT

Dr. Reshma Ambulkar - Head of the Department

Anaesthesiologists - Division of Clinical Anaesthesia

Dr. Bhakti Trivedi – Head of the Department

Dr. Malini Joshi

Dr. Anjana Wajekar

Dr. Ashwini Rane

Dr. Gauri Gangakhedkar

Dr. Pravin Dhakane

Dr. Pankaj Singh

Dr. Virinchi Sanapala

Intensivist - Division of Critical Care

Dr. Shilpushp Bhosale - Head of the Department

Dr. Amol Kothekar

Overview:

Critical Care and Pain Management services are provided by the Department of Anaesthesiology, Critical Care and Pain of TMC (TMH and ACTREC). These include eleven permanent staff members at ACTREC and twenty senior residents from ACTREC and MD (Anaesthesia) and DM (Critical Care Medicine) registered residents.

Service:

The service component of the department in 2023 included providing anaesthesia for up to 11 Major OT (9 OTs functional: 1/1/2023 - 4/6/2023, 10 OTs functional: 5/6/2023 - 29/11/2023, 11 OTs functional: 30/11/2023 onwards), Interventional Radiology, MRI, Radiotherapy operation theatre and minor OT (Bone marrow and Endoscopy). The department also manages the Critical Care for a 16-bedded ICU plus a 24-bedded PACU with a CPR team and renders Acute & Chronic Pain services. Pain team is formed comprising of Anaesthesia consultant, a resident & pain nurse who follow up all post-operative patients and chronic pain patients in wards.

During 2023, the department provided Anaesthesia services for 4669 (Elective cases: 4520 and

Emergency cases: 149) major OT procedures, 226 procedures in the Radiotherapy OT, 260 MRI, 613 Interventional Radiology procedures and 171 Minor OT (Bone marrow & Endoscopy procedures). Critical care services were provided for 6254 Recovery room admissions (Major, Minor), 665 ICU admissions (250 of which were ventilated) and 16 ICU admissions for procedures, as well as dialysis was done for 19 patients .1860 patients were treated by Acute Pain Services. Further, in PAC, the Pre-anaesthesia check-up was conducted for 3645 (2315 +1330) (new + follow-up) patients. In Chronic pain OPD, 685 (378+307) (new + follow-up) patients were seen.

Research:

The Department consultants led 23 clinical studies in the year 2023 and had 15 publications in PubMed-indexed journals. Virtual Project discussion meetings are held at regular intervals where investigators discuss planned projects in the department before submission to the IRB.

Education:

The Department organized a 2-day intensive care course (BRITE) in August 2023 and Thematic in November 2023. The Department also conducted the annual national teaching program 'ARC 2023' in February 2023. Apart from this, the annual international program 'DAC 2023' was conducted by the Department in December 2023.

The educational activities are conducted online and in-person activities for all residents and senior residents of the department. The members of the Department were invited as faculty for various conferences, national and international.

Special Positions:

Ms. Reshma Ambulkar - Oximetry Clinical Lead and Clinical Advisor, Lifebox Organisation
Secretary, Society of Onco-Anaesthesia and Perioperative Care (Mumbai Branch)

CANCER CYTOGENETICS DEPARTMENT

Dr. Dhanlaxmi Shetty - Officer-in-Charge

Scientific Officers:

Ms. Hemani Jain

Dr. Purvi Mohanty

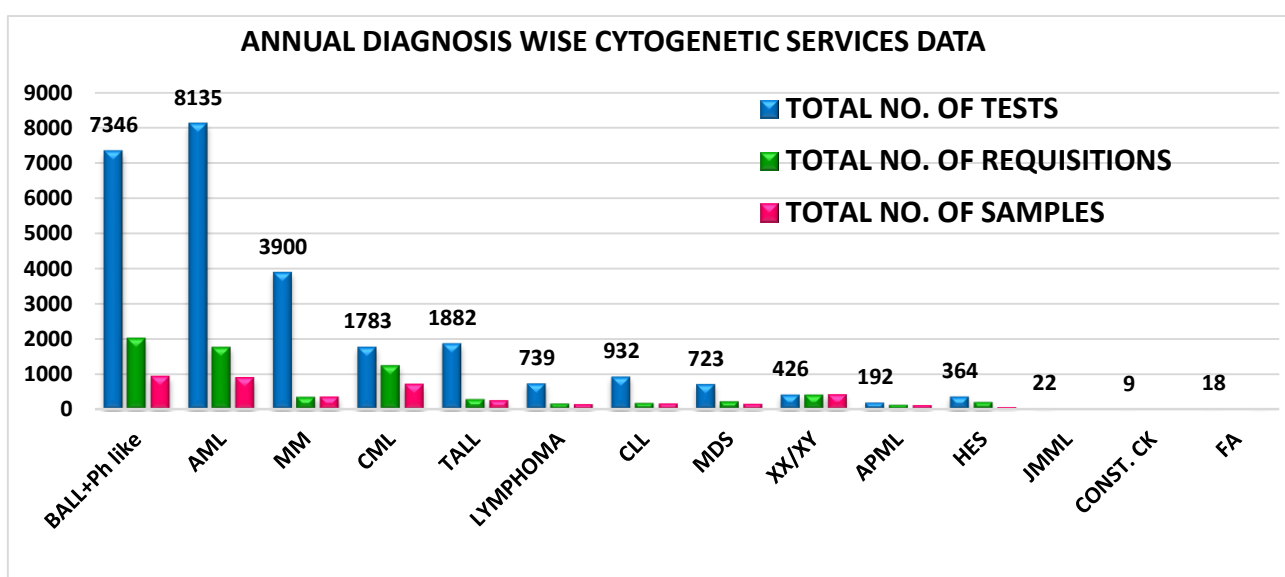
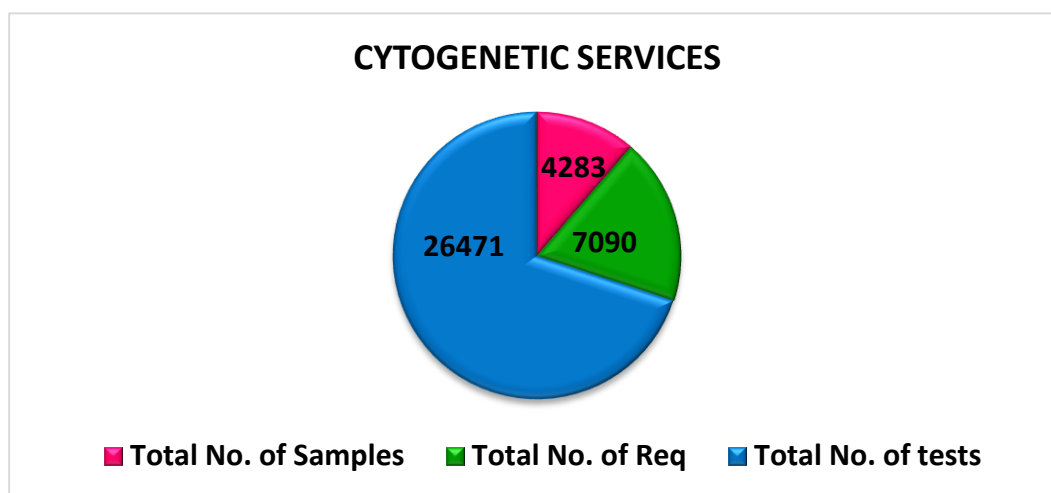


Overview:

The Cancer Cytogenetics Department is a NABL-accredited laboratory that offers diagnostic services for haematolymphoid malignancies using both traditional and molecular cytogenetic methods, including fluorescence in situ hybridization (FISH) and conventional karyotyping (CK). With advanced equipment, the department has established extensive FISH panels for cytogenetic risk stratification and evaluation of treatment response in patients with leukaemia, lymphoma, and myeloma. Leading cytogenetic laboratories in the nation are given proficiency testing through the External Quality Assessment (EQA) program by the Department to guarantee the quality of services.

Service:

The Cancer Cytogenetics Dept. received 4283 diagnostic samples, with 7090 requests for karyotyping and FISH testing. The Dept. performed 26,471 tests including FISH panels for haematolymphoid malignancies (AML, APL, B-ALL, T-ALL, MDS, MPN, CML, CLL, Lymphoma and MM), chimerism studies in sex mismatch post-BMT patients; karyotyping, chromosomal breakage studies and ploidy assessment. Three new FISH markers were introduced. The Dept. successfully provided diagnostic services for samples received from HBCH (Varanasi), BCCI (Guwahati) and HBCHRC (Mullanpur). The department completed the setup and standardization of a new technology “SNP microarray” for hematolymphoid malignancies. The Dept. participated in Inter-Laboratory Comparison Program (ILCP) and also provided proficiency testing services through the biannual EQAS Cytogenetics Program to nine cytogenetic laboratories in the country.



Research:

In the year 2023, the ICMR funded an extramural ad-hoc project for deciphering the incidence and complete clinical, cytogenetic and molecular profile of the B-other ALL subgroup in India. was completed.

Education:

One Post-doctoral fellow (Dr. Neetu Vanapalli) in cytogenetics was appointed in the year 2022 for two years. The advanced cytogenetic training program (5 trainees) for MSc. students were successfully conducted. The OIC also received an HBNI PhD student (Ms. Kruti Chaubal) under Health Sciences. The Dept. participated in DMG meetings, leukemia and MPN clinic, CPC and Joint clinic. All the staff completed their training in ISO 15189:2022 standards, they also attended National and International conferences as delegates and speakers.

Staff achievements:

- a) Dr. Dhanlaxmi Shetty was awarded the Long Term ICMR-DHR international Fellowship for Young Indian Bio-medical Scientists 2022-23 and trained in SNP microarray technique from March 2023 to September 2023 at Texas Children's Cancer Center, Houston, USA.

CLINICAL PHARMACOLOGY LABORATORY

Dr. Vikram Gota - Officer-in-Charge

Scientific Officers:

Dr. K. Manjunath Nookala

Dr. Kavita Pal

Mr. Anand Patil

Overview:

The clinical pharmacology laboratory enjoyed significant success in its drug development efforts, with two products getting regulatory approval. The Drugs Controller General of India approved a liquid formulation of 6-mercaptopurine. The market launch of the product was held in November 2023. Chlorophyllin, a radioprotector, was approved by the Food Safety and Standards Authority of India (FSSAI) as a nutraceutical. Both products were developed in collaboration with IDRS Labs Pvt. Ltd., Bangalore, India. In another significant development, a phase II trial of Withania Somnifera extract (WSE) was initiated for the treatment of steroid-refractory graft-versus-host disease. The entire preclinical development of WSE was conducted in the clinical pharmacology laboratory as part of doctoral studies of a PhD student. The laboratory got recognition as the ICMR Centre for Advanced Research and Excellence in Phase I Clinical Trials (ICMR-CARE), which was accompanied by substantial funding for developing clinical trials and bioanalytical capabilities for conducting phase I trials in oncology. An Electrochemical Workstation (ECWS) was installed for developing point-of-care devices for drug level estimation which may radically change therapeutic drug monitoring practices in the future.

Service:

This laboratory offers therapeutic drug monitoring (TDM) services for voriconazole, posaconazole, imatinib, mycophenolate mofetil, and L-asparaginase. More than 4600 samples [Voriconazole (2194), Posaconazole (2410), MMF (17), L-asparaginase (44), and Imatinib (03), were reported for drug levels in 2023, benefitting more than 1000 patients undergoing treatment for leukemias, BMT and other indications.

Research:

Notable contributions in the field of research include demonstrating the utility of herbal drugs for the treatment of cancer and related indications using suitable animal models. Bolstered by these findings, some of the drugs are in the pipeline for clinical development. These include diseleno-dipropionic acid as a lung radioprotector, mitocurcumin for therapy-resistant lung cancer, and novel mutant asparaginases for acute lymphoblastic leukemia. These developments were possible due to strategic collaborations with BARC and IIT-Indore besides several industry partnerships. In addition, clinical trials of WSE and curcumin are already underway in the bone marrow transplant setting. Further, a patent application for a novel detection technique we developed for voriconazole and posaconazole on ECWS will shortly be submitted through ICMR. The laboratory is also collaborating with EORTC to design and validate a quality-of-life questionnaire for various cancers. The laboratory has also embarked on a new domain of research wherein the benefits of probiotics and prebiotics developed in-house are being investigated for maintaining gut microbial diversity and preventing gut toxicity induced by chemotherapeutic drugs. Dr. Vikram Gota was granted a US patent for the 'Use of 3,3'-Di-Seleno-Dipropionic Acid (DSePA) as an Anti-Cancer Agent' in collaboration with BARC.

Education:

The OIC is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. Three students, Ms. Divya Gohil, Ms. Megha Garg and Mr. Saurabh Gupta, completed their doctoral studies in 2023. Ms. Gohil was also awarded the doctorate following a successful defense of her thesis. Mr. Girish Panigrahi, Ms. Aishwarya J and Ms. Amisha Joshi are presently working on their doctoral theses. The laboratory continues to offer a fellowship in oncotherapeutics, attracting several applications in 2023. Four students of MSc Clinical Research interned from the laboratory in the report year.



COMPOSITE LABORATORY

Dr. Preeti Chavan - Officer-in-Charge

Dr. Avinash Pagdhune - Consultant

Overview:

The Composite Laboratory is NABL-accredited and provides 24-hour' services to the hospital. The laboratory consists of three sections: sample collection area, hematology, and biochemistry (routine biochemistry and immunoassay). The laboratory also processes murine and canine blood samples for research purposes. Three international and one national research papers were published by the faculty in 2023. Four research projects are being conducted in the laboratory. The laboratory conducts a one-year advanced training program in Medical Laboratory Technology since November 2015.

Service:

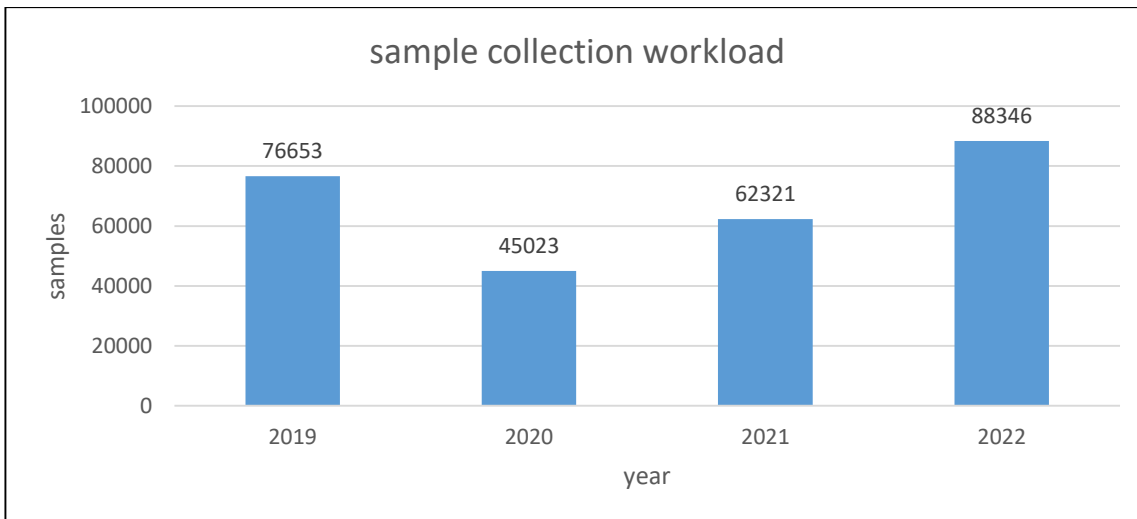
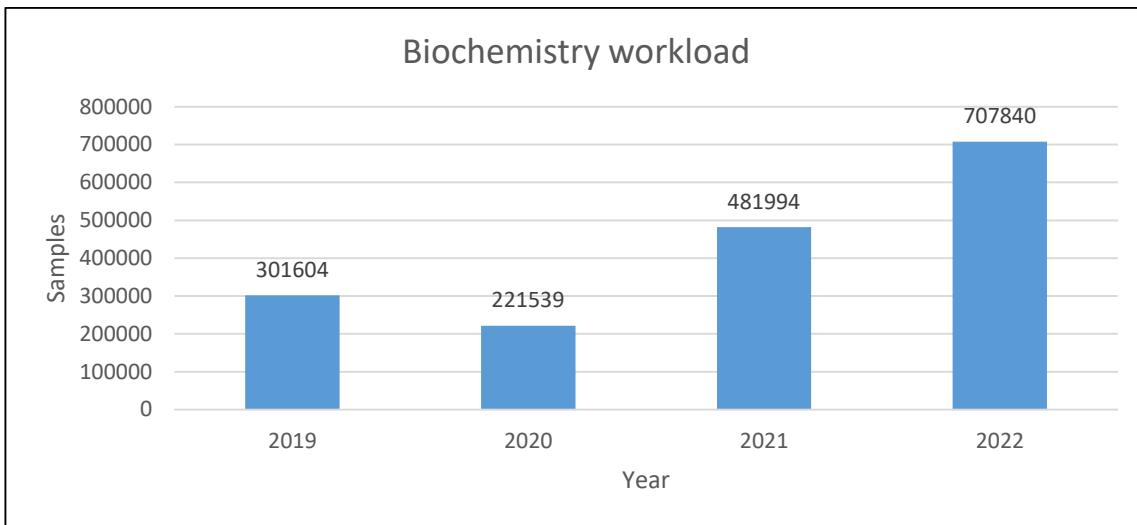
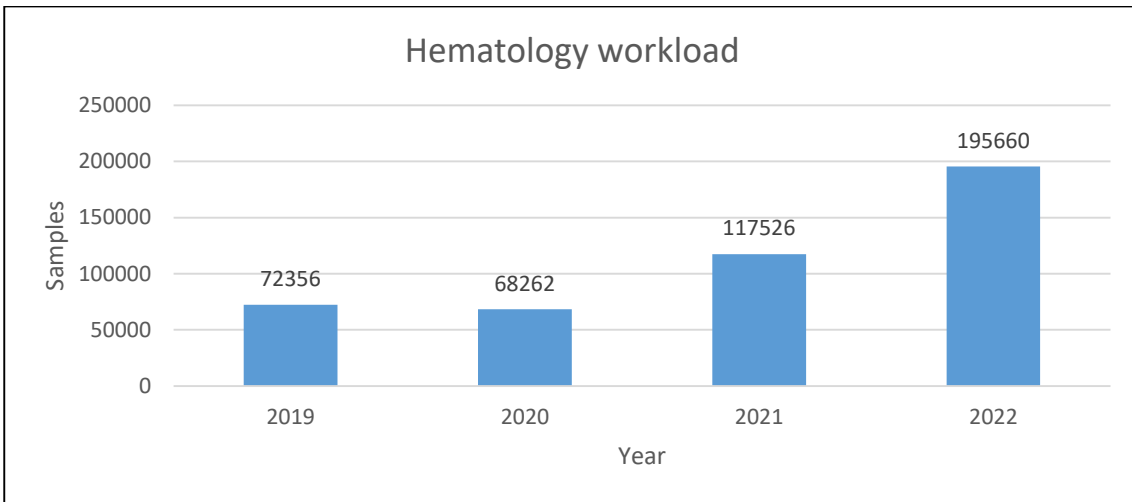
The Composite Laboratory provides the following patient-related hospital services; routine hematology (CBC, coagulation and peripheral blood smear examination) and biochemistry (LFT, RFT, electrolytes, cardiac enzymes, osmolality, immunoglobulins, ferritin, tumor markers, assays for vitamin B12, vitamin D, folate, thyroid function tests, drug assays (Cyclosporine, Tacrolimus, Sirolimus and Methotrexate). This year tumour marker assays such as CEA, CA-19.9, AFP, CA-15.3 and cardiac markers such as Troponin I and NT-ProBNP have been started in the lab. The laboratory performed 10,02,579 tests for routine biochemistry and immunoassays, 1,13,280 tests for hematology, during the period January to December 2022.

Research:

Three international and one national research papers were published by the faculty in 2023. Four research projects are being conducted in the laboratory.

Education:

Four students enrolled in advanced training course in Medical Laboratory Technology.



CLINICIAN SCIENTIST LABORATORY

Clinicians:

Dr. Sudeep Gupta

Dr. Rajendra Badwe

Dr. Shalaka Joshi

Dr. Seema Gulia

Overview:

Our primary goal is to understand the biological role of hypoxia in cancer metastasis & cancer spread, clonal evolution of a tumor leading to therapy resistance, and developing novel blood-based assays to monitor tumor burden and response to therapy.

Basic Research:

Evaluation of reference genes for normalization of transcripts in lung and breast cancer cells with variable oxygenation:

We aimed to identify genes with the least variable expression under varying O₂ conditions in cancer cell lines which could be used for normalization of transcript expression in qRT-PCR analysis. 9 genes commonly used as reference genes were subjected to qRT-PCR analysis from RNA in two cancer cell-lines (A549 Human lung carcinoma epithelial cells and MDA-MB-231 human mammary adenocarcinoma epithelial cells) exposed to three oxygenation levels, (Normoxia, 21% O₂, Hypoxia 1% O₂ and Anoxia 0.1% O₂) for 24 hours. Variability in gene expression was analyzed using Endogene, a ranking algorithm for three commonly used statistical algorithms (Normfinder, GeNorm, Bestkeeper) that identify variability in expression across experiments.

Proteogenomic characterization of Cervical Cancer:

Comparison of DNA (whole genome/exome) profiles of CA cervix to that of tumour adjacent normal cervix tissue/germline DNA will help identify structural variations, copy number changes and mutations specific to CA Cervix. Comparison of mRNA (whole transcriptome) profiles of CA Cervix to that of tumor adjacent normal cervix will help identify genes deregulated in CA Cervix. Comparison of protein (whole proteomic) profiles of CA Cervix to that of tumour adjacent normal cervix will help identify proteins deregulated in CA Cervix. These three datatypes will mimic the central dogma of molecular biology, and, Integration of

data from these three assays i.e., DNA (Whole Genome/exome Sequencing), RNA (Whole Transcriptome Sequencing) and Protein (Whole Proteome) from the same patient tumor, will unravel the molecular architecture of CA Cervix. This data will constitute a valuable resource to identify novel drivers of CA Cervix that can be probed for therapeutic vulnerabilities using functional genomic screens.

Role of Activator Protein -1 surgery-induced hypoxic stress:

To probe the role of AP-1 in promoting aggressive tumor phenotype triggered by surgery-induced hypoxic stress, gene expression studies were done with MCF7 and MDA-MB-231 cells after exposure to 0.1% and 1% oxygen concentrations for short (1h) and long time (24h and 48h). Concomitant with CA-9 and VEGF (hypoxia markers), AP-1 genes were highly expressed in hypoxic conditions compared to normoxia and normoxia followed by reoxygenation. Differential gene expression and protein expression of AP-1, mainly C-JUN, C-FOS, JUNB, JUND and FOSL1 were observed in the culture conditions tested. MTT was performed to assess the proliferation of this cell line in normoxia, hypoxia, and hypoxia followed by reoxygenation conditions. The proliferation of hypoxic cells was significantly reduced compared to normoxic cells, but hypoxia-pretreated cells had increased proliferation compared to corresponding normoxic cells. Similarly, results were also observed in a scratch assay where hypoxia pretreatment increased the collective migration of MDA-MB-231 and MCF-7 cells compared to normoxic cells. These results indicate that hypoxia pretreatment results in an aggressive phenotype characterized by increased proliferation and migration of these cells.

Proteogenomic characterization of Triple Negative Breast Cancer (TNBC):

To compare DNA (whole genome/exome) profiles of TNBC tumors to those of tumors adjacent to normal breast tissue/germline DNA will help identify structural variations, copy number changes and mutations specific to TNBC. Comparison of mRNA (whole transcriptome) profiles of TNBC tumors to those of tumor adjacent to normal breast will help identify genes deregulated in TNBC. Comparison of protein (whole proteomic) profiles of TNBC tumors to those of tumors adjacent to normal breast will help identify proteins deregulated in TNBC. These three datatypes will mimic the central dogma of molecular biology, and, Integration of data from these three assays i.e., DNA (Whole Genome/exome Sequencing), RNA (Whole Transcriptome Sequencing) and Protein (Whole Proteome) from the same patient tumors will unravel the molecular architecture of TNBC. This data will

constitute a valuable resource to identify novel drivers of TNBC that can be probed for therapeutic vulnerabilities using functional genomic screens.

Translational Research:

Standardizing Next Generation Sequencing quality nucleic acid extraction for the TMH-EQAS under the National Cancer Grid of India:

The National Cancer Grid (NCG) of India aims to establish standards of diagnostics and treatment under the External Quality Assurance System (EQAS) to ensure parity across all cancer care centers in India. We aimed to standardize NGS grade DNA and RNA extraction from FFPE archival tissues. 24 cancer centers were sent patient tumors from an internal ethics committee-approved protocol for FFPE archival tissue preparation. These FFPE samples were then subjected to DNA and RNA extraction using a custom extraction protocol, followed by quality control procedures for downstream DNA and RNA-based NGS assays.

Indian Cancer Genome Atlas (ICGA):

The purpose of this study is to collect a variety of specimens from breast cancer patients and look for differences or similarities between the specimens in genetic and molecular characteristics. Collecting important clinical information and biospecimens (i.e., blood, breast cancer and non-cancer tissues) from breast cancer patients from all parts of India for further molecular analysis (Molecular analysis are done to study what changes in a gene or chromosome leads to development of a disease or disorder, such as cancer.) and for future research use (i.e., Biobanking).

Designing a Next Generation Sequencing (NGS) based diagnostic and prognostic assay utilizing circulating tumor DNA (ctDNA):

Next-generation sequencing (NGS) offers the sensitivity and specificity that researchers need to detect low levels of ctDNA in the bloodstream. In addition to targeting a single gene or a subset of genes, NGS can also identify genome-wide tumour-derived alterations in ctDNA. We have designed an NGS panel to sequence ctDNA. This panel of genes was generated based on our assessment of the strength of available clinical evidence. This NGS panel is now undergoing validation in a prospective clinical trial.

Development of PDX model and in vivo passaging:

The patient-derived xenograft was developed using tumor tissue collected from the metastatic site of hormone therapy-resistant breast cancer. A breast PDX model was developed using hormone therapy-resistant breast cancer by orthotopically implanting tumor fragments into the mammary fat pad of female NOD/SCID mice. The rate of successful engraftment from the patient tumors to the NOD/SCID mice was estimated to be 20% (4 PDXs were established out of 20 samples implanted). However, the in vivo passaging rate was considerably higher (~90%) following the establishment of PDXs.

Education:

Prof. (Dr.) Sudeep Gupta is a recognized guide for DM and DNB at the Homi Bhabha National Institute where he is mentoring four DM students (Dr. Deep Vora, Dr. Aditya Dhanawat, Dr. Prashant Kumar and Dr. Shah Anjali Kirti) in his capacity. He is mentoring four students (Mr. Nilesh Gardi, Mr. Jinesh Maniar, Ms. Aishwarya Raja and Mr. Rushikesh Mukhare) as PhD guide at Homi Bhabha National Institute. Prof. (Dr.) Sudeep Gupta is co-mentoring two PhD students (Ms. Shashwati Parihari and Ms. Amrita Mukherjee) at the Indian Institute of Technology, Bombay (IIT-B). The laboratory had three Master's dissertation trainees (Ms. Dinky Malhotra, Ms. Devangi Nimje and Ms. Shrawani Navare) along with three summer trainees (Ms. Namrata Trivedi, Ms. Shreya Thorat and Mr. Rushiraj Shinde).

HAEMATOPATHOLOGY LABORATORY

Dr. Sumeet Gujral

Dr. P. G. Subramanian – Head of the Department

Dr. Nikhil V Patkar

Dr. Prashant R Tembhare

Dr. Gaurav Chatterjee

Dr. Sweta Rajpal

Scientific Staff

Dr. Shruti Choudhary

Mrs. Swapnali Joshi

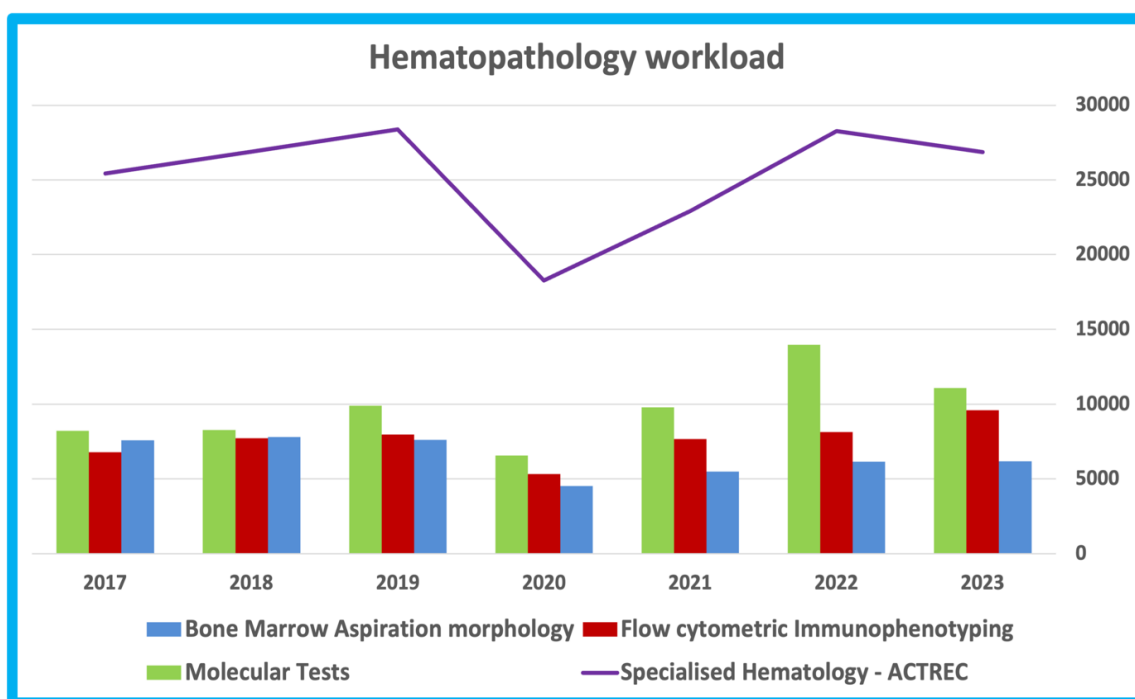
Overview:

Hematopathology Laboratory is a service laboratory at ACTREC does the diagnosis and subclassification of hematological malignancies as well as monitoring of patients while on therapy for all malignancies. The laboratory uses morphology, Flow cytometry and Molecular techniques including Next Generation Sequencing (NGS) for diagnosis. The laboratory does Minimal residual disease testing and post treatment monitoring of patients of Chronic Myeloid Leukemia, B cell Acute Lymphoblastic leukemia in children, T cell Acute Lymphoblastic Leukemia, Acute Myeloid leukemia and Multiple Myeloma. These tests are used to tailor the treatment for individual patient based on response to initial treatment.

The number of tests performed in the laboratory

Sr. No	Name of the Tests	Total No. of Tests performed
1.	Bone Marrow Aspiration Smears	6183
2.	Cytochemistry	3701
3.	Flow cytometric Immunophenotyping	9595
	Extended Immune subset monitoring	1161
4.	Body Fluids for cell counts & Morphology	2888
5.	Molecular Hematopathology	11072
	Chronic Myeloid Leukemia monitoring by BCR-ABL1 Quantitation	5884

	BCR-ABL1 and other Leukemia Transcript identification	335
	ABL Kinase Domain Mutation studies by NGS	301
	Acute Promyelocytic Leukemia PML-RARA Quantitation	261
	IGH or TCR gene for clonality and other tests	9
	Chimerism testing by STR markers for Bone Marrow transplantation	2076
	MYD 88	3
	Next Generation Sequencing Assay	1220
	RNA Sequencing Assay by NGS	658
	NGS Comprehensive	7
	NPM1 MRD	-
6.	Testing for SarsCov2	318



During the reporting year two students received Fellow Awards. The Fellow awards one in HBNI Hematopathology and one in HBNI Molecular Hematopathology. The The Department has published 15 research papers and initiated 4 new projects in the year 2023.

S. No	Project Title	Funding Source	Date commenced
1	Role of immune surveillance in the persistence of minimal/measurable residual disease (MRD) and pathogenesis of relapse in adult B-cell acute lymphoblastic leukemia (B-ALL)	Lady Tata Memorial Trust Institutional Research Grant	March 2023
2	Deciphering the molecular heterogeneity in Acute Leukemia of Ambiguous Lineage at a cellular level	Lady Tata Memorial Trust Institutional Research Grant	March 2023
3	Whole Transcriptome Sequencing of Pediatric Leukemia	Illumina Medical Research foundation	November 2023
4	Acute Myeloid Leukemia and the Clonal trajectories of Relapse	Welcome Trust -DBT Senior Fellowship	March 2023

MEDICAL ADMINISTRATION DEPARTMENT

Medical Superintendent: Dr. Prashant Bhat

Assistant Medical Superintendent: Dr. Puneeth Thattikonda

Manager, Medical Services: Dr. Minal Poojary

General Medicine: Dr. Prafulla Parikh, Dr. Sujit Kamtalwar, Dr. Ashwini More

Staff Physician: Dr. Amar Patil

Quality Manager & COVID Vigilance Officer: Ms. Chital Naresh

Medical Social Worker: Ms. Bhagyashree Tillu

Physiotherapy: Dr. Mohua Chatterjee, Dr. Supriya Nakhate

Dieticians: Ms. Nandita Dhanaki, Ms. Fagun Gandhi, Ms. Priyanka Prajapati

Medical Records Officer: Mr. Madhumohan Maddirala

CSSD (In Charge): Mr. Sachin Walawalkar

Biomedical Engineering (In Charge): Mr. Shine Kumar, Mr. Vitthal Sarnaik

Surgical Purchase (Jr. Purchase Officer): Mrs. Prachi Salvi

Surgical Stores (Asst. Admin Officer): Mr. Shanoj Shanmughan

Medical Stores (Sr. Pharmacist): Mr. Sunil Gopal

Front office: Mr. Mahendra Mhatre, Mr. Siva Ganesh

Pharmacy (Sr. Pharmacist): Mr. K N Chaudhari

Overview:

The Medical Administration, led by the Medical Superintendent, oversees a range of essential services inclusive of Outpatient and Inpatient care, Diagnostics, Clinical and Support services along with the patient hostel. The General Medicine for the management of medical co-morbidities, Staff Clinic, and super-specialty consultation through honorary specialists is organized by the Medical Administration.

Within this framework, the Office of Medical Superintendent handles associated Clinical services such as Dietetics, patient nutrition, Physiotherapy, Medical social work for patient support, and management of Medical Records. Pharmacy along with material management of drugs and surgical supplies, procurement of capital equipment for CRC, and healthcare government schemes MJPJAY and AYUSHMAN BHARAT implementation at ACTREC is facilitated by Medical Administration. Additionally, the Medical Administration is actively

engaged in ongoing infrastructure projects at ACTREC and plays a crucial role in coordinating CSR funding for underprivileged patient treatment, infrastructure development, equipment donations, and financial contributions to various patient welfare funds. Patient activities organized by NGOs and voluntary organizations are also facilitated by Medical administration.

Service:

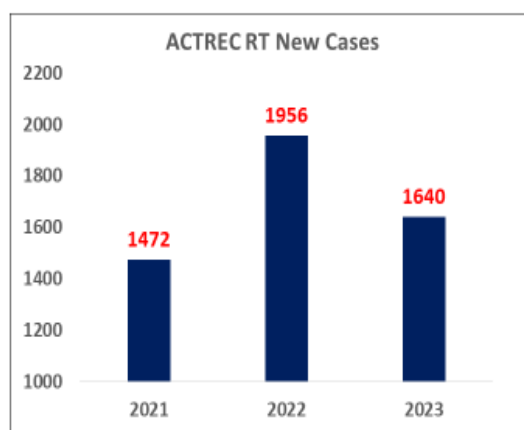
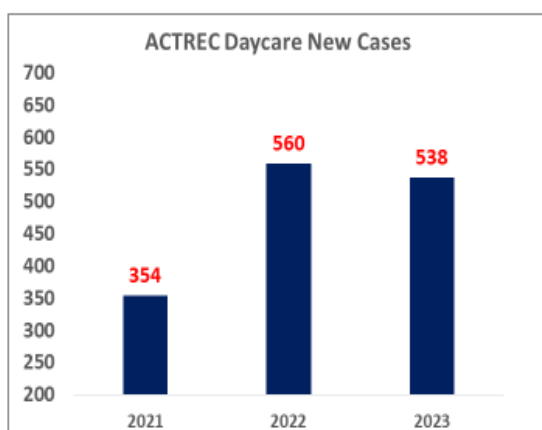
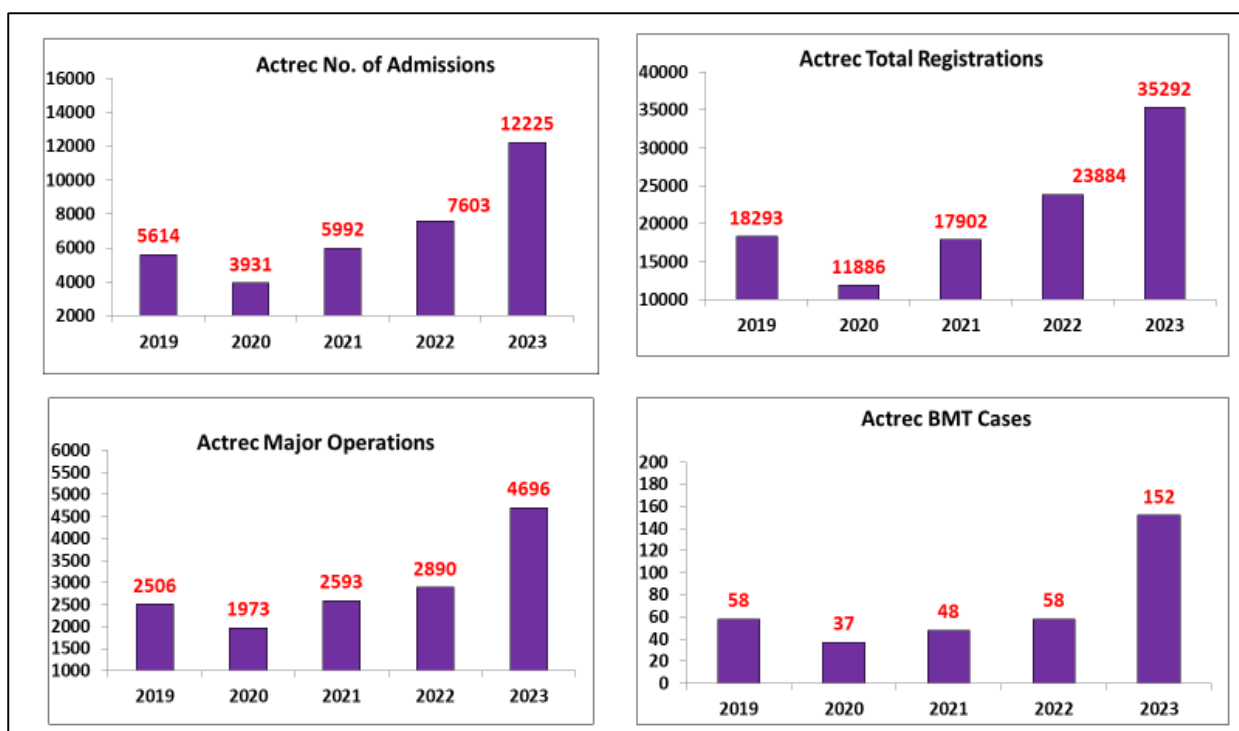
The Medical administration at ACTREC has significantly enhanced patient care projects, leading to several key advancements in healthcare facilities. These initiatives resulted in the establishment of the Shanti Sadan Outpatient Department (OPD) complex. This comprehensive facility encompasses a range of services, including OPD registrations, appointment scheduling, Medical social work counseling, and streamlined billing processes. Additionally, pivotal developments include the introduction of a modular Intensive Care Unit (ICU) complex and CT scan facility for Radiodiagnosis within the Raja Rao Shodhika (RRS) building. State-of-art facilities such as Proton Therapy and MRI facility in the Proton Therapy Centre. Further enhancements in the form of regular Gastro-endoscopy services are activated at the Minor Operating Theater.

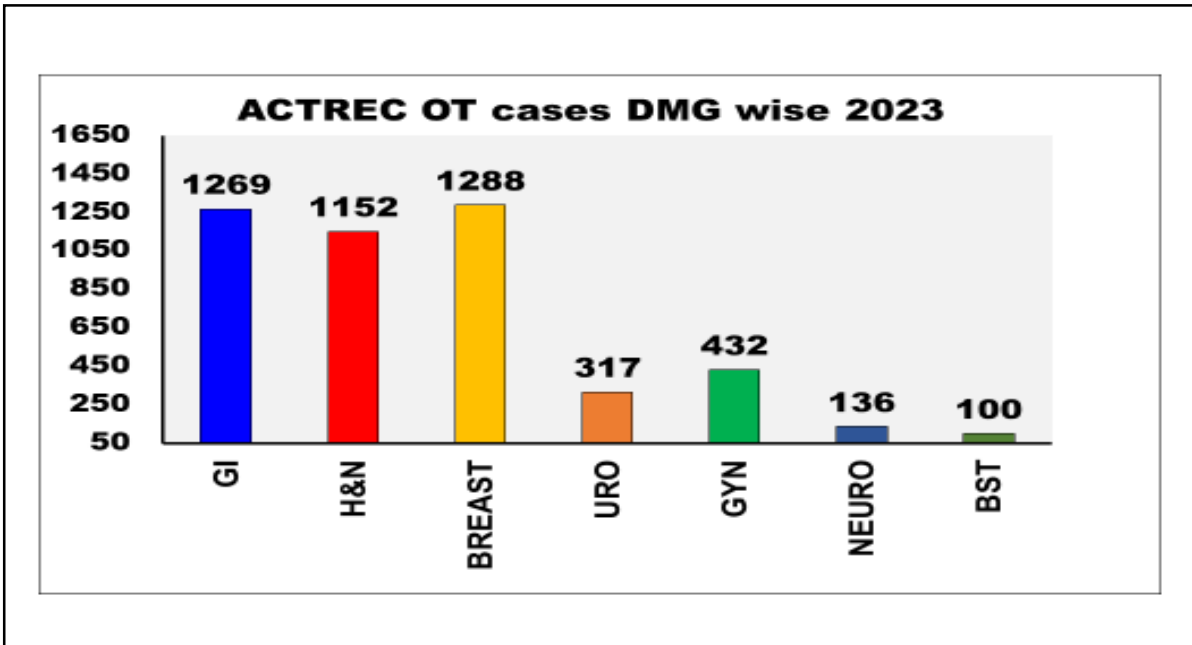
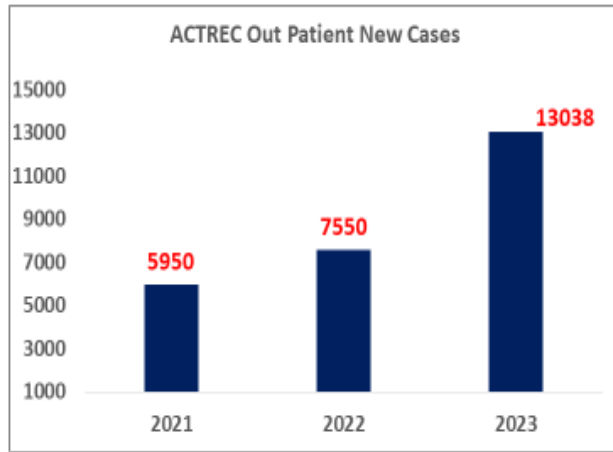
Medical administration actively participated in the foundation brick-laying ceremony of the new St. Judes' Child Care Centre, the inauguration of Mini- auditorium and mortuary facility, procurement of mini trucks for on-campus material transportation, and a 25-seater Bus for patient/ staff transport. A robust safety Assurance program emphasizing on prevention of medical errors, ongoing monitoring, reporting system and corrective measures, patient safety training, infection control measures, and active patient engagement.

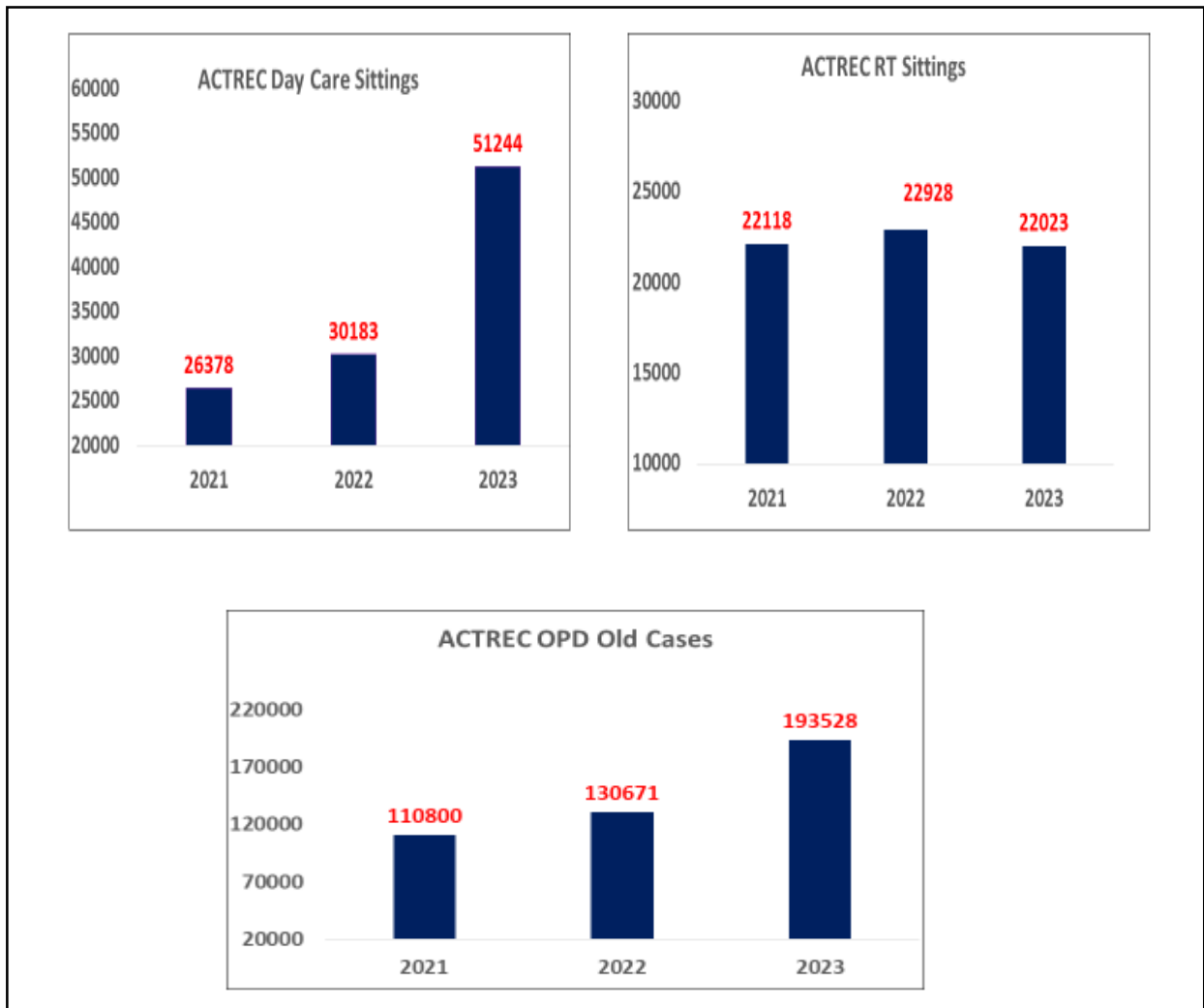
Introduction of EMR App, accessible on patients' mobile phones to effortlessly access their investigation reports, medical bills, account balances, smart-card top-ups, deposited amounts, and prescriptions.

The year 2023 has seen 4482 new ACTREC registrations, 30810 transfer cases from TMH, 695 referrals for diagnostic, and 517 expert opinions. 538 new patients have used Daycare services. Radiotherapy new referrals were 1640, and 2446 patients have undergone Interventional radiology (IR) procedures.

During the year we have carried out 4696 major surgeries and 2909 minor surgeries in 14 Operation theatres. 206566 patients were seen at the OPD at ACTREC. 6008 blood donations and 1878 apheresis were conducted in the Department of Transfusion Medicine. A total of 1366486 samples were received for investigations at various diagnostic facilities viz— Biochemistry, Hemato-oncology, Flow Cytometry & Molecular Hematopathology, Microbiology, Surgical Pathology, Cancer Cytogenetics, and Transplant Immunology & Immunogenetics lab.







Infrastructure Projects:

Medical Administration collaborated extensively with the Engineering dept., General Administration, Contractors, and vendors to oversee the setup of the Radiological Research Unit (RRU) building. This included establishing a comprehensive Nuclear Medicine department including academic offices, OPD, and specialized wards for High-dose Radionuclide therapy. The responsibilities span procurement and installation of medical equipment and furniture, liaising with the engineering department for statutory compliant infrastructure, facilitating AERB licensing for the therapy ward, and installation of Animal SPECT for Research purposes.

Medical administration is also involved in the coordination of equipment purchases for the RRU and is actively engaged in the phased commissioning of the facility.

Moreover, Medical administration was also involved in the planning and renovation of the old patient OPD area into administrative departments and Consultant office spaces.

Medical administration facilitated and coordinated with the Proton therapy team and the vendors for the smooth execution of the protocols which have led to the establishment of a state-of-the-art Proton therapy facility with appropriate AERB licensing approval.

Future Plans:

1. Commissioning of the High-dose Radionuclide therapy ward is currently under the final stages of infrastructure execution.
2. Commissioning of Radiation Research Unit including procurement and installation of major equipment for Interventional Radiology DSA and Recovery area.
3. To work with the new projects currently under various stages of execution.
4. To continue preparation for accreditation of the facility.

MEDICAL ONCOLOGY DEPARTMENT

Dr. Sudeep Gupta

Dr. Navin Khattry

Dr. Amit Joshi – Officer-In-Charge

Dr. Jaya Ghosh

Dr. Anant Gokarn

Dr. Sachin Punatar

Dr. Sumeet Mirgh

Dr. Akanksha Chichara

Dr. Nishant Jindal

Dr. Anbarasan Sekar

Overview: The Department of Medical Oncology started its services in ACTREC in 2006. The Bone Marrow Transplant unit shifted to ACTREC in November 2007; since then, 887 autologous/ allogeneic transplants have been routinely performed in our unit. CAR-T cell therapy for refractory acute lymphoblastic leukaemia was started in 2021.

Service: Bone Marrow Transplantation and Adult Haematolymphoid Unit: In 2023, 76 allogeneic and 76 autologous patients were admitted in 6 bed HEPA filtered BMT unit and in newly expanded four bedded autologous BMT services in the Raja Rao Shodika building. In-patient services were provided to 212 patients for post-transplant complications during this year. In BMT and adult haematolymphoid OPD, 18853 outpatient visits took place in BMT and adult haematolymphoid unit this year, and 426 new files (non-TMH) were registered, while 445 new referrals from TMH were seen. There were 1376 in-patient admissions in the haematolymphoid ward, and step down non HEPA filtered the second floor BMT ward for chemotherapy or supportive care administration. There were 179 PBSC collections.

Adult Solid Tumour Unit: In this year, 41435 outpatient visits took place in our OPD and tumours of the breast, head and neck, ovary, testicular, prostate, urinary bladder and cervix region comprised the bulk of cancers. We have a significant footfall of germ cell tumours of the ovary and testes. Total 2582 patients availed in patient services for prolonged chemotherapy infusions and supportive and palliative care.

Our chemo day-care has been expanded from the existing 13 beds to 39 beds, which has resulted in 51782 infusions of chemotherapy/IV fluids/antibiotics.

A total of 1942 OPD procedures, like ascitic and pleural tapping, bone marrow aspiration and biopsies, and intrathecal methotrexate, were performed in the procedure room.

There were 2558 causality visits by medical oncology patients in 24 hour running causality in RRS building.

Paediatric Oncology Unit: In the paediatric oncology OPD and inpatient services, 9473 outpatient visits took place in 2023, and 1059 inpatient admission were admitted.

Research

Faculty members of the department are involved in several investigator-initiated and sponsored clinical trials and collaborative research projects, both in the haematolymphoid and solid tumour units. There has been a thrust on doing clinically relevant research with medicinal plants, and a few ongoing projects use curcumin, resveratrol-Copper, and ashwagandha. Also, there is a thirst to establish a robust cellular therapy programme both for CAR-T cell therapy and non-CAR-T Cell therapies.

Education

The department of Oncology at ACTREC has an active educational program, which encompasses daily academic sessions about transplantation, haematolymphoid and solid tumour neoplasms for the DM students posted in ACTREC, and a monthly Journal Club that includes faculty and students from the departments.

TRANSFUSION MEDICINE DEPARTMENT

Dr Shashank Ojha - Professor & Head

Dr Sumathi Hiregoudar - Associate professor

Dr Suryatapa Saha - Assistant professor

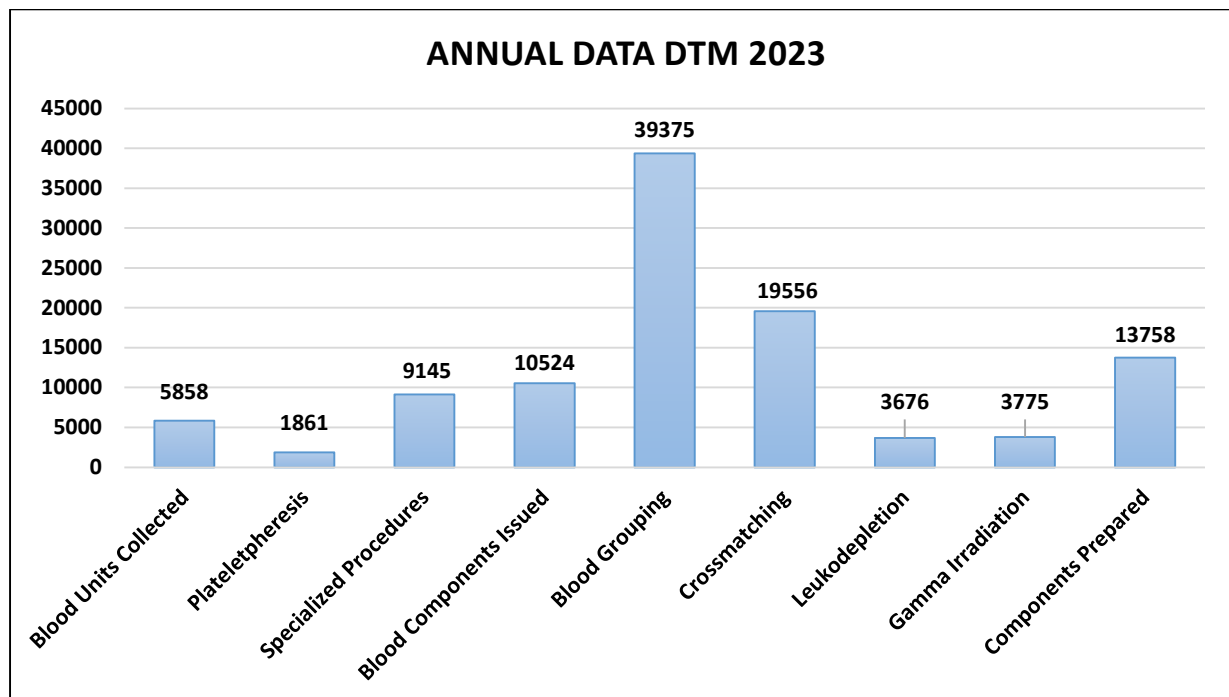
Overview:

DTM is a fully-equipped licensed blood centre complying with the highest standards and is an essential component of a tertiary care oncology centre that provides a safe and adequate supply of blood components round the clock to meet the specialized hemotherapy needs of patients admitted at ACTREC, especially Bone Marrow Transplant (BMT), haemato-lymphoid (adult and pediatric), radiation and surgical-oncology units. It also caters to the blood component requirements of patients admitted in other hospitals in Navi Mumbai.

Service:

The services offered by this Department include blood donation and apheresis including platelet apheresis, granulocyte apheresis, therapeutic leukapheresis, red cell serology, blood component separation, Transfusion Transmitted Infections (TTI) testing, storage and issue of blood products. Specialized services include peripheral blood stem cell (PBSC) harvest, cryopreservation, storage and inventory management of hematopoietic stem cells (HSCs), leukodepletion and gamma irradiation of blood components are an integral part of our services. Advanced graft manipulation procedures like $\alpha\beta$ -T cell depletion and CD45RA+ depletion procedures using Clinimacs plus immuno-magnetic cell sorter are performed in complicated Bone Marrow Transplant patients. The Department has played an indigenous role along with the collaboration of IIT Bombay in the development of novel CAR-T cell therapy for the treatment of cancers and immune disorders. A Fully Automated Immunohaematology Analyzer has been introduced for the automated performance of blood grouping and other immunohaematologic tests. The department has taken steps in supplying surplus plasma to the plasma fractionation company. During the period from January to December 2023, the department collected a total of 5858 blood units, prepared 13758 blood components, and issued 10524 blood components. In addition, 1861 platelet apheresis, 150 peripheral stem cell harvests, 12 specialized manipulation procedures, 1 Bone Marrow Harvest and 150 leukapheresis procedures were performed. Under specialized blood components, 3676 units were leuco-depleted and 3775 gamma-irradiated. Blood grouping and cross-matching were

done on 39375 and 19556 blood samples respectively. Additionally, 2634 Plasma units were being sent for Plasma Fractionation. The department organized 83 outdoor blood donation camps. DTM routinely participates in the EQAS program conducted by the Indian Red Cross Society EQAS.



Research:

Faculty members are currently involved in multiple collaborative projects with other departments at TMC to explore the role of indigenously developed Chimeric Antigen Receptor (CAR) T cells and Natural Killer (NK) cells in the treatment of leukemia.

In addition, three projects were undertaken by the Principal Investigators of the department namely “Effect of repeat plateletpheresis on iron stores among repeat voluntary male platelet donors- A single tertiary care hemato-oncology Centre experience”, “Evaluation of Intra operative Transfusion Indicators in Surgical Oncology Patients in a Tertiary Care Oncology Centre” and “The role of isohemagglutinin titers in monitoring immunohematological reconstitution in

ABO incompatible allogenic Hematopoietic stem cell Transplantation”.

Education:

The doctors and staff members imparted training in PBSC harvest and other transplant-related activities to three MD students from other centres as a part of their curriculum and two doctors from other hospitals. Faculty and staff members presented scientific papers and attended 5 national/ international conferences/ scientific meetings including virtual conferences/ meetings and also underwent training to keep abreast with the latest developments in the field.

Staff Achievements:

1. Mr. P. Nagaraju won the "USHA GUPTA AWARD" at TRANSCON 2023
2. Mr. P. Nagaraju won the "KARL LANDSTEINER AWARD" at TRANSCON 2023
3. Mr. P. Nagaraju won "BEST SCIENTIFIC ASSISTANT" AWARD in ACTREC ANNUAL DAY 2023
4. Mr. Amol Tirlotkar won the "BEST POSTER AWARD" at TRANSMEDCON 2023
5. Mr. Chawan Maruti Kalpesh has completed RSO certification for Gamma Irradiation Chamber from June 19-27, 2023.

MICROBIOLOGY LABORATORY

Dr. Vivek Bhat – Head of the Department

Dr. Sujata Lall – Scientific Officer 'E'

Ms. Nayana Baraskar – Technical Officer 'C'

Ms. Reshma Kamble – Technician 'F'

Ms. Hemali Kadu – Technician 'D'

Overview:

The Microbiology Laboratory is involved in patient service, academics and research. Patient services include processing and reporting of bacteriology, serology, mycobacteriology, molecular diagnostics, mycology and other clinical microbiological samples at ACTREC. Sterility testing for Blood Bank services, environmental surveillance, infection control guidance and waste management support is also provided by the laboratory. The laboratory is NABL accredited and involved in various External Quality Assurance programs for Bacteriology, molecular microbiology, Mycology & parasitology. The laboratory is also involved in Maharashtra state antimicrobial resistance surveillance network – MAHASAR. The department staff is also involved in research projects and scientific publications. Educational activities include teaching (TMC & other institutions) postgraduate students in microbiology, nursing department, TMC laboratory staff & Advanced Training Course in Medical Laboratory Technology (ATMLT) course.

Service:

The Microbiology Laboratory provided the following patient related & hospital services at ACTREC. A total of 45,269 clinical samples were processed in the laboratory for the period Jan 2023 – Dec 2023. These includes Bacteriology cultures for Blood (10191), CSF/Body fluids (411), Drain Fluids (176), Pus (74), urine (1914), feces (1484), swabs (1708), Respiratory samples (389) & others (30), Colistin Broth dilution (191). Serology: HBsAg (4852), HIV (4770), HCV (4833), HBCT (1024), HBCM (980), PCT (2123), Dengue (1183) & others (2641); Molecular Microbiology- Syndromic multiplex PCR testing: Respiratory Panel (166), Blood Culture Identification (79), Meningitis/ Encephalitis Panel (86), Pneumonia Panel (18), Gastrointestinal panel (152). Clinical Microbiology testing for urine (3125), faeces (1238), Clostridium difficile (738) & Adeno/ Noro / Astro/ Rota virus antigen detection (620), Mycobacteriology (Acid Fast Staining) (142), Mycology (187) (Identification of fungi in clinical

material and susceptibility testing and special staining, Routine Fungal Culture). Sterility testing for Blood Bank services: PBSC (400), SDP (1976), RDP (57), PCS (1741), Fresh frozen plasma BHI (16), RDP BHI (04), Cryo BHI (07), others (44) & Environmental surveillances for OT/ ICU/ Brachytherapy/ BMT units/CCE & others as requested. Infection control guidance and waste management support is also provided by the department.

Research:

The department is involved in three ongoing research projects that are IEC-approved. Important Research areas include the determination of MIC's to amphotericin B, voriconazole, isavuconazole and caspofungin by standardized broth micro dilution method for *Aspergillus* isolates from clinical specimens and studying the Bacteriological spectrum and antibiotic susceptibility patterns of urinary tract infections in cancer patients. Four scientific publications in peer-reviewed journals were authored/co-authored by departmental staff during the year.

Education:

The department is involved in teaching postgraduate students of microbiology (MD), laboratory staff, nursing staff, and housekeeping staff, as well as conducting projects, dissertations, and internships for MSc/B. Tech students from other institutes. The Advanced Training Program in Medical Laboratory Technology (5 seats) is also conducted and coordinated by the Department of Microbiology and Composite laboratory. The department staff participated in 10 national and international conferences and workshops during the year.

NURSING DEPARTMENT

Dr. Meera Achrekar - Deputy Nursing Superintendent

Ms. Sibhi Vinod - Assistant Nursing Superintendent

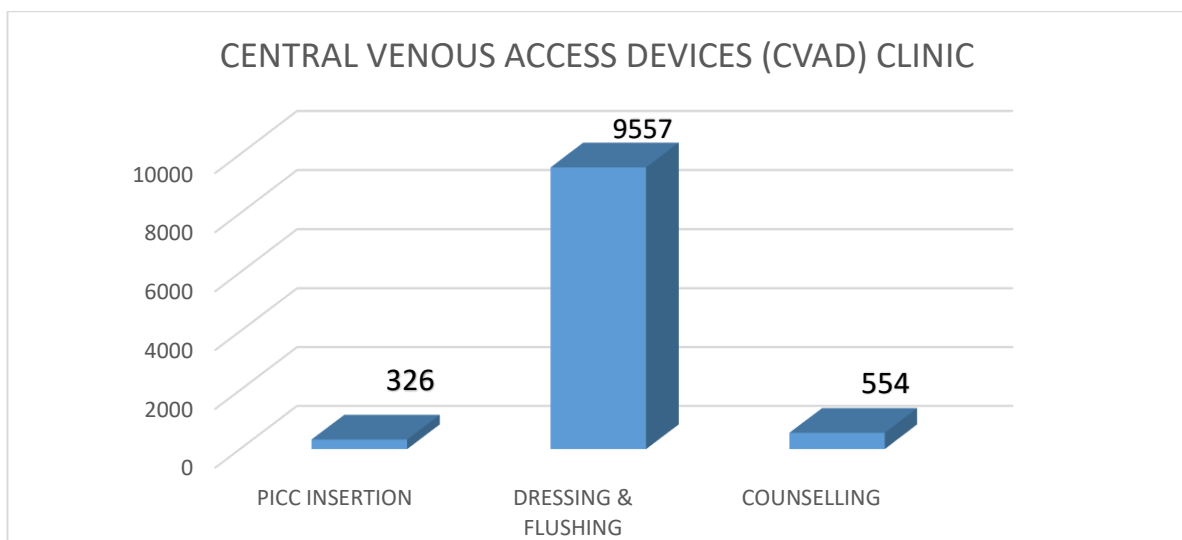
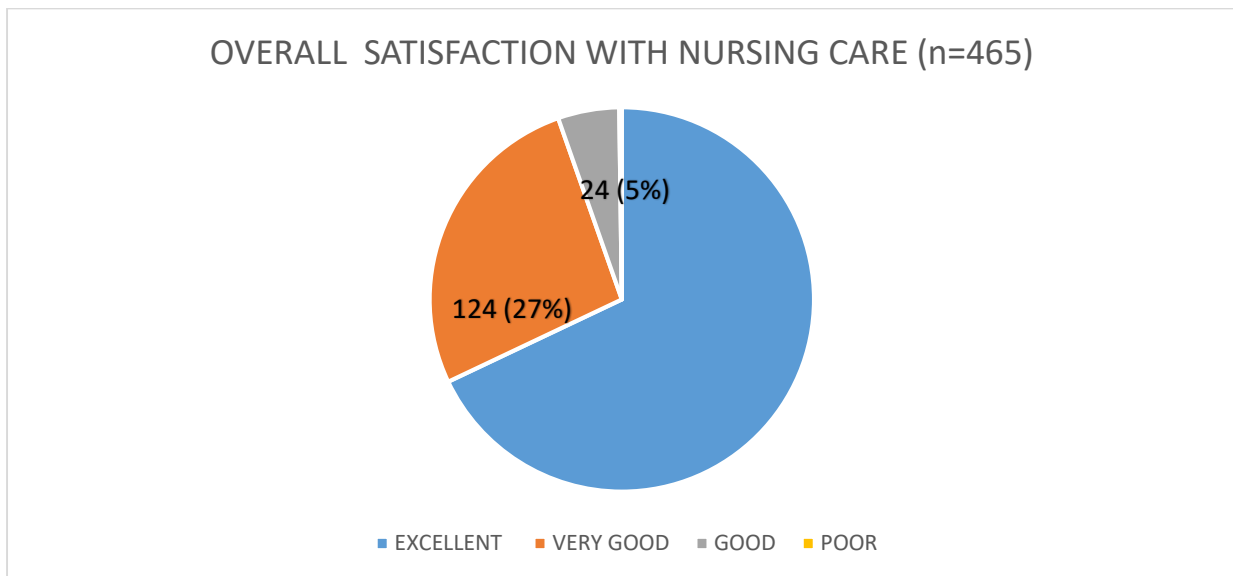
Overview:

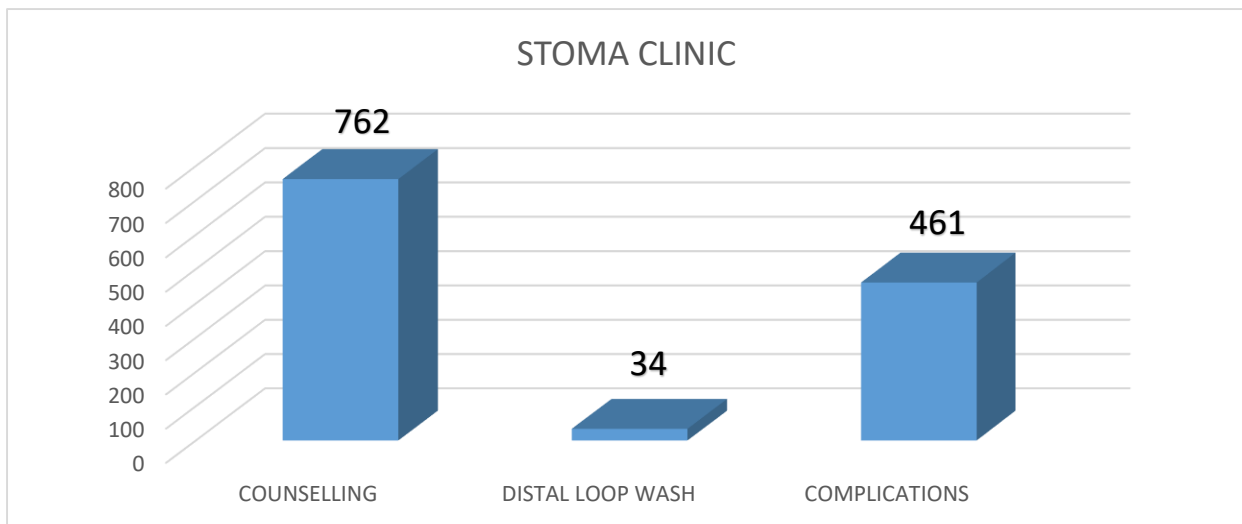
The Nursing department at ACTREC is dedicated to providee comprehensive patient care, fostering professional development and advancing the field of nursing through research and innovation. In the year 2023, our staff consistently delivered high-quality care, achieving a patient satisfaction rate of 94.6%. Notable initiatives like capturing and analyzing HAPU, IAD and MARS, fall risk and Braden's pressure risk assessment led us to successfully provide a safe and protective environment for our patients. In continuation of our journey towards Nursing Excellence certification, in 2023 we invested in our staff by offering a continuing education program and supporting nurses in obtaining advanced certifications. Our Ward induction program saw 191 new graduate nurses paired with experienced mentors in the clinical areas, facilitating their transition into professional practice. Various audits were undertaken to ensure quality care and compliance to protocols.

Service:

In 2023, as we continued to march confidently towards strengthening compliance to existing policies protocols and adhering to new ones, the scope of nursing services grew with the establishing new palliative care ward with 5 inpatient beds, introduction of the new Proton Therapy Machine (inaugurated on 15th August 2023)- a state of art and one of its kind with three gantries for treating patients and 74 patients have benefitted from this therapy. A research study on radiation safety was conducted by nurses. Nurses were deployed to the OPD area that was relocated to 3 storied building in order to cater to increasing patient visits. Our BMT Unit upgraded its services with new techniques like fecal microbiota transplant (FMT) and Donor lymphocyte infusion (DLI) for which the nurses were trained. Complications were handled with expert medical and nursing care. Continuous monitoring and follow up helped maintain SSI rate (4.19%), CAUTI rate (0.33%), CLABSI rate (0.47%) and VAP (3.4%) in the year 2023. Nurses in the Day care continued to deliver specialized care and monitoring to patients receiving chemotherapy and other short infusions while catering to approximately 180 patients per day. In the Central Venous Access Device (CVAD) clinic, 326 Peripherally

Inserted Central Catheters (PICC) were inserted, 554 patients were given counselling and 9557 dressing and flushing were performed in the year 2023. Complications like site rash, fractures, and thrombosis were resolved by the specialized CVAD nurses. 1279 patients who had undergone GI surgeries were counselled pre and post operatively in the Stoma clinic and stoma marking for 762 patients was done. Rehabilitative services like distal loop wash were taken up for 34 patients and 461 patients with complications like peristomal skin excoriation, high output stoma, stoma retraction was resolved by our specialized stoma care nurses.





Research:

The year 2023 marked with significant initiative on the part of our nurses to take up clinical studies to provide quality care to our patients. Following are some studies

Ms. Amutalakshmi – ‘To evaluate the knowledge of nurses on management of Extravasation’

Mr. Amish Kale – ‘Donor Lymphocyte infusion- A retrospective analysis’

Mr. Bhushan Shelar – ‘Perceived stressors & Coping strategies adopted in post HSCT patients’

Various audits on nursing assessment, nursing documentation, thrombophlebitis, pain management, hand hygiene was carried out. SSI, CLABSI, CAUTI and VAP surveillance helped to assess rate of these infections in our setting.

Education:

The nursing department is committed to professional development and continuing education. In accordance with the same one-week induction program was planned for all new joining staff. Also, sessions to review and revise policies and protocols were arranged for senior staff. The nurses were supervised and competencies charted by the senior nurses. Exclusive hands-on CPR sessions were also conducted to manage code blue situations. Nurses underwent courses like stoma specialist nurse, CVAD, and infection control program.

Awards:

1. Ms. Amutalakshmi – 1st prize in paper presentation, 'To evaluate the knowledge of nurses on management of Extravasation', 28th annual meeting of APBMT, 2023, Indonesia
2. Mr. Amish Kale – Best oral presentation, 'Donor Lymphocyte infusion- A retrospective analysis', 4th annual meeting of ISBMT Bengaluru, 2023.
3. Ms. Anila Jacob – 1st prize in scientific poster presentation, Building and promoting Nursing Excellence, National Nursing Conference Mumbai, 2023.
4. Mr. Bhushan Shelar – 2nd prize in oral presentation, 'Perceived stressors and Coping strategies adopted in post HSCT patients', 29th annual meeting of APBMT Indonesia, 2023.
5. Ms. Anila Jacob – 2nd Prize in poster presentation, 'Safe surgery together', AORN National conference, Mumbai, 2023.

RADIOBIOLOGY LABORATORY

Radiation Oncologists:

Dr. Jayant Sastri Goda

Dr. Supriya Sastri

Dr. Sangeeta Kakoti

Overview:

The Radiobiology Laboratory is working on various aspects of radiation biology and cancer therapeutics in collaboration with ACTREC basic scientists, oncologists, and institutes like IIT Bombay, BARC, Manipal University. This laboratory is working in the field of developing newer formulations of radiation modifiers, besides repositioning drugs for radiation modification, and is actively conducting translational aspects of clinical trials. Recently, work on Novel pharmacotherapeutic interventions to reduce neuro-inflammation and improve cognitive outcomes in Brain Tumors has been initiated.

Research:

The scientific investigations performed in the laboratory in the area of radiation sensitization and protection have led to the development and verification of the bio-efficacy and bio distribution of novel Nano formulations incorporated with chemotherapeutic agents. These novel formulations examined for biological efficacy are liposomal gel combination of paclitaxel and cisplatin for loco-regional delivery of the chemotherapeutic drug, data published in high impact factor journals (Journal of Controlled Release: IF 9.8; Nanoscale, IF: 7.8). A novel selenium compound (3-3 DSePA) as a lung radioprotector against radiation pneumonitis has been developed and is now going to be tested in humans as a phase-I /II clinical trial. The above project has been granted a BIRAC ETA grant of 2 crores. This laboratory continued collaboration with Manipal University for co-developing a Dual Drug Loaded Liposomal Nano vectors Targeting Integrin $\alpha 6$: A Glioblastoma Stem Cell marker in Intracerebral Orthotopic Xenografts of glioma. Also, the laboratory is actively involved in the preclinical development of multifunctional CAR-T cell therapy in Multiple Myeloma in collaboration with IIT Bombay. The CAR-T cell project received a DBT grant recently. The laboratory has co-developed an active plant extract called lupeol, which is an antiangiogenic agent as a radiation sensitizer in orthotopic GBM models.

The results of the study have now been applied as a product patent and communicated to a peer reviewed journal. The above project received a BRNS grant. This laboratory, along with the Department of Pathology, is the coordinating lab for an international translational research study, BIOEMBRACE. This study is investigating the impact of various biomarkers on outcomes of locally advanced cervix cancer (Dr. Supriya Sastri, co-lead of the project). Presently, the laboratory has grants from BRNS, DBT, and BIRAC. The recently initiated study on Radiation Induced Cognitive Decline focuses on identifying novel therapeutics to reduce major effects of radiation like neuroinflammation, hippocampal neuronal loss.

Education:

The faculty associated with this laboratory actively trains Ph.D. and MSc Life Science and Health Science students in molecular biology pertaining to Radiobiology. Two Ph.D. students and three MSc students were trained in the year 2023.

Patents:

In the reporting year, 1 Indian patent was filed for "ACTIVE AGENT(S) LOADED MULTIFUNCTIONAL LIPIDIC NANOVESICLES FOR GLIOBLASTOMA THERAPY AND THE METHOD OF PREPARATION THEREOF." **Application No. 202341064267**

RADIOLOGY DEPARTMENT

Dr. Nitin Shetty - Professor and Head

Dr. Amit Janu - Professor

Dr. Amrita Guha - Professor

Dr. Nivedita Chakrabarty - Associate Professor

Dr. Kajari Bhattacharya - Associate Professor

Dr. Himangi Unde - Assistant Professor B

Overview:

The Department of Radiology comprises Radio-diagnosis and Interventional Radiology. The services are provided by six permanent staff members and five senior residents from ACTREC as well as permanent staff members and residents from TMH. The department provides state of the art imaging, diagnostic and interventional oncology services and is well known for its 24 x 7 commitment to patient care. As one of the most rapidly expanding departments of ACTREC, it has garnered immense attention over the past couple of years with exponentially increasing workload and attracts qualified radiologists and technologists from different parts of the country who wish to undergo advanced training in diagnostic and interventional radiology.

Service:

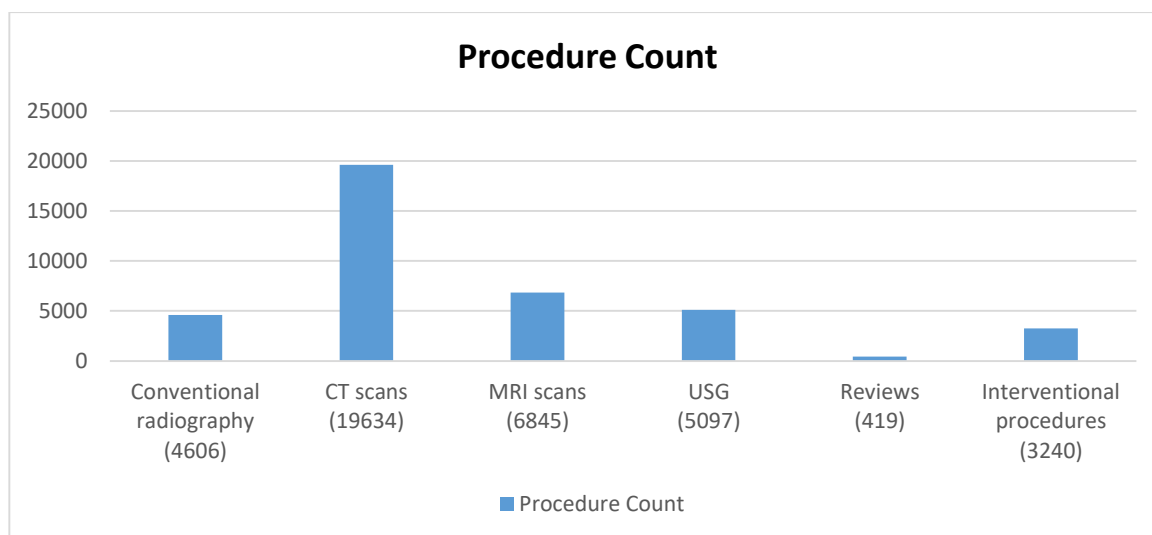
Radio-diagnosis provides diagnostic imaging services including Magnetic Resonance Imaging (MRI), Computed Tomography (CT), Ultrasonography (USG) and Radiography (X-Rays). Along with the 3T MRI we also started imaging services in conjunction with the newly installed 1.5 T Proton MRI.

The 128 -slice CT catered to more than 100 patients everyday including in-patients, and also provides services to Interventional Radiology. The advanced applications of CT coronary angiography and Volume rendered techniques provide exquisite imaging details for our patients.

We have started fusion guided USG, with already existing elastography, contrast-enhanced and three-dimensional USG for imaging and USG-guided procedures.

Interventional Radiology (IR) services range from guided FNACs and biopsies to complex ablations and angioembolizations. Apart from pre-operative tumor devascularization and liver-directed intra-arterial therapies, we also performed highly advanced ophthalmic artery chemoembolization for retinoblastoma in our paediatric patients. Recently, we have also started radial artery access (along with routine femoral artery access) for our vascular interventions, along with Percutaneous Radiographically inserted Gastrostomy for head and neck cancer patients, and pain palliation procedures like vertebroplasty.

Over the last few months, we have started our dedicated OPD in ACTREC for better evaluation of patients requiring IR-related services. The graph represents the distribution of services.



Research:

The Department of Radiology is at the forefront of research activities with more than 75 projects (completed and ongoing). The faculty of this department isare involved in multiple research projects including topics like Artificial Intelligence, Radiation protection and Advanced groundbreaking imaging and interventional techniques.

Education:

We have three weekly classes by internal and recognized national and international faculty for our MD residents. Similarly, a weekly academic session is held for our DM IR and fellowship residents with didactic lectures, journal clubs and audit sessions with participation by national and international faculty too. Yearly appraisal examinations are held for MD, DM and fellowship courses.

Teaching sessions are also organized weekly in the department for the technical staff which ensures continuous improvement in their theoretical and technical skills including patient safety practices in day-to-day service.

Conferences organized:

MRI safety conference, 29th April, 2023.

Multiple important conferences have been organized by the department of Radiology over the past year including BRIIT, 2023, Indian Cancer Conference (ICC, 2023) and SCII-CON, 2023. Apart from this, many hands-on workshops are organized often including quarterly radial artery access workshops, workshop on liver directed therapies and pre-conference workshops in the major conferences discussed above. The residents are actively encouraged to present cases and participate in workshops for first-hand experience on emerging imaging and interventional techniques.

RADIATION ONCOLOGY DEPARTMENT

Dr. Tejpal Gupta - Professor & Head
Dr. Vedang Murthy - Professor
Dr. Supriya Sastri - Professor
Dr. Goda Jayant Sastri - Professor
Dr. Tabassum Wadasadawala - Professor
Dr. Sangeeta Kakoti - Assistant Professor
Dr. Archya Dasgupta - Assistant Professor
Dr. Priyamvada Mhatre, Assistant Professor
Dr. Shwetabh Sinha, Assistant Professor
Dr. Revathy Krishnamurthy - Assistant Professor
Dr. Jifmi Jose Manjali - Assistant Professor
Dr. Anuj Kumar - Assistant Professor
Dr. Ankita Gupta - Assistant Professor
Dr. Samarpita Mohanty - Assistant Professor

Overview:

The Department of Radiation Oncology continues to fulfil the institutional mandate of quality service, education, and research (clinical as well as translational) in close collaboration with clinical colleagues from Tata Memorial Hospital (TMH) and basic scientists from the Cancer Research Institute (CRI). A novel technique of Total Marrow Lymphoid Irradiation (TMLI) was successfully initiated during 2023 as part of conditioning regimen for bone marrow transplant (BMT). The National Hadron Beam Therapy facility was also commissioned on 15th August 2023 which makes proton beam therapy available, accessible, and affordable to all sections of the society in India.

Service:

The OPD footfalls in the Department of Radiation Oncology at ACTREC for the year 2023 was 21245 which includes new registrations, patients on evaluation and treatment, as well as on follow-up. A total of 1186 unique patients were treated with external beam radiation therapy during 2023 with various modern techniques. Brachytherapy procedures were done in 162 patients resulting in delivery of 661 brachytherapy treatments during the year.

Over 300 patients were admitted under Radiation Oncology for elective procedures (brachytherapy) or supportive care during treatment/follow-up. Twenty-three patients were treated with proton beam therapy between August to December 2023 on a single working gantry.

Research:

The Department of Radiation Oncology accrued and treated patients on multiple prospective clinical trials in various solid cancers (head-neck, breast, cervix, brain, prostate, bladder, lung, rectum, and bone-soft tissues) as well as hematolymphoid malignancies (leukemia, lymphoma, and myeloma) throughout the year. The Department is also initiating prospective trials to compare proton beam therapy versus photon-based irradiation to generate high quality evidence.

Education:

Senior Residents (SR) and Junior Residents (JR) from TMH have a 3-month rotation in the Department at ACTREC. Ten such SRs/JRs were posted at any point in time at ACTREC. One Proton SR has also been appointed since February 2024. In addition, several trainees and observers from all over India and abroad visited the Department as part of their educational activity. Two Medical Physics interns successfully completed their 1-year post-Diploma in Radiological Physics Internship at ACTREC in 2023 (October 2022-September 2023). In the next batch (from September 2023), 4 new interns joined who are presently pursuing their Medical Physics Internship. Faculty members from the Department participated and presented their work in most major National and International Oncology Society Meetings and Conferences during 2023. Several Departmental Faculty have also served in various leadership positions in professional bodies and associations during the year.

SURGICAL ONCOLOGY DEPARTMENT

Dr. Sudhir V Nair - Head of the Department

Surgical Oncologists:

Dr. Sajid Qureshi

Dr. Aliasgar Moiyadi

Dr. Vinay Shankhdhar

Dr. Deepa Nair

Dr. Prakash Shetty

Dr. Manish Pruthi

Dr. Vineet Kumar

Dr. Rohini V Kulkarni

Dr. Rathan Shetty

Dr. Muffaddal Khuzema Kazi

Dr. Amendeep Arora

Dr. Arjun Singh

Dr. Dileep R Hoysal

Adhoc- Consultants

Dr. Amit Chopde

Dr. Vidula Mestry

Dr. Ankit Sharma

Dr. Kunal Mokhale

Neurophysiologist

Dr. Parthiban Velayutham

Speech and Swallow pathologist

Ms. Madhura Bhalerao

Overview:

The Surgical Oncology Department continues to provide comprehensive care to a diverse group of cancer patients, encompassing both inpatient and outpatient services. In 2023, there was a notable expansion in these services. The department observed a rise in patient numbers, particularly in the Head and Neck and Breast (BR) Services. Additionally, several other specialties have initiated their Outpatient and Joint clinics, including Gastro-Intestinal (GI), Colorectal (GI-C), Gynec-Oncology (GYN), Urology (URO), Plastic and Reconstructive Surgery (PRS), and Bone and Soft Tissue (BST) services. In line with these developments, the operating room capacity has been enhanced with the addition of two more, bringing the total to eleven regular ORs operating five days a week, plus two ORs functioning on Saturdays. The launch of the new Solid Tumour Block (Raja S Rao Shodhika) has further augmented the inpatient bed capacity for Surgical Services.

The speech and swallow therapy service operates daily, aiding in the rehabilitation of head and neck cancer patients' post-surgery. Neurosurgical services offer intra-operative neurophysiological monitoring and image-guided procedures, facilitating safer surgeries for patients with tumors in critical regions. Additionally, the GI services provide cutting-edge clinical services, including hyperthermic intraperitoneal chemotherapy (HIPEC), minimally invasive laparoscopic surgeries, and complex procedures such as exenteration.

In 2023, the surgical services registered 3904 new patients across various specialties: Head and Neck (HN) with 1812 cases, Breast (BR) with 1054, Urology (URO) with 271, Gynecology (GYN) with 311, Bone and Soft Tissue (BST) with 46, and Gastro-Intestinal (GI) with 254. Throughout the year, we conducted 4694 major surgeries, marking a significant 62% increase from 2022, along with 628 minor procedures in the newly opened RRS operation theatre complex. The distribution of major surgeries across different units was as follows: HN (1152), BR (1288), Neurosurgery (136), URO (317), GI (1269), GYN (432), and BST (100). The speech and swallow therapy unit has evaluated 5592 (IP- 178, OP- 4950) cases last year and performed 464 procedures (FOL: 215, FEES: 14, Video-fluoroscopic Swallowing Study: 235). The Plastic and Reconstructive Services notably expanded, supporting all major reconstructive surgeries and managing twelve microvascular operating rooms weekly. These expansion of services were made possible through the ACTREC administration's support, particularly in appointing ad-hoc consultants to various

units. However, to maintain the existing services and to accommodate future growth in response to rising patient demands, the department has sought approval for permanent faculty positions in various units.

Research:

The faculty members are involved in several DMG coordinated research projects. The division of neurosurgery in collaboration with the Department of Remote sensing and Robotics, BARC, Mumbai has developed a fully functional Neuro-Robotic Lab/OT setup at ACTREC. The division of Head and Neck is coordinating the multicenter AREST (Adjuvant Radiotherapy in Early Stage Oral Cancer) study funded by the National Cancer Grid involving seven cancer centers across India. The 3D Modelling lab developed under the guidance of the breast service has extended its service in designing and printing custom 3D models for surgical planning.

Education:

Annually, the postgraduate training program at ACTREC sees over twenty-four surgical oncology postgraduate trainees, who gain exposure to a variety of clinical and academic activities. The department organizes a consistent teaching program, which includes faculty lectures, presentations by resident doctors, case discussions, and journal club sessions every Thursday and Friday. The Division of Plastic Surgery has established an anatomy skills lab and regularly hosts workshops for microvascular training aimed at young doctors. The Head and Neck Unit has both national and international observers. Additionally, the department is in the process of planning workshops and conferences to share knowledge with healthcare providers from different regions of the country.

SURGICAL PATHOLOGY LABORATORY

Dr. Sridhar Epari - Head of the Department

Staff Pathologists:

Dr. Asawari Patil (ACTREC), Dr. Swapnil Rane (ACTREC), Dr Subash Yadav (ACTREC), Dr Katha Kante (ACTREC), Dr Vividh Raje (ACTREC), Dr Vishsha Adhvaryu (ad-hoc ACTREC), Dr Sangeeta Desai (TMH), Dr Tanuja Shet (TMH), Dr Sumeet Gujral (TMH), Dr Mukta Ramadwar (TMH), Dr Kedar Deodhar (TMH), Dr Bharat Rekhi (TMH), Dr Santosh Menon (TMH), Dr Munita Bal (TMH), Dr Rajiv Kaushal (TMH), Dr Ayushi Sahay (TMH), Dr Neha Mittal (TMH), Dr Uma Sakhdeo (TMH), Dr Poonam Panjwani (TMH), Dr. Trupti Pai (TMH), Dr Aekta Shah (TMH), Dr Gauri Deshpande (TMH) Dr Nupur Karnik (TMH), and Dr Prarthna Shah (TMH)

Overview:

The Surgical pathology laboratory at ACTREC is a part of the Department of Pathology, TMC, and all the pathology consultants and resident doctors work on rotation at TMH as well as ACTREC. At any given time, the ACTREC lab has minimum of three pathology consultants, eleven residents (senior residents and junior residents; all by rotation) and 27 technicians (both permanent and contract) and 2-3 secretarial staff.

Service:

The Surgical pathology laboratory provides diagnostic services for histopathology, cytopathology, frozen section and immunohistochemistry for patients treated at ACTREC as well as for referral cases from outside hospitals. The laboratory is equipped with automated tissue processors, automated stainers, cryostats and three automated immunostainers. This laboratory is accredited by NABL for all services and participates in EQAS (External Quality Assessment Scheme) offered by national agencies (Anand Lab, Bangalore and National Cancer Grid).

In the year 2023, the laboratory processed around 10,201 histopathology specimens (i.e. 1,42,557 paraffin blocks), 4855 frozen sections on 1734 cases, and 758 cytology smears for 997 cases. In this year, the laboratory has standardized additional 60 antibodies – amounting to a total of 141 standardized antibodies as a diagnostic IHC panel (and also ISH for EBER) and performed around 27,950 IHC tests in 8758 cases.

Research:

The laboratory archives all the slides and blocks and when required, retrieves and issues them for approved projects of pathologists, clinicians and scientists. The pathologists are involved as principal investigators or co-investigators in many IEC approved DMG projects, junior residents (MD students) thesis projects, as well as projects in collaborations with scientists in ACTREC.

Education:

Pathologists at Tata Memorial Hospital and ACTREC participate in DMG (Disease Management Group) meetings, joint clinics/multidisciplinary meetings and virtual tumor boards regularly. They also participate in national/international conferences as expert faculty or for oral/poster presentations. Resident doctors participate in weekly departmental academic activities as well as are encouraged to participate in conferences for oral/poster presentations and continuing medical education (CME) programs. The technical staff is also encouraged to participate in conferences, workshops as well as internal audit courses for NABL.

TRANSLATIONAL RESEARCH LABORATORY

Prof. Indraneel Mitra – Principal Investigator

Dr. Ernest Borges Chair in Translational Research

Professor Emeritus, Department of Surgical Oncology

Scientific Officers:

Dr. Ranjan Basak

Dr. Raghuram GV

Mr. Naveen Kumar Khare

Dr. Snehal Shabrish

Overview:

The primary focus of research of our laboratory is on the role of cell-free chromatin particles in evolution, the origin of stem cells and cancer metastasis.

Research:

Important research findings of the lab are: 1) Demonstration that horizontally transferred cell-free chromatin particles function as miniature “predatory” genomes in host cells. Our findings have led us to hypothesise that a cell simultaneously harbours two genome forms: one that is inherited (hereditary genome) and numerous others (miniature predatory genomes). The existence of miniature predatory genomes has evolutionary implications. 2) Demonstration of a method for reprogramming somatic cells into pluripotent states through the application of cell-free chromatin particles. Our objective is to provide an economically viable and rapid method with high reprogramming efficiency to make induced pluripotent stem cells. We are in the process of filing a patent application based on our findings. 3) Demonstration that metastases arise de novo as new cancers from cells of target organs transformed by cf ChPs released from dying cancer cells.

Education:

Three trainees are gaining research experience in this laboratory in fulfillment of MSc dissertation projects.

Cancer Research Institute





CANCER RESEARCH INSTITUTE

Dr. Sudeep Gupta - Director, ACTREC

Dr. Prasanna Venkatraman - Deputy Director, CRI

Research Team: Faculty and Principal Investigators

Dr. Sharath C. Arandkar

Dr. Subir Biswas

Dr. Kakoli Bose

Dr. Pradip Chaudhary

Dr. Sorab Dalal

Dr. Abhijit De

Dr. Amit Dutt

Dr. Shilpee Dutt

Dr. Rukmini Govekar

Dr. Sanjay Gupta

Dr. Syed K. Hasan

Dr. Arvind Ingle

Dr. Rohan J. Khadilkar

Dr. Jyoti A. Kode

Dr. Pradnya Kowtal

Dr. Manoj B. Mahimkar

Dr. C. Krishna. Murali

Dr. Sejal Patwardhan

Dr. Pritha Ray

Dr. Rajiv Sarin

Dr. Sunil Shetty

Dr. Ashok K. Varma

Dr. Prasanna Venkatraman

Dr. Nandini Verma

Dr. Sanjeev Waghmare

Dr. Ujjwala Warawdekar

BIOMOLECULAR STRUCTURE, FUNCTION AND ALTERATION GROUP

BOSE LABORATORY

Dr. Kakoli Bose - Principal Investigator

Overview:

The research focus of this group is the study of macromolecules involved in the apoptotic pathway and their implications in normal cellular functions and pathogenesis. The group works on the high-temperature requirement family of serine proteases (HtrA); the interaction between proteins of extrinsic cell death pathway forming DISC assembly, and the Bcl2 family proteins and their interacting partners. Moreover, the group is now entering into application-based translation research that includes enzymes involved in metabolic reprogramming and their role in altering cancer signaling pathways.

Research:

The highlights of the research findings in 2023 include the purification of complex heterotrimers of HtrA2 (STAR Protocols. 4(1): 102036. PMID: 36853657) and understanding the role of VRK2A in mediating apoptosis in the intrinsic cell death pathway (Biochemical Journal. 480(22):1871-1885. PMID: 37943248). We have also studied and published the role of pathogenic mutations in FADD in cancers (Journal of Haematology. 202(2):e11-e15. PMID: 37199216) through national and international collaborations.

Education:

The Principal Investigator is recognized as a guide for the Ph.D. (Life Sciences) degree of the Homi Bhabha National Institute as a full Professor. Currently, six graduate students - Ms. Kalyani Natu (will be submitting a synopsis soon), Ms. Trishita Banerjee, Ms. Oindrila Ghosal, Ms Sayali Khisty, Ms. Bhavna Thakur and Mr. Shubhankar Dutta are working on their doctoral dissertations. The students/staff received several awards as follows:

Dr. Kakoli Bose: Elected as panel member for the Training Theme Panel, Biochem. Society, UK
Felicited by ACTREC-TMC on ACTREC annual day for being the only Non-European panel

Member in the Training Theme Panel, Biochemical Society & Royal Society of London

Kalyani Natu: Third prize for flash talk at the third Indian Cancer Congress 2023

HBNI travel grant; Sam Mistry fellowship; Patel Fellowship for international conferences

Oindrila Ghosal: Published a short story titled "The Jungle Within Me" in Kitaab International, literary journal on 12.03.23

Snehal Pandav Mudrale: Best Employee Award 2023

SHETTY LABORATORY

Dr. Sunil Shetty - Principal Investigator

Overview:

The Shetty lab started in April 2023 in KS109, ACTREC. We use proteomics and biochemical approaches to investigate how cells reprogram their protein synthesis machinery to survive under stress and disease conditions. We study protein synthesis and RNA metabolism mainly in liver cancer using various animal models and patient-derived materials. We also investigate evolutionary conservation for such stress-responsive mechanisms in yeast.

Research:

The year 2023 is mainly involved with the setting up of the infrastructure in the laboratory. Currently, the lab is equipped with various biochemical and molecular biology techniques to study protein synthesis. Our lab focuses on understanding the novel mechanisms of regulation of protein synthesis under various growth and disease conditions. We employ both yeast and cancer cells as model systems to understand the regulation of protein synthesis by signaling pathways such as mTOR. We explore various post-translational modifications of translation factors and mRNA binding proteins and ribosome composition in the regulation of protein synthesis. In addition, we are also interested in understanding non-canonical protein synthesis mechanisms under stress conditions. We investigate peptides/proteins synthesized by non-canonical mechanisms and examine their role in cancer cells. We obtained an ICMR fund to set up a facility to produce Adeno-associated viruses to check gene therapy approaches. We are also involved in the setting up of the proteomics facility in the institute for proteomics and phosphoproteomics analyses.

Education:

PhD students enrolled: Ms. Pooja Singh, Mr. Ashish Shingade, Mr. Rudransh Singh

Trainees : Mr. Jashan Kler, Ms. Vidita Mumbaikar, Ms. Upasana Suresh, Ms. Apeksha Jadhav, Ms. Insiya Jawadwala, Ms. Punam Deshpande

Conferences attended: Three PhD students attended and presented posters at the RNA meeting held in IIT Guwahati,

Staff Achievements:

- Assistant Professorship, HBNI, Mumbai
- Obtained ICMR Funded Investigator Initiated Extramural Intermediate Grant.

VARMA LABORATORY

Dr. Ashok K Varma - Principal Investigator

Overview:

With the mandate to fulfil the vision of TMC and perform very good basic and translation research, my group has focused on inter-disciplinary work involving genomics, proteomics, structure biology and bioinformatics-based approach. Three PhD students were awarded degrees and eight students were actively engaged in basic and translational research. The group has published seven international peer reviewed publications. In proteomics related work, we have already identified a set of 11 differentially expressing proteins in HNSCC, now aiming to validate a from different cohort of patient's population. The new project on urine proteomics to differentiate between Muscle Invasive Bladder Cancer and Non-Muscle Invasive Bladder Cancer using mass spectrometry-based approach has been proposed. Furthermore, work towards societal impacts (1) Indian Cancer Database for Translational Research –ACTREC, which is fully supported by DBT has been formulated to serve scientists, clinicians for better translational research and also general public on cancer awareness (2) Group also received very competitive grant named “National Network Project of TMC-ACTREC” including four other group from different universities.

Service:

Varma Lab is providing training to researchers from different parts of the country with the support of DBT-GOI, TMC-ACTREC to build the skillful India. Using Macromolecular Crystallography and X-ray diffraction facility-ACTREC, the group provided support to different faculty from ACTREC and other institutions in compiling very good diffraction data. Research Scholars from ACTREC and nearby Institutions are using the facility to perform research work. I am also coordinating the National Network Project of TMC-ACTREC fully supported by DBT for five years. BIC (Bioinformatics Centre) of ACTREC-TMC funded by Department of Biotechnology (DBT) provides full infrastructural and analytical support to research scholars and faculty from ACTREC and also nearby institutions. Using the infrastructure of BIC, the faculty has published very good research work. A project staff is are also actively supporting research scholars in PhD thesis related work

Research:

Different multi-disciplinary and multi-institutional projects with the support from TMC also funding from DBT, ICMR and PhD students and project staff were ongoing in the lab. Eight PhD students were very much focused on (1) Structural and functional characterization of MAPK pathways, the overall goal was to characterize each protein present in RAS-RAF-MEK-ERK-RSK pathways in order to understand alterations in folding pattern (2) In-silico, In-Vitro and Biophysical approach were applied to identify the pathogenicity of germ-line mutations discovered in breast cancer associated proteins (3) Structural analysis of Eph receptors and Ephrin ligands and also interface of Eph-Ephrin complex (4) Protein-Protein Interactions between BRCA1/2 and BACH1, BAP1, BARD1 (5) Validation of a panel of proteomics molecules from serum as an early detection biomarker. A serious attempt has been made to prepare Indian Cancer Database for Translational Research –ACTREC (ICDTRA)

Education:

Three students Dr. Mudassar Ali Khan, Dr. Suchita Dubey, Dr. Siddharth Barua, have been awarded PhD degree of HBNI. Ms. Neha Mishra, Mr. Subhashish Chakraborty, Ms. Vaishnavee Chikhale, Mr. Aman Jaiswal and Gokul Arora are registered for PhD degree in Life Sciences program of Homi Bhabha National Institute. In the year 2023, three students Jahnvi Singh, Vaishali Singh, Arpita Pryadarshini joined the lab to work on BRCA1. PML-RARA and Urine Proteomics for their PhD program. A scientist level project staff from DBT funded project are actively engaged on in-silico related work. Students from different institutions also received research projects for their degree dissertations. Varma Lab is also actively involved in providing training to faculty and research scholars on basics and translational research.

Staff achievements:

Varma has supervised three PhD students. The projects are mentioned below:

- Structural Evaluation of Germline Missense Mutations Causing Hereditary Breast Cancer.
Mr. Mudassar Ali Khan
- A structure-based approach to elucidate protein-protein interactions of BRCT repeats.
Mr. Siddhartha Anup Barua
- Structural and functional basis to evaluate PML-RARA response to arsenic trioxide.
Ms. Suchita Dubey.

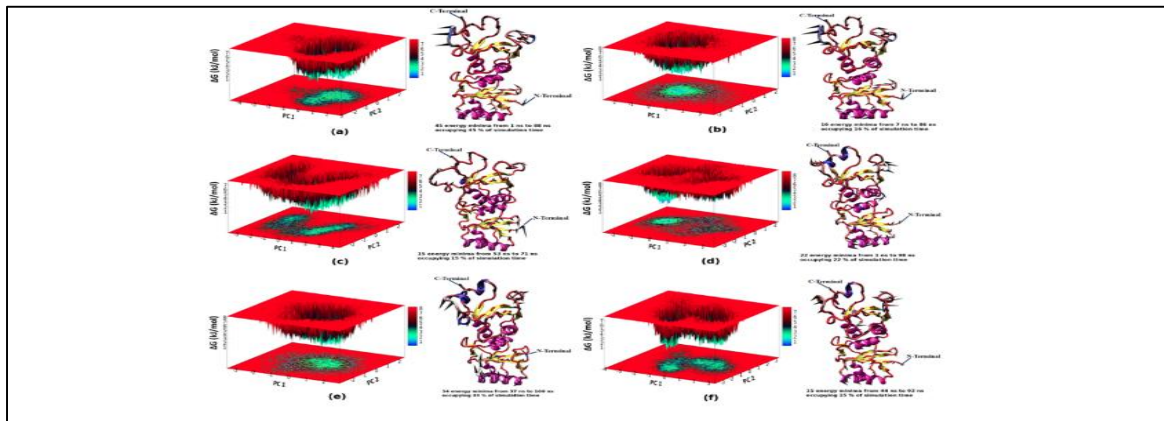


Figure: Gibbs' Free Energy Landscape (FEL), in phase space for the BRCA1 BRCT and representative structure computed from normal mode analysis of the 3D coordinates in the Gibbs' FEL plot. The vectors depicting the amplitudes of the prominent 1st PCA of normal mode analysis are shown into a 'porcupine' style plot. **(a)** BRCA1 BRCT wild-type **(b)** H1686Y, **(c)** P1749L, **(d)** P1749S, **(e)** W1718L and **(f)** W1837L.

PRASANNA LABORATORY

Dr. Prasanna Venkatraman - Deputy Director and Principal Investigator

Overview:

Protein-protein interactions (PPI), typify physical, signalling and regulatory networks that orchestrate cellular responses. PPI are sensitive to levels, mutations, post translational modifications (PTM), and subcellular boundaries. Cancer cells exploit these to rewire networks to maintain mosaic correlations that allow them to survive. The lab tries to understand PPIs at different hierarchical levels with a long-term goal is to expose the Achilles heel in cancer. The interested biomolecules are chaperones: PSMD9, PSMD10 which help in proteasome assembly, 14-3-3 which interacts with phosphoproteins and L-Asparaginase, a drug used in the treatment of AML. This report covers our findings on these important biomolecules.

Research:

- a) PSMD9: the chaperone regulates protein translation, acts as a buffer by regulating the unfolded protein response, provides survival advantage when breast cancer cells are met with mitochondrial stress.
- b) PSMD10: Having reported the role of this chaperone of proteasome assembly and oncoprotein in various gain of function activities in cancer cells, we are now evaluating the sequence and structure determinants of some of the peptide inhibitors chosen based on structure guided rationale. It is clear that these peptides can bind to PSMD10 with affinities that are equivalent to that of the client protein making it an attractive candidate for further structure activity relationship. A battery of chemical compounds and a natural compound which also bind to Gankyrin have been identified.
- c) 14-3-3, a scaffold protein and a chaperone, was found to carry ATPase activity, details of which were published in our earlier papers. The relevance of this activity and the residues involved in catalysis were unclear. We now have clear evidence for the residues involved in catalysis and have identified an allosteric role for this activity in selective ligand exclusion. This is likely to have high physiological relevance in cells where select proteins carry motifs that are similar to the ligand that is under the regulation of the enzyme activity.

d) In collaborations with Dr. Gota and Dr. Avinash Sonawane we had characterized the biophysical properties of the novel Asparaginase variants generated in Dr. Sonawane's lab. The high cost and requirement of multiple injections in children has been one of the challenges to overcome and many of Indian market ready formulations are inferior to the innovative formulations. Robust biophysical characterization is necessary for quality control. We have also crystallized the variants and solved the structures. This should enable more ideas to inhibit the immunogenic activity of the protein

Education:

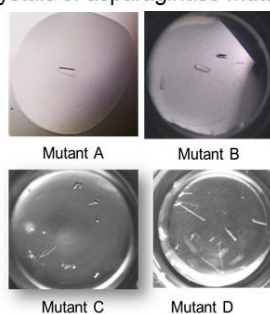
Principal Investigator is an active member of the current academic committee and a member of the doctoral committee of 15 students and a chair of many DC committees.

Administration:

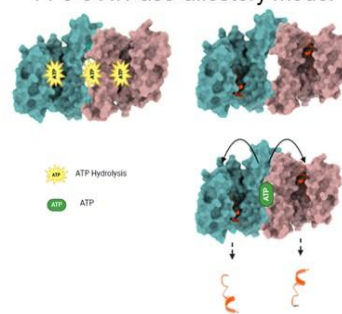
Extensive peer review of CRI was conducted which was appreciated by external panel members. Many of the important suggestions have been executed. New faculty were recruited. DST Sati project was awarded.

Student Participation:

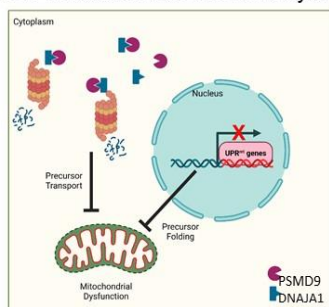
Crystals of asparaginase mutants



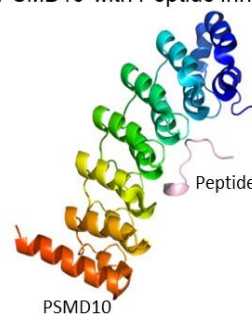
14-3-3 ATPase allosteric model



PSMD9 mediated mitochondrial dysfunction



PSMD10 with Peptide Inhibitor



Staff achievements:

- Convener Board of Studies, Life Science HBNI 2019 Till Date
- Member Technical Committee Cancer Disease Biology DBT Since 2022
- Member in D.Y Patil Committee
- Member in MGM

Initiating innovative activity impacting Research:

- Extensive peer review of CRI was conducted on 27th and 28th Feb 2023 which was appreciated by external panel members.
- Attended India – Japan Cancer Symposium International Symposium On Tumor Biology in Kanazawa 2023 Kanazawa University SAKIGAKE Symposium held in July 24-25, 2023. The symposium aimed to facilitate International Joint Research with India and Strengthen the Partnership in Cancer Research Between India and Japan. MOU is being executed.
- Invited for DST- Sophisticated Analytical and Technical Help Institutes (SATHI) Cluster project presentation before the expert panel at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Jakkur, Bangalore on 04th April 2023. Recently awarded by DST for Biopharmaceutical Innovation to cross the valley of death in translational research.
- Organized 1st National symposium on Integrating Traditional Knowledge in Evidence Based Medicine 21st & 22nd September 2023.
- Organized the American Association for Cancer Research “AACR on Campus” (AACRoC) two-day program for the first time in India at ACTREC in collaboration with American Association of Cancer Research.
- Lead discussant for 2nd Virtual Meeting of the Technical Expert Committee (Tec) – Cancer Disease Biology (CBD) held on 09/02/2023
- DST SATHI Presentation Meeting in a cluster mode (JNCASR), Jakkur, Bangalore– 4th April 2023
- Meeting of the Standing Committee of Deans (SCD) on 24-04-2023 at RRCAT, Indore
- Attended 36th RAP-SAC meeting of the National Centre for Cell Science (NCCS), Pune 21st and 22nd December, 2023.
- Vice President Global Cancer Consortium 2020 Till Date

Orations delivered:

- Nominated and Invited to the Japan Cancer Symposium International Symposium On Tumor Biology in Kanazawa 2023 Kanazawa University SAKIGAKE Symposium held in July 24-25, 2023
- Invited as speaker for the 18th Anniversary of India-Japan Fest in Pink city of India; Biyani International Conference on Nurturing Academic Entrepreneurs with Industrial Partnerships held on 26 –30 November, 2023
- 2nd Homi Bhabha National Institute Theme Meeting on Life Sciences at SINP Kolkata on 16th- 17th February 2023
- Invitation to chair Scientific Session at International Conference ICBSF 2023; 15-16 December 2023 at D. Y. Patil University

Chief Editor of national/ international journals

Editorial Board/ Review Panel

- Reviewer: US-Israel Binational Science Foundation
- Reviewer Cell Death and Discovery, Cellular and Molecular Life Sciences, Biochemistry
- Journal of Physical Chemistry, Bioscience Reports, Tumor Biology, PLoS One, Austin Journal of Pharmacology and Therapeutics, J. Biological Science

RUKMINI LABORATORY

Dr. Rukmini Govekar - Principal Investigator

Overview:

The group is using multi-'omics' approach to delineate the mechanism of resistance to tyrosine kinase inhibitors (TKI) in chronic myeloid leukemia (CML). In the initial chronic phase (CP) of CML about 90% patients respond to the TKI- imatinib (IM). Failure of salvage strategies such as increased dose of imatinib or next generations of TKIs leaves the non-responder CPs and 80% of patients in terminal stage of blast crisis (BC) without an effective treatment option. Delineation of the mechanism of resistance to TKIs is expected to: 1) Identify potential therapeutic targets for the non-responders; 2) Identify early markers to predict which of the initially responding CP patients would turn resistant during therapy.

Research:

Previous genomic and proteomic analysis of imatinib sensitive and resistant cells undertaken in the laboratory identified important features of the mechanism of imatinib resistance in CML-BC, despite inhibition of activity of Bcr-Abl by imatinib. The on-going phosphoproteome and kinome analysis threw light on the reasons for alterations in levels of p38MAPK and 14-3-3 ϵ which are mediators of imatinib resistance. The study has demonstrated that reduced expression of β 1 integrin causes altered phosphorylation and thus increased activity of p38MAPK. Demonstration of the causative role of PLAG 1 overexpression, identified in genomic analysis, in reduction in levels of β 1 integrin has provided genomic basis for the observed proteomic alterations and thus to resistance. Analysis of transcriptome of resistant cells also identified β 1 integrin as a hub molecule. MicroRNAs which can regulate expression of β 1 integrin pathway components were also found to be differentially regulated in resistant cells. Further, metabolomic studies have identified the mechanism of dysregulation of mitochondrial redox homeostasis in resistant cells.

Education:

The Principal Investigator is a recognized PhD Life Sciences mentor of the Homi Bhabha National Institute. Presently three graduate students – Mr. Manish Bhat, Ms. Neha Agarwal and Ms. Shashikumari are working towards their doctoral degree.

CELL AND TUMOR BIOLOGY GROUP

SHARATH LABORATORY

Dr. Sharath Chandra Arandkar – Principal Investigator

Overview:

The main aim of this laboratory is to understand the biology of the tumor microenvironment and specifically focus on cancer fibrosis and its role in tumorigenesis. Our studies involve the understanding of one of the major stromal cell types, Cancer-Associated Fibroblasts (CAFs) and their interaction with tumour cells. The laboratory aims to understand the generation of CAFs in the tumour-microenvironment of lung and pancreatic cancers and identify the responsible extra & intracellular factors/signalling molecules in this process. Eventually, we plan to develop new therapies to target the tumor microenvironment and cancer cells together.

Research:

We use different tumor derived cell lines and corresponding patient-derived Cancer-Associated Fibroblasts to address the tumor and stromal cell interactions. Our preliminary experimental and bioinformatics data from NFs and CAFs led us few interesting projects. The data generated in this laboratory suggest that various stromal secreted factors influence various tumour cell properties. Currently, we are focusing on Insulin Growth Factor Binding Proteins (IGFBPs) and TGFBI secreted from CAFs and their influence on tumor and its microenvironment. Additionally, the laboratory is studying Pancreatic Ductal Adenocarcinoma (PDAC), where TP53 mutations are abundant. One of our projects study how cancer cell derived p53 mutations influence PDAC tumor fibrosis. We have developed the *in vivo* xenograft mouse models to study key lung and PDAC cancer observations.

Education:

The Scientific Officer gave oral presentation at CSIR-IGIB, New Delhi, and presented a poster at the EACR Congress International Conference in Italy. Co-organized AACR on-campus international meeting and delivered an oral presentation. Currently, the lab has a DBT-Ramalingaswami project (42.5 Lakhs) and SERB –SRG grant of 29 Lakhs and additional grants were submitted to procure more extramural funds Involved in teaching Tumor Immunology and microenvironment course for PhD at ACTREC.

Nominated as an EACR Ambassador, EACR, Europe.

PhD students: Four

1. Ms. Ghanapriya Devi Yengkhom-

Participated and presented a poster at the IACR conference

Participated and presented a poster at the AACR &ACTREC-TMC conference

Presented a poster and was awarded the Best Poster at the ICC conference.

Presented a poster and was awarded the best Poster at the GCC conference on Current

Trends in Tumor Microenvironment and Therapeutics.

2. Mr. Omkar Dhurat

3. Ms. Anamika Sen

4. Mr. Pankaj Mehato

Trainees: Six completed the training.

SORAB LABORATORY

Dr. Sorab N. Dalal - Principal Investigator

Overview:

Our work has demonstrated that the iron siderophore Lipocalin2 (LCN2), is required for therapy resistance and invasion in colorectal cancer cell lines by regulating the levels of intracellular iron and the levels of ROS. In collaboration with our colleagues at MSMF and Beyond antibody, we have demonstrated that a novel monoclonal antibody targeting LCN2 inhibits therapy resistance, invasion, and tumor progression. Further, we have now established a syngeneic mouse model that leads to disease progression in the colon with a concomitant increase in LCN2 levels. Our work has also identified novel mechanisms by which the 14-3-3 family of proteins regulate centrosome duplication and centrosome clustering, which is often disrupted in human cancers.

Research:

Ferroptosis is an iron-dependent form of cell death that is activated when tumor cells are treated with cytotoxic therapies. Therefore, multiple tumor types have developed ways in which to inhibit ferroptosis thereby promoting therapy resistance. The iron-binding siderophore, LCN2, is over-expressed in multiple solid tumors and our work demonstrated that it promoted therapy resistance in colorectal cancer by reducing intracellular iron and stimulating the expression of genes required for detoxifying peroxidated lipids. These events also lead to increased invasion and tumor progression. A novel monoclonal antibody developed by our collaborators sensitized tumors to therapy and inhibited tumor progression. We have also demonstrated that LCN2 promotes focal adhesion formation by stimulating the activity of c-Src leading to increased focal adhesion formation.

We have identified a novel role for acidic residues in the 14-3-3 peptide binding groove in ligand binding and have demonstrated that mutation of these residues either promotes or inhibits complex formation with ligands. Our work has also demonstrated that a knockout of two 14-3-3 paralogs, 14-3-3 ϵ and 14-3-3 γ , leads to centrosome amplification. We have also demonstrated that the two paralogs regulate different steps in the centrosome duplication pathway, 14-3-3 γ inhibits centriole duplication while 14-3-3 ϵ inhibits centriole disengagement. We are now using the mutants described above to identify paralog-specific ligands.

Education:

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute and has six PhD students (Amol Lonare, Monika Jaiswal, Prerana Uttankar, Bushra Khan, Sneha Patil, and Avi Pandey) who worked on their doctoral thesis in this laboratory during 2023. Ten trainees worked in the lab this year, for a Bachelor's or Master's dissertation. Lab members participated in weekly in-house seminars and journal club and presented their findings at six meetings in 2023.

Name	Conferences attended
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Dr. Sorab N. Dalal	6
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PhD students

Ms. Monika Jaiswal	1
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Mr. Amol Lonare	0
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Ms. Prerana Uttankar	1
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Mr. Bushra Khan	1
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Staff achievements:

- An Indian patent application for the antibody clone 3D12B2 and its variants entitled "Antibodies against lipocalin-2 and uses thereof." has been Indian Patent Office on 30 July 2021 in the Official Journal No. 31/2021.
- A PCT application for the antibody clone 3D12B2 and its variants entitled "Antibodies against lipocalin-2 and uses thereof." - published.
- Member of DBT TEC on Cancer Biology and SERB CRG-BHS-PAC
- President of Indian Association for Cancer Research (IACR)
- Presidential Oration at the 43rd Annual Convention of IACR in January 2024

HASAN LABORATORY

Dr. Syed Hasan - Principal Investigator

Overview:

Hasan laboratory is committed to unraveling the molecular basis of resistance to targeted therapies (such as Venetoclax, CDK7 inhibitors) in acute myeloid leukemia and breast cancer, employing cancer cell lines, primary patient samples and murine models. In high-risk acute promyelocytic leukemia, research from this laboratory integrates proteomics and single cell genomics to uncover intricate mechanisms driving coagulopathy related early mortality and identification of clinically relevant druggable targets. Multiple myeloma (MM) is an incurable plasma cell neoplasm. Despite several effective frontline therapeutic regimens, including Bortezomib (BTZ), relapse is almost inevitable; therefore, better therapeutic modalities to improve the outcomes are needed. Cyclin-dependent kinases (CDKs) are an essential constituent of the cellular transcriptional machinery and tumors including MM are critically dependent on transcription to maintain their oncogenic state. We explored the efficacy of THZ1, a covalent CDK7 inhibitor in MM treatment using Bortezomib resistant (H929BTZR) cells and zebrafish xenografts.

Research:

Our laboratory aims to understand the molecular mechanisms underlying Venetoclax-Azacytidine (Ven-Aza) resistance in acute myeloid leukemia, seeking strategies to overcome this challenge. The emergence of resistance to the highly successful BCL2-directed therapy is a major unmet need in acute myeloid leukemia, an aggressive malignancy with poor survival rates. Towards identifying therapeutic options for AML patients who progress on BCL2-directed therapy, we studied a clinical-stage CDK7 inhibitor XL102, which is being evaluated in solid tumors. Additionally, we endeavor to introduce comprehensive validation studies for a CRISPR-Cas12-based point-of-care diagnostic assay tailored for acute promyelocytic leukemia (APL), aiming to facilitate its integration into outpatient department (OPD) settings. This assay promises rapid diagnosis without specialized equipment, utilizing lateral flow strip technology. Moreover, we are actively engaged in diverse cellular and molecular experiments to elucidate the potential

tumor suppressor role of pregnancy zone protein in breast cancer. The laboratory is dedicated to advancing knowledge and deepening our understanding of cancer biology through ongoing scientific efforts. It offers a platform for young researchers nationwide to develop new skills and expertise in this field. From January-December 2023, this Laboratory has contributed in four research publications (PMIDs: 37507802, 37369156, 37311352, 37678607).

Education:

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. Ms Tarang Gaur successfully defended Ph.D. and moved to the University of Washington for postdoctoral studies. Presently, Ms Deepshikha Dutta, Mr Akash Maiti, Anup Jha and Neha Gupta are working towards their doctoral thesis. The Board of Directors of the Society of Hematologic Oncology (SOHO) has appointed the PI (Syed Hasan) as the ambassador for India in 2023. Four abstracts have been selected for presentation at the prestigious international conferences. Mr. Akash delivered an oral presentation on single-cell multiome data in acute promyelocytic leukemia at the Human Cell Atlas Asia 2023 conference. Dr Amritha Sathynarayanan, postdoc Hasan Lab, has been selected to pursue further research at DKFZ German Cancer Research Center

PATWARDHAN LABORATORY

Dr. Sejal Patwardhan – Principal Investigator

Overview:

The prime goal of this group is to decode the multidirectional crosstalk between the biochemical and biophysical components of tumor microenvironment to investigate key regulators of cancer progression and therapy resistance. The current research activities of this group focus on extracellular matrix (ECM) remodelling and its influence on various facets of cancer biology. To achieve this, multi-armed approaches including proteomics, metabolomics, and cellular biophysics have been employed to delineate the phenomena and underlying molecular mechanisms. In parallel, the group is also engaged in identifying novel biomarkers for cancer prognosis and developing innovative assays for liquid biopsy applications.

Research:

ECM stiffening due to collagen deposition and crosslinking is a profound phenomenon in breast cancer that governs plethora of cellular traits including cytoskeletal remodelling, motility, invasion, stemness, etc. However, the effect of ECM stiffening on cellular networking via diverse modes of intercellular communication remains largely intangible. Research from our lab has established the link between ECM rigidity and exosome secretion. Our findings have unveiled how ECM-stiffness-modulated exosomes promote invasiveness of breast cancer cells with a pivotal role of exosomal thrombospondin-1. Moving ahead our group has discerned the role of stiffness-tuned-exosomes on tunnelling-nanotube (TNT) formation. Interestingly, the exosomes were found to promote TNT formation in breast cancer cell through cell-dislodgement model of TNT formation. The effect of exosomes on cargo transport along TNT was also characterized revealing interesting features of exosome-TNT interplay in response to ECM stiffening. The study was published in Archives of biochemistry and Biophysics (PMID: 37146866).

The group is also investigating the novel role of exosomes in the metabolic reprogramming of breast cancer cells in response to varying ECM conditions. Cells cultured on stiff ECM scaffolds exhibit low lipids, high nucleic acids, and mitochondrial content as reflected from Raman spectroscopic analysis. The key findings harboured by spectral profiles were corroborated by electron microscopic imaging and other biochemical assays, confirming altered metabolic status as reflected by increased mitochondria number and decreased lipid droplets in

response to ECM stiffening. Collectively, these findings not only gave the spectral signatures for mechanoresponse but also provided significant insights about metabolic changes in response to ECM stiffening. The group is further delineating the role exosomes in linking cancer mechanobiology with bioenergetics along with the underpinning molecular mechanisms.

In parallel, the group also investigated and identified Txrd1 as a prognostic biomarker for breast cancer recurrence, metastasis, and response to neoadjuvant chemotherapy and radiotherapy using meta-analysis approach and wet lab experimental evidence which has been recently published in Heliyon (PMID: 38524569)

Education:

The Principal Investigator is an assistant professor affiliated to the Homi Bhabha National Institute, and presently has four PhD students in life sciences (Mr Shubham Jha, Ms Ritika Pant, Priyanka Kashid and Paratibha Koppala) working on their doctoral thesis under her guidance. Six trainees worked in the group during 2023 for their master's thesis or to gain research experience. Group members participated in weekly in-house seminars and journal club, and presented their research findings at various conferences during the year. The faculty delivered talk in two international meetings (Global Cancer consortium and AACRoC). The faculty co-organized GCC conference and chaired the session at ICC. The faculty is member of standing academic committee that takes care of various educational activities of JRFs. The PI also serves as a doctoral committee member for ACTREC students (13) as an external expert for PhD students from various institutes like RGCB, BARC, NMIMS, RMC, MAHE etc.

CELL AND TUMOR BIOLOGY GROUP

Dr. Ujjwala Warawdekar - Scientific Officer 'G'

Overview:

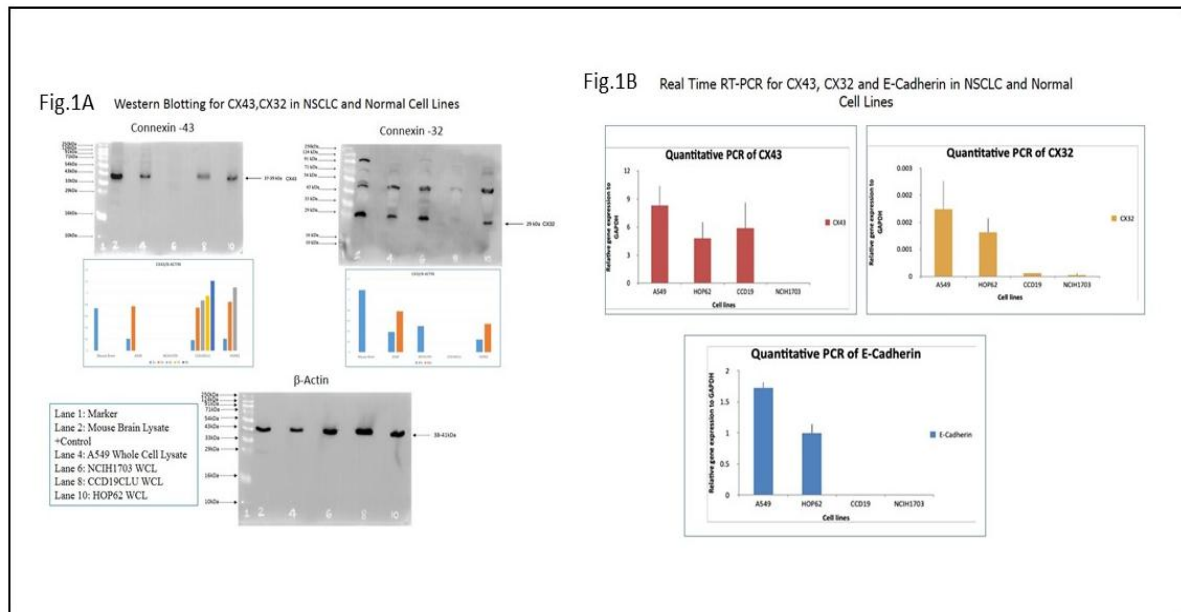
Connexins, constituent proteins of the Gap Junction Intercellular Channel - which mediates exchange of small molecules with the extracellular environment, with classical roles of communication, enhanced or manipulated experimentally. Connexins also have a non-classical role carried out by the C terminal domain of the protein molecule by virtue of its phosphorylation status. The localization of Connexins in subcellular compartments may be contributing to the non-classical role especially in diseases like cancer.

Research:

NSCLC constitutes about 80-85% of Lung cancer and comprises of Adenocarcinoma or Squamous Cell pathology. The hypothesis that in NSCLC with adenocarcinoma pathology both Connexin 43 and Connexin 32 have a non-classical function was based on the observations in the NSCLC cell lines, A549 and HOP62. Both cell lines expressed both Connexin 43 and Connexin 32 in substantial quantities as determined by RT-PCR and Western blotting as seen in Figure 1A,1B. However, examined by Immunocytochemistry the localization was not only the plasma membrane, and these proteins distributed in other cellular compartments, hypothesized to execute specific roles that support the malignant characteristics and features of these cells. Evaluating the role of Connexin 43 and 32 by silencing their expression was an approach as is identifying interacting proteins using a proteomics approach. Experiments to demonstrate effect of silencing CX43 on Gap Junction Communication using the Dye -Transfer assay (Warawdekar, U. M. (2019); J Biomol Tech 30(1): 1-6) was carried out for CX-43 silenced clones, scrambled controls and parental cells of cell lines A549 and HOP-62 with the quantitative methodology using the Incucyte microscope. Assays that evaluate cellular transformation in vitro; the Soft Agar Colony Formation Assay; Wound healing or Scratch assay were done to demonstrate the effect of CX43 knockdown on NSCLC cancer cell tumorigenicity and migration using A549 and HOP 62. Platinum based drugs such as Cisplatin and Carboplatin have been widely used in the adjuvant setting for the treatment of NSCLC. These drugs were evaluated in the in-vitro setting on CX 43 silenced clones and controls of the adenocarcinoma NSCLC cell lines.

Education:

In the year 2023, the faculty contributed to the Centre's academic and training program. Four students for experience training and one for doctoral collaborative work were accepted in this laboratory in the report year. The faculty also participated in area-specific virtual conferences and webinars.



CARCINOGENESIS, GENOME BIOLOGY AND PRECISION MEDICINE GROUP

DUTT LABORATORY

Dr. Amit Dutt - Principal Investigator

Scientific Staff:

Mr. Dhananjay Kawle

Overview:

Our lab investigates the somatic landscape of human cancers, particularly focusing on the genomic underpinnings of oncogenesis and progression in lung, breast, cervical, gallbladder, head and neck, and other malignancies. This deeper understanding of cancer's genetic drivers across diverse tissues holds the potential to inform broader therapeutic strategies and ultimately improve clinical outcomes for a wider range of cancer patients. We aim to uncover novel therapeutic vulnerabilities within these cancers by utilizing cutting-edge sequencing technologies and rigorous functional validation. Our ultimate goal is to translate these discoveries into next-generation targeted therapies, significantly enhancing clinical outcomes and offering renewed hope for cancer patients across a broad range of malignancies.

Service:

Participate in weekly Molecular Tumor Board to discuss and interpret the molecular reports of patients at the Medical Oncology department to help decide the appropriate therapeutic regimen based on the underlying genetic alteration.

Research:

Oral Cancer:

Occult lymph node metastases in early-stage tongue squamous cell carcinoma (TSCC) pose a significant challenge. Without reliable biomarkers, 70% of patients undergo unnecessary neck dissection, increasing morbidity and cost.

We presented the first landscape of genetic alterations among tongue cancer patients of Indian origin, showing a lack of HPV infection and a tobacco-associated signature.

We identified NOTCH1 alterations and MMP10 overexpression as promising prognostic biomarkers, potentially sparing many early-stage tongue cancer patients from mandatory elective neck dissection (*Oncotarget* 2017, *Oral oncology* 2018).

Subsequently, we demonstrated that miR-944 negatively regulates MMP10 by targeting its 3'-UTR. Overexpression of MMP10 induces EMT, upregulating the tyrosine kinase gene AXL, which is essential for the functional consequences of miR-944 downregulation or MMP10 overexpression (*Communications Biology* 2023). Our work characterizes the miR-944/MMP10/AXL axis's role in lymph node metastasis using an orthotopic in vivo tongue cancer mouse model. Recently, our work led to identifying a novel fusion transcript, *UBE3C-LRP5*, in head and neck cancer, with potential clinical relevance. This fusion activates the Wnt/ β -catenin pathway, driving cancer cell behaviors. The FDA-approved drug pyrvinium pamoate shows promise in inhibiting tumor growth linked to this fusion. Patient survival data suggests its importance. This finding proposes a new therapeutic angle for head and neck cancer, warranting larger clinical trials. Overall, his work uniquely blends basic and translational cancer genomics research and detailed functional mechanistic insight (*NPJ Precision Oncology* 2024).

Additionally, we described the first comprehensive landscape of infectious pathogens across various cancers, establishing a significant prevalence of *Fusobacterium nucleatum* in tongue tumors among Indian patients. This bacterium occurs mutually exclusively with HPV in Caucasian samples and is associated with poor survival and nodal metastases, defining a distinct subgroup of head and neck cancer. Our work blends basic and translational cancer genomics research with detailed functional mechanistic insights (*NAR Cancer* 2022, *Briefings in Bioinformatics* 2021).

Education

The Principal Investigator is a recognized guide for PhD in Life Sciences of the Homi Bhabha National Institute. Presently, 3 students – Mr. Suhail Ahmad, Ms. Supriya Hait are working towards their doctoral theses. During 2020, the Laboratory presented its research findings as invited oral presentations at 10 national meetings.

Staff achievements:

Tata Innovation Fellowship Award by DBT, Government of India to Dr. Amit Dutt.

Patents:

Title: Novel fusion transcripts, composition and use thereof in treating cancer

Applicant: ACTREC- Tata Memorial Centre

Inventors: **Amit Dutt**, Bhasker Dharavath, Pawan Upadhyay, and Sudhir Nair

Patent Application: 202321054451 **Ref. No.:** E- 8000 1/63425/2023-MUM; **C.B.R. No.:**

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GUPTA LABORATORY

Dr. Sanjay Gupta - Principal Investigator

Overview:

The site-specific histone post-translational modifications and polyadenylation of replication-dependent histone isoforms are emerging as vital epigenetic players in cancer development and resistance mechanisms. Ongoing studies have shown that chemotherapy drugs and hypoxia-induced resistance have altered mitochondrial structure and slow proliferation. Due to downregulated glycolysis and oxidative phosphorylation in drug-tolerant persister or drug and hypoxia-induced resistant cells, the altered metabolic state resulted in hypoacetylation of chromatin. Moreover, the polyadenylation of histone isoform mRNA under stress conditions due to the downregulation of SLBP and altered HuR/BRF1 levels causes histone stress in the cell. In continuation of earlier leads, the genomic localization studies are on the way for H3.3 and H3.2 genes and H3S10phK14ac in gastrointestinal cancers to decipher the pathways regulated by cancer-specific marks for potential application in clinics.

Research:

Recently, the group has shown that drug and hypoxia-induced resistance studies have shown altered mitochondrial structure and slow proliferation in DoxR HeLa and breast cancer cells, respectively. The DoxR phenotype is attributed to the downregulated glycolysis and oxidative phosphorylation, with autophagy as a survival mechanism. However, in cisplatin-resistant cells, targeting PI3K-AKT signaling and glycolysis leads to alteration in histone acetylation levels and re-sensitization of resistant cells to chemo-drug. This provides evidence of the importance of the pathways in histone acetylation regulation and cisplatin-resistant cells' cell survival. The post-hypoxia-reoxygenation of radiation-resistant cells displays an enhanced aggressive phenotype by modulating their bio-energetics profile and inducing the expression of genes associated with cell survival, DNA repair, and antioxidant potential. These studies in cancer and resistant cells highlight that metabolism and epigenetics play a critical role in cancer and resistance mechanisms. Moreover, despite tight regulation, replication-dependent histone isoform mRNA undergoes polyadenylation under persistent low-dose stress, rendering their presence

throughout the cell cycle. The decreased level of SLBP and BRF1 and an increased HuR favor histone isoform polyadenylation in breast tumor tissues. This potentially disturbs the DNA: histone ratio, leading to altered nucleosome organization and genomic instability.

Education:

The Principal Investigator is a mentor for a Ph.D. in Life Sciences at the Homi Bhabha National Institute. Mr. Abhiram Natu was awarded their thesis in 2023. Presently, two students – Ms. Tripti Verma and Ms. Sukanya Rauniyar, have submitted their theses and are awaiting viva voce. Ms. Anjali Singh, Ms. Parul Sachdeva, and Ms. Flevia Anthony are working on their doctoral theses. PI is a recognized guide of MAHE, Manipal, and Ms. Riddhi Pandya, who has submitted her thesis as a Ph.D. student. PI is on doctoral committees of research scholars undergoing Ph.D. programs at ACTREC and other institutes like BARC, Amity, NMIMS, Yenopoya, and NIRRH. PI is involved in the doctoral program for Ph.D. During the year, trainees were taken for their Master's dissertations and experience. Lab members have in-house data presentation, abstract, and journal club and participated in national/ international conferences.

Dr. Sanjay Gupta

- Core Member of the Screening Committee of Life Sciences for SERB-SURE, DST, India.
- Member, Project Monitoring Committee for 'NSM Platform for Genomics and Drug Discovery' Centre for Development of Advanced Computing, A Scientific Society under the Ministry of Electronics and Information Technology, Government of India.
- Executive committee member, Indian Association of Cancer Research, India.
- Vice-Chairperson, Biobank Regulatory Committee, Sri Sathya Sai Sanjeevani Centre for Child Heart Care, Navi Mumbai.
- Member, Peer Review Committee, Chittaranjan National Cancer Institute (CNCI), Kolkata.
- Member, Institutional Ethics Committee, Sri Sathya Sai Sanjeevani Centre for Child Heart Care, Navi Mumbai.

Editor of national/ international journals

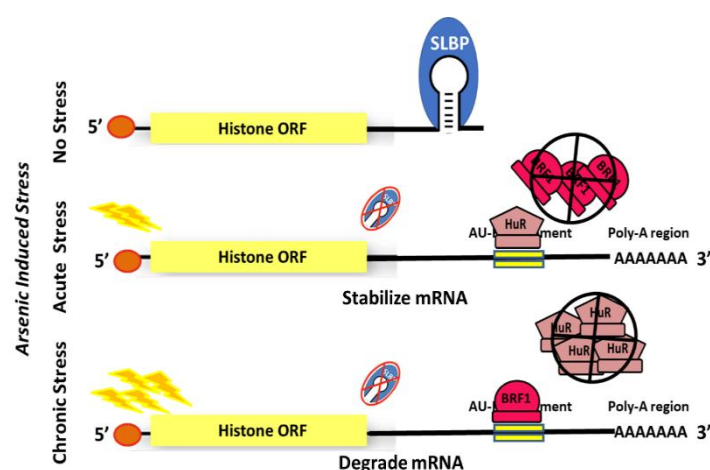
- Editorial Board Member, Journal of Clinical Epigenetics
- Associate Editor, JOURNAL OF INTEGRATED–OMICS: A Methodological Journal
- Associate Editor, Journal of Radiation and Cancer Research

Orations/invited talks:

- Epigenetic alteration in gastric cancer and their potential clinical applications. Yenepoya Research Centre, Yenepoya University, Mangaluru, Karnataka, India January 06, 2023,
- Demystify the molecular environment and heterogeneity in hepatocellular carcinoma 2nd International GCC Conference, 'Futuristic oncology: Integrating Precision medicine in Breast, Liver and Lung cancer' January 07-08, 2023, Manipal.
- Histone isoform polyadenylation: Whether an early event in response to persistent stress for cellular transformation? Homi Bhabha National Institute Theme Meeting on Life Sciences– 2 Saha Institute of Nuclear Physics; February 16-17, 2023.
- Integrative epigenome-transcriptome analysis unravels cancer-specific over-expressed genes as potential therapeutic targets. Accelerating Biology 2023: Discovery to Delivery" Bioinformatics Group of C-DAC, Pune. Feb 28-Mar 2, 2023.
- Nutraceuticals: Epigenome Has Any Role? '8th Annual Nutrition India Summit' at Holiday Inn, Mumbai, 19 - 20 April 2023.
- Epigenetics, Histone post-translational modifications and their potential clinical applications. Sri Sathya Sai Sanjeevani Research Foundation, Kharghar, Navi Mumbai. May 9, 2023.
- Histone isoforms: Is an altered expression an early event in cellular transformation? IGIB-ACTREC Meeting, IGIB, New Delhi. May 23-24, 2023.
- 'Omics' at the forefront of personalized medicine and fundamental biology studies. 1st Brainstorming Meeting on 'Exascale Computing in Life Sciences: Vision and Strategy for India,' at C-DAC, Pune. July 20, 2023
- Histone isoforms: Is an altered expression an early event in cellular transformation? Symbiosis School of Biological Sciences, Pune. July 21, 2023
- Ethics and Rules in Reporting Bioscience Animal Research for Scientific Publications PHARMATECH-2023, 'Glimpses of Pharmacology: Preclinical to Real World Evidence' Department of Pharmacology and Therapeutics, Seth GSMC and KEMH, Parel, Mumbai, 2-19 August 2023.

- Histone modifications in gastric cancer and their potential clinical applications. Research Talk Series, Kasturba Medical College, Mangalore. September 8, 2023.
- Persistent Stress Meets Histone Transcripts: Implications in Cancer Development. Colloquium Lecture, UM-DAE Centre for Excellence in Basic Sciences, Mumbai. September 12, 2023.
- Epigenetic Regulators: Potential Clinical Applications in Gastrointestinal Cancers. International Conference on Advances in Biotechnology: Current Discoveries and Future Perspectives, Amity University Mumbai, October 17-18, 2023
- Epigenetics of Gastrointestinal Cancer: Biomarker and Therapeutic Potential. AACR on Campus-ACTREC, Tata Memorial Centre, Kharghar, Navi Mumbai. 31st October-1st November 2023.
- Is there an epigenetic connection between persistent stress and cancer? 8th meeting of the Asian Forum for Chromosome and Chromatin Biology, 2023, JNCASR, Bangalore, 4-6 November 2023.
- An Epigenetic Road to Genome Instability: Histone Isoform Transcripts Meet Persistent Stress. Narsee Monjee Institute of Management Studies, Vile Parle, Mumbai. December 18, 2023.
- Epigenetics of Gastric Cancer: Biomarker and Therapeutic Potential. 8th International Conference on Stem Cells and Cancer (ICSCC-2023): Proliferation, Differentiation & Apoptosis. JLN Auditorium, AIIMS, New Delhi. 20 -22 December 2023.

Model:



Stem Loop Binding Protein (SLBP), Human antigen R (HuR), Butyrate response factors 1 (BRF1), and replication-dependent histone poly A+ transcript levels under acute and chronic stress: Low-dose persistent stress leads to decreased SLBP protein favoring the accumulation of polyadenylated histone isoform and is mediated via differential binding of HuR and BRF1 to AU-rich element in the 3' untranslated region.

MAHIMKAR LABORATORY

Dr. Manoj Mahimkar - Principal Investigator

Overview:

Mahimkar laboratory focuses on understanding the genetic basis of tobacco-related cancers by studying genomic alterations in copy number across the genome and identifying genes/ gene clusters underlying the altered genomic loci. Signatures associated with the progression of pre-invasive lesions to invasive oral squamous cell carcinoma have been identified, and candidate driver alterations unique to primary tumors with lymph node metastasis and related to patient survival have been established. The chemo preventive efficacy of polymeric black tea polyphenols (PBPs), abundantly found in black tea in inhibiting carcinogen-induced lung adenomas in A/J mice and oral cancer in C57 mice, is being tested.

Research:

Research in this Laboratory has led to identifying signatures associated with the progression of pre-invasive lesions to invasive OSCC and established candidate driver alterations unique to primary tumors with lymph node metastasis related to patient survival. Integration of genome, epigenome, and transcriptome data in HPV-negative OSCC revealed candidate genes with gene expression synergistically regulated by copy number and DNA methylation changes. We identified 32 genes associated with patient survival. In an independent set of samples, we validated eight genes (FAT1, GLDC, HOXB13, CST7, CYB5A, MLLT11, GHR, LY75) from the integrative analysis and 30 genes from previously published reports. Bisulfite pyrosequencing validated GLDC ($P = 0.036$), HOXB13 ($P < 0.0001$) promoter hypermethylation, and FAT1 ($P < 0.0001$) hypomethylation in GBC-OSCC compared to normal controls. Our findings identified methylation signatures associated with leukoplakia and gingivobuccal complex cancers. The integrative analysis in GBC-OSCC identified putative biomarkers that enhance existing knowledge of oral carcinogenesis. We investigated the pre-treatment of Thearubigins/PBPs as a chemo preventive agent at three doses (1.5, 5, 10%) against B[a]P-induced lung carcinogenesis in A/J mice. We also investigated the effect of PBPs at early time points to understand molecular changes by employing western blotting in xenobiotic metabolism pathways, DNA damage, inflammation, apoptosis, and proliferation. We observed no decrease in tumor incidence and multiplicity upon treatment of Thearubigins/PBPs. Further,

we also report no changes in molecular markers at early time points, in agreement with former observations. Our results suggest that chemopreventive agents must be tested with different combinations of carcinogens and regimens to fully understand the complex interplay between carcinogenesis and the efficacy of chemopreventive agents.

Education:

The Principal Investigator is a recognized guide for the Ph.D. in Life Sciences at the Homi Bhabha National Institute. Presently- Ms. Mayuri Inchanalkar, Ms. Vaishnavi Nimbalkar, Mr. Zaid Shaikh, Ms. Rinal Chavda, and Ms. Sakshi Anchan are working towards their doctoral theses. The Laboratory participates in the Centre's training program, and in 2023, two trainees were accepted for their Master's dissertation, while three 3 for the experience.

THERAPY RESISTANCE AND STEM CELL BIOLOGY GROUP

SHILPEE LABORATORY

Dr. Shilpee Dutt - Principal Investigator

Scientific assistant

Ms. Ketaki Patkar

Overview:

Our laboratory is working towards understanding the molecular mechanisms that govern radiation and chemo resistance in Glioblastoma and Leukemia. For this, we have developed in vitro cellular models from primary patient samples and in vivo pre-clinical orthotopic mouse models that allow for systematic identification of signals and pathways that are relevant to resistance, thus providing the critical information necessary for therapeutic interventions. We collaborate with the clinicians from TMH to explore the translational aspects of the discoveries from our laboratory.

Research summary:

Therapy resistance is the longstanding fundamental problem in cancer therapeutics that we address in our lab. A significant body of work in the field of Neuro-Oncology and leukemia has emerged over the years from my laboratory delineating molecular mechanisms of how the residual resistant cells and recurrent survive chemo and radio therapy, thus providing critical basic information necessary for therapeutic interventions in Glioblastoma and leukemia.

In an important translational study from our lab, we show that similar to parent GBM, the recurrent GBM cells also elicit a competent DNA damage response (DDR) post irradiation. However, the use of apical DNA damage repair components is different in the recurrent cells compared to parent cells. Since there is no effective treatment specifically for recurred GBM patients, these findings provide a rationale for developing newer treatment option to sensitize recurrent GBM samples by detecting in clinics the ability of cells to activate a DNA damage repair kinase different from their parent counterparts. We also showed the influence of extracellular matrix stiffness on the aggressive nature of recurrent glioblastoma. Also we identified molecules

that could be targeted specifically recurrent GBM (**Matrix Biology 2023**)

Education:

The lab is recognized for Ph.D course in life science by Homi Bhabha National Institute. Presently we have 8 research scholars, 1 post-doctoral fellow and 2 trainees. The PI takes classes for the core coursework and electives and marks the assignments. The lab conducts regular data presentation and journal clubs. Lab members present their research findings as oral and poster presentations at national and international conferences. Students attended many conferences in 2022 and presented their data (oral and poster).

Ph.D Scholars (Eight):

Ms. Anagha Acharekar, Mr. Saket Vatsa Mishra, Ms. Tejashree Mahaddalkar, Ms. Madhura Ketkar, Ms. Debashmita Sarkar, Ms. Bhawna Singh, Mr. Archisman Banerjee, Ms. Priyanka Kashid

Post-Doctoral Fellow:

Dr. Saffiula Sayed Basha (DST-NPF)

Staff Achievements:

PhD student Ms. Anagha Acharekar successfully defended her thesis in August 2023

Awards to Ph.D students:

1. Ms, Debashmita Sarkar won the 'Best Poster Award' at the 8th meeting of the Asian Forum for Chromosome and Chromatin Biology, held at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, November 4-6, 2023.
2. Ms. Madhura Ketkar won the 'Best Flash Talk Award' at the 3rd Indian Cancer Conference held at Jio world Convention Centre, Mumbai, November 2-5, 2023.
3. Ms. Anagha Acharekar received "Paeonia Foundation Travel Award" from the organizers of MBI Conference 2023, "Mechanobiology in Health and Disease", scheduled to be held in Singapore from September 26-29, 2023.
4. Ms. Bhawna Singh received Travel Award by ESTRO Biology Committee at the 16th International Wolfsberg Meeting on Molecular Radiation Biology/Oncology, Norway June 17-19, 2023. The award is given to the highest ranked abstract whose first author is a PhD student!

5. Ms. Madhura Ketkar received DST-SERB International Travel Grant Award to present her work at the Gordon Research Conference (GRC) on 'Biology of Aging'. Spain, July 2-7, 2023.
6. Ms. Bhawna Singh received DST-SERB International Travel Grant Award to present her work at the 16th International Wolfsberg Meeting on Molecular Radiation Biology/Oncology. Norway, June 17-19, 2023.
7. Mr. Safiulla Basha Sayed won 3rd position in the global competition entitled 'Battles of the Blots' by Bio-Rad in April 2023
8. Ms. Bhawna Singh was selected to co-chair the opening keynote lecture and the DNA repair session in the 16th International Wolfsberg Meeting on Molecular Radiation Biology/Oncology. Norway, June 17-19, 2023.
9. Ms. Madhura Ketkar and Ms. Debashmita Sarkar won Bursary Award at EACR-AACR-SIC Basic and Translation Research Conference at Florence Italy 15-17 March 2023

RAY LABORATORY

Dr. Pritha Ray - Principal Investigator

Overview:

The focus of the group is to delineate the key molecular signatures associated with acquirement of resistance and metastasis in Epithelial Ovarian Cancer (EOC) and Gastric Cancer (GC). Our research findings in 2023 have led to deeper understanding of the role of different mutants of P53 in autophagy, platinum resistance and PIK3CA signaling, role of autophagy in maintaining chemoresistance and homeostasis in cancer stem cell (CSC) population, role of RUNX1 and ID in driving chemoresistance in EOC and identification and characterization of novel peptide ligand-receptor for platinum resistant EOC cells. We are also evaluating the effects of herbal compounds in sensitive and 5-FU resistant GC and GCSC cells, molecular association between wtp53/mp53 with HER2 expression in GC cells and tumors.

Research:

Among the important observations of our ongoing studies, we elucidated the mechanism behind autophagy driven ID-TCF12 axis in the regulation of hCTR transporter expression and maintenance of platinum resistance of CSCs in EOC cells. In another study, we observed enhanced cisplatin sensitivity in 30% of a small group of HGSOE patients (primary and platinum-resistant) by an FDA-approved PIK3CA inhibitor (alpelisib). Apart from PIK3CA gene amplification, a novel p53 mutation for HGSOE was identified by NGS in these responders. We showed that this mutant p53 can upregulate PIK3CA expression which leads to higher cisplatin sensitivity. We are also studying the association between various mp53 with autophagy, ROS, mitochondrial structure and function and role of ID and RUNX proteins in chemoresistance. For our gastric cancer project, we observed an association between p53 mutations in trans-activation domain and HER2 expression in tumor tissues and enhanced cell death by herbal compounds in sensitive and 5 FU resistant GC cells. All these observations are now being investigated at molecular levels.

Education:

Currently, eight Ph. D students –Mr. Pratham Phadte, Ms. Megha Mehrotra, Ms. Priti Shenoy, Mr. Sourav Chakraborty, Ms. Prerna Singh, Ms. Diksha Joshi, Ms. Sreyashi Nath and Mr. Ankit Dekate are working on their doctoral dissertation under the mentorship of the Principal

Investigator. Mr. Souvik Mukherjee had successfully completed his doctoral program and received the degree. Megha, Pratham, Priti and Sourav presented their work in various national (42nd IACR at ACTREC, 45th AICBC at BHU and 1st Integrating traditional Knowledge and Evidence-based medicine at ACTREC) and international conferences (Gordon Research Conference on Stem Cells and Cancer: Strategies for Controlling Development, Tissue Homeostasis, and Cancer held at Italy on May 14-19, 2023 & EACR Conference on Cellular Bases for Patient Response to Cancer Therapies held at Lyon, France on 14-16th November, 2023). Megha received Mangala Bamne Award for the best Oral Presentation in 43rd IACR and Pratham received best poster presentation award in 45th AICBC. The PI is actively involved in teaching for the ACTREC course work, participating in PhD interview for DAE-CBS, Mumbai University, served as external thesis examiner for students of NCCS, and Manipal university as well as promotional evaluator for BARC scientist. She is a member of doctoral committee for ACTREC (10), IISER-Pune, NIRRH and BARC Ph.D. students. Currently, the PI serves as vice president of Indian Society for Cell Biology and as Treasurer for Indian Association of Cancer Research

NANDINI LABORATORY

Dr. Nandini Verma - Principal Investigator

Overview:

TNBC is a very heterogeneous, aggressive, and metastatic disease that has a higher prevalence in South-Asian countries, including India. The lack of hormone receptors and other targetable molecules like Human Epithelial Receptor-2 (HER2) makes TNBC more difficult to treat. The only option for clinical management is chemotherapy for TNBC patients. Our work enhanced the understanding of cellular and molecular alterations that TNBC cells of different subtypes undergo upon treatment that make them resistant to therapies. Some of these identified changes have potential targets and may be developed as alternate therapies to treat resistant and metastatic relapsed disease.

Research:

We identified that ferroptosis, an iron-mediated cell death can be effectively exploited to kill Triple-Negative Breast Cancer (TNBC), a very aggressive subtype of breast cancer, and show high rates of metastasis. We identified the Bromodomain family protein BRD4 is highly expressed in TNBC tumors and can be targeted to induce ferroptosis in TNBC tumor cells. Our recent studies revealed that chemotherapy-tolerant residual TNBC cells invariably have low Glutathione Peroxidase 4 (GPX4) and high vimentin (GPX4^{Low}/VIM^{High}) expression status, which are vulnerable to autophagy and ferroptosis. Our research found that hyperphosphorylation of Epithelial Growth Factor Receptor (EGFR) in chemo-tolerant TNBC cells due to activated cytosolic tyrosine kinases contributes to chemo-resistance.

Education:

The PI has been an HBNI-affiliated assistant professor since Dec 2020. Currently guiding 2 Ph.D. students, Ms. Shagufa Shaikh and Mr. Kedar Sharma. Apart from this, 5 master's dissertation students were trained during this period. She is a member of the academic committee at ACTREC and is involved in the review, planning, and execution of the annual academic activities. Participated in organizing IACR and AICBC meetings. PI and group participated in 10 conferences, delivered 4 talks, chaired 2 sessions, and participated as a panelist in 2 meetings.

WAGHMARE LABORATORY

Dr Sanjeev K Waghmare - Principal Investigator

Overview:

The focus of this group is to unravel the molecular signaling mechanisms that regulate the normal adult stem cells and cancer stem-like cells in human epithelial cancers. In particular, the group is investigating the cellular signalling such as Wnt/Notch/Sonic-hedgehog etc. and others that govern the self-renewal and differentiation of stem cells. The group is using murine skin transgenic/knockout models, and human epithelial cancers such as head and neck cancer as experimental models. Thus, uncovering the molecular players that maintain cancer stem cells during therapeutic intervention, may pave the way for future clinical implications.

Research:

Secretory phospholipase A₂ group-IIA (sPLA₂-IIA) is deregulated in various human cancers. sPLA₂-IIA catalyzes the sn-2 position of glycerophospholipids that leads to fatty acids and lysophospholipids. Our data showed that sPLA₂-IIA knockdown in both the human oral cancer and breast cancer cell lines showed decreased tumorigenic potential. Importantly, sPLA₂-IIA knockdown in breast cancer cell lines resulted in differentiation of cancer stem cells with decreased metastatic potential.

SFRP1 (Secreted frizzled related protein), a Wnt inhibitor is down regulated in various human cancers. We have shown that Cancer stem-like cells (CSCs) isolated from the Sfrp1 knock out tumors showed higher tumorigenic potential. Further, molecular profiling on CSCs revealed up regulation of genes involved in epithelial to mesenchymal transition (EMT) markers, non-canonical Wnt signalling, and also stem cell marker, Sox2. The TCGA data analysis of western population showed an inverse co-relation of Sfrp1 and Sox2 in human oral and breast cancer patient samples. In addition, we have also shown the inverse co-relation in Indian population of human oral and breast cancer patient samples.

Dab2 (Disabled-2 protein) is an adaptor protein that is involved in endocytosis of the receptors, which also act as a Wnt inhibitor. Our laboratory showed that Dab2 knockout mice showed a

decreased stem cell pool. Further, skin induced carcinogenesis using DMBA/TPA in the Dab2 knock out skin showed decreased proliferation followed by formation of papilloma (benign tumors), which don't convert into malignant squamous cell carcinoma. Thus Dab2 behaving like an oncogene.

Oral cancer patients at an advanced stage have a poor clinical outcome. CSCs within the tumor escape chemo-radiotherapy leading to recurrence of disease post-treatment. This group is investigating the molecular mechanisms involved in the maintenance of CSCs within the tumor. The group developed the primary oral cancer cell lines from the advanced-stage treatment naïve samples from buccal mucosa and tongue, followed by the orthotopic mice models. Thus, the ongoing studies would provide insight into the molecular mechanism underlying the maintenance of these CSCs. This study may enable to stratify responders and non-responders to chemotherapy.

Education:

The Principal Investigator is recognized as a guide for the Ph.D. degree in Life Sciences under the HBNI. Currently, seven PhD students - Mr. Sushant Navrange, Ms. Sayoni Roy, Ms. Priyanka Joshi, Darshan Mehta, Sonal Negi, Akshay Paradkar, S Gunakaran and Ashutosh Sharma are pursuing their doctoral training. The PI accepted one trainee and two observers during the year. The group engages in weekly in-house presentations and journal club.

Oration delivered:

- **Epigenetic modification in Sfrp1 activates non-canonical Wnt signaling in human skin cancer stem cells**

8th International Conference on Stem Cells and Cancer (ICSCC-2023): December, 20 – 22 2023

Member of National committee:

- ❖ Institutional Biosafety Committee, **BARC**, Mumbai.

TUMOR IMMUNOLOGY AND IMMUNOTHERAPY GROUP

BISWAS LABORATORY

Dr Subir Biswas - Principal Investigator

Scientific Staff

Ms. Meena Patkar, Scientific Assistant F

Overview:

The Biswas Laboratory commenced in December 2022, primarily with the renovation of both the main and the tissue culture laboratories, procurement and delivery of equipment. Two projects; 'Tumor-associated myelomonocytic cells and B lymphocytes cross-talk in epithelial malignancies' and 'Mechanisms of resistance to spontaneous antitumor antibodies in epithelial malignancies', with HBNI-JRF approval and intramural funding have been initiated and standardizations of the lab-protocols are on-going. Besides, two other projects, 'Mechanisms of resistance to spontaneous antitumor antibodies in epithelial malignancies' (SERB-grant) and 'Mechanisms that govern spontaneous humoral immune responses at tumor beds and outcome' (DBT-Ramalingaswami fellowship) have been successfully obtained. Two PhD students, one project fellow and one dissertation trainee, worked in the laboratory in the reporting year.

Research:

Our research program focuses on understanding the mechanisms governing the balance between protumor and antitumor immune responses in the tumor microenvironment, with an emphasis on the crosstalk between B lymphocytes, T cells & myeloid cells. We aim to design immunotherapeutic interventions that maximize durable protective immunity by exploiting the potential of antitumor antibodies. We are currently exploring the importance of Gamma-Delta T cells in establishing a sustained, robust antitumor immune response in epithelial malignancies.

Students and Academics:

Ms. Baishali Tamuli, PhD student

Mr. Gaurav Chakravorty, PhD student

Ms. Sakshi Sharma, Scientific Assistant

Ms. Nisha Sharma, Dissertation Trainee

Mr. Zaid Shaikh, PhD student Trainee

- Invited talk at the DBT-Institute of Life Sciences, Bhubaneswar, on 17/07/2023
- Invited Talk for “Post-doc life in National Lab / Research Institute” at Purdue University on 06/11/2023
- Invited Talk at the international conference “3rd Indian Cancer Congress” held at the Jio World Convention Centre, Mumbai from 02/11/2023 to 05/11/2023
- Attended “AACR on-campus meeting” held at Tata Memorial Centre- ACTREC from 31/10/2023 to 01/11/2023

Attended National Conference “Integrating Traditional Knowledge in Evidence-Based Medicine” held at Tata Memorial Centre- ACTREC from 21/09/2023 to 22/09/2023

KHADILKAR LABORATORY

Dr. Rohan Khadilkar - Principal Investigator

Scientific Staff:

Mr. Ganesh Joshi

Overview:

The lab currently focuses on understanding how stem cell – niche microenvironment gets altered in a disease scenario versus a developmental scenario. We are investigating how modulating the genetic circuitry of ageing specifically in the stem cells impact organ homeostasis. The lab is also studying inter-organ communication and systemic signaling in the context of tumorigenesis in a *Drosophila* model of cancer.

Research:

Our lab is investigating how genetic modulation of ageing circuitry in stem cells in *Drosophila* especially hematopoietic stem cells or intestinal stem cells impact overall organ homeostasis. We are trying to study the signaling mechanisms that are impacted during organ homeostasis. We are also investigating the role of certain molecular regulators and their role during developmental hematopoiesis and immune response in *Drosophila*. In a *Drosophila* model of tumorigenesis in the gut, we are investigating a phenomenon named cancer cachexia which is a multifactorial syndrome and are trying to understand how cachexia impacts inter-organ communication and systemic signaling thereby having an effect on various organs like the muscle, fat body where lipids are stored and peripheral organs. Hence the overall theme of the lab is understanding stem cell and tissue homeostasis in a developmental and disease scenario.

Education:

PhD students: Ms. Ujjayita Chowdhury; Ms. Mincy Kunjumon; Mr. Atharva Mahajan

Number of trainees: Six

Conferences attended:

Mincy Kunjumon (Indian *Drosophila* Research Conference, December 2023)

CANCER THERANOSTICS AND CLINICAL PHARMACOLOGY GROUP

DE LABORATORY

Dr. Abhijit De - Principal Investigator

Overview:

Research in the De laboratory involves the development and use of molecular imaging methodologies suitable for estimating macromolecular functions *in vivo*. The laboratory has developed a spectrum of novel platform technologies for understanding molecular functions in live cell model as well *in vivo* function using non-invasive molecular imaging in mice disease models. The laboratory has the mandate to acquire diverse translational experimental therapeutics *developed through collaborative research*. The PI started a new research project approved by Heavy Water Board and funded by Dept. of Atomic Energy. The laboratory has published five publications and received three Indian patents granted.

Research:

Reporter genes of bioluminescence and fluorescence signature are widely utilized in my lab for the purpose of designing molecular imaging sensors to enable measurement of cellular /macromolecular functions in live cell or *in vivo* physiological contexts. This laboratory harbours a core technology based on biophysical assay principle called bioluminescence resonance energy transfer (BRET) for understanding important oncoprotein functions. Research work completed this year using BRET imaging sensor is to measure MAPK and AKT protein activation, which switches as a result of HER2:HER2 homodimerization or HER2:HER3 heterodimerization conditions due to patient specific mutation in those receptor proteins, respectively. Additionally, in collaboration with the Chemistry department, IISER Pune team, we completed and published a high impact article by designing a novel semi-synthetic BRET reporter sensor to measure Caspase-3 protease target enhancement *in situ*. Further, in an ongoing international bilateral project, using the novel humanized mushroom luciferase reporter, we established a new BRET reporter system, demonstrating its use for studying mTOR pathway proteins.

Continuing with the efforts on developing novel nanomedicines for cancer treatment in collaboration with IITB, Mumbai, we explored the development of a biomimetic design of gold nanosphere. This development is expected to enhance the precision of targeting and triggered treatment of palpable tumors upon brief exposure to NIR laser irradiation. The laboratory was actively engaged in another collaborative project with IIT-B to test a novel gemcitabine drug loaded thin film implant for pancreatic cancer treatment. This nanomaterial was tested in an orthotopic pancreatic xenograft mouse model using non-invasive optical imaging.

During this year, we initiated a new collaborative project with Heavy Water Board, DAE to evaluate anticancer potential of deuterium depleted water (DDW) on experimental cell and animal models and clinical trial patients of human breast cancer. This laboratory overall published one invited review article and four research articles in peer-reviewed journals. The lab has also received three patents granted (No. 421037, 435844 and 437191) during this year.

Education:

The Principal Investigator is affiliated as Professor in Faculty of Life Science, HBNI as a PhD guide. In 2023, seven students- Mr. Aaiyas Mujawar, Ms. Chetna Patnaik, Ms. Mansi Joshi, Ms. Shivali Mishra, Ms. Sulagna Rath, Ms. Anuradha Gupta, Ms. Shaonlee Ghosh worked in the laboratory. Ms. Janvi Patel joined as a new student and Mr. Pranay Dey has successfully completed the PhD degree during the year. The group conducted weekly meetings to discuss results and review research in the related field. The Principal Investigator and students represented their research work in multiple national and international conferences, and one student has earned best presentation award at a conference. The Principal Investigator has actively served in three international and one national journal editorial board.

CHILAKAPATI LABORATORY

Dr. Murali Krishna Chilakapati - Principal Investigator

Overview:

The lab aims to develop and evaluate non-invasive and minimally invasive Raman Spectroscopy (RS) approaches for detecting early cancer alterations, emphasising oral cancers. RS studies of blood, saliva, and urine have the potential to stratify normal subjects, tobacco users, and patients with oral premalignant cancers. As well, RS has the potential to predict the recurrence of oral cancer subjects, to stratify pituitary adrenal adenomas, and to detect early cancer in experimental carcinogenesis studies. Moreover, Plasma Raman studies can potentially delineate the severity of diabetic subjects. Further, it can assess radioresistance and chemoresistance, target drug delivery with nanoparticle-based targeted drugs, and correlate spectral features with biomarkers.

Research:

The laboratory's Raman spectroscopy studies on oral cancer demonstrated stratification of normal, premalignant, and malignant conditions and identified early events. Early identification of recurrence/ second primaries and validation studies are done, along with exploring the utility of optical spectroscopy in disease-free survival and other prognoses with the help of multivariate tools. Raman studies on brush biopsies, and sera demonstrated stratification of healthy subjects, habitual tobacco users, oral premalignant subjects and subjects prone to second tumour/recurrence. Presently, the focus is on classifying different premalignant conditions and recurrence. Protocols for salivary Raman spectroscopy and demonstrated stratification of healthy, habitués and tumour subjects have been developed. Further, studies are being carried out to stratify premalignant subjects. Serum Raman spectroscopy studies of hamster buccal pouch models are being done to evaluate the utility of this minimal invasive tool in cancer applications and have demonstrated the detection of early changes- by week 5th in the 14-week carcinogenesis model. Further, RS could successfully assess radioresistance, chemoresistance, the effect of CAP therapy, nanoparticle-based targeted drug delivery and the correlation between spectral and biomarkers.

Chilakapati Laboratory has several collaborative programs globally; BARC (Mumbai, Vizag), IPR Ahmedabad, IITs (Mumbai, Kharagpur, Dharwad), Mumbai University, BHU, University of Eastern Finland (Finland), Swansea University (UK) and Shimane University (Japan).

Education:

The PI is affiliated with Homi Bhabha National Institute as a guide for a PhD degree in Life Sciences. In 2023, five students- Ms. Priyanka Jadhav, Ms. Panchali Saha, Mr. Parikshit Patel, Ms. Sampurno Banerjee and Ms. Sreeparna Nath were working towards the Ph.D. degree. Besides these external PhD students, Mr. Sebin Augustine (IPR, Ahmedabad), Dimple Saikia (IIT, Dharwad), Mr. Ajinkya Anjekar (Shimane University, Japan) and external Post-Doctoral students, Dr. Mahesh Sayni (IPR, Ahmedabad) were working in this laboratory. In the reporting year, the laboratory accepted four trainees for research experience.

Staff achievements:

Dr. C. Murali Krishna

- Spectromics in Cancers: Perspectives and Outlook, IIT Hyderabad 17-08-2023, INVITED SPEAKER.
- Integrating Traditional Knowledge in Evidence-Based Medicine, ACTREC 21-09-2023 to 22-09-2023, Delegate.
- Indian Cancer Congress 2023, Indian Cancer Congress Nov 2-11-2023 to 5-11-2023, Chair Person.
- PIDD 2023, ACTREC 28-11-2023 to 30-11-2023, Invited speaker.
- Optics4Life: Photonics Tools for Life Science, IIT Delhi 18-12-2023 to 22-12-2023, Invited speaker.
- 46th All India Cell Biology Conference, Indian society of cell biology to, Delegate.
- NATIONAL SCIENCE DAY, IWSA Invited speaker.
- European Conference on Biomedical Optics (ECBO) 2023, International Congress Center Munich Germany 24-06-2023 to 29-06-2023, ORAL.
- ICTRB 2023, Mahe Manipal 03-08-2023 to 04-08-2023, INVITED SPEAKER.
- IIPHT 2023 Jena, IIPHT 6 Nov 2023, Invited speaker.

Ms. Priyanka Jadhav - Senior Research Fellow

- Poster presentation titled 'Serum Raman Spectroscopy for longitudinal assessment in the Hamster Buccal Pouch Model' at International Conference On Translational Research & Applications of Biophotonics (ICTRB 2023), Manipal School of Life Sciences, Manipal Academy of Higher Education, Udupi on 3-5 August 2023.
- Flash Oral presentation titled 'Serum Raman Spectroscopy in experimental carcinogenesis: Explorations on the role of tumour load' at 3rd Indian Cancer Congress (ICC 2023), JIO World Convention Centre, Mumbai on 2-5 November 2023.
- Poster presentation titled 'Sequential evaluation of DMBA-induced oral carcinogenesis using Serum Raman Spectroscopy' at the Peer review meeting, ACTREC, Kharghar on 25th February 2023.

Ms. Panchali Saha - Senior Research Fellow

- First runner-up position for poster presentation at "International Conference On Translational Research & Applications of Biophotonics (Ictrb 2023)", Manipal School of Life Sciences, Manipal Academy of Higher Education (August 3-5, 2023). Poster title: Serum Raman Spectroscopy: Minimally Invasive Assessment of Recurrence in Oral Cancers.
- First position for poster presentation at National Research Scholars Meet, 2023, ACTREC (Dec-8-9, 2023). Poster title: Raman spectroscopy of biofluids: Applications in oral cancer diagnostics.
- Presented poster at European Conferences on Biomedical Optics 2023, Munich, Germany 2023. Poster title "Raman spectroscopy of urine: an exploratory study on stratification of oral cancers and tobacco habitués."

Mr. Parikshit Patel - Senior Research Fellow

1. Raman spectroscopy in vitro cell cultures: Understanding chemoresistance, European Conferences on Biomedical Optics –SPIE 25th – 29th June 2023, Parikshit Patel, Abhiram Natu, Arti Hole, Sanjay Gupta, C. Murali Krishna.
2. Chemoresistance characterisation using Raman spectroscopy: A pilot study National Research Scholars Meet (NRSM) 2023 7 th -8 th December 2023, Parikshit Patel, Abhiram Natu, Arti Hole, Sanjay Gupta, C. Murali Krishna.

RESEARCH AND SUPPORT FACILITIES IN CRI

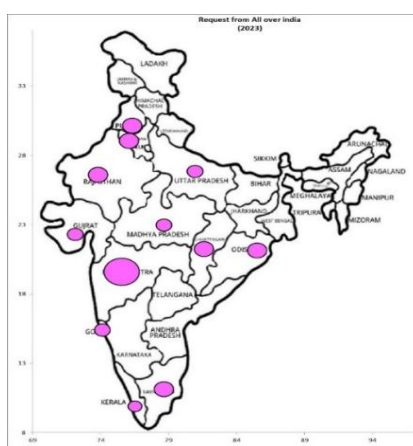
ANTI-CANCER DRUG SCREENING FACILITY

Dr. Jyoti Kode - Officer-in-Charge

Scientific Officer

Dr. Nirmal Kumar K

The Anti-Cancer Drug Screening Facility (ACDSF) at ACTREC supports the efforts of anti-cancer drug development in India, with *in vitro* and *in vivo* drug screening assays that have been developed in-house. ACDSF has over 20 human tumor cell lines, 10 murine tumor models and 38 xenograft models for accomplishing drug screening. During the year 2023, 1122 compounds were received from over 100 clients, viz corporate R&D and academic organizations, from 14 states across India. 1080 compounds were tested for *in vitro* activity. 21 *in vivo* studies comprising 42 compounds were screened for *in vivo* efficacy experiments (14), tumor development studies (3) and MTD (08). The facility has been part of Kode Lab PI-initiated projects. Mechanistic study on herbo-mineral formulations, funded by CCRAS, have provided corroborative evidence using preclinical models, showing that these formulations impede the growth of tumor xenografts in immune-compromised mouse models and inhibit the proliferation of different cancer cells *in vitro*. In On BARC project, interesting leads on the evaluation of the compound's anti-cancer, chemo-sensitizing, and radio-modifying properties have been identified. One of the facility staff member qualified for the PhD Entrance Exam and enrolled for a doctoral program under Mumbai University. The facility scientist and the staff presented their work at international forum at IUIS-2023, Cape Town, South Africa.



BIOINFORMATICS AND COMPUTATIONAL BIOLOGY FACILITY

Dr. Prasanna Venkatraman - Convener

Board members:

Dr. Kakoli Bose

Dr. Ashok Varma

Dr. Amit Dutt

Staff:

Mr. Nikhil Gadewal,

Dr. Gourab Das

The Bioinformatics and Computational Biology Facility provides infrastructural and technical support to scientists and students to fulfill bioinformatics requirements in their projects. The major focus of the facility is a multi-omics analysis of genes, genomes, transcriptomes, proteins, proteomes, metabolites, metabolomes and other macromolecules using advanced statistical techniques of data analytics like unsupervised and supervised machine/deep learning, graph theory-based approaches to solve the basic problems of regression, classification, association mining etc. Additionally, it provides infrastructural and technical support for molecular docking and dynamics studies in the structural bioinformatics area. The facility is also involved in developing and maintaining biological databases, web servers, and software, fulfilling a broad range of scientific community interests.

For molecular dynamics simulation studies, the facility is well equipped with two nVIDIA Tesla A40 GPU workstations. For NGS-data analysis, access to the HPC cluster (3 compute nodes comprising 2TB RAM and 108 computing cores) is provided to various institute laboratories. Additionally, 2 workstations, 1 webserver and 7 PCs to meet the scientific demand of the users. The facility provided short-term training (3-6 months) to 8 students in the B.Tech and M.Sc. programs for their project dissertations. The facility will also be involved in conducting credit courses for PhD students of the institute in the area of multi-omics data analysis and programming for experimentalists.

BIOPHYSICS FACILITY

Dr. Kakoli Bose - Officer in Charge

The ACTREC Biophysics facility houses an extensive array of sophisticated instruments for in vitro molecular-scale characterization of biological macromolecules with accuracy and precision. The facility provides services to various projects, enabling the characterization of the intrinsic properties of macromolecules and their assemblies (size, shape, folding, and stability) as well as of the interactions in which they are involved (stoichiometry, thermodynamic and kinetic parameters). The facility is equipped with Jasco J-815 Circular Dichroism Spectropolarimeter, FluroLog -3 Modular Spectrofluorimeter, Dynamic Light Scattering (DLS) DynaPro Plate Reader II, JESS from Biotechne and OCTET Bio layer interferometry (BLI) from Sartorius. Along with technically sound instrumentation, the facility also provides, if required, expertise to assist users in experimental design and data interpretation. Subject to individual requirements, either an experiment is performed for the users or help is provided towards operating these instruments independently with minimal supervision. Training on Fluorescence Spectroscopy and Circular Dichroism is also being given to the in-house users from time to time. These services are also available for students, research scholars, and scientists from other academic institutions as well as industries on payment basis. During the year 2023, besides in-house users, facility services were also used by investigators and students from different Universities and Institutes such as BITS Pilani, Goa, CEBS, Mumbai University and ICT, Mumbai.

BIOREPOSITORY FACILITY

Dr. Poonam Gera - Officer-In-Charge

Scientific Assistant

Mr. S. Yesudas

ACTREC Biorepository Facility collects, annotates, stores, and distributes biological samples to in-house researchers for duly approved research projects. The biospecimens are collected from the Operation Theatre, Frozen Room and Surgical Pathology as well as Breast OPD. After obtaining the ethical consent from patients an accrual of tissue samples from 1068 cases has been done during 2023, with a majority of samples being Head and Neck tumors, followed by Breast tumors. Other tumor types included Gastrointestinal, Neurological, etc. For all the possible cases paired normal samples were also collected and cryopreserved. In addition, 48 core biopsy samples were collected from Breast OPD. Cryopreserved tissue samples were provided to 7 Principal Investigators with approved projects. Total prospective distribution was of 189 and retrospective distribution was of 272 tissue samples during 2023.

The OIC of this Facility with an expertise in Pathology is a Co-investigator on different Projects at ACTREC as well as an external subject expert & member for Biorepository committee for Sri Sathya Sai Sanjeevani Research Foundation and external advisor for Biobanking facility at ICMR--NIIH and she has published research articles in peer reviewed journals.

COMMON INSTRUMENT ROOM

Mr. Uday Dandekar - Officer-in-Charge

Over the past 46 years, the Institute has maintained a “Common Instrument Room” as a Facility housing vital scientific equipment that are routinely required by the Centre’s staff and students, to optimize their utilization and make them available round the clock on all days of the week - including holidays. The Facility also provides technical guidance and support to various research laboratories in the procurement and maintenance of their capital equipment. Technically qualified staff members attached to this Facility handle routine maintenance of all the equipment and render help to the end users, thus ensuring proper use of the equipment. Requisite spares for centrifuges, low temperature freezers, CO₂ incubators, etc. and consumables like centrifuge tubes, thermal paper rolls, etc. are procured on a regular basis and stored in stock in the facility to reduce downtime of the equipment. In all, 116 number of equipment are currently housed in this Facility. Equipment like Gel Documentation System, Microplate Absorbance Reader, Microliter Spectrophotometer were procured and installed.

DIGITAL IMAGING FACILITY

Dr. Murali Chilakapati - Officer in Charge

The Imaging Facility serves as a vital resource for researchers and students, offering advanced imaging capabilities for visualizing a wide spectrum of biological samples. Over the past year, the facility has continued to enhance its infrastructure and support services to meet the evolving needs of our scientists and students.

Technological Advancements:

Our facility is equipped with state-of-the-art imaging microscopes, including Widefield (Nikon Eclipse Ti, AxioImager Z1 and BX63), Confocal (LSM780 and Nikon AX), Spinning Disc confocal (3i) and Super-Resolution STED microscopy (Leica SP8), alongside specialized systems for Live Cell Imaging (Incucyte) supported by sophisticated software like NIS Elements, ZEN, Slidebook, Incucyte software, etc. Students and researchers have access to advanced tools for processing images, conducting analysis, and performing 3D reconstructions and volumetric measurements using the newly installed high end analysis software like Imaris and Arivis.

Utilization and Accessibility:

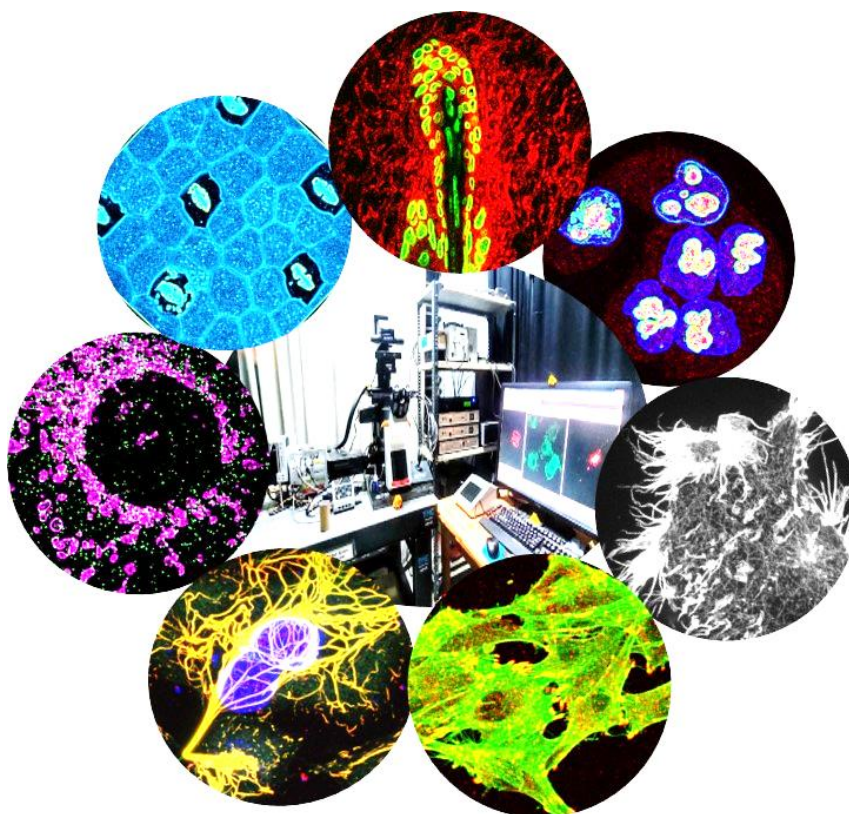
Throughout the year, the facility has experienced high demand for its services, with particular emphasis on confocal imaging resources. The LSM780, in particular, operates at maximum capacity with eight daily sessions, followed by the other systems with six sessions a day. The facility operates daily from 7:00 AM to 10:30 PM, with extended hours on weekends exclusively available to independent users who are trained and certified for specific systems. The facility also extends its services to external institutions for imaging their samples.

Researchers using our facility have conducted studies involving the localisation/ colocalization of proteins, uptake studies, cellular dynamics, tumour cell killing, apoptosis, migration/invasion assays etc by imaging diverse samples like cells, tissues, drosophila parts, algae, teeth, hair etc.

User Support and Training:

To ensure effective utilization of our resources, we provide comprehensive training programs on instrument operation and conduct workshops. Our staff actively assist with hands-on image acquisition, provide support for data analysis, and offer guidance and troubleshooting for sample preparation protocols, creating a supportive environment for students and researchers.

This year, the Imaging Facility has grown successfully as a team. Looking ahead, we aim to expand capabilities, enhance accessibility to users, and integrate advanced microscopy for new research avenues.



RECOMBINANT DNA SEQUENCING FACILITY

Dr. Pradnya Kowtal – Officer in Charge

Scientific assistant

Ms. Sujata Hake

The Recombinant DNA facility offers genotyping services to researchers of ACTREC. Genotyping is carried out with various PCRs like the conventional, fluorescent and third generation Droplet digital PCR.

During 2023 with conventional PCRs followed by agarose gel electrophoresis, 500 transgenic mice were genotyped for 10 markers.

Cell line authentication was performed on 22 cell lines with a panel of 18 microsatellite loci using fluorescent PCRs followed by capillary electrophoresis and data analysis.

The droplet digital PCR (QX 200-Biorad) housed in the facility was used to estimate copy numbers of 10 different markers in 500 oral cancer subjects and controls.

ELECTRON MICROSCOPE FACILITY

Dr. Sorab N. Dalal - Officer in Charge

Scientific Assistants

Ms. Siddhi A. Redkar

Ms. Arpana Kadam

Technician

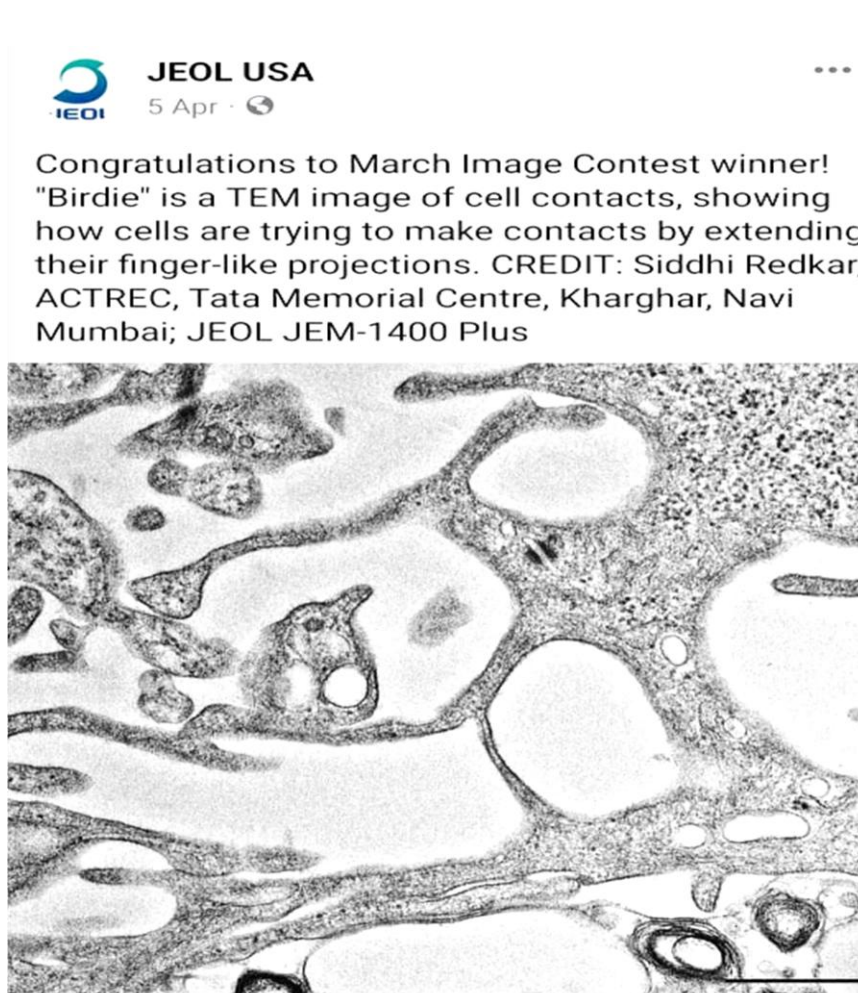
Mr. Shridhar K. Nadkar

The Electron Microscope Facility at ACTREC is equipped with JEM 1400 PLUS, a Transmission electron microscope (JEOL, Japan) functioning at 120kV with magnification up to 12,00,000 X and 0.2nm resolution. The facility provides services for research and ultrastructural analysis of biological samples, nanoparticles characterization and other applications. The facility carries out sample preparation for routine electron microscopy, including resin block making (solid tissues, monolayer cell cultures, and single-cell suspensions) followed by ultrathin sectioning using Leica UC-7 ultramicrotome, contrasting, and imaging. The facility carries out negative staining for smaller particles (<100nm) like bacteriophages, exosomes, nanoparticles and proteins. The elemental detection by EDS and immunogold labeling is also done by the facility. During the year 2023, the facility has analyzed 702 samples for routine electron microscopy and 164 samples for negative staining. For EDS, the facility has carried out the acquisition of spectra for nanoparticles for 19 samples and analyzed them. The facility helps the users in quantitative analysis using iTEM software and also interpretation on the basis of ultrastructural results. The facility has analysed 409 samples other than ACTREC and has 6 publications.

Year	Total sample analysed	Negative staining	EDS	External samples	Number of publications
2023	702	164	19	409	6

Staff Achievement:

Ms. Siddhi A. Redkar was the March 2023 image winner of JEOL USA image contest for the “Birdie” TEM image and has received an award of \$100.



FLOW CYTOMETRY FACILITY

Dr. Sanjeev Waghmare - Officer-in-Charge

The Flow Cytometry facility is a core facility, provide the support to Scientist, Students and clinicians from ACTREC to analyse their Flow cytometry based data. The facility also extends technical support to students in Fluorochrome panel designing, interpretation of data, in troubleshooting of sample preparation. In 2023, The facility is used by 105 scientists and students from 24 labs. The facility is equipped with two Cell Sorters- FACS Aria-III (5 lasers, 18 colors), FACS Aria-I (3 lasers, 11 colors), which can perform up to 4 –way sorting and one analyzer- Attune NxT (4 lasers, 14 colors). The data is analyze using the softwares- FACSDiva, FlowJo, Attune NxT, FCAP Array and Modfit. The research applications carried out on routine basis includes Surface and Intracellular staining like Immunophenotyping, DNA content studies- ploidy determination, Cell cycle analysis, S-phase detection by BrdU staining, Stem Cell Analysis- dermal stem cell analysis, Side cell population, Apoptosis studies, detection of mitochondrial membrane potential, Detection of fluorescence proteins like GFP Turbo Red , Functional Assays like proliferation assay, oxidative burst analysis, Mitochondrial membrane potential, intracellular cytokine analysis, cytometric bead array assay for detection of cytokines and live cell sorting.

The facility also offers its services to investigators from other academic institutions and private organizations on a payment basis. In the year 2023, Facility has analyze the data of 15 samples from other academic Institute. Demonstrations and training were conducted for visiting clinicians, scientists and students on request. The facility has initiated hands on training program (course work) for 6th and 5th year PhD students. Ten students have been trained by facility staff in period of January- December 2023.

HISTOLOGY FACILITY

Dr. Arvind Ingle - Scientific Officer

The Histology Facility provides to the Centre, services comprising of: (a) slides of unstained/ haematoxylin and eosin (H&E) stained histology sections of animal tissues including bone/ tumor samples, and (b) logistic support for frozen sectioning of human/ animal tissues. During 2023, the facility received 4461 tissue samples in fixative and 1143 human and 4549 animal paraffin blocks, and post- processing, supplied 5328 stained and 28636 unstained slides to 23 research laboratories. In addition, 128 tissues were processed for cryo-sectioning, and 52 H&E stained and 427 unstained slides were supplied to 18 research laboratories.

LABORATORY ANIMAL FACILITY

Dr. Arvind Ingle - Officer-in-Charge

Scientific Officers:

Dr. Rahul Thorat

Dr. Hemant Vira

Overview:

The Laboratory Animal Facility (LAF) aims to breed, maintain and supply laboratory animals to the research groups of the Centre. During the year 2023, LAF undertook planned breeding of 10 (normal strains), 2 (Nude), 2 (SCID), 1 (hybrid), 50 (Transgenic/ Knock-Out strains/sub-strains) of mice, 2 rat and 1 hamster strain, and supplied normal (2866), Nude (546), NOD SCID (1722) mice, 54 rats, 127 hamsters to 32 researchers against 132 IAEC-sanctioned research proposals. Towards quality control, LAF examined 355 stool/ animal samples and 1274 food, water, pulses, bedding material and room air samples for routine microbiological testing, 914 hair/ stool/ cellophane samples for clinical-pathology, 56 samples for serological detection of 8 rodent pathogens (i.e. LCM, MHV, MP, Hanta, MPV, MNV, Mouse Adeno Virus, Mouse Sendai virus) from 14 strains, and carried out PCR-based tests for 9 infectious agents (i.e. HB, KRV, MHV, MNV, MP, PC, PP, PA and CAR) using 64 random samples from 14 different strains. For genetic purity, PCR based tests for 20 microsatellite markers on 40 DNA samples from 10 mice strains; 21 microsatellite markers on 4 DNA samples from 1 rat strain were done. Skin grafting of 24 mice of 8 different strains and 4 rats of one strain was completed. Flow Cytometry was used to assess the T- and B-cell profile in 32 blood samples of Nude/ SCID mice, as also control BALB/c and Swiss mice. In the rodent germplasm freezing program, sperms of 6 from 3 strains are frozen in 60 straws. In 2023, LAF supplied normal (10391), Nude (517), SCID (339) mice, and 527 hamsters as experimental animals to 19 CCSEA registered Indian organizations. The senior faculty accepted 2 MSc students for dissertation in 2023. Editorial Board Member of Chinese as well as Korean Laboratory Animal Science Journals; Member, Board of Studies in Veterinary Pathology of Veterinary University, Nagpur; Section Editor of Laboratory Animals journal; Treasurer, LASA India; Ad hoc Specialist, AAALAC International, USA; Zonal Secretary (West Zone), IAVP.

Staff achievements:

Dr. Arvind Ingle

- Chairman, Education and Training Committee, ICLAS, <https://iclas.org/education-and-training-committee/>
- Chairman, ICLAS Asia Region, <https://iclas.org/regional-committees-asia/>
- Chairman, Communication Standing Committee, IACLAM, <https://www.iaclam.org/abt-committees.php>
- iZonal Secretary, IAVP, Izatnagar, https://iavp.org/office_bearers.html
- President, ICLAM <https://iclam.in/about-council.php>
- Editorial Board Member of Chinese as well as Korean Laboratory Animal Science Journals
- Member, Board of Studies in Veterinary Pathology of Veterinary University, Nagpur
- Ad hoc Specialist, AAALAC International, USA; Zonal Secretary (West Zone), IAVP

Dr. Rahul Thorat:

Section Editor of Laboratory Animals journal; Treasurer, LASA India; Ad hoc Specialist, AAALAC International, USA.

MASS SPECTROMETRY FACILITY

Dr. Rukmini Govekar - Officer-in-Charge

Scientific Officer:

Mr. Shashadhar Dolas

Overview & Service:

Mass spectrometry facility at ACTREC houses a Nano-LC (ABSCIEX, Eksigent)-ESI-Q-TOF (ABSCIEX, Triple TOF 5600 plus) mass spectrometer. Varied applications such as, profiling of complex protein mixtures (120 samples), identification of enriched proteins (86 samples), and label free quantification (SWATH analysis) complex protein samples (70 samples) have been carried out on this platform.

STAFF ACHIEVEMENTS:

Training Imparted

Mr. Shashadhar Dolas.

- Attended 15th Annual Meeting of Proteomics society, India & international conference on Integrated Proteomics: Applications in food, Nutrition and health. During this conference also attended pre-conference training & Hands on workshop on plant / agricultural proteomics, metabolomics & Data analysis and post-conference Workshop on Biomedical Proteomics and Data Analysis.
- Attended Bruker Daltonics webinar on 'Bruker's Trapped Ion Mobility Spectrometry technique (model TIMS-TOF Ultra) and its proteomics applications'.
- Attended Thermo Scientific webinar on 'Orbitrap unites with Astral Analyzer for single cell proteomics. Rastek Liquid Chromatography'.

Demonstration conducted for instrumentation of nLC- ESI- Q-TOF and data analysis to the participants of:

- Delegates from India-Bangladesh Youth delegation to promote exchange of ideas, values and culture amongst the youth & to develop International understanding among the youth.
- Delegates from Central Ayurveda Research Institute.
- Delegates from University of Mysore
- Fresh JRF students of ACTREC Batch of year-2023.

MOLECULAR IMAGING CORE FACILITY

Dr. Abhijit De - Office In charge

Overview:

This year the Molecular Imaging Core Facility located at AH105-107, ACTREC completes its successful run for ten years. In the current report year, the facility has added a top of the line model, i.e. IVIS Spectrum-CT system, and is in the process of installation and optimization for use. With the procurement of this new system, the MI Core now houses three state-of-the-art IVIS equipment - IVIS Lumina II, IVIS Spectrum, and IVIS Spectrum-CT. The IVIS Lumina II has a total of 14 users, and IVIS Spectrum has a total of 18 users. In the current year, these systems were upgraded with Windows10 operating platform as well as new Living Image software version 4.7.4. A user-friendly online booking system also started this year, helping researchers to seamlessly schedule their experiments online. To further enhance the facility's infrastructure, oxygen pipeline was installed in both AH-105 and 107 rooms, ensuring a safe and well-organized environment for *in vivo* imaging studies.

These advanced imaging equipment are instrumental in supporting the research activities of multiple groups from basic and clinical research wings of ACTREC, investigators from other institutions in the vicinity, viz. BARC, IIT-B etc. The facility continued to provide support and train users for performing scans and fulfil their research purpose. This year, five users completed their PhD work, four new research publications came and one new patent filed using data generated from this facility. The Molecular Imaging Facility is poised to continue its journey with cutting-edge preclinical research, enabling researchers to push through the boundaries of their scientific discovery.

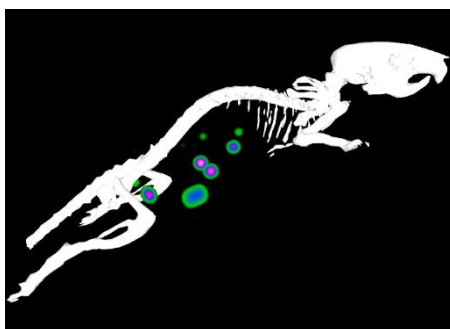


Image of a mouse with metastatic disease captured using IVIS Spectrum-CT installed in 2024

TRANSLATIONAL PRECLINICAL IMAGING AND RADIOTHERAPY FACILITY

Dr. Pradip Chaudhari – Officer in Charge

Scientific Officer:

Dr. Kiran Bendale

Scientific Assistant

Mr. Bhabani Monhanty

The major research focus of this Facility is on preclinical animal imaging and research on radiopharmaceuticals. Various diagnostic radionuclides such as Technetium-99m, and Fluorine-18 complexes are evaluated for their utility in imaging and monitoring cancer xenografts in various mouse models. Several PET, SPECT and CT studies involving rodents are performed for research projects from ACTREC, other DAE units, academic institutes and pharmaceutical industries. The small animal imaging facility is utilized for preclinical PET, SPECT and CT imaging by various basic and translational research scientists from within and outside ACTREC. In 2023 the Facility has included two new systems micro-CT system and X-ray Irradiator for radiotherapy for lab animal studies. 50 studies majority being proof-of-concept studies, normal tracer uptake studies and in vivo tumor uptake studies wherein the expertise is in designing imaging protocols, development of animal models, data quantitation and analysis, have been initiated. The research component in preclinical imaging is validation of xenograft mouse model using preclinical imaging modalities CT, PET and SPECT. In 2023, PET scan done in mouse to evaluate wound healing caused by radiation. CT scan done for rat Femur and Tibia to analyze bone mineral density. The Facility is also involved in diagnosis and treatment of pet animals diagnosed with spontaneous cancers. These cases are being referred to animal oncology clinic for further management. During 2023 (Jan-Dec), 311 referral cases underwent major or minor surgeries, single or combination drug chemotherapy and radiation therapy or a combination, as per the clinical requirement. The biological specimens were preserved in the animal cancer bio-repository for comparative research. The research focus of this Facility is to deliver complete cancer care for pet animals suffering from spontaneous cancer and develop focused research areas on comparative aspects of animal and human cancers. Animal cancer bio-repository maintains biological material, which is received during the course of diagnosis and treatment. Bio-repository has fresh frozen tissue, blood, formalin fixed tissue and FFPE tissue. These animals

are seen as a suitable alternative model system because of closer proximity to humans. The Facility organized the 12th annual Hands-on Workshop on "In Vivo Preclinical Imaging and Drug Discovery" from 28th – 30th November 2023. This offline workshop was attended by 18 national delegates. Translational Preclinical Imaging and Radiotherapy Facility

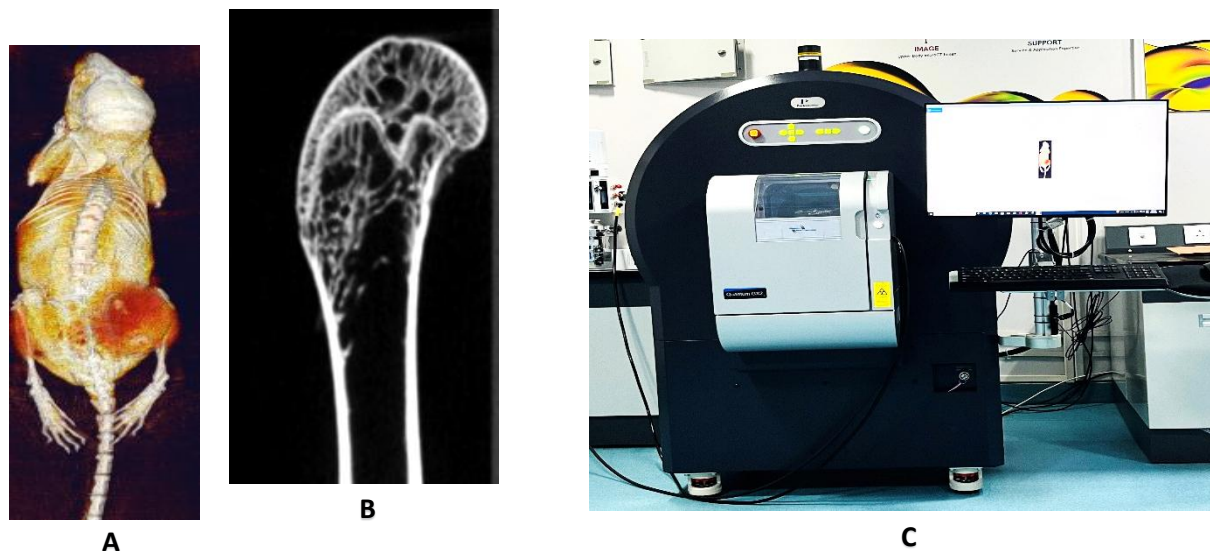


Fig A: Whole body CT scan of tumor bearing mouse, B- CT scan of Femur of Rat, C- Quantum GX2 CT Scanner



MACROMOLECULAR CRYSTALLOGRAPHY AND X-RAY DIFFRACTION FACILITY

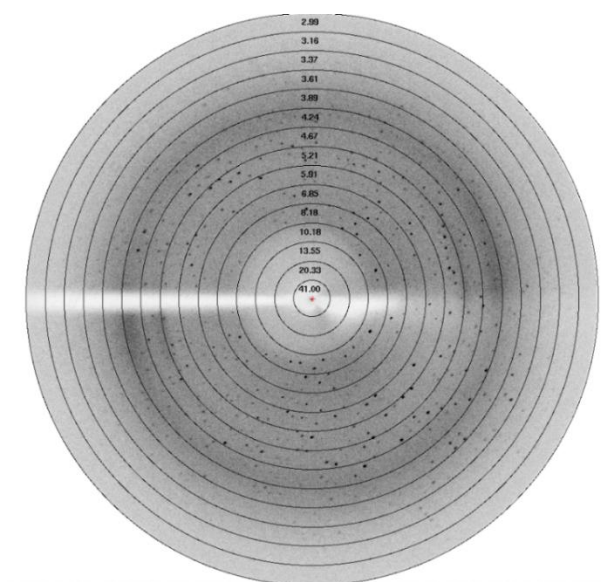
Dr. Ashok K Varma - Officer-in-Charge

Scientific Assistant

Ms. Ulka U Sawant

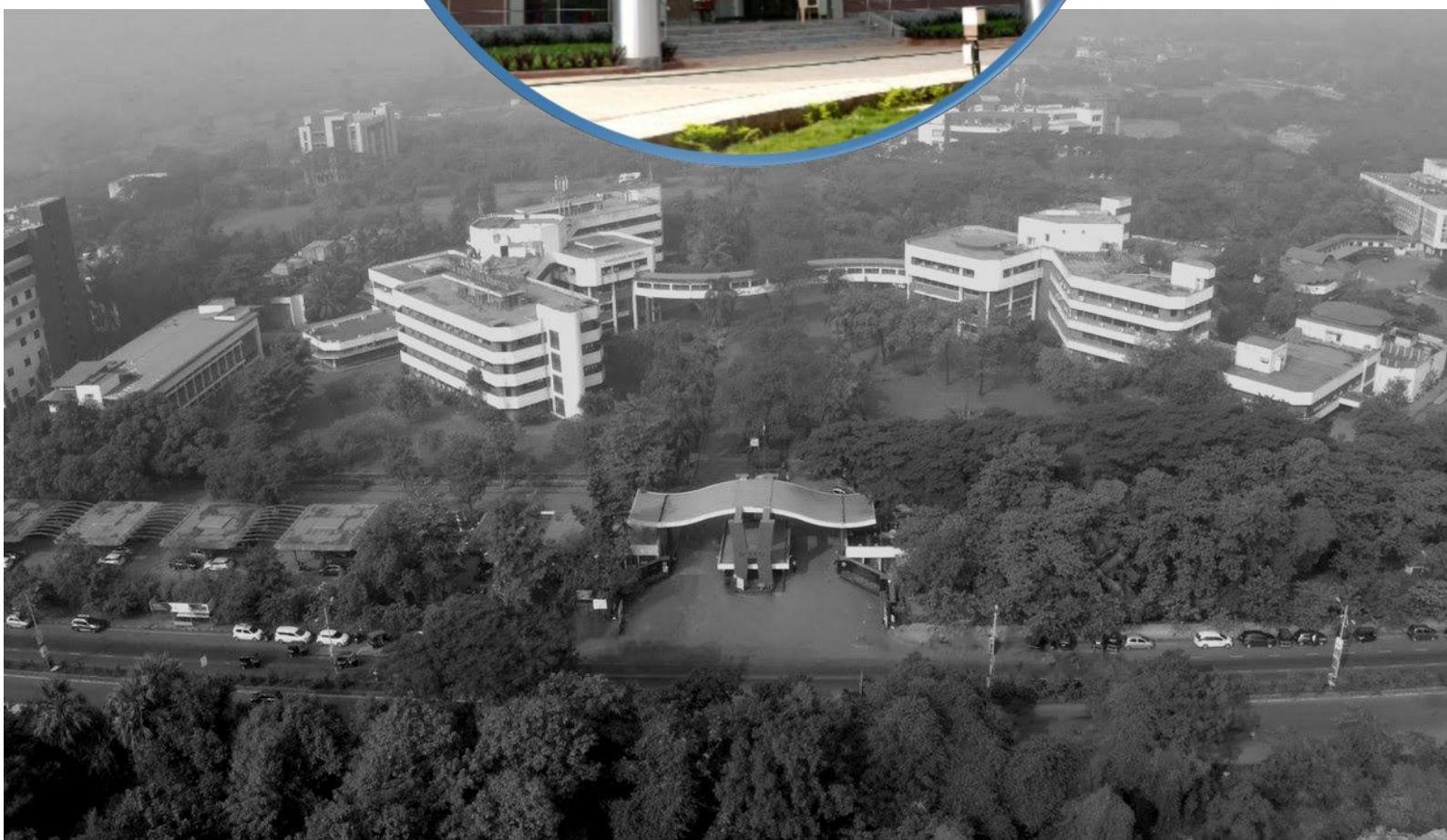
Macromolecular and X-ray diffraction facility at CRIACTREC was installed and commissioned in the year -2012. The facility has a state of art Microstar Microfocus Rotating Anode X-Ray Generator, High Brightness Multilayer Optics, and Imaging Plate Detector for X-ray diffraction analysis. Recently, Robotics for crystallization also installed and commissioned and became the integral part of facility. Robotics support users in crystallization of different proteins. The staff engaged in diffraction facility provides full support to users from ACTREC and also nearby institutions in crystallization, data collection. The crystal tested in home source has also been nicely diffracted in synchrotron facility available at RRCAT-Indore. The major users from ACTREC are Bose Lab, Prasanna Lab and Varma Lab. In the year-2023, total 16 crystals were analyzed; (Varma lab: 1; Prasanna lab: 4; IITB: 11). The available computational power is well enough for users to process the data, solve and refine the structure. The required software's for data processing, structure solution and refinement are installed in the workstations.

Figure: X-ray diffraction pattern obtained by facility





Centre for Cancer Epidemiology





CENTRE FOR CANCER EPIDEMIOLOGY

Department of Preventive Oncology

Dr. Rajesh Dikshit - Director

Dr. Pankaj Chaturvedi - Deputy Director

Department of Preventive Oncology

Dr. Sharmila Pimple - Officer in Charge

Dr. Gauravi Mishra

Dr. Subita Patil

Division of Medical Records & Cancer Registries

Dr. Atul Budukh - Officer in Charge

Division of Hospital Based Cancer Registry and Patterns of Cancer Care

Dr. Amey Oak - Officer in Charge

Dr. Sivaranjini. K

Division of Molecular Epidemiology & Population Genetics

Dr. Sharayu Mhatre - Officer in Charge

Unit of Cancer Surveillance for Special Population (CSSP)

Dr. Ganesh B

Dr Rajshree Gaidhani

Unit for Strengthening Cause of Death Data (USCOD)

Dr. Rajesh Dikshit

Unit for Access to Affordable Cancer Care for One and All Project

Dr. Pankaj Chaturvedi

DEPARTMENT OF PREVENTIVE ONCOLOGY

Dr. Sharmila Pimple Professor and Physician

Dr. Gauravi Mishra Professor and Physician

Dr. Subita Patil Professor and Physician

Dr. Vasundhara Kulkarni Scientific Officer 'C'

Overview:

Department of Preventive Oncology primarily focuses on comprehensive prevention and control interventions to reduce the risk of developing cancer, application and uptake of cancer screening/early detection tests including strategies for implementation into clinical and public health practice. Department of Preventive Oncology has been actively engaged and involved in conducting a range of multidisciplinary research and service projects with cross-cutting themes in this area, demonstrating the importance of comprehensive cancer control in improving outcomes for most common cancers.

In year 2022, Preventive Oncology Services were expanded to its rural spoke center at Khopoli, Raigad District Maharashtra State. Preventive Oncology provides services and conducts activities through its five main thrust areas:

- Information, education and communication (IEC): Programmes for risk prevention, life style modification and improving health-seeking behavior such as Tobacco & Alcohol Cessation towards early detection of common cancers in India.
- Cancer screening services: Clinic and Community-based: Programmes for Screening of Common Cancers and risk assessment for High-Risk cancers.

Sr.No	Preventive Oncology Services	New Registration			Rescreening registrations of OPD patients only
		OPD Based	Community projects	Total	
1	TMH Mumbai	6716	28194	34910	3102
2	Rural Spoke, Khopoli	4060	9137	13197	191
Total		10776	37331	48107	3293

- Health manpower development: 938 health professionals were trained at TMH Mumbai and 186 were trained at Rural Spoke PO services at Khopoli, Raigad for organizing & implementation of cancer control programmes. Thus, total 1124 health

professionals were trained. A total of 43 invitations were received and 7505 participants were benefitted with scientific sessions.

- Research & publications: Total 13 Research studies are ongoing for developing newer methods and strategies for the prevention and early detection of common cancers in India. Total 08 research papers were published in International [05]. National [03] and abstracts [07] in indexed journals
- Advocacy, NGO-training and networking: The department observed National Health Days and conducted various cancer control activities on those occasions.

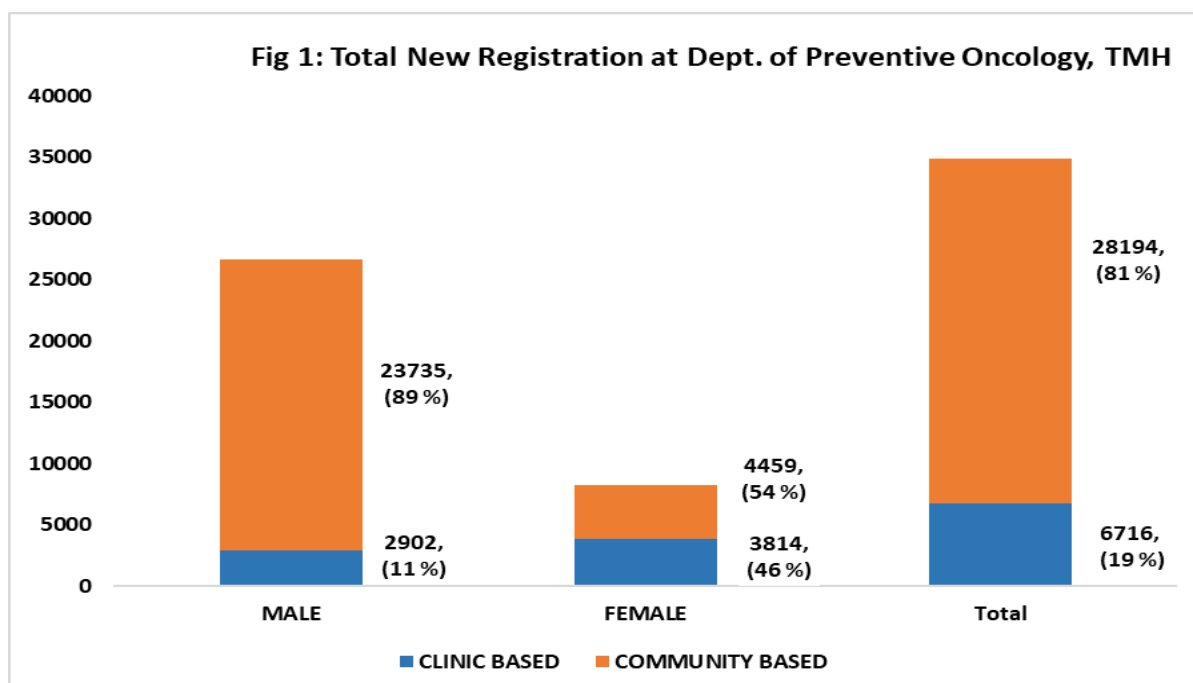
Service:

a) Preventive Oncology Services:

The department provides Preventive Oncology services of screening & early detection of cervical, breast & oral cancers at OPD based and community based.

The OPD services are provided at TMH, Mumbai and Rural Spoke, Khopoli, Raigad, Maharashtra.

The new registrations under Preventive Oncology Services are:



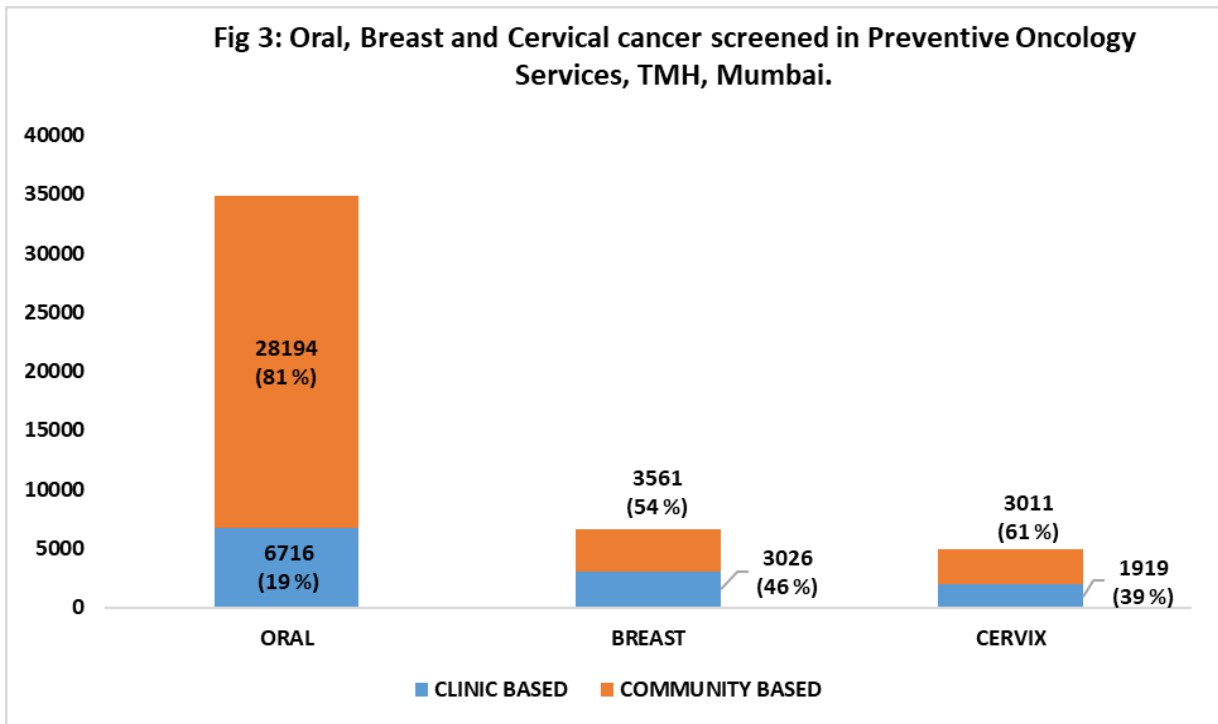
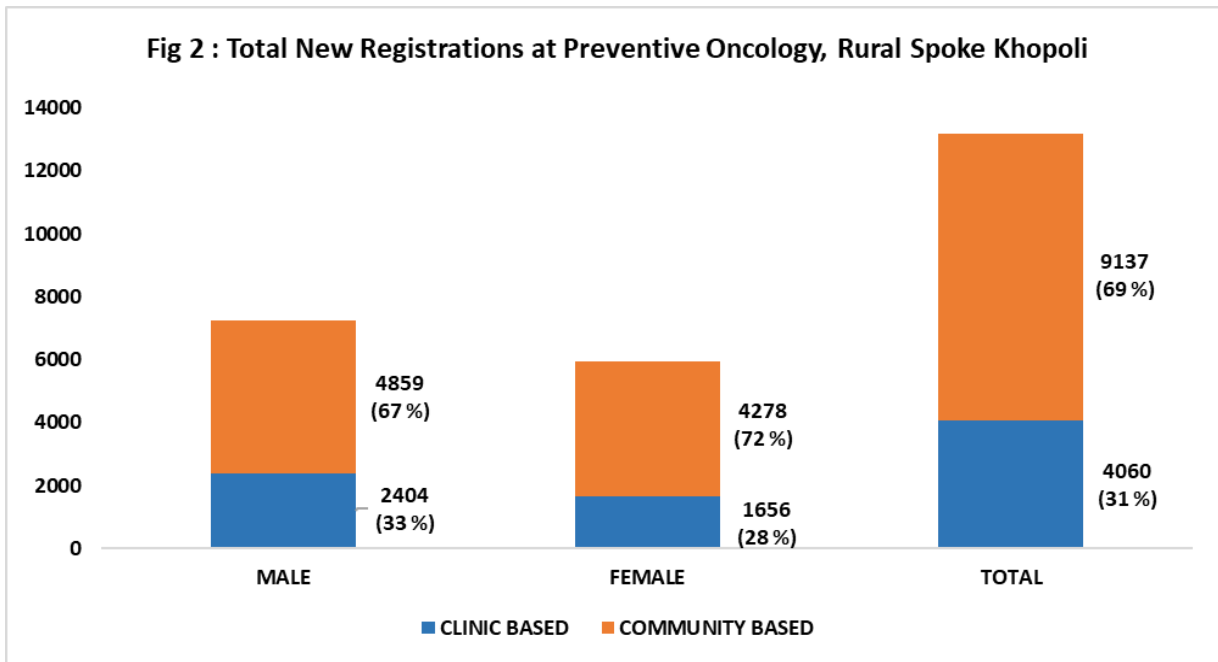


Fig 4: Oral, Breast and Cervical cancer screened in Preventive Oncology, Rural Spoke Khopoli.

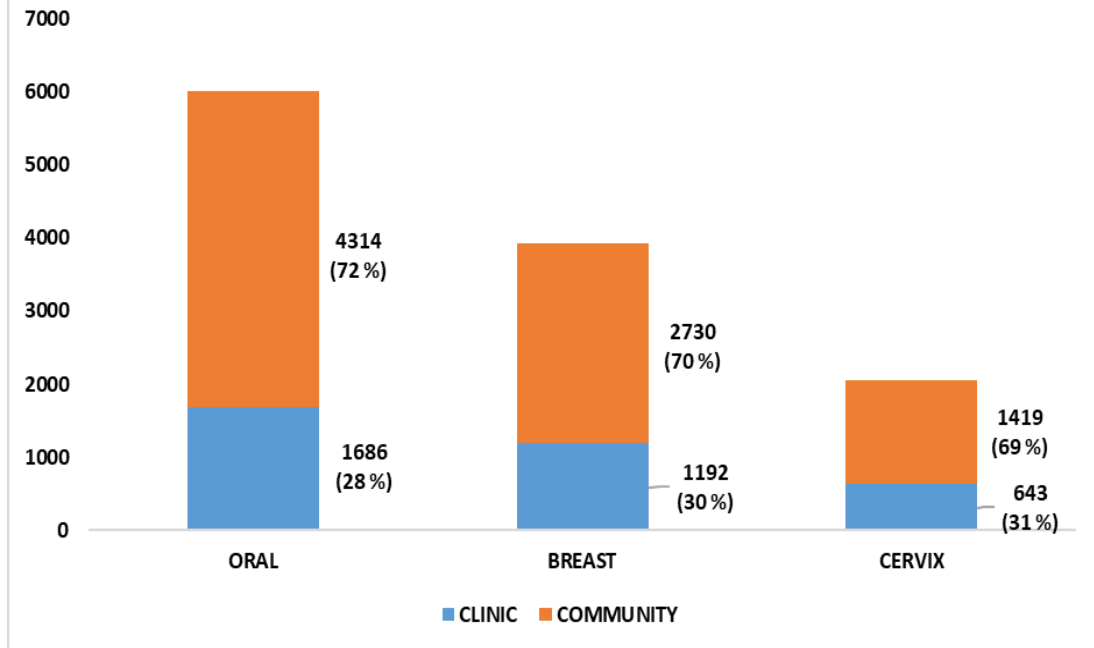
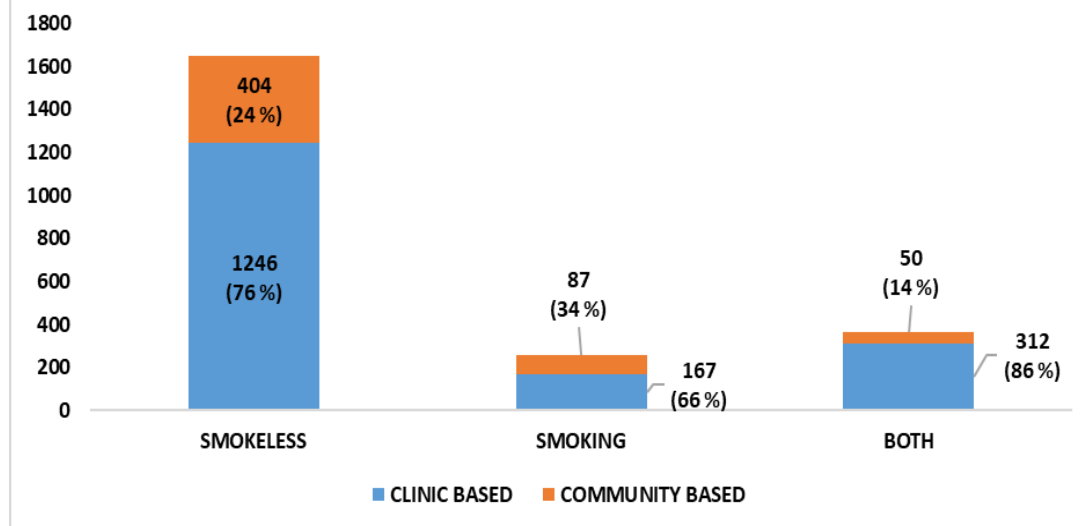
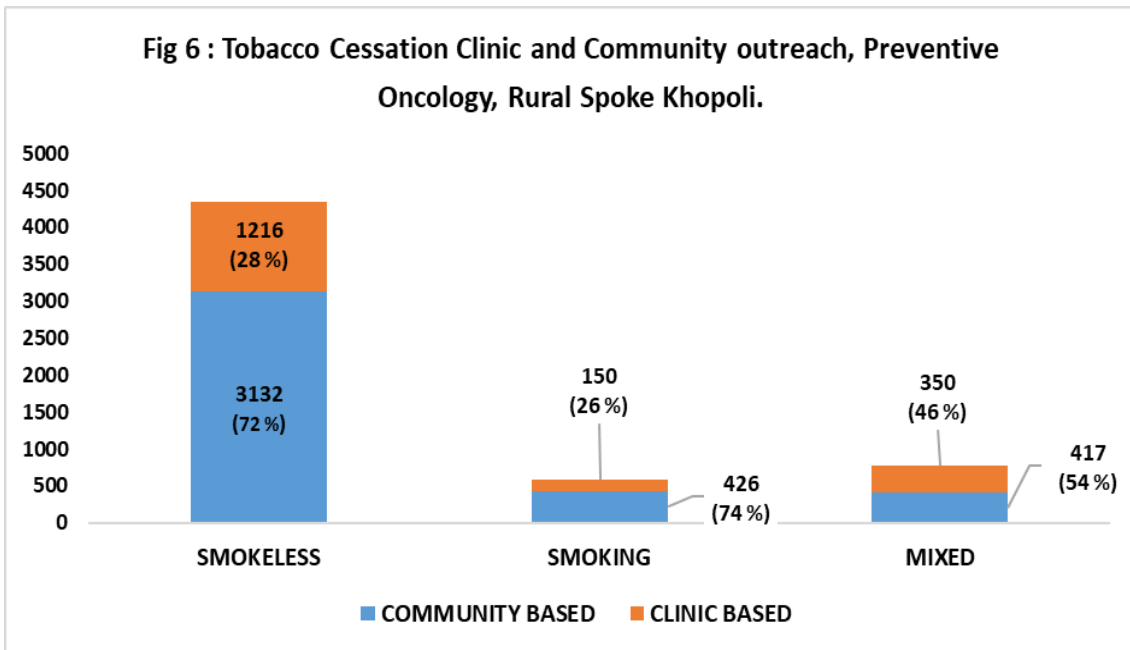


Fig 5 : Tobacco Cessation Clinic and Community outreach, Preventive Oncology, TMH, Mumbai.





b) Outreach camps:

Conducted	No. of Outreach Camps	No. of Beneficiaries
Department of Preventive Oncology, TMH, Mumbai	23	888
Projects, TMH	1370	27306
Preventive Oncology, Rural Spoke, Khopoli	195	9137
Total	1588	37331

c) Awareness Sessions:

Preventive Oncology Services		Total Sessions	Total Beneficiaries
A.	TMH, Mumbai & Project	9539	36069
B.	Rural Spoke, Khopoli, Raigad, Maharashtra	1009	22141
Total		10548	58210

d) Special Activities / events:

World No Tobacco Day:

- Tobacco Control and Cessation training program was conducted by Tata Memorial Center and Public Health Department of Maharashtra, supported by Bajaj Electricals Foundation. The program was inaugurated at CCE through the Tobacco Quitline Centre, Mumbai on 31st January 2023. The Department of Preventive Oncology conducted two days training program on the 1st and 2nd February 2023.
 - “World No Tobacco Day” 2023. The main aim of these activities was to raise the awareness regarding tobacco consumption and the harmful effects of Tobacco. The activities include sensitization of the tobacco hazards for specific group/ institution, marginalized population as well as training & capacity building through planned workshops. In collaboration with ACT India and Nehru Science Centre Worli sensitization program was conducted on Tobacco control for students on 31st May 2023 including an Online Quiz (184 students), a painting competition (21 students), a slogan contest (40 students) & short film competition (10).
 - Commemoration of National Cancer Awareness Month during November and December 2023. A total of 47 Cancer awareness sessions were conducted and 722 attended. A total of 27 camps were conducted for common cancer screening and total of 1008 participants were screened. The screen positives were referred to Tata Memorial Hospital for further investigations/ treatment.
 - ACT- India event with Vital Strategies: Press Launch of Musical Anthem Campaign "Aaj Zindagi Jeete Hai" in Mumbai. The campaign was to promote youth to quit tobacco consumption and to refrain the initiation of any form of tobacco. This was conducted in collaboration between Tata Memorial Centre, ACT-India, Delhi Police and Salim-Sulaiman. Publicized widely on social media on musical platform by Vital Strategies and placed on digital and musical platforms conducted on 31st May 2023.
- International Women’s Day Celebration:
- As a part of Women’s Day Celebration Department of Preventive Oncology Tata Memorial Hospital in Collaboration with various NGOs had organized 25 awareness sessions on cancer prevention. 2214 Women participants were benefited.

I) Research:

Table: 4 Research conducted		
Sr No	IEC Project No	Title of The Study
Extramural Projects: 10		
1	562	Effectiveness and safety of 2 versus 3 doses of HPV Vaccine in preventing cervical cancer: An Indian multi-centre randomized trial
2	3361	Primary screening of high risk HPV DNA by a low cost molecular HPV test for early detection of cervical pre-cancers and cancers among women in urban and rural community of Maharashtra.
3	3450	Investigating Human Papillomavirus (HPV) Infection and HPV-associated Disease in Indian Men who have Sex with Men who are HIV-positive.
4	3451	Incidence of Human Immunodeficiency Virus (HIV) among Indian Men who have Sex with Men (MSM)
5	4045	Exploring the association of cervicovaginal microbiome with transient and persistent high-risk HPV infection.
6	3864	Slow progress in low-resource environments: is lack of education & training in cancer prevention key? (SENSE Pilot Study).
7	3239	Prevalence of Human Papilloma Virus in Spouses of Men diagnosed with Oral and Oropharyngeal Cancer.
8	1763	A Pilot Study on HPV and Cervical Cancer Screening in Mumbai.
9	3826	Women Empowerment – Cancer Awareness Nexus (WE- CAN). An Implementation Research Study of Cervical Cancer Prevention through HPV Self – Sampling and Education in India.
10	3835	PRESCRIP-TEC Prevention and Screening Innovation Project Toward Elimination of Cervical Cancer
Extramural and intramural with CSR funding 01		
11	3231	Collaborative Action for Control of Cancer and Other Non-Communicable Diseases among Mumbai Police, Railway Police, Maharashtra Police and Maharashtra Security Force.
Pharmaceutical Company Sponsored Projects: 1		
12	3051	Protocol No. - SII-qHPV/IN-02 : A Phase-II/III, Partially Double-blind, Randomized, Active-controlled, Multicentric Study to Assess the Immunogenicity and Safety of SIIPL's qHPV Vaccine Administered Intramuscularly in Healthy Volunteers According to a Two-dose Schedule to Cohort 1 (Girls and Boys Aged 9-14 years) and a Three-dose Schedule to Cohort 2 (Women and Men Aged 15-26 years) as Compared to Merck's HPV6/11/16/18 vaccine (Gardasil®)

<u>Nil Funding: 1</u>		
13	4240	A retrospective cohort study on the prevalence and determinants of tobacco use and premalignant and malignant oral lesions among tobacco users attending Tobacco Cessation Centre in a tertiary cancer care hospital.
Service Programme Implemented Through Department <u>Of</u> Preventive Oncology		
14	Oral Cancer Screening Programme for High Risk Population Residing in Low Socio-Economic Settings in Mumbai, Maharashtra: An Organised Service <u>Programm</u>	
15	Awareness, Screening, Capacity Building and Long-term follow-up for Breast Cancers among high-risk women attached to a Spiritual Organization in India for <u>Brahmakumaris</u> at Mount Abu.	
16	To Assess the Effects of Health Education programs on Early Detection <u>Of</u> Oral, Breast and Cervical Cancer In <u>Gadchiroli</u> District of Maharashtra State.	
17	Early Detection, Screening and Prevention for Breast, Oral and Cervical cancers in <u>Khordha</u> district of Odisha.	
18	Early Detection, Screening and Prevention for Breast, Oral and Cervical cancers in Mayurbhanj district of Odisha	

II) **Education: Conferences / training programs / Workshops / Webinars / CME / Seminars / Scientific Sessions conducted:**

Educational programs			
<u>Sr.No</u>	Educational programs	No. of sessions	No. Beneficiaries
1	Training and capacity building program	32	1124
2	Scientific sessions conducted	43	7505
Total		75	8629

III) Staff achievements:

Awards:

Dr. Subita Patil was awarded full scholarship by International Agency of Research on Cancer, Summer School, Lyon, France for Preventive Module 2023.

Recognitions:

Dr. Gauravi Mishra completed one-year program of Women Lift Health Leadership Journey from April 2022 to March 2023.



DIVISION OF MEDICAL RECORDS & CANCER REGISTRIES

Dr. Atul Budukh	Professor Epidemiology & OIC
Dr. Suvarna Gore	Scientific Officer D
Ms. Sushama Saoba	Scientific Assistant E
Mrs. Monika Sarade	Social Investigator
Mrs. Deepali Lokhande	Scientific Assistant E
Mrs. Suvarna Kolekar	Social Investigator
Mr. Narpat Padvi	Scientific Assistant C

Overview:

The Division of Medical Records and Cancer Registries plays an important role in strengthening cancer registration and tobacco control in India. The department has established 11 population-based cancer registries (PBCRs) and four hospital-based cancer registries in different parts of India. Based on the PBCR data and recommendations, the division offers early detection program (EDP) for breast, cervical and oral cancers in the cancer registry area.

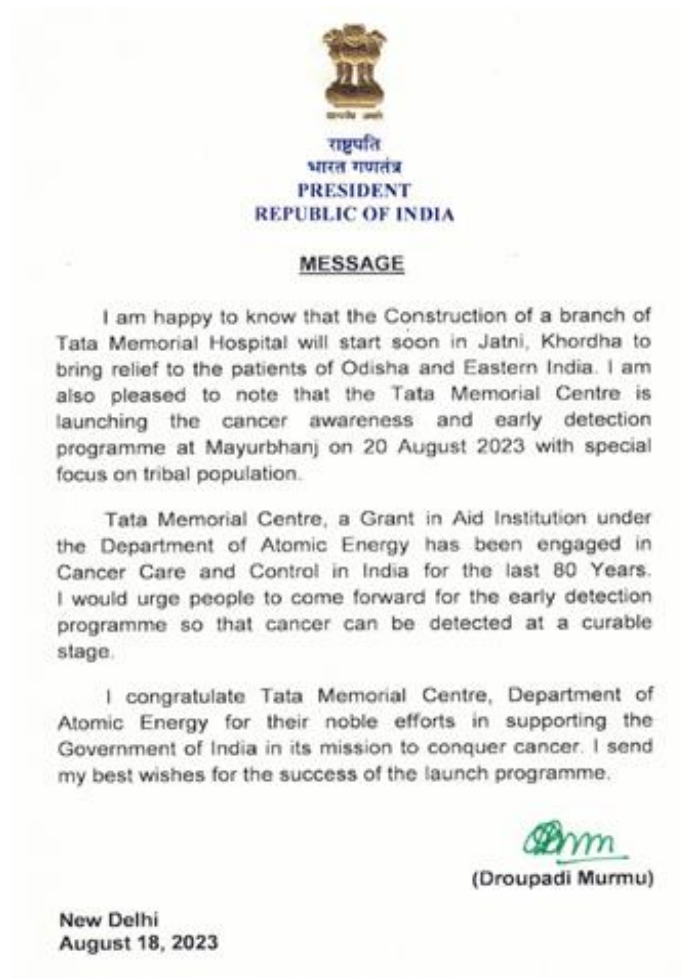
The department, as part of the International Agency for Research on Cancer (IARC) Regional Hub for Cancer Registration project, conducts virtual workshops on PBCR quality control and data management for south-east Asian countries. The division delivers the National Tobacco Quitline Service (NTQLS) in collaboration with the Government of India. Furthermore, the medical record unit regularly maintains the death records of Tata Memorial Hospital, Mumbai and addresses queries raised by patients/relatives and RTI.

The department is recognized center for cancer registration by World Health Organization (WHO CC IND 59).

Service: The department delivers NTQLS, under which free counselling is provided to tobacco users who are willing to quit tobacco.

Research:

- ❖ The eleven PBCRs from Maharashtra, Punjab, Uttar Pradesh, Bihar, Andhra Pradesh, and Odisha states as well as Chandigarh Union Territory cover about 22 million populations.
- ❖ In the year 2023,
 - The first annual report of Muzaffarpur-Bihar PBCR (year 2018) was published.
 - Khordha and Mayurbhanj district PBCRs were established in Odisha state.
 - The department achieved notable success by having Chandigarh, SAS Nagar, and Sangrur PBCR data accepted for publication in Cancer Incidence in Five Continents Volume XII by the IARC and the International Association of Cancer Registries (IACR), France.
 - EDP for breast, cervical and oral cancers was started in Khordha, and Mayurbhanj districts of Odisha state. The successful launch of the PBCR and EDP program in the Mayurbhanj district was graced with a congratulatory message from the Honourable President of India, Smt. Droupadi Murmu.
 - NTQLS received 61,951 calls in the year 2023; after providing effective counselling by trained counsellors, 11,739 individuals were ready to quit tobacco habit and of which 3,174 (27%) individuals were able to quit tobacco. Several tobacco awareness camps were organized by the NTQLS staff.
 - Dr. Atul Budukh visited Sri Lanka in March 2023 to conduct data quality control activities for the Colombo PBCR. Final report was submitted to Vital Strategies Organization, USA and Colombo PBCR.
 - IARC Regional Hub Mumbai developed the “Nirmiti” a web-based application, for generating incidence, mortality, and paediatric incidence tables as per the guidelines given by IARC and ICCC3.
 - A total of eight international- and three national-level research were published.



A congratulatory message from the Honourable President of India Smt. Droupadi Murmu for TMC's & Odisha Health Departments' successful launch of PBCR and EDP program in Mayurbhanj district, Odisha

Education:

- ❖ A virtual and in-person PBCR data management course for participants from countries including Bhutan, Sri Lanka, Nepal, Timor-Leste, Myanmar, Afghanistan, Indonesia, Vietnam, and India was organised.
- ❖ Ms. Sushama Saoba was invited as faculty to the IARC Global Initiative for Cancer Registry (GICR), National Cancer Center Graduate School of Cancer Science and Policy (NCC-GCSP) Summer School "Cancer Registration: Principles and Methods" held in Goyang, South Korea in June 2023.
- ❖ Mr. Pratik Sawant was invited by the Vital Strategies Organization at Hanoi Cancer Registry, Vietnam to provide training on CanReg5 software in November 2023.
- ❖ Ms. Samyukta Shivshankar, a student pursuing an M.Sc. in Public Health, successfully completed her dissertation utilizing Ratnagiri PBCR data.



A virtual course in data management of population-based cancer registry (PBCR) for participants from countries Bhutan, Sri Lanka, Nepal, Timor-Leste, Myanmar, Afghanistan, Indonesia, Vietnam, and India (25th to 27th September, 2023)



Workshop participants with the faculty of NISER, Jatni, Odisha and TMC, Mumbai along with Dr. Susanta Swain (Additional Director NCD cum State Nodal Officer) (9th to 14th October, 2023)

DIVISION OF CANCER CARE, HOSPITAL CANCER REGISTRIES & SURVIVAL STUDIES

Dr. Amey Oak	Officer In charge & Medical Officer
Dr. Sivaranjini K.	Medical Officer
Dr. Shalmali Chavan	Scientific Officer - Adhoc
Ms. Nikita Rajput	Scientific Officer
Mrs. Sandhya Cheulkar	Scientific Assistant
Mrs. Ashwini Patil	Scientific Assistant
Mrs. Esha Dashmukhe	Scientific Assistant

Overview:

The two main service projects under this division are HBCR (Hospital Based Cancer Registry) and POCSS (Patterns of Cancer Care & Survival Studies). We have expanded the POCSS service to other TMC centers like HBCH Sangrur, MPMCC Varanasi & HBCHRC Visakhapatnam in 2023. In-house software for unified entry of HBCR & POCSS data was developed and implemented, linkages with various modules like MOIS, ROIS, OT, PABR, CIS was also carried out for minimizing the duplication of work and to improve the manpower efficiency.

Service:

Regular cancer awareness sessions & screening camps were conducted by the division. Cancer awareness sessions were conducted for students at Kalina University, Santacruz on 4th March 2023, for staff of PDCA, BKC Mumbai on 9th Jan 2023 & for students at Kendriya Vidhyalaya, Surat on 29th April, 2023. Health camp was organised by TMH in collaboration with Salaam Bombay Foundation on 25th, 26th Sept 2023. Oral & Breast Cancer screening was done at the health camp by doctors of our division.

Research:

1. HBCR Cancer Registry Funding Intramural A/C No.- 1233
2. Patterns of Care & Survival Studies (POCSS), ICMR (Funding-Extramural-ICMR-till 31/03/2022-A/C No. 3712). Now, POCSS is a service with intramural funding from 1st April 2022, A/C No.-4790.
3. Collaborative project between CCE & CCDC (Centre for Chronic Disease Control, Delhi) titled "A Comparative analysis of patient demographics & clinical characteristics,

lifestyle factors & survival outcomes of oral & oropharyngeal cancers using hospital-based cancer registries in India & USA". Project No:901007

4. A Hospital-Based Study of survival in Colorectal Cancer patients of Tata Memorial Hospital (Mumbai). Project no:901020
5. A Hospital-Based Study of survival in Gastric Cancer patients of Tata Memorial Hospital (Mumbai). Project No:901047
6. A Hospital-Based Study of survival in Oral Cancer patients of Tata Memorial Hospital (Mumbai). Project No:900986
7. A Hospital-Based Study of survival in Prostate cancer patients of Tata Memorial Hospital (Mumbai). Project No:901028
8. A Hospital-Based Study of survival in Ovarian cancer patients of Tata Memorial Hospital- (Mumbai). Project No:901027
9. PhD Thesis: Role of Socio-clinical factors in the survival of ESCC patients

The HBCR Cancer Registry began in 1957, while the POCSS service started in 2022. All other PI-generated projects commenced in 2023 and are ongoing. A total of 3 articles, 2 reports, 1 book chapter (National), 1 thesis was published by the division in 2023.

Education:

Dr. Amey Oak & Dr. Sivaranjini.K are the mentors for the following student thesis Survival studies: A Hospital-Based Study of Survival studies in patients of Tata Memorial Hospital (Mumbai): Ph.D thesis's Ms. Nikita Rajput: Esophagus Cancer. M.Sc Public Health & Epidemiology students: Ms. Monika Lokhande: Oral Cancer, Ms. Aswathy P: Prostate cancer, Ms. Shubhangi Sahu: Ovarian Cancer, Mr. Tushar Ambekar: Colon cancer, Mr. Aswin Vishwnath: Rectal Cancer. Thesis names are mentioned above in detail in research.

Staff achievements:

Award & Certificate for Best Mini Oral Presentation at the 3rd Indian Cancer Congress 2023, Jio Convention Centre, Mumbai for the abstract "Role of Education & Income on Disparities of Time to Treatment Initiation & its Impact on Cervical Cancer Survival: A Retrospective Study in TMH, Mumbai." Presenter: Dr. Amey Oak

DIVISION OF MOLECULAR EPIDEMIOLOGY & POPULATION GENETICS

Dr. Rajesh Dikshit Professor Epidemiology

Dr. Sharayu Mhatre Officer in Charge

Mr. Pravin Doibale Scientific Officer

Overview:

The main objective of the division is to identify lifestyle and genetic factors and their interaction (gene-environment interaction) to understand causes of cancer which are common in India. The division identifies biomarkers for early detection and prevention so as to do risk stratification while conducting population-based screening. The division undertake large-scale bio samples-based case control and longitudinal cohort studies in community to meet these objectives. Following enrolment were done in different studies.

1. Case control studies:

Cancer Site	Enrollment with risk factors collection and collection of blood samples	Genotyped (Whole genome) (cases and controls)
Gallbladder	3340	3676
Buccal Mucosa +Oropharynx	4295	5500
Breast	5050	6000
Lung Non-Smokers	878	1296
Total	22,125	16472

2. Longitudinal Cohort:

Total enumeration	Detailed risk factors+ Blood samples
200,000 from 372 villages	60,000

3. Screening in community:

In coordination with different divisions of CCE, screening for oral, breast and cervix cancer was conducted at Varanasi, Mullanpur, Sangrur and in Guwahati. So far 3000 camps were conducted in community and completed screening of 3 lakhs women. Total of 8500 women were screen positive and they were further confirmed and then treated at respective centers of TMC.

Division of Molecular Epidemiology and Population Genetics	
	Number only
Extramural Projects	4
Pharmaceutical Company sponsored Projects	-
Intramural Projects +Extramural Projects	6
Nil Funding	-
Publications/Reports	05
Conferences/Workshops/ Invited speakers /Seminars attended as delegates by staff members.	05
Patents	None

Education:

Organized training programmes for different units of TMC in Molecular Epidemiology.

Teaching of MSC (Epidemiology and Public Health) students.

Details of conference/ training course organized/participated:

Sr. No	Name of the conference/ Training program	Date	Attended by	Role
1	XXI Annual conference evidence-based management of cancer in India	24th to 26th February 2023.	150	Organizing secretary
2	XXI Annual conference evidence-based management of cancer in India: Track-1 Precision in prevention	24th to 25th February 2023.	150	Organizing secretary
3	XXI Annual conference evidence-based management of cancer in India: Pre-conference workshop-1 GWAS virtual workshop	23 rd February 2023	150	Organizing Chairperson
4	29th International Symposium on Epidemiology in Occupational Health (EPICOH 2023), Mumbai, India, Hosted by the Indian Association of Occupational Health, Mumbai Branch & Tata Memorial Centre.	14 th to 17 th March 2023	200	Participant
5	Molecular epidemiology lab work observation	1 st to 10 th March 2023	02	Observer

DIVISION OF CANCER SURVEILLANCE FOR SPECIAL POPULATIONS

Dr. Ganesh B Project Coordinator

Dr. Rajshree Gaidhani Scientific Officer D

Overview:

The Division was established in July 2021, for Cancer Surveillance of Special Population, under CCE. The division has in all 32 staff, including those at registry locations.

The mandate of the division are:

- 1) To setup and conduct studies on special populations as special Registries, NPP cancer registries
- 2) Continue operations of present registries
- 3) Setup newer cancer registries in the upcoming NPP locations
- 4) Undertake epidemiological health surveys in the NPP, as requested per the MOU between TMC-NPCIL Share the outcomes of the registry with DAE/NPCIL the Government for needful & to prepare and publish the registry reports.

Research:

Population Based Cancer Registries (PBCR) First PBCR (Proposed setup in Ratnagiri NPP at Jaitapur), non-NPP location, setup in 2009, subsequently setup PBCRs in Sindhudurg (2010) and Visakhapatnam (2014). Subsequently 6 more PBCRs, Tarapur in Maharashtra, Rawatbhata in Rajasthan, Kaiga in Karnataka, Kakrapar in Gujarat, Kudangulam and Kalpakkam in Tamil Nadu were set up in 2012. All registries are fully functional and data collection and reporting are done routinely.

Real-time data capture:

As designed in Tablet-PC, registry data is collected in real-time and transmitted to the SERVER in CCE, ACTREC. The total number of cancer cases accrued in Nuclear Power location registries is approximately 20,000, during the year. In the year 2023, data for the years 2019-22 were collected, compiled and published for all the Registries. Data for the years 2021-2022 for 4 registries are compiled, analyzed and will be published shortly.

Health Survey: CSSP, as an expert advisor, designed, implemented the Health Survey in Rawatbhata in Nov, 2022 and was completed in Sept 2023. Periodical visit and checks were done on the project progress.

CSSP division has undertaken Epidemiological Health Survey in Rohil tehsil of Sikar District of Rajasthan for Uranium Corporation of India Limited. Contract was awarded to TMC in month of March 2024. Fund transfer process got over by May 2024. Recruitment of 51 staff was undertaken during last week of May 2024. The data collection started from 15th June 2024. Approximately population of 75000 (household14000) was surveyed within a period of 6.5 months (December 2024). Data entry and report writing got over by 1st week of April 2024. Report was submitted to UCIL on 10th April 2024 for review.

Publications

Four Population-based Cancer registry reports, of Tarapur, Kaiga, Kakrapar and Rawatbhata for year 2021-2022 were completed in January 2024.

Education:

- Periodical Online Training and orientation were provided to the Cancer registry staff, every 3 months.
- Cancer Registry lectures were conducted for KEVAT students
- Medical Certification of Cause of Death Course completed by Dr Rajshree Gaidhani Reorientation for Strengthening Cause of Death Data Quality” was done in 2023.

Deputation:

- Visits to Tarapur, Rawatbhata and Kakrapar registries for review by Dr. Ganesh B, Dr. Rajshree Gaidhani & Mrs. Mitali Sapkal.
- Deputation to Rawatbhata for review of NPCIL-RR site Epidemiological Health survey review meet and Deputation to Rohil (Rajasthan) for review of UCIL-TMC Epidemiological Health survey progress review.

Unit for Strengthening Cause of Death Data

USCOD Leaders:

Dr. Rajesh Dikshit, Director, Centre for Cancer Epidemiology, Tata Memorial Centre

Dr. Pankaj Chaturvedi, Dy. Director, Centre for Cancer Epidemiology, Tata Memorial Centre

USCOD has been functioning as a reliable resource centre for strengthening the cause of death data in India through capacity building of government and private doctors in Medical Certification of Cause of Death (MCCD), supporting implementation and institutionalization of mortality coding teams, advocacy and governance to support the adoption of standard MCCD forms across the country. The unit works in 10 states in total at present with major activities in the states of Maharashtra, Bihar, Uttar Pradesh, West Bengal and actively expanding to the states of Haryana, Punjab, Andhra Pradesh, Nagaland, Odisha, Assam. Within these states USCOD collaborates with the respective State Health Department, State Department of Medical Education, Directorate of Census Operations, State branches of the Indian Medical Association, AYUSH officials to implement its capacity building, ICD coding and governance programs. Along the government, USCOD also works with private hospitals and medical colleges to strengthen the institutional capacity and CRVS system. The target audience for the unit's capacity building in MCCD are medical interns, resident doctors, medical faculty, and consultant doctors from government and private hospitals. USCOD also supports a training of trainer program that builds doctors capacity as a MCCD trainer.

Training and Capacity Building Activities:

Sr No	Training	Location	No of Participants
1.	MCCD Orientation Session at State Oncology Summit	Bihar	400
2.	MCCD Orientation Training, Darbhanga Medical College	Bihar	172
3.	MCCD Training of Trainers, HFWTC	Chhatrapati Sambhaji	42

		Nagar, Maharashtra	
4.	MCCD Orientation of Residents, HBCHRC	<u>Mullanpur</u> and Sangrur, Punjab	30
5.	MCCD Orientation for Government Medical Officers, NHM	West Bengal	110
6.	MCCD Orientation for doctors and nurses, North Bengal Medical College	West Bengal	55
7.	One-to-one MCCD training of residents, MPMMCC & HBCH	Varanasi, Uttar Pradesh	60
8.	MCCD Training Interns, <u>R A Podar Ayurved Medical College</u>	Mumbai, Maharashtra	63
9.	MCCD Training Residents, <u>R A Podar Ayurved Medical College</u>	Mumbai, Maharashtra	55
10.	MCCD Training of Trainers for Faculty, <u>R A Podar Ayurved Medical College</u>	Mumbai, Maharashtra	39
11.	MCCD Training Resident, Government <u>Ayurved</u> Medical College	Nagpur, Maharashtra	60
12.	MCCD Training of Trainers for Faculty, Government <u>Ayurved Medical College</u>	Baramati, Maharashtra	5
13.	MCCD Training of Trainers for Faculty, Government <u>Ayurved Medical College</u>	Nagpur, Maharashtra	45
14.	MCCD Training Resident, Government <u>Ayurved</u> Medical College	Nagpur, Maharashtra	100

15.	State Institute of Health and Family Welfare	Lucknow, Uttar Pradesh	20
16.	MCCD Orientation Training for government and private doctors, TMH	Mumbai, Maharashtra	151
17.	MCCD Training of Trainers, HFWTC	Nashik, Maharashtra	22
18.	MCCD Orientation Training, SMBT Medical College	Nashik, Maharashtra	37
19.	MCCD Training for Residents, HBT Medical College and Cooper Hospital	Mumbai, Maharashtra	127
20.	MCCD Training for Interns, HBT Medical College and Cooper Hospital	Mumbai, Maharashtra	127
21.	MCCD Training of Medical Officers, NISER Campus	<u>Jatni</u> , Odisha	44
22.	MCCD Training of Residents, Seth GS Medical and KEM Hospital	Mumbai, Maharashtra	31
23.	MCCD Training of Interns, Seth GS Medical and KEM Hospital	Mumbai, Maharashtra	182
24.	MCCD Training for residents and nurses, HBCHRC	Muzaffarpur, Bihar	57
25.	MCCD Training of Interns, Malda Medical College and Hospital	West Bengal	99
26.	MCCD Training of Medical Officers through Chief Medical Officer	Varanasi, Uttar Pradesh	125
27.	MCCD Training of Interns, R G Kar Medical College	West Bengal	100
TOTAL			2358

Access to Affordable Cancer Care for One and All Project

Dr Pankaj Chaturvedi - Principal Investigator

Overview:

“Access to Affordable Cancer Care for One and All” a Viatrix funded CSR project has been launched in the year 2016. Initially, the project was launched in 6 districts of Maharashtra (Amravati, Jalgaon, Nagpur, Gadchiroli, Pune, and Nashik) which further expanded to all other districts of Maharashtra state. In the year 2019, the project was scaled up at National level and launched in 19 districts of 7 States of India [West Bengal (8 districts of North Bengal region), Punjab (Sangrur and Amritsar), Nagaland (Kohima and Mokokchung), Odisha (Mayurbhanj), Bihar (Buxar, Gaya, Jehanabad) and Andhra Pradesh (Vizag), Assam (Morigaon & Kamrup)].

Service: Services provided by the project are, training and capacity building of all existing government medical and paramedical staff on ‘Early detection, screening, prevention and treatment of common cancers’ and provide technical support to the state health department in strengthening existing cancer care facilities at the district level along with these creating an awareness about harmful effects of tobacco in the community.

Under training component, we train the healthcare professionals of all cadres,

1. Medical Officers (MBBS) & Staff Nurses of Government Health Care Set Up under On-Site Training Program
2. Physician (MBBS, MD Medicine) & Staff Nurses of Civil/ District Hospital under In-House Training Program at Department of Medical Oncology, TMC.
3. Surgeon (MBBS, MS) & Staff Nurses of Civil/ District Hospital under In-House Training Program at Department of Surgical Oncology, TMC.
4. Medical Officers (MBBS), Gynecologist (MBBS, MS) & Staff Nurses of Government Health Care Set-Up under In-House training program at Department of Preventive Oncology, TMC.
5. Community Health Officer’s (CHO’s) of Government Health Care Set-Up in Virtual Training Program.

Objectives of the training and capacity building -

1. By training MO's, CHO's & Staff Nurses of PHC's and Sub-Centre's, we are strengthening NP-NCD Program (National Program for Prevention and Control of Non-Communicable Diseases) with respect to common cancer, which will increase Common cancer screening in the community.
2. By training Physicians and Staff Nurses of Civil/ District Hospitals, Public Health Department of respective state should establish Day Care Chemotherapy unit at District level.
3. By training Surgeons & Staff Nurses of Civil/ District Hospitals, we are expecting that Cancer Surgeries to be performed at district level.
4. By training Medical Officers (MBBS), Gynecologist (MBBS, MS) & Staff Nurses of PHC's and CHC's, we expect Public Health Department should establish Preventive Oncology Clinic in their Set-Up.

Where TMC, Mumbai will provide Technical Support for establishment of Cancer Care, for which TMC officials submit an 'Infrastructure and Skill Gap analysis report to respective public health officials.

Results of Project Activity January 2023 – December 2023:

- In On-site district level training program - We have trained around 1280 Health Care Professionals (Medical Officers and Staff Nurses) from 8 districts of West Bengal state, Morigaon, Kamrup, Darang districts of Assam state, Mayurbhanj and Khorda of Odisha states, Zero district from Arunachal Pradesh state, Sindhudurga and Ratnagiri districts of Maharashtra state.
- In-House training program - 4 (2 Doctors and 2 Staff Nurses) have been trained at Department of Palliative care, BBCI, Guwahati, which is a recent initiative of project towards palliative care; whereas 8 (4 Doctors and 4 Staff Nurses) from Ratnagiri and Sindhudurga districts of Maharashtra state trained at Department of Preventive Oncology, TMC Mumbai.
- On-line Training Program - On 'Early Detection, Screening and Prevention of Common Cancer' for CHO's. We have trained around 1770 CHO's from Kohima and Mokokchung of Nagaland state, Coochbehar and Kalimpong; Jalpaiuri and Alipurduar; South Dinajpur and North Dinajpur; Malda and Darjeeling of North Region of West Bengal state, Kamrup and Morigaon districts of Assam state and Satara district of Maharashtra state.

- On-line Awareness Program - We have created an awareness and trained around 1363 Health Care Professionals, teachers and NTCP consultants on 'Tobacco Cessation Counselling Skills and Awareness'
- Infrastructure and Skill Gap Analysis Report – Submitted a report to respective Public Health Department of Morigaon and Kamrup districts of Assam State; Mayurbhanj and Berhampur districts of Odisha state and Sindhudurga and Ratnagiri districts of Maharashtra state.
- Workshops - The State level scientific workshop was conducted at Bihar, 'Bihar Oncology Summit' around 350 Health Care Professionals from state of Bihar have sensitized and trained for Common Cancers; whereas on occasion of 'World Head and Neck Cancer Day' 200 Dentist from state of Maharashtra have been trained.

ADMINISTRATIVE & CORE INFRASTRUCTURE GROUPS

Administration	Chief Admin Officer	Mr. M. Y. Shaikh
HRD	Dy. Admin Officer (HRD)	Mrs. Shilpa Sardesai
	Jr. Admin Officer (HRD-OS)	Mr. Devendra Pitale
Estate Management	Jr. Admin Officer (EM)	Mr. Shyam Anavkar
Accounts	Dy. Controller of Accounts	Mrs. Kamala Paidipati
	Dy. Accounts Officer	Mrs. Anuradha Narayanan
Purchase Stores	Purchase Officer	Mr. Anandrao Kokare
	Asst. Stores Officer	Mrs. Kanchana Gopalkrishnan
Engineering Services	Officer in Charge	Mr. Hrishikesh Kelkar
Security	Dy. C.S.O (Gr.II)	Mr. Paul G. Pinto
Information Technology	Officer in Charge	Mr. Prasad Kanvinde
	Officers	Mr. Anand Jadhav,
		Mr. M. Sriram,
		Mr. Padmakar Nagle

ADMINISTRATIVE & CORE INFRASTRUCTURE GROUPS

Human Resource Department

The Human Resource Development (HRD) oversees key functions including manpower planning, performance management, recruitment of regular and temporary staff, employee training and development, and maintenance of discipline. During the year 2023, a total of 88 regular staff members were appointed across Medical, Scientific, Technical, and Administrative cadres, in strict adherence to the reservation policies of the Government of India.

Public Relations Department

Since its inception, the Public Relations (PR) Department has been actively engaged in organizing employee engagement initiatives, patient-centric programs, observance of important national and institutional days as directed by the Department of Atomic Energy (DAE), and coordination of key events such as inaugurations and visits by donors and dignitaries.

During the reporting period, the department coordinated and supported a wide range of institutional events, including Republic Day (26 January), Marathi Bhasha Mahotsav (February), International Women's Day (8 March), ACTREC Annual Day (13 April), Anti-Terrorist Day (21 May), World No Tobacco Day awareness programme (31 May), World Blood Donor Day (14 June), International Day of Yoga (21 June), Independence Day (15 August), Hindi Pakhwada (14–26 September), Breast Cancer Awareness Programme (12 October), Rashtriya Ekta Divas (31 October), Vigilance Awareness Week (31 October–6 November), Bharatiya Bhasha Divas (11 December), Annual Prize Distribution, and Superannuation Programme for 11 employees.

One of the flagship initiatives coordinated by the department was **DAE's Iconic Week under Azadi ka Amrit Mahotsav**, observed from 22–28 August. The week-long celebration saw active participation from multiple departments and included focused group discussions by the National Tobacco Quitline Services (CCE) for security staff, drivers, and housekeeping personnel; motivational quote displays in patient-centric areas; a talk on infection control by Nursing Services; sapling plantation activities by CRI students; expert talks on ethics in animal research, vaccine development in India, and yoga; blood donation camps; CPR training for non-medical staff; fire safety demonstrations; health awareness programmes in rural and educational settings.

The PR Department played an important role in managing major institutional events attended by

dignitaries and visitors. These events included Republic Day celebrations, visits by the Parliamentary Standing Committee on Health and Family Welfare, Science & Society Day, Independence Day celebrations, Vigilance Awareness Week programmes, and visits by international delegations.

Accounts Department

The Finance and Accounts Department focused on effective fund flow management through prudent budgetary controls and continuous review of financial outflows. All financial operations were carried out in strict compliance with the guidelines and instructions issued by the Department of Atomic Energy, Government of India, ensuring proper maintenance of documentation and statutory records.

The department managed patient billing, receipting, and settlement of accounts across various categories, including smart card holders, cash-paying patients, trust-supported patients, and company-referred cases. Procurement-related financial transactions were processed as per prescribed procedures, ensuring optimal utilization of capital and non-plan grants. Regular reports on fund utilization and capital expenditure were submitted to DAE.

Purchase Department

The Purchase Department continued to provide efficient procurement services to the Centre by ensuring timely availability of approved-quality materials and equipment. All procurement activities—including indenting, preparation of comparative statements, approvals, purchase order generation, and follow-ups—were managed through the in-house Material Management System (MMS) developed by the Information Technology Department.

Stores Department

The Stores Department supports the day-to-day operational requirements of wards, outpatient units, CRI, CRC, CCE, hostels, and administrative departments by managing the receipt and issue of stock, non-stock items, consumables, spares, and capital equipment (excluding drugs and surgical items).

All store operations are conducted through a fully digital, paperless system, including receipt of indents, generation of Purchase Sanction Notes (PSNs), Goods Receipt and Inspection Notes (GRINs), and online approvals. Materials procured through GeM followed prescribed inspection and receipt protocols.

The Asset Cell manages the Asset Management System, overseeing physical and virtual transfers, asset tracking, and record updates.

Engineering Services

Engineering Services continued to provide round-the-clock support for patient care, research, and educational activities, ensuring optimal utilization and maintenance of infrastructure and utilities across the 60-acre ACTREC campus. The department's scope extends beyond operations and maintenance to liaison with government authorities for statutory approvals and implementation of major infrastructure projects.

Key projects included construction and maintenance support for the Shantilal Shanghvi Paediatric Haematolymphoid Cancer Centre, sewage and water treatment facilities, underground water storage tanks, modular OT and ICU facilities, OPD renovations, and off-campus initiatives such as the Ayurvedic Cancer Hospital, Medicinal Plant Cultivation Facility, and Preventive Oncology Centres. Preliminary work for a nurses' hostel and multi-level parking facility is also underway.

The department is supported by a dedicated workforce of approximately 130 engineers, supervisors, technicians, and skilled staff, who manage critical systems including HVAC, electrical distribution, medical gases, water supply, fire safety, civil works, laboratory utilities, and preventive maintenance programmes.

Security Section

The Security Section ensures round-the-clock safety and security of ACTREC's premises, personnel, students, and patients through strict access control and surveillance systems. Additional security personnel from Maharashtra Security Force have been deployed to strengthen perimeter and building security.

The section regularly conducts training programmes for security staff and has upgraded surveillance, fire detection, and firefighting systems across the campus. Periodic security audits are conducted by national and state intelligence agencies, with recommended measures implemented promptly.

Ceremonial parades were conducted on Republic Day and Independence Day. The section also manages departmental transport services, including shuttle buses, patient transport, vehicle procurement, and regulatory compliance with RTO authorities.

Vigilance Awareness Week was observed from 31 October to 6 November, in line with Central Vigilance Commission guidelines. The inaugural programme was graced by Shri Jai Jeet Singh, IPS, Commissioner of Police, Thane, as Chief Guest. The vigilance pledge was administered to approximately 130 staff and students, reaffirming the commitment towards a “Corruption-Free India for a Developed Nation.”

Information Technology

IT Coordinator: Mr. Prasad Kanvinde

Officers: Mr. Anand Jadhav, Mr. M. Sriram, Mr. Padmakar Nagle

In alignment with its institutional mandate, the Information Technology (IT) Department at ACTREC continued to provide robust computational facilities, digital infrastructure, and technical support for seamless information access, processing, storage, archiving, printing, and dissemination across the campus during 2023.

ACTREC is supported by a high-performance, campus-wide 10 Gbps Local Area Network (LAN) comprising copper and fibre connectivity, over 1,000 LAN nodes, eight servers, and a secured Wi-Fi environment. Internet connectivity is provisioned through a 1 Gbps shared National Knowledge Network (NKN) gateway, supplemented by redundant 155 Mbps Tata Teleservices connectivity, ensuring uninterrupted access and high availability.

Networking

Networking operations remained a core focus area, encompassing day-to-day support, administration, upkeep, and maintenance of both passive and active network components. The IT Department successfully supported the exponentially growing demand for online meetings, conferences, and webinars, which continued to be a major operational requirement in 2023. To strengthen digital security and operational continuity, the department established highly secure, encrypted remote access connectivity to campus resources, incorporating data leakage prevention mechanisms. Significant infrastructure expansion was achieved through the establishment of high-speed LAN connectivity for the New RRS (HWCC) Building and RRU Buildings, with approximately 350 network points per building. Implementation of a comprehensive Wi-Fi network in the RRS Building is currently in progress.

Hardware

During the year, the department received and successfully commissioned major IT infrastructure, including Hyper-Converged Infrastructure (HCI) servers, wireless networking systems, active network components for the RRU Building, desktop computers, corresponding printers, laptops, peripheral devices, and audio-visual equipment.

Software and Applications

Patient information processing at ACTREC operates on a 24x7, multi-location online platform. In 2023, the department undertook a major system enhancement by expanding the patient case number format from 8 digits to 14 digits. Following successful implementation, the IT team facilitated seamless rollout and commissioning of this upgrade across all satellite units of Tata Memorial Centre (TMC).

In the same context, extensive customization and system updates were carried out for multiple clinical and administrative modules, including PABR, DIS, RIS, ROIS, OT, Accounts, Pharmacy, Stores, and Purchase systems.

Notable software developments during the year included:

- An Android-based Electronic Medical Records (EMR) application, enabling patients to securely access medical reports on registered mobile devices.
- Features for smart card top-ups and online payments integrated into the EMR app.
- Design and commissioning of an online donation portal for donors.
- Facility booking systems for shared research equipment at the Cancer Research Institute.
- Development of a Whole Slide Imaging (WSI) application for digital pathology, covering requisition, scanning, and secure storage.
- Upgradation of Cytogenetics reporting systems to a .NET/HTML-based platform with image capture functionality.

Additionally, essential software subscriptions and renewals, including Microsoft Office, antivirus solutions, and VMWARE / ARCSERVE backup software, were completed to ensure system reliability, data security, and operational continuity.

LIBRARY

Dr. Satish S. Munnolli - Librarian

Scientific Assistants

Mrs. Swati S. Belapurkar

Mrs. Mugdha A. Raul

Overview:

The ACTREC library is a dedicated resource center for scientific information, actively involved in acquiring, organizing, and delivering valuable scientific and clinical information to its users. Its primary mission is to support information requirements to enhance research, patient care, and ongoing educational programs within the institute. The library has expanded its online services significantly. It subscribes to 65 journals specializing in cancer and allied areas, ensuring comprehensive coverage for its users. The library's physical collection includes 5,946 books, 13,229 bound volumes of journals, 690 theses, 3,927 staff publications, 441 reports, and 20 videos. In addition to its physical holdings, the library provides extensive access to electronic resources. Through the DAE - Elsevier consortium, it offers unlimited access to over 500 scientific, technical, and medical journals via ScienceDirect. ClinicalKey and UpToDate are two prominent online clinical resources providing access to books, journals, clinical trials, drug monographs, guidelines, patient education materials, and multimedia content. Under the National Cancer Grid program, the library facilitates 27 online clinical journals. Subscribing to the discovery tool, *J-Gate Biomedical Sciences* ensures seamless access to various journals and online resources, including remote access for end-users. All these online resources are accessible through campus-wide internet-connected nodes and of the campus through remote access online tool - RomotLog. During the reporting period, the library enabled trial access to the 'Cambridge Medical eBooks' with access to over 3000 ebooks.

Service:

The library plays a pivotal role in supporting research and scholarly activities. It maintains records of staff publications and publishes weekly updates through 'Science Sparks @ ACTREC'. Services such as publication statistics, citation analysis, impact factor, authenticity checks of journals,

Open access models, article processing charges (APCs), bibliographic services, and reference/referral services are provided proactively and upon request throughout the year. The library has provided 829 articles out of 903 requests in 2023. Furthermore, it has supplied 78 documents to government-affiliated libraries and individual visitors. In its approach to books and journal procurements, the library adopts scientific methods to select subscription economic models.

Research:

The library staff actively contributed in developing search commands on different scientific database platforms for the research publications of systematic reviews and scientometric studies.

Education:

Education and training are integral parts of the library's mission. It conducts an ongoing information literacy program for new students, which includes orientations, one-on-one sessions on search techniques and authentic information sources, group discussions on research strategies, and training on research metrics such as Impact Factor and h-Index. Specialized sessions on nursing information resources, literature reviews, and search strategies are also tailored for nursing students as part of their curriculum. Overall, the ACTREC library serves as a dynamic hub for scientific knowledge and scholarly support, continuously evolving to meet the needs of its diverse user community and advancing the institute's mission in cancer research and patient care.

Staff achievements:

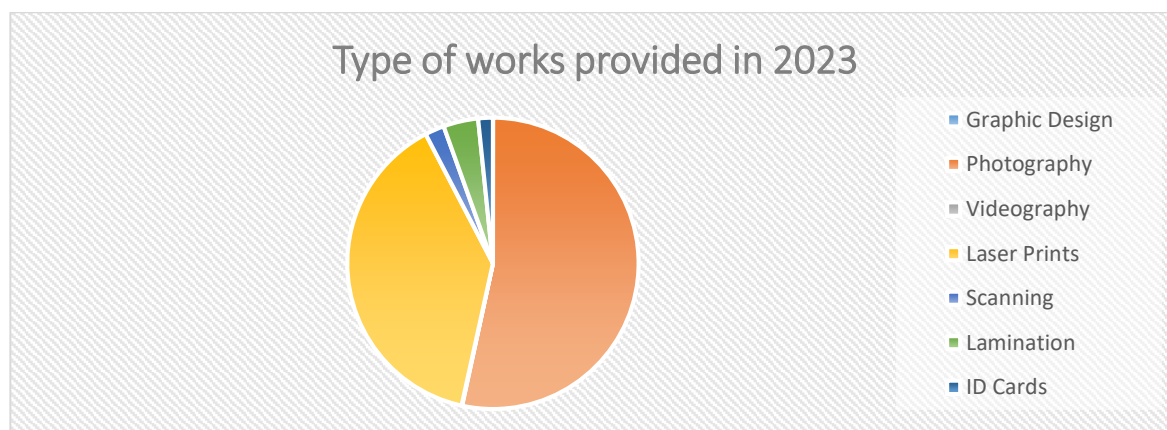
Dr. Satish Munnolli has delivered lectures as a resource person on search techniques for health science literature, TMC, Gawahati, Research Metrics at ATLAS SkillTech University, Mumbai, Systematic search techniques for Medical literature at Bharati Vidyapeeth Deemed University Medical College & Hospital, Pune. He is a Trustee of the non-for-profit organization - LISA Academy, Bangaluru.

PHOTOGRAPHY SECTION

Dr. Satish Munnolli - Officer-In-Charge

Mr. Shyam M. Chavan - In-charge

Photography section of ACTREC provides support to the scientific / medical staff and students towards photo recording of their experimental studies results. The state-of-the-art facility has high end digital cameras to record the images in the indoor and outdoor & to get visual clues to research activities, using the advanced desk top publishing software and video recording of required surgeries and events in the indoor and outdoor. The Photography section handles design, printing and display of announcement brochures / flyers, banners, programs, letterheads, invitation cards, signages, name plates, coupons, badges, certificates, posters, workshop protocols / abstract books and others for the scientific meetings viz., conferences, workshops as well as cultural events organized at ACTREC. The section also assists in the preparation of poster / slide presentations for scientific user's community and handles printing of identity cards for the security and administrative services. The section takes photographs of the campus, functional groups, and infrastructure of the Centre, carefully archives all the images, and provides them for use in the Centre's print publications, audiovisual presentations, website and management to administrative and presentation purpose. The section takes videos of surgical, Institutional and departmental introduction, visitors, architectural and interior design. The section assists users in handling the presentation equipment in the seminar / conference / meeting / board rooms and mini auditorium. During 2023, the facility provided photographic support for 95 events held in ACTREC (national and international events, workshops, conferences & other programs) including Art work for CRI, CRC, CCE departments with Digital photographs, Colour laser prints, Photo printing, lamination and scanning.



SCIENCE COMMUNICATION AND PROFESSIONAL EDUCATION CELL

Dr. Satish Munnolli - Officer-In-Charge

Mrs. Ojaswini Upasani -In-charge

The Science Communication and Professional Education Cell (SCoPE) at ACTREC plays a pivotal role in facilitating seamless communication with key infrastructure groups, ensuring the successful execution of all scientific events and seminars. These events are conducted both in-house and virtually. Throughout 2023, the SCOPE Cell coordinated numerous significant events, including the Innovation Festival at Nehru Science Centre (1st-3rd Feb), Women's Day (8th Mar), Day of Immunology (29th April), ACTREC Alumni Event at DY Patil Pune (10th Mar), Pillai College, New Panvel (29th Apr), Cancer Awareness programs at Shastri Hall, Girgoan (1st Oct) and SIES College (21st Dec), and the first National Symposium on Integrating Traditional Knowledge in Evidence-Based Medicine (21st-22nd Sept). Additionally, ACTREC Alumni Talks were held on 21st Nov, 5th Dec, and 20th Dec.

The SCoPE cell facilitates the doctoral programs at ACTREC stands as a cornerstone of its academic pursuits. The Cell actively supports the Centre's research initiatives, ensuring effective management of the academic HBNI doctoral programs. Under the guidance of the Academic Committee, the SCOPE Cell organizes Friday Seminars, Faculty Seminars, and Scientific Talks by Guest Speakers for research scholars at ACTREC. The Cell also manages the intake procedures and provides support for training programs. In 2023, a total of 353 trainees were allocated across various programs, including Master's dissertations, research experiences, summer internships,

Collaborative initiatives, observer ships, research associate positions, and CSIR fellowships. These trainees were placed under the mentorship of senior and mid-level faculty/staff at ACTREC. Furthermore, in 2023, the SCOPE Cell facilitated educational visits for students from institutions such as Amity University, Mumbai; Civil Hospital College of Nursing, Alibaug; Bharati Vidyapeeth, Kharghar; and FNINE MGM College, Vashi. The ACTREC Open Day in December 2023 was a successful event, attracted over 617 students and 46 faculty members from 34 colleges, underscoring the Centre's commitment to promoting science and education. This comprehensive engagement in science communication and professional education highlights the SCOPE Cell's integral role in fostering a vibrant academic and scientific community at ACTREC.

CORE COMMITTEES

ACTREC APEX COMMITTEE FOR RESEARCH AND ACADEMICS (AACRA)

Chairperson	Dr. Sudeep Gupta, Director, ACTREC
Member Secretary	Dr. P. Venkatraman, Dy. Director, CRI-ACTREC
Member	Dr. Navin Khattry, Dy. Director, CRC-ACTREC
Member	Dr. Rajiv Sarin, SO 'H', PI Sarin Lab

BASIC SCIENCES RESEARCH GROUP(BSRG)

Chairperson	Dr. Sudeep Gupta, Director, ACTREC
Co-Chairperson	Dr. Navin Khattry, Dy. Director, CRC-ACTREC
Co-Chairperson	Dr. P. Venkatraman, Dy. Director, CRI-ACTREC
Member Secretary	Dr. Rohan Khadilkar, SO 'D'
Members	All Principal Investigators & Co-Investigators in Charges of Facilities in CRI

Institutional Animal Ethics Committee (IAEC)

Chairperson	Dr. Sanjay Gupta, Scientific Officer 'G', ACTREC
Member Secretary	Dr. Arvind Ingle, In charge of Animal House Facility
Members	Dr. Sanjeev Waghmare, Scientific Officer 'F' ACTREC Dr. Shilpee Dutt, Scientific Officer 'F' ACTREC Dr. Rahul Thorat, Veterinarian, ACTREC Mr. Sharad Bhagat, Main Nominee (CPCSEA) Dr. Swapnil Bangar, Link Nominee(CPCSEA) Mr. Sameer Shaikh, Scientist from Outside the Institute Prof. Vishnu Thakare, Socially Aware Nominee

Institutional Biosafety Committee (IBSC)

Chairperson	Dr. Sanjay Gupta, Scientific Officer 'G', ACTREC
Member Secretary	Dr. Shilpee Dutt, Scientific Officer 'F', ACTREC
DBT Nominee	Dr. Badri Narain Pandey, Scientific Officer 'H' and Head, BARC, MUMBAI
Members	Dr. Abhijit De, Scientific Officer 'G', ACTREC - Internal Expert Dr. Sejal Patwardhan, Scientific 'D' ACTREC- Internal Expert Dr. Bhavani Shankar, BARC, Trombay - Outside Expert Dr. Shashank Ojha, CRC, ACTREC - Biosafety Officer

Institutional Radiation Safety Committee (IRSC)

Chairperson	Dr. Navin Khattry, Dy. Director, CRC-ACTREC
Member Secretary	Dr. Pradip Chaudhari, Scientific Officer 'G', CRI, ACTREC
Members	Dr. Vedang Murthy, Radiation Oncologist 'G', ACTREC Dr. Shashank Ojha, CRC, ACTREC - Biosafety Officer Dr. Amit Kumar Janu, Assoc. Prof. Radio Diagnosis, ACTREC Dr. Sayak Choudhary, Assist. Prof. Nuclear Medicine, ACTREC Ms. Reena Devi, CRC, Medical Physicist 'E' CRC, ACTREC Mr. Lalit Chaudhari, Medical Physicist 'E', CRC, ACTREC Sr. Administrative Officer, ACTREC Ms. Anjali Rawat, Assistant Nursing Superintendent, ACTREC Mr. P.G. Pinto, Dy. CSO, Grade I, ACTREC

ACADEMIC COMMITTEE

Chairperson	Dr. Abhijit De, Scientific Officer 'G', ACTREC
Member Secretary	Dr. Rukmini Govekar, Scientific Officer 'G', ACTREC Dr. Kakoli Bose, Scientific Officer 'F', ACTREC Dr. Sanjeev Waghmare, Scientific Officer 'F', ACTREC Dr. Shilpee Dutt, Scientific Officer 'F' ACTREC Dr. Syed Hasan, Scientific Officer 'F' ACTREC Dr. Rohan Khadilkar, Scientific Officer 'D' ACTREC

INTERNAL COMPLAINTS COMMITTEE (ICC)

Chairperson	Dr. Preeti Chavan, Manager-Diagnostics, Scientific Officer 'F' ACTREC
Member Secretary	Dr. Vikram Gota, Clinical Pharmacology, Scientific Officer 'G' ACTREC
Members	Dr. Rukmini Govekar, Scientific Officer 'G' ACTREC Dr. Prafulla Parikh, Prof, General Medicine F, ACTREC Mrs. Bhagyashree Tillu, Medical Social Worker, ACTREC
Convener	Mr. Devendra Pitale Jr. Administrative Officer, ACTREC
Outside Expert	Dr. Nasreen Rustomfram Prof & Chairperson, Centre for Life Long Learning, Tata Institute of Social Sciences, Mumbai

ANTI-RAGGING COMMITTEE

Chairperson	Dr. P. Venkatraman, Dy. Director, CRI-ACTREC
Members	Dr. Vikram Gota, Clinical Pharmacology, Scientific Officer 'G', ACTREC
Member- Secretary	Dr. Shilpee Dutt, Scientific Officer, 'F', ACTREC Dr. Ujjwala M. Warawdekar, Scientific Officer 'G', ACTREC Dr. Syed Hasan, Scientific Officer 'E' ACTREC
Student Members	Mr. Archisman Banerji, Shilpee Lab, ACTREC Ms. Neha Agarwal, Rukmini Lab, ACTREC

Grievance Committee

Chairperson	Dr. Arvind Ingle, Scientific Officer 'H'
Member Secretary	Dr. Preeti Chavan, Lab Manager- DS, SO'F'
Member	Dr. Sanjay Gupta, Scientific Officer 'G'
Member	Dr. Sorab Dalal, Scientific Officer 'H'
Member	Dr. Amit Joshi, Medical Oncologist 'G'
Member	Senior Administrative Officer
TMHWU Rep	Mr. J.K.Rane, Technician 'H'
Students Members	Ms. Neelima Yadav Mr. Archisman Banerji, Shilpee Lab, ACTREC

Students Council of ACTREC (SCA)

Ms. Shivali Mishra (De Laboratory)
Mr. Archisman Banerji, (Shilpee Laboratory)
Ms. Neha Agarwal, (Rukmini Laboratory)
Mr. Aiyas Mujawar(De Laboratory)
Mr. Rudransh Singh (Dutt Laboratory)

INSTITUTIONAL ETHICS COMMITTEE III TMC IEC – III

Dr. Sudhir Nair - Member Secretary

The TMC-ACTREC Institutional Ethics Committee (IEC-III) was established in December 2009 as per the ICMR and ICH-GCP guidelines for Ethics Committees, at ACTREC, TMC. The IEC-III, constituted by the Director, TMC under the authority vested upon him by the Governing Council of TMC, monitors projects carried out at ACTREC, TMC. The present committee is constituted for the term - 01st April 2022 to 31st March 2024. The committee has met 145 times in the past 14 years and 809 projects have been discussed till December 2023. The entire spectrum of studies involving human subjects including epidemiological studies, biological studies on human tissues, retrospective audits, pharmacokinetic studies and human clinical trials using drugs or additional invasive intervention had been discussed and approved by the committee.

The details of the members of IEC-III are as follows:

Sr. No	Name & Position	Affiliation	Affiliation Status	Gender	Expertise
1.	Dr. Surekha Zingde, Chairperson	Trustee, Indian Women Scientists' Association, (IWSA), Former Deputy Director, CRI, Scientific Officer 'H'	Non Affiliated	Female	Basic Scientist
2.	Dr Shona Nag, Member	Director, Oncology, Sahyadri Super Speciality Hospitals, Hadapsar, Survey No. 163, Bhosale Nagar, Pune, 400 028, Maharashtra	Non Affiliated	Female	Clinician (Medical Oncology)
3.	Dr. Pravesh Golay Member	Associate Professor, Department of Humanities and Social Sciences, Indian Institute of Technology Bombay, Powai, Mumbai - 400 076, India	Non Affiliated	Male	Philosopher
4.	Dr Sudhir Nair, Member Secretary	Prof. Head and Neck Surgical Oncology, ACTREC., TMC	Affiliated	Male	Clinician (Surgical oncology)

Sr. No	Name & Position	Affiliation	Affiliation Status	Gender	Expertise
5.	Dr. Sangita Sukumaran, Member	Prof and Head, Department of Pharmacology, Terna Medical College Navi Mumbai, 400706	Non Affiliated	Female	Clinical Pharmacologist (Basic Medical Scientist)
6.	Mrs. Deepa Ramani, Member	Zenith Spinners Ltd. Ex-play group teacher, store and purchase in-charge, Zenith Spinners Ltd., Member of IC-SCR, ACTREC	Non Affiliated	Female	Layperson
7.	Mr Akil Hirani, Member	Head of the Transactions Practice and Managing Partner Majmudar & Partners, International Lawyers, India	Non Affiliated	Male	Legal Expert
8.	Dr. Girish Maru, Member	Former Principal Investigator and Scientific Officer 'H', CRI	Non Affiliated	Male	Basic Scientist
9.	Dr. Syed Hasan, Member	Principal Investigator and Scientific Officer 'E' ACTREC, TMC	Affiliated	Male	Basic Scientist
10	Dr Naveen Mummudi, Member	Associate Professor, Dept. of Radiation Oncology, Tata Memorial Hospital, TMC.	Affiliated	Male	Clinician (Radiation Oncology)
11	Dr. Sachin Punatar, Member and DSMU Secretary	Prof. Medical Oncology, E (Adult Hematolymphoid) ACTREC, TMC	Affiliated	Male	Clinician (Medical Oncology)

Sr. No	Name & Position	Affiliation	Affiliation Status	Gender	Expertise
12	Dr. Shalaka Joshi, Member	Prof. Dept. of Surgery, Tata Memorial Hospital, TMC.	Affiliated	Female	Clinician (Surgical oncology)
13	Dr. Prashant Tembhare, Member	Clinician Scientist and Prof in Hematopathology Laboratory (SO F) ACTREC, TMC	Affiliated	Male	Basic Medical Scientist (Hematopathology)
14	Dr. Nitin S Shetty, Member	Prof. Interventional Radiology, Tata Memorial Hospital, TMC	Affiliated	Male	Clinician (Interventional Radiology)

Other staff members

Sr No	Name	Qualification	Job responsibilities
1	Ms. Kasturi Awatagiri	M.Sc.	Clinical Trial Co-ordinator
2	Ms. Sajiri Tengashe	M. Pharm.	IEC Co-ordinator
3	Ms. Vaibhavi Patil	M.Sc.	DSMU Co-ordinator
4	*Mr. Vaibhav Tambe	B.Sc.	IEC Admin Assistant
5	Mr. Nitin Mhatre	10 th	Office Attendant

* Mr. Vaibhav Tambe (B.Sc.): IEC Admin Assistant joined from May 2023

IEC-III PERFORMANCE 2023

The committee conducted 12 full board committee meetings in 2023 for meticulous scrupulous examination of the scientific and ethical contents of submitted projects, owing to which 57 new projects and 21 old projects from 2020-2021 were examined.

Table 1: Review type

Review type	2022	2023
Full Board	62	57
Expedited	02	01
Exempted	02	03
Total	66	61

Table 2: IEC decision on new projects (full board review)

Full board review	2022	2023
Approved	41	36
Revision with minor modification	10	10
Resubmit (major)	09	11
Not approved	0	0
Withdrawn by PI	01	0
Deferred	0	0
Under review process	01	0
Total	62	57

Table 3: IEC decision on expedited review projects

Expedited projects	2022	2023
Approved	2	1
Revision with minor modification	0	0
Revision with major modification	0	0
Not approved	0	0
Total	2	1

Table 4: IEC decision on (full board + Expedited) projects carried forward previous years (n=21)

Projects carried forward	2022
Approved	16
Resubmitted	0
Not Approved	0
Closed by IEC	01
Revision with minor modification	0
Withdrawn by PI	02
Exempted from review	0
Approval Pending	02
Total	21

Note: Carry forwarded projects to 2024: 02 Minor modification

Table 5: Summary of the source of funding

Source of funding	2022	2023
IM	09	07
EM	11	11
IM + EM	04	15
Pharma	04	01
Others	0	0
Non funded projects	38	27
Total	66	61

Education: Training and Education for EC members:

SR N O	DATE	THEME	VENUE	CONDUCTED BY	Attended by IEC MEMBERS	Attended by DSMU MEMBERS	
						Attended IEC STAFF	
1	13.03.2023	Overview of NABH standard	Board Room	Kasturi Awatagiri	Surekha Zingde Pravesh Golay Sudhir Nair, Sangita Sukumaran Shona Nag Deepa Ramani Akil Hirani Syed Hasan Girish Maru Shalaka Joshi Prashant Tembhare Nitin Shetty	Sachin Punatar	Vaibhavi Umer Akash Rao
2	21.04.2023	Reimburseme nt process	Board Room	Yogesh Kembhavi Nikita Vahalkar	Surekha Zingde Pravesh Golay Sudhir Nair, Sangita Sukumaran Shona Nag Deepa Ramani Akil Hirani Syed Hasan Girish Maru Shalaka Joshi	Sachin Punatar	Kasturi Awatagiri Sajiri Tengashe Vaibhavi Patil Umer Ahmed Khan

					Prashant Tembhare Naveen Mummudi		
3	12.05.2023	GCP element (element 1): Investigator Responsibility	Board Room	Vaibhavi Patil	Surekha Zingde Pravesh Golay Sangita Sukumaran Deepa Ramani Akil Hirani Syed Hasan Girish Maru Shalaka Joshi Prashant Tembhare Naveen Mummudi Nitin Shetty	Sachin Punatar	Kasturi Awatagiri Sajiri Tengashe Umer Ahmed Khan
4.	07.07.2023	Overview of Research Review Committee including Monitoring	Board Room	Sachin Punatar	Surekha Zingde Pravesh Golay Sangita Sukumaran Deepa Ramani Akil Hirani Syed Hasan Girish Maru Shalaka Joshi Prashant Tembhare Naveen Mummudi	Sachin Punatar	Kasturi Awatagiri Sajiri Tengshe Vaibhavi Patil Umer Ahmed Khan

					Nitin Shetty		
	18.08.2023	Review of regulatory and investigator initiated study SAEs	Board room	Dr. Sachin Punatar	Surekha Zingde Shona Nag Pravesh Golay Sudhir Nair Sangita Sukumaran Deepa Ramani Akil Hirani Syed Hasan Girish Maru Nitin Shetty		Kasturi Awatagiri Sajiri Tengshe Vaibhavi Patil Umer Ahmed Khan Vaibhav Tambe

Future Steps: Reduction in carbon foot prints by going more paperless for all kinds of communications to and from the IEC. **Research Projects Approved by IEC III-2023**

Project Number	PI Name	Project title
900801	Dr. Sudeep Gupta	Amyloid hydrogel as a scaffold for the development of patient centric-breast cancer organoid for high-throughput screening of anticancer therapeutics.
900891	Dr. Supriya Chopra	Retrospective Cervical Cancer Oligo States (recurrence, metastasis) Multicenter Outcomes Study. (Retro-COSMOS)
900908	Dr. Gaurav Narula	"Evaluating Efficacy and Safety of HCAR19 in pediatric, adolescents and young adults with relapsed/ refractory B-Acute lymphoblastic leukemia (ESHA) - A Phase I b/II Clinical Trial
900913	Dr. Shalaka Joshi	A pilot study to evaluate ICG fluorescence imaging to predict flap necrosis in patients undergoing breast surgery.
900925	Dr. Kumar Prabhash	A Phase 3, Randomized, Double-Arm, Open-Label, Controlled Trial of ASP 1929 Photoimmunotherapy Versus Physician's Choice Standard of Care for the Treatment of Locoregional, Recurrent Head and Neck Squamous Cell Carcinoma in Patients Who Have Failed or Progressed on or After at Least Two Lines of Therapy, of Which at Least One Line Must Be Systemic Therapy
900939	Dr. Sanjeev Waghmare	A pilot study to evaluate ICG fluorescence imaging to predict flap necrosis in patients undergoing breast surgery.
900940	Dr. Sanjeev Waghmare	A Phase 3, Randomized, Double-Arm, Open-Label, Controlled Trial of ASP 1929 Photoimmunotherapy Versus Physician's Choice Standard of Care for the Treatment of Locoregional, Recurrent Head and Neck Squamous Cell Carcinoma in Patients Who Have Failed or Progressed on or After at Least

		Two Lines of Therapy, of Which at Least One Line Must Be Systemic Therapy
900949	Dr. Seema Gulia	Investigating the molecular mechanism of Sfrp1 in skin cancer and cancer stem cells
900950	Dr. Vikram Gota	Investigating the Wnt signaling and epigenetic modifications involved during differentiation of induced pluripotent stem cells into various lineages
900951	Dr. Dhanlaxmi Shetty	Investigating the Immunotherapeutic potential of invariant natural killer T cells (iNKT) cells in Triple negative Breast cancer (TNBC).
900952	Dr. Kajari Bhattacharya	A randomized, double-blind, placebo-controlled clinical trial to assess chemoprotective efficacy of Aqueous standardized extract of <i>Tinospora cordifolia</i> (AsSET) in patients receiving Docetaxel based chemotherapy for advanced / metastatic solid tumors
900956	Dr. Shilpee Dutt	Frequency and Prognostic Impact of IKZF1 deletions in BCR::ABL1 positive B-Acute Lymphoblastic Leukemia (B-ALL)
900958	Dr. Shalaka Joshi	Radiological evaluation of operability in post Neoadjuvant Chemotherapy (NACT) cases of borderline operable gingivobuccal carcinoma.
900959	Dr. Rahul Krishnatry	Engineering Perfusion Models of Human organs for Pre-Clinical and Biological Research
900960	Dr. Poonam Joshi	Prospective Evaluation of Bone health in post-Menopausal breast cancer patients with DEXA scan while receiving Aromatase Inhibitors. (BMD-AI)
900961	Dr. Shwetabh Sinha	Short Course Radiotherapy Based Total Neoadjuvant therapy with or without chlorophyllin (SCOTCH study)

900962	Dr. Vedang Murthy	Role of Raman spectroscopy in predicting recurrence/second in Oral cancer patients.
900964	Dr. Sudhir Vasudevan Nair	"A Phase II randomized study to assess the radioprotective effect of oral chlorophyllin in acute toxicity reduction for Head Neck cancer patients receiving radiation / chemoradiation.
900965	Dr. Supriya Chopra	Phase II study of Spatially Fractionated Radiation Treatment using Rapid Rod Technique for Gynecological Cancer.
900966	Dr. Syed Hasan	Deciphering the tumor-associated functions of pregnancy zone protein in breast cancer
900967	Dr. Sujata Lall	"Toxicity with empty bladder protocol during prostate stereotactic body radiotherapy (EMPTY-RT):
900968	Dr. Vedang Murthy	A phase 2 study"
900969	Dr. Reshma Ambulkar	"Effect of Perioperative Immune-Enhancing Diet in Head and Neck Cancer Surgery: A Randomized Control Trial (IEDiet-HN)
900970	Dr. Archya Dasgupta	A Prospective Phase 2 Study of Chlorophyllin for the Management of Brain Radionecrosis in Patients with Diffuse Glioma (CHROME).
900972	Dr. Vedang Murthy	Evaluation of multimodal artificial intelligence models for localized prostate cancer outcomes prediction.
900973	Dr. Abhishek Chatterjee	Sellar frameless fractionated radiosurgery for pituitary adenoma (Saffron): a retrospective dosimetric and clinical audit
900975	Dr. Vivek Bhat	Phase II study of Spatially Fractionated Radiation Treatment using Rapid Rod Technique for Gynecological Cancer.
900976	Dr. Ranjan Basak	Deciphering the tumor-associated functions of pregnancy zone protein in breast cancer

900978	Dr. Sudhir Vasudevan Nair	Comparative evaluation of disc diffusion method against Vitek -2 compact for performing in vitro Tigecycline susceptibility testing in Gram negative bacteria
900979	Dr. Shiva Kumar Thiagarajan	Oral Chlorophyllin for the Prevention of Toxicity in Radiotherapy for Bladder Cancer: A phase II trial.
900980	Dr. Manjunath Nookala	Can Six-minute walk test predict post-operative outcome in major GI surgeries? A prospective interventional study. (CAPACITY study)
900981	Dr. Murali Krishna Chilakapti	A Prospective Phase 2 Study of Chlorophyllin for the Management of Brain Radio necrosis in Patients with Diffuse Glioma (CHROME).
900984	Dr. Kajari Bhattacharya	Evaluation of multimodal artificial intelligence models for localized prostate cancer outcomes prediction.
900983	Dr. Shiva Kumar Thiagarajan	"Sellar frameless fractionated radiosurgery for pituitary adenoma (Saffron): a retrospective dosimetric
900985	Dr. Vikram Gota	and clinical audit"
900986	Dr. Amey Oak	Determination of MIC's to Amphotericin B, Voriconazole, Isavuconazole and Caspofungin by standardized Broth Microdilution method for Aspergillus isolates from clinical specimens of cancer patients at a tertiary care hospital
900988	Dr. Nishant Jindal	Prognostic value of droplet digital PCR in determining Her2 copy number and TP53 mutations in circulating tumor DNA in advanced unresectable gastric and gastroesophageal cancer

		patients receiving targeted therapy alone or with standard chemotherapy
900989	Dr. Tejpal Gupta	Survey of Long-term Survivors of Oral Cancer patients - Looking beyond Cancer Biology
900990	Dr. Snehal Shabrish	"Utility of intraoperative frozen section of bone marrow to assess the adequacy of bony resection margins following mandibulectomy for oral cancer.
900992	Dr. Anant Gokarn	Retrospective Analysis of Efficacy of Various Peripheral Blood Stem Cell Mobilization Regimens used In Lymphoma and Factors which Influence Successful Mobilization
900993	Dr. Akanksha Chichra	Pattern of sensitivity and resistance of stool surveillance over 13 years in a tertiary cancer centre and impact of stool surveillance guided selection of antibiotics during neutropenic sepsis in patients undergoing allogeneic HSCT.
900995	Dr. Amit Dutt	A prospective efficacy & safety study of intravenous Ferric CarboxyMaltose in breast cancer patients with iron deficiency anemia.
900994	Dr. Vedang Murthy	Comparison of Raman and molecular approaches in prediction of TKI resistance in CML patients
900996	Dr. Nivedita Chakrabarty	Retrospective evaluation of hypertrophic olivary degeneration in posterior fossa tumors
900997	Dr. Bhakti Trivedi	Factors predicting neck node involvement in recurrent oral squamous cell carcinoma (pN-ROC Study).
901000	Dr. Manju Sengar	Evaluation of Anti-tumour activity of Mitocurcumin on Patient-Derived Xenograft Model of Non-Small Cell Lung Carcinoma (NSCLC)
901001	Dr. Nikhil Patkar	A hospital-based study of survival in oral cancer patients of Tata Memorial Hospital (Mumbai)

901002	Dr. Arpita Sahu	Fertility Outcomes Post Autologous Stem Cell Transplantation for Hodgkin Lymphoma with LACE Conditioning Regimen
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RESEARCH REVIEW COMMITTEE:

IEC- III, ACTREC

Dr. Sachin Punatar - Chairperson

The Tata Memorial Centre dissolved the Data and Safety Monitoring Unit of Institutional Ethics Committee and constituted Research Review Committee (RRC) at TMH and ACTREC whose primary responsibility is to review the Serious Adverse Event reports (SAE's) and monitor research studies, as an institutional committee with effective from circular dated 24.11.2023.

The functioning of RRC is overseen by the TMC-Research Administration Council (TRAC).

The Research Review Committee (RRC), a unit of the IEC-III at Tata Memorial Centre is responsible for monitoring of patient safety during the course of the study in a manner that ensures the scientific and ethical integrity of the study. The RRC comprises of an intensivist, basic scientist, medical oncologists, surgical oncologists and radiation oncologists. The members of the RRC are trained in causality assessment as per WHO criteria and routinely implement the criteria in assessing the relatedness of adverse events.

The composition of the current RRC (1st April 2022 to 31st March 2024) is given below:

Sr. No.	Name & Position	Affiliation	Gender	Expertise
1	Sachin Punatar, Chairperson	Prof. Medical Oncology, E (Adult Hematolymphoid) ACTREC, TMC	Male	Clinician (Medical Oncology)
2	Manjunath Nookala Krishnamurthy, Co-chairperson	Scientific Officer F (Clinical Pharmacology)	Male	Clinical Pharmacologist
3	Dr Anant Gokarn, Member	Prof. Medical Oncology, E (Adult Hematolymphoid) ACTREC, TMC	Male	Clinician (Medical Oncology)
4	Dr Shwetabh Sinha, Member	Asst. Professor, Dept. of Radiation Oncology, ACTREC, TMC	Male	Clinician (Radiation Oncology)
5	Dr Madhura Sharma, Member	Asst. Professor. (Dental AND Prosthetic Surgeon)	Female	Clinician (Dental Surgeon)

6	Dr, Sejal Patwardhan, Member	Scientific Officer E, ACTREC TMC	Female	Basic Scientist
7	Dr. Debashree Lahiri, Member	Asst. Professor, Anesthesia, TMH TMC	Female	Clinician (Anesthesia)
8	Dr. Rohan Khadilkar, Member	Scientific Officer E, ACTREC TMC	Male	Basic Scientist
9	Reena Devi Phurailatpam, Member	Scientific Officer 'E' Medical Physicist 'E' Radiation Oncology, ACTREC TMC	Female	Medical Physicist
10	Dr. Sumeet Mirgh, Member	Asst. Prof. Medical Oncology, (Adult Hematolymphoid) ACTREC, TMC	Male	Clinician (Medical Oncology)

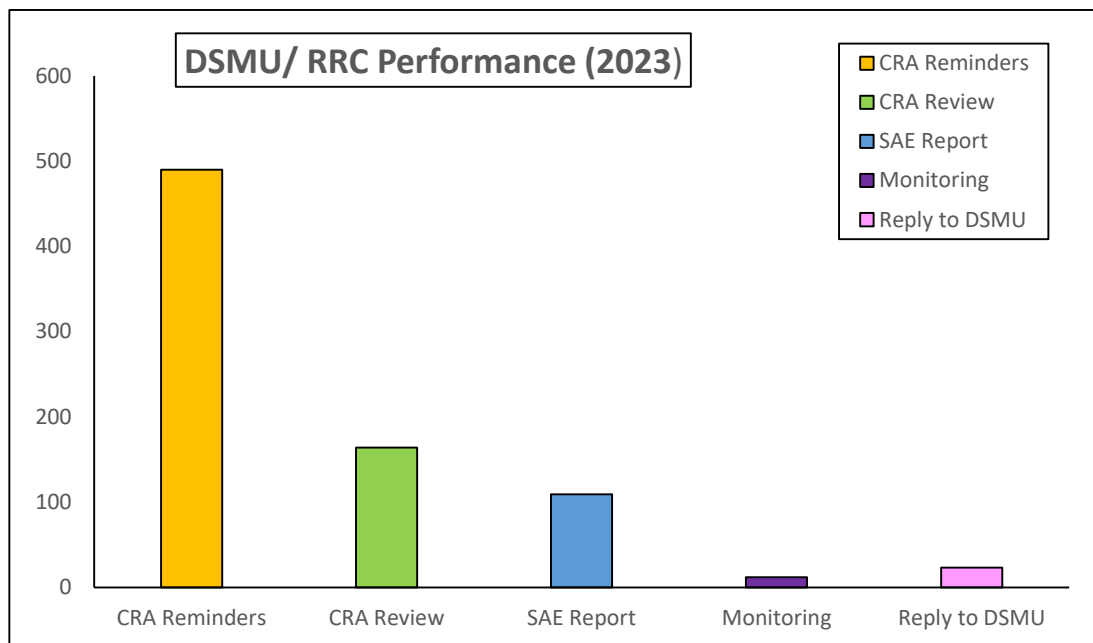
Responsibilities:

- Review of Serious Adverse Event reports (SAEs).
- Monitoring of overall progress of institutional (investigator initiated) trials and for cause monitoring of other trials as requested by the IEC.
- Initial review of Continue Review Application/ Annual Status reports.
- Review of Site Monitoring Report

RRC activities

The RRC conducted 12 meetings (Hybrid) during 2023, and the minutes were forwarded to IEC for further action. Besides the scheduled monthly meetings and review of SAEs reported on all the studies, SAEs on regulatory trials were evaluated continuously (to meet the 30 days' timeline) via email by a group of four members consisting of the two lead discussants and Member Secretary of RRC and IEC. The committee conducted 12 site monitoring visits, reviewed 109 SAE reports from 17 projects (51 events) and sent 490 reminders to PIs for Continue Review Application submission as required. A detailed initial review of 164 Continue Review Applications

(CRA) was done by RRC Member Secretary and comments from the RRC were forwarded to the IEC for further action. At every IEC meeting, the RRC Member Secretary or representative of the RRC presented the minutes of RRC meeting to IEC for further action. One monitoring report was discussed in the full board (09 SAE reports + 07 CRAs will be carried forward to 2024 for further decision) and based on IEC comments, recommendation and query letters were issued to PIs. A total of 23 replies were reviewed by RRC and their comments were forwarded to IEC.



Activities:

- Maintaining and updating a database for internal SAEs occurring at ACTREC that help in following up on significant events that have occurred on the trial.

ACADEMICS

Education continues to be one of the three core mandates of the Advanced Centre for Treatment, Research and Education in Cancer (ACTREC). In 2023, the campus environment remained strongly supportive of academic excellence, fostering interdisciplinary learning, rigorous research training, and continuous professional development. ACTREC's academic ecosystem integrates doctoral education, structured training programmes, conferences and workshops, research seminars, educational outreach, and public engagement, thereby strengthening its role as a national hub for cancer research education.

The Centre's educational activities encompass: (a) a robust Ph.D. programme in Life Sciences, admitting scholars from across the country through a national-level written examination followed by interviews; (b) comprehensive training programmes for undergraduate and postgraduate students from Indian and international institutions; (c) organisation of local, national, and international conferences, symposia, workshops, and training courses in biological and life sciences, along with CMEs and CNEs across oncology disciplines; (d) regular research seminars by visiting national and international scientists and clinicians; (e) facilitation of educational visits and Open Day programmes to showcase ACTREC's research facilities; and (f) organisation of a National Research Scholars' Meet by ACTREC research scholars. In addition, the Centre actively conducts public outreach initiatives to enhance cancer awareness.

Faculty members, clinicians, scientists, and staff are encouraged to participate in CMEs, workshops, and training courses, and to present their research findings at national and international forums. The academic vibrancy on campus is further reinforced by regular in-house data presentations, journal clubs, and interdisciplinary discussions involving both basic and clinical researchers.

Doctoral Programme

The Academic and Training Programme Office, chaired by Dr. Abhijit De, oversees the Ph.D. (Life Sciences) programme at ACTREC, which is affiliated with the Homi Bhabha National Institute (HBNI)—a Deemed-to-be University established in 2006 under the aegis of the University Grants Commission and encompassing all constituent units of the Department of Atomic Energy, Government of India.

The Programme Office works in close coordination with HBNI to ensure smooth conduct and compliance of doctoral processes. Its responsibilities include organising and documenting annual Doctoral Committee (DC) meetings (with a minimum of four DC meetings during a scholar's tenure), managing pre-synopsis and synopsis submissions, coordinating thesis submission (spiral-bound and final-bound versions), corresponding with external examiners, conducting open viva voce examinations, and submitting final evaluation reports to HBNI.

The Academic Committee of ACTREC oversees the overall conduct of the JRF–ACTREC entrance examination and the doctoral programme. This is supported by the SCOPE Cell and Steno Pool for student intake and academic coursework, ACTREC Administration for enrolment and fellowship matters, and the Academic and Training Programme Office for all HBNI-related coordination.



Standing left to right - Janvi Patel, Bhavana Thakur, Baishali Tamuli, Neha Gupta, Vaishali Singh, Arpita Priyadarshini, Pooja Mourya, Avi Pandey, Sneha Patil, Jahnavi Singh, Sayali Khisty, Pratibha Koppala

Seated left to right - Gunakaran S, Pankaj Mahato, Shubhankar Dutta, Ashish Shingade, Advait Dubey, Atharva Mahajan, Ankit Dekate

During the period January–December 2023, ACTREC hosted a vibrant cohort of doctoral scholars pursuing Ph.D. degrees in Life Sciences, reflecting the Centre’s continued commitment to nurturing high-quality research talent in cancer biology and allied disciplines. In 2023, 122 students enrolled for the Ph.D. program and 20 new batch of students joined for the program.

Award of the Ph.D. Degree in Life Sciences (HBNI)

During 2023, 15 scholars successfully completed their doctoral program and were awarded the Ph.D. degree in Life Sciences by HBNI. These dissertations covered diverse and cutting-edge areas of cancer biology, genomics, proteomics, signaling pathways, translational research, and therapeutic innovations, underscoring the breadth and depth of research at ACTREC.

The successful completion of these doctoral programmes highlights the Centre’s strong mentoring framework, state-of-the-art research infrastructure, and emphasis on scientific rigor and innovation.

Sr. No.	Name of the Student with Guide	Thesis Title
1	Mr. Souvik Mukherjee Dr. Pritha Ray	Consequence of differential activation of Notch signaling in ovarian cancer progression and chemoresistance
2	Mr. Mudassar Ali Khan Dr. Ashok Varma	Structural Evaluation of Germline Missense Mutations Causing Hereditary Breast Cancer
3	Mr. Saim Mulla Dr. Prasanna Venkatraman	Proteosomal Chaperones and the Cross-talk with NF-KB Signaling- An Integrated network and Experimental approach
4	Ms. Naini Chakraborty Dr. Dibyendu Bhattacharyya	Study of Organelle Dynamics, Relative Organelle Positioning and Inter-Organelle Contact Sites
5	Ms. Rashmi Puja Dr. Kakoli Bose	Understanding the role VRK2A in regulation of apoptosis and cancer
6	Ms. Anagha Anil Acharekar Dr. Shilpee Dutt	Understanding the role of radiation induced cell-cell fusion in glioblastoma
7	Ms. Neelima Dr. Amit Dutt	Characterization of long non-coding RNAs in human breast cancer
8	Mr. Bhasker D Dr. Amit Dutt	Characterizing genome-wide aberrations that underlie oral cancer
9	Mr. Abhay Ramaji Uthale Dr. Tanuja Teni	Deciphering the role of Mcl-1 in stress and autophagy in oral cancers
10	Mr. Pranay Dey Dr. Abhijit De	Imaging molecular interaction dynamics in drug resistance breast cancer
11	Mr. Abhiram Girish Natu Dr. Sanjay Gupta	Understanding the role of epigenetic alterations in acquirement of chemoresistance in cancer
12	Mr. Siddhartha Anup Barua Dr. Ashok Varma	Structure-based approach to elucidate protein-protein interactions of BRCT repeats
13	Ms. Bhagya Shree Choudhary Dr. Sorab Dalal	Identification of mechanisms required for tumor progression upon LCN2 overexpression
14	Ms. Dievya Dilip Gohil Dr. Vikram Gota	Evaluation of phytochemicals with immunomodulatory activity for graft versus host disease (GVHD) prophylaxis
15	Ms. Suchita Dubey Dr. Ashok Varma	Structural and functional basis to evaluate PML-RARA response to arsenic trioxide

Training Programme

ACTREC's training programme continued to play a vital role in capacity building and skill development in 2023. The programme caters to: (a) undergraduate and postgraduate students undertaking short-term projects for Bachelor's or Master's dissertations; (b) graduates seeking hands-on research experience; (c) summer trainees utilising their academic breaks for research exposure; and (d) students or healthcare professionals visiting as observers to learn specialised techniques.

In 2023, 293 Trainees in Life Sciences and 67 Medical observers are placed under the close supervision of senior and mid-level scientists, clinicians, and technical officers, ensuring structured learning and meaningful research engagement. The training programme not only strengthens individual competencies but also contributes to building a skilled workforce in biomedical and cancer research.

Advanced Training Course in Medical Laboratory Technology (AMLT)

The Advanced Training Course in Medical Laboratory Technology (AMLT), jointly coordinated by Dr. Preeti Chavan, Dr. Vivek Bhat, and Dr. Shashank Ojha, continued in 2023 with its objective of providing advanced theoretical knowledge and intensive hands-on training in medical laboratory sciences. The one-year course, followed by a mandatory one-year bond period, is designed to prepare skilled technologists capable of working in accredited hospital laboratories or independently functioning diagnostic laboratories.

The AMLT curriculum includes extensive practical exposure to Hematology, Clinical Biochemistry, Microbiology, Histopathology, and Transfusion Medicine, using state-of-the-art instrumentation and advanced diagnostic technologies. Trainees also receive structured training in internal quality control, external quality assurance programmes, and laboratory accreditation practices, along with active participation in academic activities at ACTREC.

Educational Visits and Outreach

Educational visits form an integral part of ACTREC's academic outreach, offering students and faculty from universities and colleges an overview of the Centre's research and clinical activities, followed by guided visits to key departments and facilities.

In 2023, ACTREC continued to facilitate OPEN DAY for science graduate and undergraduate students to visit the laboratories for promoting science and interaction with experts, fostering scientific curiosity, and motivating students towards careers in biomedical and cancer

research. In two days over 617 students and 46 faculty from 34 colleges from Mumbai and Navi Mumbai visited.

The center also facilitated the visit of 146 students and 10 faculty members of Bharati Vidyapeeth College of Engineering, Navi Mumbai for getting exposure to advanced 3D Printing laboratory, advanced facilities and equipment in cancer biology in the campus. These engagements play an important role in strengthening academic linkages and enhancing awareness of translational research in oncology.



CONFERENCES, SYMPOSIA, WORKSHOPS, EBMS & CMES

6 January	Series on Advancements in Cell Therapy - SACT 2023 Organizing Secretaries: Dr. Albeena Nisar
7–8 January	Annual scientific national symposium on cellular therapy workshop Dr. Gaurav Narula, TMC Dr. Anant Gokarn
12-16 January	42nd Annual Conference of the Indian Association of Cancer Research - IACR 2023 Organizer: Dr. Sorab Dalal, Dr. Manoj Mahimkar, Dr. Pritha Ray
18 February	Wound Care Conference Dr. Vinay Kant Shankhdhar, Professor and Head, Plastic and Reconstructive Surgery, Tata Memorial Centre
30 March – 2 April	AAZPIRE Workshop Dr. Vikram Gota
21-22 September	First National Symposium on Integrating Traditional Knowledge in Evidence Based Medicine Organizing Committee: Dr. Pankaj Chaturvedi, Dr. Prasanna Venkatraman, Dr. Vikram Gota, Dr. Jyoti Kode, Mr. Satish Bhangale
26 September	G20 University Connect Event, New Delhi
29-30 September	SACT-2023, Series on Advancements in Cell Therapy, An International Symposium and Hands-On Workshop Series, 2nd SACT Event, CAR-T & Cell Therapy Centre (CTCTC), TMC, MUMBAI Organizing Secretaries: Dr. Albeena Nisar
11 October	One Day Hybrid Workshop on Innovate & Patent: Roadmap to Intellectual Property Convener: Dr. Vikram Gota Organizing Committee: Dr. Kavita Pal & Dr. Manjunath Nookala
18 October	AWS Cloud Computing Workshop 2023 Dr. Pratik Chandrani
31 October–1 November	AACR on Campus 2023 at ACTREC Scientific Organizing Committee: Dr. Prasanna Venkatraman, ACTREC Dr. Sanjay Gupta, Dr. Pritha Ray, Dr. Sharath Chandra Arandkar, Dr. Sachin Punatar, Dr. Shwetabh Sinha
18–19 November	Tutorials in Haemodynamic Monitoring & Therapy in Critical Care'22 (THEMATICC'22) Conference Dr. Shilpushp Bhosale
22-24 November	12th PIDD Workshop Organizer: Dr. Pradip Chaudhary
30 November – 1 December	ACTREC Open Day 2023
7-8 December	NRSM 2023 Organizer: NRSM Scholars

WEBINARS

<p>22 February</p>	<p>Global Cancer Consortium – Pancreatic Cancer Mini-Symposium Title: Pancreatic Cancer Mini-Symposium 1) Michael J. Pishvaian, MD, PhD. Associate Professor, Department of Oncology, Johns Hopkins University School of Medicine, Washington DC, USA “Precision Medicine in Pancreatic Cancer: Proven and Novel Therapeutic Targets to Improve Patient Outcomes” 2) Kirsten L. Bryant, PhD, Assistant Professor, Dept. of Pharmacology, Lineberger Comprehensive Cancer Center, University of North Carolina at Chapel Hill, NC, USA “Combined Inhibition of the RAS Pathway and Autophagy as a Treatment Approach for Pancreatic Cancer” 3) Núria Malats, MD, PhD, Head, Genetic and Molecular Epidemiology Group, Spanish National Cancer Research Centre (CNIO), Madrid, Spain "Epidemiology and Microbiome Biomarkers in Pancreatic Cancer" 4) Giulia Biffi, PhD, UKRI Future Leaders Fellow, Group Leader, University of Cambridge CRUK Cambridge Institute, Cambridge, United Kingdom “Deconstructing Pancreatic Ductal Adenocarcinomas” 5) David G. DeNardo, PhD, Professor, Department of Medicine, Washington University School of Medicine, St. Louis, USA “Leveraging the Tumor Microenvironment to Improve Responses to Therapy” 6) Florencia McAllister, MD, Associate Professor, Department of Clinical Cancer Prevention, UT MD Anderson Cancer Center, Houston, TX, USA “Microbial and Immune Matters in Pancreatic Cancer”</p>
<p>24 February</p>	<p>Global Cancer Consortium – Cancer Biology & Therapy Series Title: Hallmarks of Cancer Metastasis and the Role of Advocates in Cancer Research Danny R. Welch, PhD, Hall Family Professor in Molecular Medicine, Associate Director, Cancer Education, Kansas University Cancer Center, Kansas City, Kansas, USA</p>
<p>Workshop Week 1: 13-15 March Week 2: 20-22 March</p>	<p>Global Cancer Consortium – Cancer Omics Training Workshop Speaker: Sooryanarayana (Soory) Varambally MS, PhD, Professor, Department of Pathology, Director of Translational Oncologic Pathology Research, Senior Scientist, Informatics Institute and O’Neal Comprehensive Cancer Center, University of Alabama at Birmingham, AL, USA</p>
<p>31 March, 14 & 28 April, 12 & 26 May, 9 & 23 June, 7 July</p>	<p>Global Cancer Consortium – Public Lecture Series Title: Understanding Cancer Without Scientific Lexicon Suresh Mohla, PhD, Former, Associate Director, Chief, Tumor Biology and Metastasis Branch, Program Director, Tumor Microenvironment Network (TMEN), National Cancer Institute, NIH, Bethesda, Maryland, USA</p>
<p>31 March</p>	<p>Global Cancer Consortium – Cancer Engineering Series Title: Accelerating the Impact of Technology and Innovation for Global Cervical Cancer Prevention Nimmi Ramanujam, PhD, Robert W. Carr, Jr., Distinguished Professor of Biomedical Engineering, Director, Center for Global Women's Health Technologies’ Pratt, School of Engineering, Duke University, Durham, NC, USA</p>

<p>10 June</p>	<p>Global Cancer Consortium – Mini Symposium Title: Advances in Prostate Cancer Therapeutics Scott T. Tagawa, MD, MS, FACP. Professor of Medicine and Urology, Weill Cornell Medicine, Attending Physician at New York-Presbyterian – Weill Cornell Medical Center, New York, NY, USA “PSMA-targeted Drugs, Radionuclide Therapy and Immunotherapy”</p> <p>S arki A. Abdulkadir, MD, PhD. John T. Grayhack, MD, Professor of Urological Research, Robert H. Lurie Comprehensive Cancer Center, Northwestern University, Chicago, IL, USA “Determinants of Therapeutic Resistance in Prostate Cancer”</p> <p>Emmanuel S. Antonarakis, MD. Clark Endowed Professor of Medicine, Associate Director of Translational Research, Masonic Cancer Center, University of Minnesota, Minneapolis, MN, USA “B7-H3-directed Therapeutics in Prostate Cancer”</p> <p>Neeraj Agarwal, MD, FASCO. Professor of Medicine, Presidential Endowed Chair of Cancer Research, Huntsman Cancer Institute, University of Utah, Salt Lake City, UT, USA “PARPi Combination Treatments for Prostate Cancer”</p> <p>Akash Patnaik, MD, PhD, MMSc. Assistant Professor of Medicine, Section of Hematology/Oncology, Department of Medicine, University of Chicago, Chicago, IL, USA “Novel Precision Medicine/Immunotherapeutic Strategies in Aggressive-Variant Prostate Cancer”</p> <p>Tanya Dorff, MD. Associate Professor and Section Chief, GU Disease Program, Department of Medical Oncology & Therapeutics Research, City of Hope Comprehensive Cancer Center, Duarte, CA, USA “CAR-T Cells in Patients with Metastatic Castration-Resistant Prostate Cancer”</p>
<p>28 July</p>	<p>Global Cancer Consortium – Cancer Biology and Therapy Series Topic: Rapid Affordable Medical Innovation: Unleashing the Potential of Drug Repurposing in Cancer and COVID Vikas P. Sukhatme, MD, ScD, Woodruff Professor of Medicine Emory School of Medicine, Founding Director, Morningside Center for Innovative and Affordable Medicine, Emory University, Atlanta, GA USA</p>
<p>24 August</p>	<p>Global Cancer Consortium – Cardio-Oncology Series Topic: Immune Checkpoint Inhibitors and the Heart – the Good, the Bad and the Ugly Dipti Gupta, MD, MPH, Cardio-Oncologist and Director, Cardio-Oncology Clinical Research Fellowship Program, Memorial Sloan Kettering Cancer Center, New York, NY, USA</p>

GUEST SEMINARS

13 February	Targeting GBP1 to overcome resistance to cancer treatment Prof. Sanjay Malhotra, Professor Cell, Developmental & Cancer Biology, Director, Center for Experimental Therapeutics, Knight Cancer Institute, Oregon Health & Science University, Portland
21 February	TOR signalling regulates epithelial cell shape transition in <i>Drosophila</i> oogenesis Prof. Mohit Prasad, Department of Biological Sciences, IISER, Kolkata
15 March	Accelerator beams and their applications in bio-science and medical science Dr. Arup Bandyopadhyay, The Head - Head - Accelerator Physics Group, Variable Energy Cyclotron Centre (VECC), Kolkata
3 April	Democratising Sequencing: Technology and Applications of Oxford Nanopore Dr. Lakmal Jayasinghe, VP-R & D-Oxford Nanopore Technologies plc, UK
28 April	Endoplasmic reticulum – mitochondria crosstalk maintains cellular homeostasis Dr. Oishee Chakrabarti, Professor, Saha Institute of Nuclear Physics Unravelling the role of ‘histone readers’ in human health and diseases Dr. Chandrima Das, Professor, Saha Institute of Nuclear Physics
27 July	Mitochondria and what we don’t know about them: from rare diseases to cancer treatments Dr. Alex Lyakhovich, Faculty of Engineering and Natural Sciences, Sabanci University, Istanbul, Turkey
28 July	Molecular and metabolic mechanisms that dictate physiology: aging and age-related diseases Dr. Ullas Kolthur, Professor, Tata Institute of Fundamental Research, Mumbai & TIFR-Hyderabad
31 August	Unveiling the Hypoxia Puzzle: Investigating Gene Regulation and Alternative Splicing in Cancer Dr. Sanjeev Shukla, Associate Professor, Department of Biological Sciences, Indian Institute of Science Education and Research (IISER) Bhopal
3 October	Understanding the Nuances of Research and Publication Ethics Dr. Sabuj Bhattacharyya, Scientist and Research Ethics and Integrity Officer at DBT-inStem
4 October	Fuels and Additives for the Human Machines Dr. Mahaveer Swaroop Bhojani, President, Hut-K Inc and Back2Roots LLC, USA
5 December	Mechanical signaling enhances neutrophil defense Dr. Amitabha Mukhopadhyay, Instructor, Dept. of Pharmacology & Regenerative Medicine, University of Illinois Chicago
3 January	An Overview of Structural Biology Research at the Australian Synchrotron Dr. Ashish Sethi, Beamline Scientist- Scattering Team, Research Translation and Synchrotron, Australia
8 January	Using principles of stem cells to understand lineage hierarchies in breast cancer Dr. Shaheen Sikandar, Assistant Professor, University of California Santa Cruz, USA

FACULTY SEMINARS

10 April	<p>Developing novel immunotherapeutic interventions based on comprehensive understanding of spontaneous immune responses in epithelial cancers</p> <p>Dr. Subir Biswas, Principal Investigator & Scientific Officer 'E', Ramalingaswami re-entry fellow, Tumor Immunology and Immunotherapy, ACTREC, Tata Memorial Centre</p>
4 May	<p>Ribosome heterogeneity in growth and disease</p> <p>Dr. Sunil Shetty, Principal Investigator & Scientific Officer 'E', ACTREC</p>
11 August	<p>Life, the Universe and Everything: why we study 14-3-3 proteins</p> <p>Dr. Sorab Dalal, PI, Sorab Lab</p>
15 September	<p>Are SLiMs compatible with evolution?</p> <p>Dr. Prasanna Venkatraman, PI, Prasanna Lab & DD CRI, ACTREC</p>
13 October	<p>The ethical conduct of human research</p> <p>Dr. Sudhir V. Nair, Head, Department of Surgical Oncology, ACTREC</p>
10 November	<p>Light Camera InterAction – taking luciferases to the action point</p> <p>Dr. Abhijit De, PI, De Lab</p>

ACTREC ALUMNI SEMINARS 7 CUTTING-EDGE LECTURE SERIES

28 July	<p>Molecular and metabolic mechanisms that dictate physiology: aging and age-related diseases</p> <p>Dr. Ullas Kolthur, Professor, Tata Institute of Fundamental Research, Mumbai & TIFR-Hyderabad</p>
5 December	<p>Mechanical signaling enhances neutrophil defense</p> <p>Dr. Amitabha Mukhopadhyay, Instructor, Dept. of Pharmacology & Regenerative Medicine, University of Illinois Chicago</p>
21 November	<p>Identification and targeting of glioma intrinsic factors that determine response to chemotherapies and immunotherapies</p> <p>Dr. Crismita Dmello, Research Assistant Professor, Department of Neurological Surgery, Northwestern University, Chicago</p>
20 December	<p>Cancer associated mutations lead to altered differentiation and mitochondrial dynamics in oral SCC</p> <p>Dr. Priyanka Bhosale, Research Associate, Watt Lab, Center for gene therapy and regenerative medicine, Kings College, London</p>

FACULTY AND STAFF ACHIEVEMENTS

Mr. Shyam Chavan	On being awarded a bronze award for the CAA “Talent Hunt-2021” a mega painting competition on 4 th January, 2022 held from September to December 2021 at New Delhi
Dr. Rohan Khadilkar, PI, Khadilkar Lab, CRI, ACTREC	Awarded the “National Academy of Sciences India (NASI) Platinum Jubilee Young Scientist Award 2022” For extensive work on Identification of molecular regulators of cellular signalling circuitry governing stem cell and tissue homeostasis held at NASI in New Delhi, India
Dr. Kakoli Bose, PI, Bose Lab, CRI, ACTREC	For their featured article in SciSoup India titled ‘Unraveling The Conundrum of Multitasking HtrA2-A Potential Therapeutic Target” as a part of SciSoup’s Interview series named “Unfolding Science with Scisoup”. Interview was based on their distinctive research finding published in “Structure – Cell Press Journal”
Mr. Pratik Pradeep Poladiya, Composite Lab, CRC, ACTREC	Oral Presentation (Faculty) on “Path to Lab Accrediation and Improvements” during the 49 th ACBICON 2023 Kerala at AI Saj Convention Centre, Kazhakkottam, Thiruvananthapuram Organized by Association of Clinical Biochemists of India (ACBI) and Believers Church Medical College Hospital (BCMCH), Thiruvalla, Kerala During September 14-16, 2023

STUDENT AWARDS

Ms. Deepshikha Dutta, ACTREC-SRF, Hasan Lab, CRI, ACTREC	On being awarded the Dr. J.C. PATEL BEST PAPER AWARD 2022 for “ <i>Venetoclax induces autophagy and apoptosis by targeting Stat3/Bcl2 axes in arsenic trioxide resistant acute promyelocytic leukemia</i> ” in Indian Society of Haematology and Blood Transfusion (ISHBT) Biswa Bangla Convention Centre, Kolkata, West Bengal during 3 rd -6 th November, 2022
Mr. Anup Jha, DBT-JRF, Hasan Lab, CRI, ACTREC	On being awarded the First Prize in ‘National Blog Writing Competition, Group-I category’ on “ <i>Leveraging Science, Technology and Innovation for an Atmanirbhar Bharat</i> ” (VIGYANIKA, 8 TH India International Science Festival 2022) Organized by Ministry of Science & Technology, Ministry of Earth Sciences, Department of Space, Department of Atomic Energy, Government of India and Government of Madhya Pradesh in Association with Vijnana Bharati (VIBHA) held at MANIT, Bhopal, Madhya Pradesh During January 22-23, 2023
Ms. Panchali Saha, ACTREC-SRF, Chilakapati Lab, CRI, ACTREC	On being awarded the Poster presentation during the International Conference on Translational Research & Applications Organized by Manipal School of Life Sciences in association with Manipal OPTICA

	Student Chapter, Manipal Academy of Higher Education, Manipal, India During August 3-6, 2023
Ms. Manasi Nagare, ACTREC-SRF, Kode Lab, CRI, ACTREC	On being awarded the Poster presentation on “Delineating the crosstalk between innate immune inflammasome pathway, AML blasts and Bone Marrow microenvironment” during the Immunocon 2023 (Theme: Frontiers in Immunology: A Gateway to Healthcare) at The Golden Jubilee Conference of the Indian Immunology Society Organized by All India Institute of Medical Sciences, New Delhi, India During October 5-8, 2023
Mr. Girish Panigrahi, ACTREC-SRF, Clinical Pharmacology Lab, CRI, ACTREC	On being awarded, the best Poster award entitled of the “Mitocurcumin Serves as A Potential Drug Candidate for The Treatment Of Advanced Non-Small Lung Cancer Through Modulating Glutathione Redox Cycle” at 7th Annual International Conference on Translational Research During October16-18 th , 2023 at AIIMS, New Delhi.

ACTREC SCIENTIFIC PUBLICATIONS

Publications in International Journals

1. Acharekar A, Bachal K, Shirke P, Thorat R, Banerjee A, Gardi N, Majumder A, Dutt S (2023). Substrate stiffness regulates the recurrent glioblastoma cell morphology and aggressiveness. *Matrix Biology*. 115: 107-127. PMID: 36563706
2. Anjekar A, Jadhav P, Hole A, Panneerselvam R, Ingle A, Yamamoto T, Noothalapati H, CM Krishna (2023). Removal of hemolysis interference in serum Raman spectroscopy by multivariate curve resolution analysis for accurate classification of oral cancers. *Sensors and Diagnostics*. 2:390-97.
3. Anwaar A, Varma AK, Baruah R (2023). In silico-based structural evaluation to categorize the pathogenicity of mutations identified in the RAD class of proteins. *ACS Omega*. 8(11):10266-10277. PMID: 36969410
4. Asija S, Chatterjee A, Goda JS, Yadav S, Chekuri G, Purwar R. (2023). Oncolytic immunovirotherapy for high-grade gliomas: A novel and an evolving therapeutic option. *Frontiers in Immunology*. 14:1118246. PMID: 37006286
5. Badwe RA, Parmar V, Nair N, Joshi S, Hawaldar R, Pawar S, Kadayaprath G, Borthakur BB, Rao Thammineedi S, Pandya S, Balasubramanian S, Chitale PV, Neve R, Harris C, Srivastava A, Siddique S, Vanmali VJ, Dewade A, Gaikwad V, Gupta S (2023). Effect of Peritumoral Infiltration of Local Anesthetic Before Surgery on Survival in Early Breast Cancer. *Journal of Clinical Oncology*. 41(18):3318-3328 PMID: 37023374.
6. Bagal B, Sarma R, Dey S, Nayak L, Bonda A, Goda J, Khanna N, Dasgupta A, Kakoti S, Chatterjee A, Jain H, Epari S, Laskar S, Sengar M, Gupta T (2023). Lenalidomide following whole-brain radiotherapy in patients with primary central nervous system lymphoma ineligible for intensive systemic therapy. *Br J Haematol*. 201(1):150-153. PMID: 36682363.
7. Bagal S, Budukh A, Singh Thakur J, Dora T, Qayyumi B, Khanna D, Fernandes D, Chakravarti P, Singh R, Patil S, Dikshit R, Chaturvedi P (2023). Head and neck cancer burden in India: an analysis from published data of 37 population-based cancer registries. *ecancer*.17:1603. PMID: 37799939
8. Ballinger ML, Pattnaik S, Mundra PA... Puri A, Sarin R (2023). et al. Heritable defects in telomere and mitotic function selectively predispose to sarcomas. *Science*. 379(6629):253-260. PMID: 36656928.
9. Banerjee A, Halder A, Jadhav P, Sarkar A, Hole A, Shastri J, Agrawal S, CM Krishna, Srivastava S (2023). SARS-CoV-2 severity classification from plasma sample using Confocal Raman spectroscopy. *Journal of Raman Spectroscopy*. 54(1): 124-132. PMID: 36713977
10. Barrios C, de Lima Lopes G, Yusof MM, Rubagumya F, Rutkowski P, Sengar M (2023). Barriers in access to oncology drugs - a global crisis. *Nature Reviews Clinical Oncology*. 20(1):7-15. PMID: 36380066
11. Baviskar Y, Likonda B, Pant S, Mokal S, Pawar A, Dasgupta A, Chatterjee A, Gupta T (2023). Short-course palliative hypofractionated radiotherapy in patients with poor-prognosis high-grade glioma: Survival and quality of life outcomes from a prospective phase II study. *Clinical Oncology*.35(10): e573-e581. PMID: 37455146
12. Bhatla N, Muwonge R, Malvi SG, Joshi S, Poli URR, Lucas E, Esmey PO, Verma Y, Shah A, Zomawia E, Pimple S, Jayant K, Hingmire S, Chiwate A, Vashist S, Mishra G, Jadhav R, Siddiqi M, Anantharaman D, Panicker G, Butt J, Sankaran S, Kannan TPRA, Varghese R, Kartha P, Pillai MR, Waterboer T, Müller M, Sehr P, Unger ER, Sankaranarayanan R, Basu P (2023). Impact of age at vaccination and cervical HPV infection status on binding and neutralizing antibody titers at 10 years after receiving single or higher doses of quadrivalent HPV vaccine. *Human Vaccines Immunotherapeutics*. 19(3):2289242. PMID: 38078840.
13. Bindal A, Mittal P, Shinghal A, Scaria L, Prajapati K, Swamidas J, Gurram L, Berger D, Sturdza A, Chopra S (2023). Sigmoid dose accumulation and reporting for multifractionated brachytherapy for cervical cancer: Methodological development of sigmoid points through virtual endoscopic method. *Brachytherapy*. 22(3):325-333. PMID: 36882345

14. Biswas D, Halder A, Barpanda A, Ghosh S, Chauhan A, Bhat L, Epari S, Shetty P, Moiyadi A, Ball GR, Srivastava S (2023). Integrated Meta-Omics Analysis Unveils the Pathways Modulating Tumorigenesis and Proliferation in High-Grade Meningioma. *Cells*. 12(20): 2483.PMID: 37887327
15. Biswas S, Mandal G, Anadon C, Chaurio R, Lopez-Bailon L, Nagy M, Mine J, Hänggi K, Sprenger K, Innamarato P, Harro C, Powers J, Johnson J, Fang B, Eysa M, Nan X, Li R, Perez B, Curiel T, Yu X, Rodriguez P, Conejo-Garcia J (2023). Targeting intracellular oncoproteins with dimeric IgA promotes expulsion from the cytoplasm and immune-mediated control of epithelial cancers. *Immunity*.56(11):2570-2583.e6 PMID: 37909039
16. Budukh A, Kadam P, Singh D, Thakur JS (2023). Innovative field methods for residence confirmation and updating follow-up status of cancer cases: Experience from rural cancer registry, Punjab, India. *Clinical Epidemiology and Global Health*. 22: 101329.
17. Burikhanov R, Ganguly S, Ellingson S, Sviripa VM, Araujo N, Li S, Venkatraman P, Rao M, Choughule A, Brainson CF, Zhan CG, Spielmann HP, Watt DS, Govindan R, Rangnekar VM (2023). Crizotinib induces Par-4 secretion from normal cells and GRP78 expression on the cancer cell surface for selective tumor growth inhibition. *American Journal of Cancer Research*. 13(3):976-991. PMID: 37034206
18. Butti R, Kapse P, Bhadauriya G, Ahmad S, Chaubal R, Parab P, Kadam R, Mahapatra SS, Shet T, Dutt A, Gupta S, Kundu GC (2023). Development and characterization of a patient derived orthotopic xenograft of therapy resistant breast cancer. *Oncology Reports*. 49(5): 99. PMID: 36999625
19. Chakraborty N, Jain BK, Shembekar S, Bhattacharyya D (2023). ER exit sites (ERES) and ER-mitochondria encounter structures (ERMES) often localize proximally. *FEBS Letters*. 597(2):320-336. PMID: 36103135
20. Chakraborty S, Baruah R, Mishra N, Varma AK (2023). In-silico and structure-based assessment to evaluate pathogenicity of missense mutations associated with non-small cell lung cancer identified in the Eph-ephrin class of proteins. *Genomics and Informatics*.21(3):e30.PMID: 37813626
21. Chakraborty S, Shenoy PS, Mehrotra M, Phadte P, Singh P, Rekhi B, Ray P (2023). Through the looking Glass: Updated insights on ovarian cancer diagnostics. *Diagnostics*. 13(4): 713. PMID: 36832201
22. Chakravorty G, Ahmad S, Godbole MS, Gupta S, Badwe RA, Dutt A (2023). Deciphering the mechanisms of action of progesterone in breast cancer. *Oncotarget*. 14: 660-667.PMID: 37395734
23. Chatterjee G, Patkar N (2023). United we stand, divided we fall. Multicentre standardization of measurable residual disease assessment in acute leukaemia is the way forward. *British Journal of Haematology*. 200(3):277-279 PMID: 36282207
24. Chaubal K, Shetty D, Mohanty P, Walunj K, Tembhare P, Patkar N, Narula G (2023). B-cell acute lymphoblastic leukemia with t(5;9)(q22;q34.1) involving the SNX2 and ABL1. *Atlas of Genetics and Cytogenetics in Oncology and Haematology*.
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27. Chikhale V, Goswami N, Khan MA, Borah P, Varma AK (2023). Evaluation of pathogenicity and structural alterations for the mutations identified in the conserved region of the C-terminal kinase domain of Human-Ribosomal S6 Kinase 1. *ACS Omega*. 8(18):16273-16283. PMID: 37179615
28. Chilukuri S, Mallick I, Agrawal A, Maitre P, Arunsingh M, James FV, Kataria T, Narang K, Gurram BC, Anand AK, Utreja N, Dutta D, Pavamani S, Mitra S, Mallik S, Mahale N, Chandra M, Chinnachamy AN, Shahid T, Raghunathan MS, Kannan V, Mohanty SK, Basu T, Hotwani C, Panigrahi G, Murthy V (2023). Multi-institutional clinical outcomes of biopsy gleason grade group 5 prostate cancers treated with

- contemporary high-dose radiation and long-term androgen deprivation therapy. *Clinical oncology*. 35(7):454-462. PMID: 37061457
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 32. Chougule A, Chandrani P, Noronha V, Pange P, Kale S, Nikam A, Nambiar K, Marchande D, Durve A, Gupta V, Jagtap V, Tiwrekar P, Menon N, Joshi A, Kaushal R, Pai T, Patil V, Dutt A, Banavali S, Prabhaskar K (2023). Real world evidence of EGFR targeted therapy in non-small cell lung cancer– a brief report of decade long single centre experience. *JTO Clinical and Research Reports*. 4(11):100566.
 33. Christie J, Anthony CM, Harish M, Mudartha D, Farooq SBUD, Venkatraman P (2023). The interaction network of the proteasome assembly chaperone PSMD9 regulates proteostasis. *FEBS Journal*. 290(23):5581-5604. PMID: 37665644.
 34. Das CG, Kumar VG, Kode J (2023). Green nanotechnology approaches using *Mesobacillus jeotgali* ADCG SIST 4 strain synthesized gold nanoparticles for anticancer studies. *Journal of Drug Delivery Science and Technology*.
 35. Das L, Shekhar S, Chandrani P, Varma AK. (2023) In silico structural analysis of secretory clusterin to assess pathogenicity of mutations identified in the evolutionarily conserved regions. *Journal of Biomolecular Structure & Dynamics*. 41(2):469-478. PMID: 34821197.
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Patents Granted in 2023

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