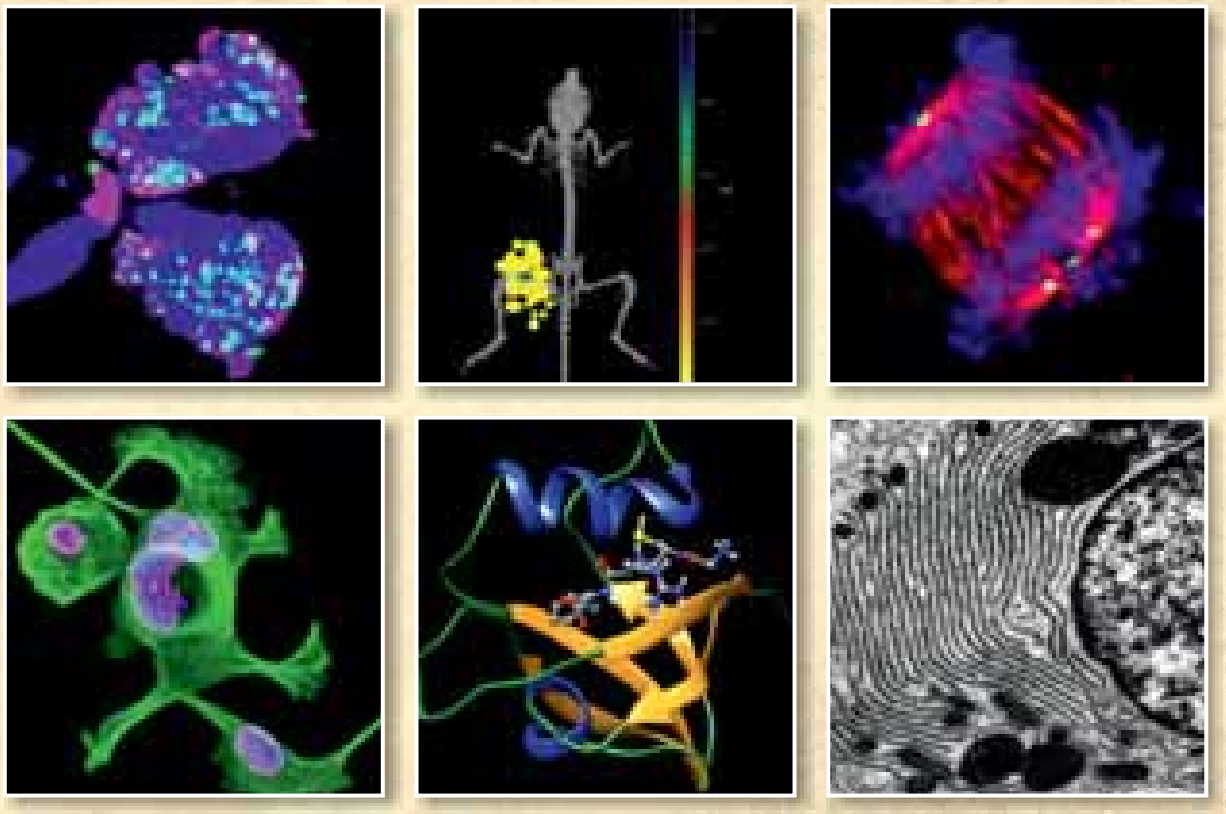
ADVANCED CENTRE FOR TREATMENT, RESEARCH & EDUCATION IN CANCER (ACTREC)



Annual Report

2020

ADVANCED CENTRE FOR TREATMENT, RESEARCH & EDUCATION IN CANCER (ACTREC)

Contents

Message from Director, ACTREC

Like most other institutions, the Advanced Centre for Treatment, Research and Education in Cancer (ACTREC) faced a very difficult and unique period in 2020 and 2021 – an annus horribilis, if you will. The Covid-19 pandemic disrupted most previous plans and forced us to innovate in previously unimaginable ways. We are proud of the fact that all staff members and employees of ACTREC rose to the occasion in times of fear and uncertainty and kept our institution functional for patient care. Our institution successfully treated a large number of patients and staff who had COVID-19, within our campus. Beyond clinical services, our engineers and contractors continued to execute projects despite challenges in terms of supply chains and labour availability. We are likely to commission four very important projects within ACTREC campus in the current year – Women and Children and Hematolymphoid Building, RRU, Proton Therapy Centre and Asha Niwas (Dharmashala for patients donated by Infosys Foundation), which will begin our transformation into a large Clinical Cancer Centre with cutting edge healthcare facilities. Simultaneously, our basic science colleagues have planned expansion of their infrastructure and projects in the next 3-4 years, to provide a solid scientific foundation for future cancer treatments.

All of above will require dedication and contributions from every single member of ACTREC – all-hands-on-the-deck approach. I am grateful to the ACTREC community for their untiring efforts thus far and their continued commitment in the coming years. And lastly, on behalf of ACTREC, we rededicate ourselves to the welfare and care of cancer patients from all sections of the society.

Dr. Sudeep Gupta
Director
ACTREC

Message from Director, Centre for Cancer Epidemiology (CCE), ACTREC

The Centre for Cancer Epidemiology (CCE) is rapidly evolving to fulfil its mandate related to identification of cancer burden, risk factors and develop screening tools for prevention of cancer. The activities of cancer registries are now expanding to provide support for establishment of cancer registries in South East Asia region and nearby countries including Nepal, Bhutan and Myanmar. Molecular Epidemiology is now established to conduct multicentric cutting edge research to identify lifestyle and genetic risk factors for most common cancer in India. Molecular Epidemiological studies provide the axis that unites insights at the molecular level and understanding of disease at the populations level and thus providing path towards precision in cancer prevention.

Genome wide Association studies (GWAS) to identify association of more than one million polymorphisms with most common cancer sites by comparing thousands of cases and controls has been established. These studies have potential to discover genetic regions potentially responsible for development of cancer. GWAS will also provide a way towards estimating heritability component for common cancer, develop polygenic risk score and develop genetic instrument which can be used as a proxy for variety of environmental factors. One of the examples of success story of epidemiological study is in designing of randomized trial for prevention of gall bladder cancer by enrolling women at high risk of developing gall bladder cancer. This trial will help to identify best preventive strategies for gall bladder cancer. The studies to discover mutational signature by correlating somatic and germline mutations with available questionnaire data for common cancers will help to confirm the risk factors in cancer development and to understand mechanism of carcinogenesis. These kinds of cutting-edge research using molecular epidemiology study design is underway in collaboration with International Agency for Research on Cancer (IARC) and Sanger institute, UK. studies are underway.

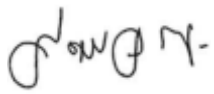
Breast cancer in India is showing increasing trend in both rural and urban area. The research conducted by Preventive Oncology department of CCE demonstrated that Clinical Breast Examination is useful tool in reducing mortality from breast cancer. The studies are

ongoing to use artificial intelligence in detecting the disease early. These studies are being undertaken in collaboration with US-NCI and IIT Mumbai.

The year 2020 and early part of the year 2021 was difficult for conducting field activities because of COVID-19 pandemic. I wish to take this opportunity to pay sincere thanks to the staff who worked throughout this difficult period and immensely contributed in war against COVID-19. CCE staff were involved in vaccination drive at vaccine centres of TMH and ACTREC. CCE staff also undertook research related to identification of host related factors in disease progression.

The year 2021-22 will be celebrated as "Ajadi ka Amrit Mahotsav" . CCE has planned to undertake task of screening of 5 lakhs women for breast, cervix and oral cavity cancer in North and North east India. This will go long way in crating awareness and in reducing mortality from these common cancers. The CCE is also planned to undertake Indian study for healthy Ageing (ISHA) with collection and storage of blood samples from 4 different centres in India. This will help to build up research platform to develop biomarkers and understand development of chronic diseases.

All these activities and aspirations will hopefully help in reducing burden and mortality from cancer.



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

Message from Dy. Director, Centre for Cancer Epidemiology (CCE), ACTREC

Complementing our staff for converting challenges into opportunity.

The second half of 2020 and the first half of 2021 will be remembered in the history for the Covid Pandemic and its impact on all aspects of the society. The country has suffered unprecedented health crisis ever witnessed in the human history. Given the magnitude of the problem, Center for Cancer Epidemiology stepped in Covid control and care to help our staff, our patients and relatives. A dedicated facility was created in National Sports Club of India, Worli for isolation of Covid positive patients andtheir relatives. The facility looked after nearly 700 patients and their relatives during the first wave alone. We also embarked on Covid related research to strengthen our knowledge regarding treatment and outcome of Covid 19. The lockdown led to great hardships to our staff that were incarcerated at home but remained active and productive.

The abstraction for the HBCR could be done during the Covid-19 period as Work from Home due to the availability of the Online Electronic Records. During this period, the Consolidated Report for Cancer Registries situated at Nuclear Power Plant was published. The HBCR data shows reduction in the hospital registrations due to the Covid-19 Pandemic. However, the Preventive Oncology registrations increased during the pandemic due to the Health Scheme for staff provided by Mumbai Police Department. The department conducted several training programs for the hospital staff on preventive aspects of Covid. Several virtual educational workshops were done for the doctors in Maharashtra for awareness, screening and treatment of cancer.

Despite travel restrictions, the section of Cancer registry continued technical support to the cancer registries in South-East Asia and regularly organizes cancer registration training programs for the South-East Asian region. Virtual cancer registration training programs were organized for the participants from India, Myanmar, Bhutan, Nepal, Sri Lanka, Myanmar and Timor-Leste. The registries from Nepal, Bhutan and Sri Lanka have published their report. Similarly, the section monitored the population-based cancer registries (PBCRs) in Punjab, Uttar Pradesh and Bihar states of India.

Given the adverse outcome of Covid among tobacco users, our team made all efforts to enhance cessation through Telephonic Quitline Services. Of the total registered 35,743 calls, 42% people were ready to quit tobacco and agreed to attend the regular follow-up calls. The counsellors made a total of 95,139 follow up calls, out of which 54% calls were attended by the clients with a quit rate of 36%. The registry team also worked on early detection program for oral, breast and cervical cancer in Sangrur, Varanasi and Muzaffarpur. In Punjab, under this project, nearly one lac individuals of the population have been covered.

The section of Molecular Epidemiology and Population Genetics organized the workshop and training program. The case control studies were expanded to other Centers to identify risk factors for common cancer. Several online training programs were conducted with staff at Varanasi, Guwahati and Barshi. A Collaboration was developed with BYL Nair Charitable Hospital, Mumbai and BARC, Mumbai to conduct following studies related to COVID-19. It is heartening that the collaborations with University of Oxford, NCI, University of Bristol, IARC, University of Minnesota have led to significant progress.

Section of Biostatistics is offering services to the principal investigators and clinical scientist researcher of various units of Tata Memorial Centre like ACTREC, HBCH, MPMMCC and TMH Mumbai. This section was involved with data science by applying artificial intelligence with Bayesian tech`nology, variable selection, classification algorithm, genomic data analysis and applications in cancer-genomic studies. Despite raging pandemic, one-year post-graduate diploma in Biostatistics was successfully initiated in the middle of 2020.

I would conclude by saluting our staff who have done a commendable job despite the continuing threat of the covid virus. It is indeed a pleasure to work with such committed and passionate team members.

Dr. Pankaj Chaturvedi
Deputy Director,
Center for Cancer Epidemiology

Message from Deputy Director, CRC (ACTREC)

2020 has probably been the most eventful period after World War II. It has changed the way how we deal with ourselves and our fellow human beings. While it may easily be labelled as “annus horribilis”, the year also brought about the best in mankind in more than one way. ACTREC was no exception. Our staff worked relentlessly during the Covid pandemic not only to continue cancer related treatment of our patients but also delivered the best of Covid related care to both cancer patients and employees. With the help of Tata Projects Ltd., we were able to build 3 wards dedicated to Covid Care for both our patients and staff. Similarly, many of our staff were able to use their creative minds to indigenously make various components of PPEs such as face masks, face shields, anaesthesia induction box etc. which helped us in being self-reliant at a time when there was acute shortage of PPEs across the country. As many patients could not travel from far distances during the extended periods of Lock Downs imposed in our country, a tele consultation unit was set up to call all patients who were due for their follow ups and advices were given on phone. Our centre also couriered various medicines to patients residing in other cities and towns to ensure that they received their regular cancer related medicines.

While Covid did take a large proportion of our time, we are proud of the fact that our institute continued with cancer care for every single day of the year. We continued with major surgeries, chemotherapy and radiation treatment for our patients. This was only possible due to dedication of our administrative, technical, medical and nursing staff.

ACTREC is on the cusp of major expansion with 3 cancer care buildings (Women and Children Cancer Centre, Radiation Research Unit and Proton Therapy Unit) due to be commissioned in next one year. The bed strength of our institute will increase from current 130 beds to approximately 500 beds. The existing supportive infrastructure is also being strengthened to cater to this exponential expansion.

We hope that normalcy returns to our lives in the year ahead and lessons learnt from the year 2020 is put in to good use for the coming years.

Dr. Navin Khattry
Dy. Director, CRC, ACTREC

Message from Deputy Director, CRI (ACTREC)

Proceedings at the Cancer Research Institute, Annual report, ACTREC 2020

The Covid Chapter

'It is elementary my dear Watson!'

Like the rest of the world, the mask and social distancing became elementary to the campus life at ACTREC for the best part of 2020 and it continues to be so. Our doctors created a Covid ward for the cancer patients and the ACTREC family. They treated the permanent and non-permanent staff alike. They continued to offer their self-less service along with all other frontline workers. ACTREC as a unit learnt formidable lessons and there were many who stole the limelight and found new perspectives. Students and staff of the basic science division pitched in their services and helped in the emergency.

Amidst this turbulence, we kept afloat so that the students can pedal their way towards research goals and degree.Thanks to the tenacity and the co-operation of all the well-recognized front-line warriors and many of the CRI staff, who assumed this role, we carefully navigated through these rough weathers and began preparing for better days. Like some of the previous years we saw our faculty and staff winning national and international recognition, collaborative grants and patents. One of our most proud moment this year has been the award of Newton-Bhabha PhD placement fellowship (DBT-British council) to one of our senior research fellow student.Like many other academic institutions, our faculty entered therace for developing diagnostic kits for SARS COV2 and created aninhouse technology called the 'WARS', spelt as 'VARS' a one step – one tube RT-PCR kit. The 'know how' was transferred to the Industry.

The virus not only came with the highly decorated spike protein, there were other fringe benefits-such as the environmental change, clean air, generosity, and fair amount of introspections. Arguably, the major revolution has been the emergence and use of digital platforms for communication. We conducted our course works many seminars,

events and meetings via media various such applications and kept very close to the normal academic calendar.

As mentioned in the previous report, last year we crafted a new era in the assembly of our progress report. As we strive to make it more effective, creative, intellectually entertaining and more inclusive in the coming years, we provide the first-generation trade mark cover with a distinct ACTREC flavor. Hope you enjoy the look and the contents inside.

Finally, I take this opportunity to salute the brave and selfless, the faculty friends and colleagues and relatives of many who braved the storm or lost the battle to the pandemic.

As always focusing on a brighter and glorious future for ACTREC with the team X,

Yours

Prasanna Venkatraman
Deputy Director, Cancer Research Institute,
ACTREC

Overview of ACTREC

The **Advanced Centre for Treatment, Research and Education in Cancer** (ACTREC) of the Tata Memorial Centre in Kharghar, Navi Mumbai comprises of (1) the Clinical Research Centre and a 120+ -bed Hospital that together address clinical and translational cancer research and treatment of cancer patients, (2) the Cancer Research Institute that focuses on basic and applied research on cancer, and (3) the Centre for Cancer Epidemiology. Scientists and clinicians of the Centre are committed to numerous basic, applied, translational and clinical research projects that strive for a better understanding of cancer and attempts to achieve early diagnosis and improved survival of cancer patients. Most of these interdisciplinary projects involve collaborations both within the Centre and also with national/ international centres of repute from academia and industry, and are supported by institutional, intramural or extramural funding.

During 2020, there were 218 on-going projects at ACTREC; which received financial support of Rs. 2.77 crores from governmental agencies such as DBT, DST, ICMR, and others. In addition, 8 new extramurally funded projects were sanctioned Rs. 12.76 Crores for an average three years period, of which Rs. 10.03 Crore were received during the report year. Research carried out by faculty of the Centre resulted in 247 total publications in the year 2020, of which 192 were in reputed international journals, 46 in widely circulated Indian journals and 3 were book chapters. The total publications also included 6 articles, one in conference proceedings and 5 miscellaneous. During 2020, 30 regular staff members were appointed in different grades in Medical, Scientific, Technical and Administrative cadres, adhering to the reservation policies of the Government of India, while eight employees superannuated and one employee voluntarily retired.

Several important TMC projects located in the ACTREC campus made good progress during 2020. These include Women's and Children and Hematolymphoid Hospital, National HADRON Therapy Unit, Radiological Research Unit and a patient hostel called Asha Niwas. These are expected to be completed and commissioned soon.

Clinical Research Centre

The Clinical Research Centre (CRC) and Hospital continue to be at the forefront of new developments at ACTREC. Currently CRC has a total of more than 120 beds including 88 ward beds, 13 ICU and Recovery beds, six Bone marrow transplant beds and 16 Day care beds. The year 2020 has been a difficult and a trying year for ACTREC, particularly the medical community constituting the clinicians, nursing staff and the support staff. The onset of COVID 19 pandemic, and its deleterious effects on human life and clinical practice mobilized the augmentation of infrastructure and service support to take care of COVID infected cancer patients and staff at ACTREC. The management of COVID patients was initiated in May 2020, by converting the 15 bed Surgical Ward into a dedicated COVID ward with support infrastructure. This was enhanced to an advanced 50 bedded COVID Care Centre by repurposing three floors in the Archival Block on the ACTREC campus. This facility comprised of 22 intensive care beds for acutely ill COVID patients requiring ventilators and complex medication management. Fourteen beds were reserved for patients with mild to moderate symptoms

requiring medicine management and isolation and another 14 beds were dedicated for quarantine of patients who had high risk exposure and need of isolation and monitoring. The COVID care unit was made available to both patients and staff at ACTREC and since it's commissioning on 15thAugust 2020, 330 patients/ staff have been admitted and treated. The testing for the SARS-CoV2 by RT-PCR was initiated at ACTREC since May 2020 and services were extended to support the local community by accepting referrals made by the Panvel Municipal Corporation. In August 2020 COVID antibody and IL6 testing were also started to assess patients that were infected by the SARS-CoV2 virus. Another pathfinder presented by ACTREC in 2020 during the pandemic, was the design and manufacturing of face masks with sterilization wraps made of non-woven polypropylene spunbond-meltblown-spunbond (SMS) fibers, for patients. This was an inexpensive solution and effective mask with filtration capability near equivalent to N95 respirators (as per test reports from BARC laboratories) and was given to staff and patients free of cost.

The year 2020 has seen 1690 new ACTREC registrations, 10196 transfer cases from TMH and 6392 referrals for diagnostic and expert opinion requirement. Due to the pandemic the numbers were much lower as compared to previous years. New patients (337) have used Daycare services. RT new referrals were 1203 and 697 patients have undergone Interventional radiology procedure. There were 1973 major surgeries and 300 minor surgeries that have been conducted in 2020. ACTREC has always advocated and strived towards patient safety, and in congruence, the WHO declared 'World patient Safety Day' is celebrated every year at ACTREC, with expert faculty presentation on 'Safety in Hospitals'. However, in this pandemic year of 2020, a public celebration was not organized in adherence of the protocol followed for safe work practices during the pandemic.

The **Clinical Research Centre** and **Hospital** constitutes; the department of **Medical Oncology** which administers chemotherapy in the neoadjuvant, adjuvant and palliative setting for solid tumors. The department of Medical Oncology started its services in ACTREC in 2006. It comprises of the adult solid tumor unit, the bone marrow transplant unit and the pediatric oncology unit. The Bone Marrow Transplant unit shifted to ACTREC in November 2007, since then, ~850 autologous/ allogeneic transplants have been performed with overall transplant related mortality of 10% (2% in autologous, 18% in allogeneic). Since October 2011, adult patients with hematolymphoid neoplasms not undergoing transplant are also being treated in ACTREC. Solid tumor unit is routinely administering chemotherapy in neoadjuvant, adjuvant and palliative setting since 2006.The department of **Radiation Oncology** provides comprehensive cancer care and constitutes a team of radiation oncologists, medical physicists and radiotherapy technologists who run the department with dedication and efficiency. The Facility houses three external beam radiotherapy machines of which one is an indigenous telecobalt (Bhabhatron) and two advanced linear accelerators with state of the art capability that enables advanced procedures like IMRT/IGRT/SBRT and adaptive RT. The myeloablative total body irradiation is routinely performed at ACTREC and facilitates bone transplants. The **Department of Surgical Oncology** has been providing continued care to a wide range of cancer patients. This includes in-patient care as well as outpatient clinics. The service is running five regular operating theatres five days a week and two operating theatres on Saturdays. The Department also conducts

regular OPDs (newly registered as well as pre- and postoperative care follow-up OPDs) for breast, head and neck and neurosurgery. Anesthesia, Critical Care and Pain Management services are provided by the **Department of Anesthesiology, Critical Care and Pain** of TMC (TMH and ACTREC). These include nine permanent staff members (four new permanent staff members were appointed in the year 2020) and twelve senior residents from ACTREC as well as full-time consultants and residents from TMH. The department provides Anesthesia services for up to 5 operation theatres; Major OT, Interventional Radiology, MRI, Radiotherapy operation theatre and Endoscopy. The department also administers Critical Care for a 10-bedded ICU (includes 3 isolation beds) plus a 3-bedded PACU with a CPR team and renders Acute Pain services. A formal Pain team is formed compromising of Anesthesia consultant, resident and nurse who round the wards taking care of the post-operative and chronic pain patients. The Department of **Radio-Diagnosis and Interventional Radiology** is equipped with radiography, ultrasonography (USG), Color Doppler, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Mammography (MG), with Digital Breast Tomosynthesis (DBT), and Interventional radiology (IR). The Department provides 24 x 7 radiological services. Some additions in the Department were; two portable direct radiography (DR) machines, one of which is exclusively used for COVID-19 patients, and a high-end USG machine (Samsung RS80 EVO) which provides excellent resolution along with advanced applications for imaging and interventional procedures. With the CT modality, apart from imaging routine cases (shared with Nuclear medicine for PET-CT and Radiotherapy for planning); essential services were provided during the COVID-19 pandemic for diagnostic and follow-up imaging. For the MRI modality, routine MRI and under general anesthesia for patients from pediatric services and adults, advanced MR imaging including perfusion and spectroscopy, is performed. All these services are provided to ACTREC registered patients on priority and further extended to TMH patients to optimize time slots on the machines. Preventive, diagnostic, and follow-up mammograms are performed regularly. Diagnostic and Therapeutic invasive procedures are done under sonographic or fluoroscopic guidance. The on-site cytopathological evaluation has been initiated to assess adequacy and appropriateness of samples collected under image guidance with a dedicated IR-OPD for care of these patients. Emergency services of urgent radiography, sonography, Doppler studies, and CT are available all time. Besides these, USG and CT examinations of animals are also done as part of approved animal research projects. In addition to the regular staff, 3 senior and 6 junior registrars from TMC are posted on rotation to support these activities. The senior registrars in Radiodiagnosis and Interventional Radiology (IR) serve as residential doctors for the department. In this crucial year of the COVID-19 pandemic, this Department has been on the front line in COVID care by imaging these patients (Radiography, CT, USG, and MRI) screening, swabbing and ward duties. The **Department of Transfusion Medicine (DTM)** consistently strives to maintain high quality standards in provision of safe and adequate supply of blood components round the clock to meet the specialized hemotherapy need of patients admitted at ACTREC especially Bone marrow transplant (BMT), Hemato-lymphoid, Pediatric and Surgical Oncology units. It also caters to the blood component requirements of patients admitted in other hospitals in Navi Mumbai. The **Nursing Department** at ACTREC, constantly strives to provide safe environment and positive experience to patients/caregivers.

The department is committed and focused on bridging the gap between theory and practice through an incessant nursing education program. The year 2020 was designated as the "International Year of the Nurse and the Midwife," in honor of the 200th birth anniversary of Florence Nightingale by the World Health Organization (WHO). In 2020 all nursing efforts and attention were focused on facing the challenges posed by the COVID-19 pandemic. Nurses being the frontline workers had additional responsibilities in combating the pandemic and also could not escape the threat, recording a COVID-19 positivity of 21%. New initiatives taken were planning and execution of new COVID center ward/ICU/quarantine facility, extensive PPE training and meticulous contact tracing of patients/staff. Health education material for BMT patients was finalized. An enrollment for the one year fellowship program in Bone Marrow Transplant Nursing was done, by 1 student. In 2020, the formalities of the Nursing Excellence Certification have been initiated by the Nursing Department. **The Cancer Cytogenetics Department** is a well-equipped high volume laboratory providing diagnostic services [Conventional Karyotyping (CK) and Fluorescence In-situ hybridization (FISH)] for all hematolymphoid malignancies both in-house and referrals. Comprehensive FISH panels for assessing cytogenetics at baseline and follow-up thereby assisting in diagnosis, risk stratification and guiding clinicians in deciding treatment and monitoring response is some of the expertise provided. The department contributes towards quality patient services and is accredited by National Board of Accreditation for Testing & Calibration Laboratories (NABL) and participates in External Quality Assessment program (EQAS) with College of American Pathologist (CAP) to ensure continual efforts for improving patient care. The **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 one pathology consultant, two senior residents and two junior residents (all by rotation). The Laboratory provides diagnostic services for histopathology, 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 processor, automated stainer, cryostat and automated immunostainer. This laboratory is accredited by NABL for all services and participates in EQAS (External Quality Assessment Scheme) offered by national agency (Anand Lab, Bangalore) and an International agency (College of American Pathologists). The **Composite Laboratory** is NABL accredited and provides 24 hours' services to the hospital. The Laboratory consists of three sections: sample collection area, haematology, and biochemistry (routine biochemistry and immunoassay). This Laboratory provides the following patient-related hospital services; routine hematology (CBC, coagulation and peripheral blood smear examination), biochemistry (LFT, RFT, electrolytes, cardiac enzymes, osmolality, immunoglobulins, ferritin, tumor markers, assays for vitamin B12,vitamin D, folate, thyroid function tests) and drug assays (cyclosporine, Tacrolimus, sirolimus and methotrexate). In 2020 Interleukin-6 and COVID neutralizing antibody test was initiated in the laboratory. The Laboratory also processes murine and canine blood samples for research purposes. The Laboratory conducts an advanced training course in Medical Laboratory Technology since November 2015.The **Hematopathology Laboratory** at ACTREC provides services and undertakes the diagnosis and sub classification of hematological malignancies as well as,

monitoring of patients while on therapy, for all malignancies. The Laboratory uses morphology, flow cytometry and molecular techniques for diagnosis. The Laboratory does minimal residual disease testing and post treatment monitoring of patients with 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. In 2020, the Laboratory has also established testing for SarsCov2 virus using quantitative PCR in view of the Pandemic. The **Microbiology Laboratory** is involved in patient service, academics and research. Patient services include processing and reporting of bacteriology, serology, mycobacteriology, molecular microbiology, mycology and other clinical microbiological samples at ACTREC. Sterility testing for Blood Bank services, environmental surveillance, infection control services and waste management support is also provided by this Laboratory. Educational activities include teaching (TMC & other institution) students of MD microbiology, nursing department, TMC laboratory staff and in the Advanced Training in Medical Laboratory Technology (ATMLT) course. The **Clinical Pharmacology Laboratory** aims at developing new drugs for radioprotection, and pharmacokinetics (PK) driven optimization of drugs. In addition, critical support and expertise necessary to conduct early-phase clinical trials in oncology is provided by the faculty, as well as training personnel and developing capacity in the field of cancer pharmacology, biostatistics and clinical research operations. This Laboratory is identified as an adverse drug reaction monitoring centre under the pharmacovigilance program of India for capturing and reporting the adverse events due to drugs and devices occurring at TMC. The goal of the **Clinician Scientist Laboratory** is to delineate the role of hypoxia in cancer progression and metastatic spread, clonal evolution of a tumor leading to therapy resistance, and developing novel assays to monitor tumor burden and anticipate therapeutic outcome. The Laboratory (CSL) employs a bedside - to bench - to bedside approach wherein, research questions formulated from clinical observations are addressed in the laboratory settings using pre-clinical assays; with an ultimate aim to develop tailored therapeutic strategies.The major focus of research in the **Translational Research Laboratory** is on the role of cell-free chromatin particles in cancer, degenerative disorders and ageing. The members of this Laboratory continue to work on the novel finding that cell-free chromatin (cfCh) that circulate in blood or those that are released locally from dying cells can freely enter into healthy cells to damage their DNA and induce inflammatory cytokines. 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 Mumbai, BARC, Manipal & Yenepoya 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.

In the **Cancer Research Institute**, research projects encompassing basic and applied research on cancer are being conducted by the following thematic groups – Biomolecular Structure, Function and Alterations; Cell and Tumor Biology; Carcinogenesis, Genome Biology and Precision Medicine; Therapy Resistance and Stem Cell Biology; Tumor Immunology and Immunotherapy and Cancer Theranostics and Clinical Pharmacology. Besides these, other research projects not within the helm of these

groups are being pursued by scientists and investigators.

In the **Biomolecular Structure, Function and Alterations** group, **Dr. Prasanna's team** focuses on protein-protein interactions (PPI) which 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. This Laboratory tries to understand PPIs at different hierarchical levels with a long term goal to expose the Achilles heel in cancer. Current activities include characterizing atypical domain motif interactions with the intent to identify functionally important residues in different molecular chaperones, to direct a repurposed drug towards a specific oncogenic network, assigning functions to PSMD9 and its first neighborhood interaction and their role in cancer. **Dr. Bose's team** studies the macromolecules involved in the apoptotic pathway, and their implications in normal cellular functions and pathogenesis. This laboratory works on the high temperature requirement family of serine proteases (HtrA), the interaction between anti apoptotic c-FLIP and calmodulin, and the Bcl2 family proteins and their interacting partners. Moreover, research in this laboratory is now entering into application-based translation research that includes enzymes involved in apoptotic and metabolic reprogramming, and their role in altering cancer signaling pathways. **Varma Laboratory** continues to contribute to structural genomics of cancer to unravel the pathogenicity of genetic alterations identified in different genes for translational research. Different interdisciplinary approaches such as in-silico, in-vitro, biophysical and structure biology are being used for different cancer associated proteins such as BRCA1, MAPK, FANCI to evaluate folding patterns and functions associated with protein-protein interactions. Some of the important contributions have been observations on impairment in protein-protein interactions and folding patterns due to cancer risk mutations and understanding the expression patterns of serum proteins at different time points of radiation treatment. This laboratory carries out serum proteomics work to check the differentially expressed protein in head and neck cancer treated with radiotherapy. Furthermore, a very good protocol to remove highly abundant proteins from serum while retaining significantly low molecular weight protein for proteomics profiling has been optimized. The focus of **Rukmini Laboratory** is the use of 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 leave non-responder CPs and 80% of patients in terminal stage of Blast Crisis (BC) without an effective treatment option. Delineation of mechanism of resistance to TKIs is expected to; identify potential therapeutic targets for the non-responders and identify early markers to predict which of the initially responding CP patients would turn resistant during therapy. These aspects are being studied with specific projects undertaken. In the **Cell and Tumor Biology** group, research programs of the **Teni Laboratory** aim to gain insights into the molecular basis of oral and cervical tumorigenesis. Studies to identify the mutant p53 interacting partners that impact it's stability in oral cancer cells and deciphering the role of TCTP in DNA damage response using the established radioresistant oral cancer cell lines are on-going. This

laboratory has established for the first time chemo radioresistant cervical cancer cell lines with the goal to understand the molecular mechanisms of chemo radiotherapy resistance and the plausible role of HPV16. Studies to decipher the role of Mcl-1 in radiation induced DNA damage and autophagy, the novel nucleolar functions of CLU and regulation of Activin A by p63 in oral cancer cell migration are in progress. The two major areas of research in the **Sorab Laboratory** are the regulation of cellular pathways by 14-3-3-proteins and identifying pathways downstream of a loss of desmosome function that contributes to neoplastic progression. The Laboratory has demonstrated that the secreted protein LCN2 confers radio and chemo resistance to cells in vitro and in vivo and that this might be a potential target for therapeutic intervention in multiple tumor types including colorectal cancer. Further, the Laboratory has identified mechanisms by which 14-3-3-ligand complexes form and dissociate, and determined the relevance of this mechanism to centrosome duplication. **Bhattacharyya Laboratory** examines vesicular trafficking and intracellular organelle biogenesis and dynamics. Organelles' size and shapes are greatly altered in cancer and such alteration is a hallmark of cancerous cells. Using basic cell biological approach along with advanced microscopic techniques, attempts are being made to understand the underlying mechanisms that govern the size control mechanism of Golgi, nucleus and nucleolus. Yeast cell lines and cultured neurons are being used as model systems to understand the ultra-structures of ER and Golgi. The Laboratory also has a research focus to develop novel tools for different forms of microscopy. **Dr. Hasan's** research focus is to understand the signalling between anti-apoptotic proteins and cyclin dependent kinases and combining their targeted actions for the improved therapeutic strategies to overcome apoptotic resistance in Acute Myeloid Leukemia (AML) and Breast cancer. Functional and molecular aspects of novel agents in leukemia using xenografts models of AML is another important research focus of the Laboratory. With the advent of targeted therapy using arsenic trioxide (ATO) and All-Trans Retinoic Acid (ATRA) very high cure rates (>90%) can be achieved in low/intermediate risk group Acute Promyelocytic Leukemia (APL). However, high risk group patients (white blood cell counts >10000/l) still require chemotherapy. The majority of post-remission deaths and relapses are linked to high risk group patients due to toxicity associated with chemotherapy or acquired ATO resistance. **Dr. Warawdekar** aims to understand the contribution of intercellular communication for antineoplastic therapeutic efficacy and studies have been towards development of a functional assay to validate gap junction communication as well as identifying Connexin types in breast and lung cancer. Tumor cell derived signalling through expression and activation of proteins can lead to change in stromal remodeling and invasive properties, and may contribute to cellular dis-regulation and transformation. One such protein is cellular Fibronectin. Efforts are to assess differences in expression and protein levels in different subtypes of breast cancer, other cancers and evaluate therapeutic outcomes. In the **Carcinogenesis, Genome Biology and Precision Medicine** group, **Dr. Shirsat's** team efforts are towards understanding molecular mechanisms in brain tumors particularly Medulloblastoma, a highly malignant pediatric brain tumor that consists of four molecular subgroups namely WNT, SHH, Group 3 and Group 4. These four subgroups differ in their expression profile including the microRNA profile. MiR-193a, a WNT-subgroup specific microRNA, was found to downregulate MYC oncogene's activity and thereby brings widespread repression of

gene expression. MiR-193a, therefore, has therapeutic potential in the treatment of MYC overexpressing aggressive cancers. Proteomic analysis identified enrichment of RNA surveillance pathways and extensive metabolic reprogramming in adult SHH and Group 3 medulloblastomas, respectively. Upregulation of CRX and haploinsufficiency of ARID1B was found to be instrumental in the pathogenesis of Group 3 and WNT subgroup medulloblastomas, respectively. The **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 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. In parallel studies, the chemopreventive 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 hamsters is being tested. The Laboratory has demonstrated that administration of PBPs in drinking water throughout the carcinogen treatment period significantly decreases the multiplicity of tumors in both model systems in pre as well as post treatment settings. **Dr. Gupta's** team examines the importance of histones in providing complexity to the eukaryotic genome. Histone proteins and their site specific post translational modifications regulate processes like gene expression, DNA repair, and are emerging as key players in cancer and therapy resistance mechanisms. Recent advances from this Laboratory strongly indicate a role for histone, HIST2H2AC and H3C14 and also the part of 3'-UTR organization of histone genes for the genomic instability in human liver, gastric and breast cancers. Further, the critical role of chromatin modifiers like mitogen and stress activated kinase 1, protein phosphatase 1 and class 1 histone deacetylase for H3 serine 10 phosphorylation along with site-specific acetylation in DNA damage response have been identified in human cell lines and gastric cancer tissues. The **Dutt Laboratory** focuses on the somatic genetics of human cancer and aims to develop Next Generation effective targeted therapies for cancer. A major focus has been on the genomic features of genetic alterations underlying oncogenesis and cancer progression in lung, breast, cervical, gall bladder, and head-neck cancers. The three major foci of research are cancer genomics, functional genomics and pathogen discovery. Advanced sequencing methodologies followed by functional validation are being used to identify novel cancer dependencies, therapeutic strategies and biomarkers. The team has developed a computational pipeline to detect pathogens in cancer and to explore a possible pathogenic basis for cancer. The **Sarin Laboratory** aims to understand the molecular basis of inherited and somatic cancers and develop translational algorithms through molecular biology and functional genomics. These questions are addressed through: A) Large cohort of over 9300 families with various inherited cancer syndromes using banked DNA and lymphoblastoid cell lines; B) BRCA-GEL case control study with 2800 breast cancer cases / matched healthy controls; C) TMC International Sarcoma Kindred Study (TISKS) a case control study with 500 osteosarcoma cases / matched controls enrolled from TMC; D) International Cancer Genome Consortium (ICGC) project covering 465 Gingivo-Buccal SCC patients with full clinico-pathological annotation, follow up and somatic / germline NGS analysis and functional studies. **The Therapy Resistance and Stem Cell Biology** Group comprises of four teams. **Dr. Waghmare's** team aims to unravel the

molecular mechanisms that control both the adult stem cells and cancer stem-like cells regulation in human epithelial cancers; on the molecular signalling pathways such as Wnt/Notch/Sonic-hedgehog and others that regulate self-renewal and differentiation of stem cells. These aspects are being investigated using skin model and human epithelial cancers such as head and neck cancer as experimental models. Unraveling the molecular signatures that regulate and maintain cancer stem cells would open up an avenue for future clinical implications. The **Shilpee Laboratory** is working towards understanding the molecular mechanisms that govern radiation and chemo resistance in Glioblastoma and Leukemia. For this the Laboratory has developed in vitro cellular models from primary patient samples and in vivo pre-clinical orthotopic mouse models that allows for systematic identification of signals and pathways that are relevant to resistance, thus providing the critical information necessary for therapeutic interventions. The focus of the **Ray Laboratory** is to delineate the key molecular signatures associated with acquirement of resistance and metastasis in Epithelial Ovarian Cancer (EOC) and Gastric Cancer (GC). Findings from this Laboratory have led to understanding of the role of different mutants of P53 in platinum resistance and PIK3CA signalling, role of protein-protein and protein-lipid interaction in conferring multi-drug resistance in platinum-resistant EOC cells, role of autophagy in maintaining drug induced homeostasis in cancer stem cell population, transcriptional regulation of IGF1R by co-operative interaction of RUNX1 and FOXO3a and their consequences, delineation of temporal dynamics of Notch3 signaling in real time and identifying the molecular players involved in lung metastasis of chemoresistant cells in an orthotopic mouse tumor model during acquirement of chemoresistance. **Dr. Nandini Verma** is interested in the molecular mechanisms underlying the response and resistance to first-line chemotherapeutic agents in Triple Negative Breast cancer (TNBC), which has become highly prevalent among Indian women in the last decade. TNBC is an aggressive Breast Cancer type that lacks expression of targetable receptors like estrogen and progesterone hormone-receptors, and human epidermal growth factor receptor-2, therefore, the clinical management of TNBC primarily relies on the cytotoxic chemotherapeutic agents. TNBC responds better to chemotherapy as compared to hormone-positive BCs, however, a large number of patients are either intrinsically unresponsive or develop resistance and relapse within 2-5 years of treatment, resulting in very poor prognosis. Since, till now there are no approved targeted therapies for TNBC, therefore, improvement in chemotherapy response and patient's outcome after treatment is one of the most desirable clinical prerequisites that need to be addressed. In the **Tumour Immunology and Immuno-therapy** group, **Dr. Kode** focuses on investigating; immune phenotype, soluble factors landscape and immune evasion in patients, understanding crosstalk of stem cell niche, immune cells and mesenchymal stem cells in the tumor microenvironment in oral cancer, Hodgkin's lymphoma and acute myeloid leukemia, and also understanding the role of hypoxia in differentiation and effector functions of T cells in oral and pancreatic cancers. Immunomodulatory effects of ayurvedic formulations are being tested in two clinical trials on patients with ovarian and oral cancer. This Laboratory has identified CD26, an immunoregulatory-enzyme and few immune subtypes as prognostic biomarkers for Graft-versus-Host disease in stem cell transplant patients. In the **Cancer Theranostics and Clinical Pharmacology** group, research in the **De Laboratory** involves development and use of imaging methodologies

suitable for estimating molecular functions in vivo. A wide spectrum of experimental medicine and novel concept therapeutics in model systems using non-invasive molecular imaging techniques are tested. The Laboratory has the mandate to acquire diverse translational experimental therapeutics developed through research with appropriate technical support from permanent and project staff. **Dr. Chilakapati's** team is actively pursuing the development of Raman spectroscopy based methods for routine in vivo/ in situ screening and diagnosis, and as a minimally invasive micro spectroscopic method to screen body fluids and cell smears. This Laboratory is actively pursuing Raman based methods for; development of in vivo/in situ methods for routine screening and diagnosis; development of minimally invasive microspectroscopy methods using body fluids and cell smears; synthesis, optical and photothermal characterization of metallic nanoparticles for biomedical applications; exploring Raman and Infrared spectroscopy for oral cancer diagnosis using serum and saliva; and Investigations on experimental carcinogenesis in animal models. Among other research projects pursued at the Cancer Research Institute; **Dr. Mehrotra's** research involves understanding mechanisms that regulate response to replication stress in cells. It specifically concerns investigating the proteins involved in stabilization and restarting of stalled replication forks using mammalian cell cultures and Drosophila melanogaster as model systems. Many components of homologous-recombination (HR) mediated DNA repair are crucial during replication-stress response where their functions are mechanistically distinct and remain poorly understood. This study focuses towards understanding the functions of a novel BRCA2 and CDKN1A interacting protein (BCCIP) during replication stress and its implications in tumorigenesis; **Dr. Khadilkar** has initiated work to elucidate the effects of organismal ageing on the stem cell – niche micro-environment with Drosophila as a model organism, using its hematopoietic system to answer this biological question. Utilizing the powerful genetic toolkits in Drosophila, the plan is to understand how stem cell properties and the cellular signalling landscape in their environment changes upon modulation of ageing. This will help in understanding the transformation of the hematopoietic stem cell niche into a leukemic niche thereby fostering the onset and progression of leukemia; **Dr. Arandkar** aims to understand the tumor-stroma cellular interaction and their role in tumorigenesis in tumor-microenvironment. Specifically, the focus is to understand one of the stromal cell type, Cancer Associated Fibroblasts (CAFs) and their interaction with tumor cells. The Laboratory aims to understand the generation of CAFs in the tumor-microenvironment and identification of the responsible extra & intra cellular factors/signaling molecules in this process; **Dr. Patwardhan's** major research project is to investigate the role of ECM dynamics in cancer metastasis. ECM stiffening promotes exosomes secretion in breast cancer cells which in turn facilitates their invasion, and the key regulators of exosomes-regulated cancer cell migration and invasion have been established in this laboratory with the plan to further delineate the mechanisms. Also, a study demonstrating metastasis prognostic potential of age and serum analytes in non-metastatic lung cancer patients in follow-up conditions has been completed and published.

The **Centre for Cancer Epidemiology** has been operational in the ACTREC campus since the year 2015, with the vision to fulfill the need of population based research and to promote epidemiological as well as public health research in India. The absolute goals are; to build a

program to identify cancer burden, causation and prevention strategies; build a platform to conduct large scale cutting edge epidemiological studies with accurate exposure measurement to identify risk factors; build capabilities to conduct population genetic studies; and to develop manpower for cancer surveillance, epidemiology and molecular epidemiological studies. The Centre has been organized into six departments or sections and is governed by **Dr. Rajesh Dikshit** as **Director** and **Dr. Pankaj Chaturvedi** as **Deputy Director**.

The **Department of Medical Records & Cancer Registry** is one of the six and important departments of the Centre, with **Dr. Ganesh B.** at the helm. This department provides case files to patients for therapy protocols and treatment follow-up. It also provides case files to doctors/clinicians for research and other activities. Some of the important on-going projects are; Patterns of Care & Survival Studies, Hospital Based Cancer Registry, TMC-DAE Network of Cancer Registries, Health Check-up Programs – Service & Research, Tobacco Survey Program. The **Department of Preventive Oncology** headed by **Dr. Sharmila Pimple**, is a designated WHO Collaborating Centre for Cancer Prevention, Screening and Early Detection and has five thrust areas; Information, Education and Communication which encompasses programs for risk prevention, life style modification and improving health seeking behavior towards early detection of common cancers in India; Clinic and Community-based, Opportunistic-Screening which includes programs for screening of common cancers and risk assessment for high risk cancers; Health Manpower Development for supporting the cancer control programmes of the Centre and State Governments; Advocacy, NGO-Training and Networkingfor Dissemination of cancer control activities; Research for developing newer methods and strategies for the prevention and early detection of common cancers in India. The section of **Field Intervention and Cancer Surveillance with Dr. Atul Budukh** (OIC) provides technical support and conducts cancer registration training program for the cancer registries in India as well as South East Asia. It is instrumental in providing service and being the Tobacco Quit Line Centre to tobacco consumers willing to quit the habit. Some of the on-going projects are on early detection for oral, breast and cervical cancer in Sangrur district, Punjab; oral cancer screening in Ratnagiri, Maharashtra; population based cancer registries in North India and hospital based cancer registry of Sangrur and Varanasi. The section of **Molecular Epidemiology and Population Genetics** with **Dr. Sharayu Mhatre** (OIC), conducts research in the field of Molecular Epidemiology and Population Genetics with the main thrust on accurate measurement of exposures and investigations of life style, understanding environmental and genetic risk factors for common cancer sites in India with the use of case control and longitudinal cohort study designs. Several on-going projects of the section address lifestyle factors, genetic susceptibility and geographical differences in the incidence and development of certain common cancers affecting the Indian population. The section of **Biostatistics** was formed at the end 2018 with **Dr. Sanjay Talole** as the Officer-in-charge. Some of the services offered by this section encompass; statistical consultation to TMC clinicians & researchers through CRS in TMH, statistical plan for analysis, data organization, randomisation for clinical trials and sample size estimation. Further, an orientation program for post graduate students of TMC, M.Sc. Nursing, short courses on Biostatistics for TMC researchers, Modules for PhD students, workshop and training programs on Biostatisticsare conducted by this section.

Academics

To fulfill the third mandate of the Centre, strong momentum is given to the educational programs at ACTREC. The main focus is on its doctoral program conducted under the aegis of the Homi Bhabha National Institute – a deemed university recognized by the University Grants Commission. Between January and December 2020, a total of 105 graduate students were working towards the Ph.D. degree in Life Sciences at ACTREC; these included 11 JRF 2020 batch students who joined in November 2020. Under the short term and summer training program, a total of 94 trainees worked in close supervision of the Centre's faculty during the year; these included 32 MSc dissertation students. In 2020, the Centre organized 7 local/ national/ international conferences, symposia, workshops, training programs, etc., beginning with the first National Symposium on "Administrative Excellence" in January and ending with the ACTREC Open Day in December which was shared on a virtual platform due to the global COVID-19 pandemic that affected normal life since March 2020. ACTREC observed and celebrated days of National and International importance, some of which were the Republic Day, the Independence Day, Women's Day, Sadbhavana Diwas, Hindi Diwas and the Fire Service Week. The Vigilance Awareness Week was observed between October 27th and November 2nd in this year. The Centre conducts Yoga sessions as a part of the staff welfare activity. In 2020, the 6th International Yoga Day was organized virtually on the 21st June from Kaivalyadham, Lonavala and was observed by staff and students from their homes in accordance to the pandemic protocol.

Science & Society Oration 2020

Glimpses from the Past Captured By the Lens Reminisce Of Inspiring Orations

The Science and Soceity Oration has been held in ACTREC for more than a decade now, to honor and recognize eminent individuals and their exemplary contribution to science and humankind as well as society at large. This event has been always looked forward to and appreciated by all age-groups amongst the staff and students of ACTREC. It has served as an inspiration to many, and instilled a confidence required for moulding a satisfying career. ACTREC has hosted several luminaries for this event,to name a few: Drs. Rani and Abhay Bang; Drs. Mandakini and Prakash Amte; Dr. Anand Nadkarni; Dr. Arati Gokahale; Dr. Chittaranjan Yagnik and very recently in 2019, Shri. Palagummi Sainath. In the year 2020, the COVID-19 pandemic disabled all plans of public meetings, lectures and conferences. The 'Science and Society Oration', was not spared too, and ACTREC could not organize this most coveted event of the year, in 2020.

ACTREC Annual Day 2020

The Annual Day is celebrated every year in the last week of the month of March since the inception of ACTREC in the year 2002. In the initial years, the Annual Day was celebrated informally as many laboratories were in the setting-up phase at this new campus in Kharghar, Navi Mumbai. It was from 2006 that, day long events were organized to celebrate the Annual Day. Celebrations have always commenced with the ACTREC Foundation Day Oration which is delivered by an invited eminent speaker, a stalwart in a specific field of cancer research or other sciences. Students and staff look forward with enthusiasm for this academic treat. In the year 2017, Prof. Stefan Kaufmann, Director, Max Planck Institute for Infection Biology, Germany, a renowned immunologist and microbiologist known for his outstanding contributions to the immune response against intracellular bacterial pathogens had delivered the ACTREC Foundation Day Oration. Later in the evening, a cultural program organized by the students and staff of the Centre, unfolds for the audience comprising of the Centre's students, employees and their families. This is followed by a session where employees who have completed 30 years of service are felicitated in recognition of their loyal service to the organisation. The highlight of the evening is a variety entertainment program by a professional team followed by a delectable dinner. In the year 2020, this popular event was not held due to the world-wide COVID-19 pandemic. As most other group and community events, this planned event was abandoned too for a later date and eventually could not be arranged.

International Yoga Day

Yoga has been integrated into the Patient Care program since several years at ACTREC and has proven beneficial for the overall well-being and Quality of Life for patients diagnosed and treated for cancer. ACTREC has yoga trainers / instructors who visit ACTREC thrice a week to conduct yoga sessions for patients voluntarily. These yoga sessions follow the tradition of Ashtanga yoga through a 1 hr. 45 min protocol. The concept of integrating yoga as a complementary therapy to ease stress and anxiety of cancer patients and their attendants has proven beneficial and gained popularity amongst the patients undergoing treatment at ACTREC.

In the year 2020, the pandemic brought an unprecedented halt to all community based activites to combat the spread of COVID-19.

ACTREC and Kaivalyadham jointly interacted via an online Google Meet link to celebrate the Sixth International day of Yoga (IDY) on 21st June, 2020. About 60 people comprising of doctors, administrators, staff and family participated online and included yoga practitioners and non-practitioners.

Sports Events

The Nature and Culture Club of ACTREC organizes sports activities such as the Annual ACTREC Premier League Cricket Matches, Football, Badminton, Athletics, Carom and Chess competitions.

In the year 2020, these could not be organized due to the COVID-19 pandemic.

Cancer Awareness Programs 2020

Cancer is a leading cause of death in our country. Cancer can be prevented by modifying lifestyle or minimizing exposure to risk factors. Most cancers can be treated if detected in the early stages. Tata Memorial Centre focuses on prevention aspect and keeping this in mind, ACTREC started its cancer awareness program in 2012 and have delivered talks on various topics like cancer prevention and early detection, breast, cervical, oral and inherited cancers to name a few, to beneficiaries from Mumbai and Navi Mumbai. The sessions also focus on breast self-examination and clinical breast examination by the medical team. Referral note is given to beneficiaries if they request for screening or if a lump is detected during clinical breast examination.

In the year 2020, we have reached out to 248 beneficiaries. The program was not initiated during the COVID period due to lockdown and requirement of social distancing.

SN	Month	Organization	No.of Beneficiaries
1.	12/01/2020	Gurudwara Kharghar	150
2.	05/02/2020	Navi Mumbai Municipal Corporation	53
3.	05/03/2020	ACTREC,	45

COVID Support Infrastructure

With the onset of COVID 19 pandemic, ACTREC augmented its infrastructure and service support to take care of COVID infected cancer patients and staff.

COVID Ward & ICU

ACTREC initiated management of COVID patients in May 2020, by converting the 15 bed Surgical Ward into a dedicated COVID ward with support infrastructure. The COVID management was enhanced to an advanced 50 bedded COVID Care Centre by repurposing three floors in the Archival Block on the ACTREC campus. This facility comprised of 22 intensive care beds for acutely ill COVID patients requiring ventilators and high end medication management. Fourteen beds were reserved for patients with mild to moderate symptoms requiring medicine management and isolation. Fourteen beds were dedicated for quarantine of patients who had high risk exposure and need of isolation and monitoring. The COVID care unit was made available to both patients and staff at ACTREC and since it's commissioning on 15thAugust 2020, 330 patients/ staff have been admitted and treated.

COVID Testing

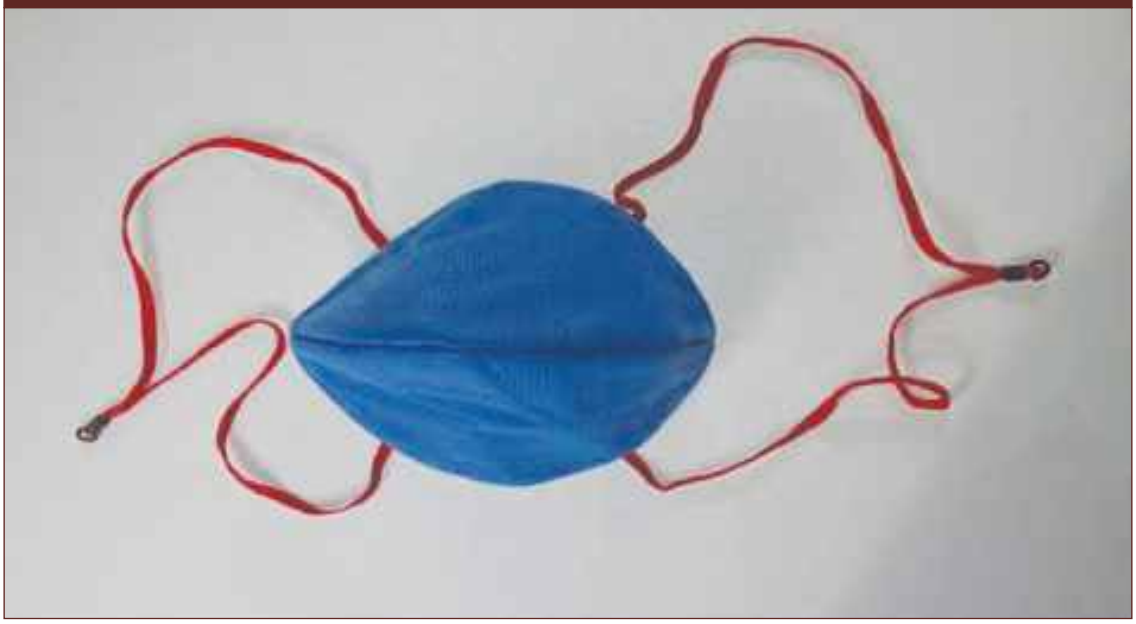
COVID management was augmented by initiating testing SARS-CoV2 by RT – PCR at Hematopathology laboratory, which is an ICMR approved laboratory since May 2020. To support the local community, the benefit of this testing facility has been extended to patients referred by Panvel Municipal Corporation. Further the Composite laboratory also started the COVID antibody testing and Interleukin 6 (IL6) since August 2020 and conducted Antibody testing (700) and IL6 testing (250) in 2020.

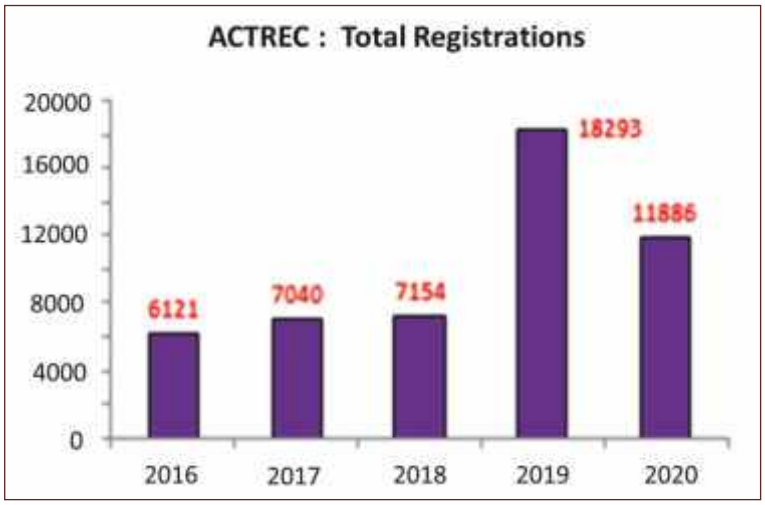
Face Masks

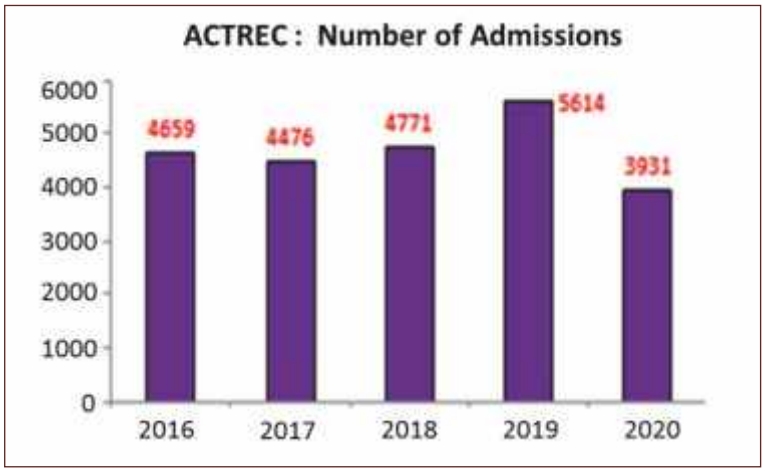
ACTREC designed and manufactured face masks for patients with sterilization wraps made of non-woven polypropylene spunbond-meltblown-spunbond (SMS) fibers available from CSSD. This was an inexpensive solution and effective mask with filtration capability near equivalent to N95 respirators (as per test reports from BARC laboratories) and is given to staffand patients free of cost.

COVID-Support at ACTREC

ACTREC Designed Face -Mask




ACTREC : Total Registrations
20000
16000
12000
8000
4000
0
6121
7040
7154
18293
11886
2016
2017
2018
2019
2020


ACTREC : Number of Admissions
6000
5000
4000
3000
2000
1000
0
4659
4476
4771
5614
3931
2016
2017
2018
2019
2020


ACTREC : Major Operations
6000
5000
4000
3000
2000
1000
0
2333
1645
1528
2506
1973
2016
2017
2018
2019
2020

PERFORMANCE STATISTICS ACTREC

	2019	2020
General New Patient Registrations– (1)	13344	9022
Private New Patient Registrations–(2)	4949	2864
Total New Patients – Total (1+2) – (3)	18293	11886
Patient Referrals for Investigations – (4)	1064	6392
Patients Referred for Consultation (Expert Opinion) – (5)	182	187
Preventive Oncology Patients – (6)	SNA	SNA
Total Patient Registrations (3+4+5+6)	19539	18465
INPATIENT SERVICES		
Total Beds	120	120
Number of Admissions	5614	3931
Average Length of Stay (Days)	5.05	5.74
Bed Occupancy %	81	64.48
SURGICAL ONCOLOGY		
Major Operative Procedures	2506	1973
Minor Operative Procedures	1563	974
Robotic Surgery	SNA	SNA
MEDICAL ONCOLOGY		
Day Care- General	22383	13759
Day Care- Private	4028	2574
Number of Bone Marrow Transplants	58	37

	2019	2020
DIGESTIVE DISEASES AND CLINICAL NUTRITION		
Endoscopies	18	04
Nutrition Clinic	SNA	SNA
ANAESTHESIOLOGY, CRITICAL CARE & PAIN		
Number of ICU Admissions	2675	2133
Patients in Recovery Ward	2500	1865
Pain Clinic	768	295
RADIATION ONCOLOGY		
External Beam Therapy	1186	911
Brachytherapy	325	68
Treatment Planning / Beam Modification	1660	917
IMAGING SERVICES		
Conventional Radiography	3170	2723
Ultrasound / Color Doppler	2080	1688
Mammography	1566	1225
C.T. Scan (Diagnostic)	6743	4349
C.T. Scan (for Radiotherapy Planning)	1450	935
M.R.I Scan	3763	2349
Interventional Radiology	1441	697
Bone Densitometry	SNA	SNA
NUCLEAR MEDICINE		
PET-CT Scan	2882	1991
SPECT-CT Scan	SNA	SNA

	2019	2020
SPECT- Scan	SNA	SNA
C.T. Scan (Diagnostic)	SNA	SNA
High Dose Therapy	SNA	SNA
GENERAL MEDICINE		
ECG	3693	3432
Echo Cardiography	1814	1767
Pulmonary Function Tests	SNA	SNA
LABORATORY DIAGNOSTICS		
Pathology - Histopathology + IHC + Frozen Section	14433	10910
Biochemistry	66045	50812
Cytopathology	SNA	SNA
Molecular Pathology	SNA	SNA
Microbiology	18004	14871
Bacteriology	9951	6951
Mycobacteriology	97	66
Mycology	192	129
Serology	5489	5914
Clinical Microbiology	2272	1767
Hematopathology	61082	44946
Cytogenetics	30980	18141
Flow Cytometry & Molecular Hematopathology		
Bone Marrow Aspiration Morphology	7610	4519
Flow Cytometric Immunophenotyping	7973	5325
Molecular Hematopathology	9900	4787

	2019	2020
Transfusion Medicine		
Blood Components Prepared [Whole Blood + packed Red Cells + Platelets (RDP)+ Fresh Frozen Plasma + Cryoprecipitate + Factor VIII Deficient Plasma]	4864	4371
Single Donor Platelets (SDP) prepared	1118	967
Specialized Procedures (Irradiation of blood Products+ Granulocyte Harvest +Therapeutic Leukapheresis + Therapeutic Plasma Exchange)	4788	4423
Laboratory Investigations [Blood Grouping +Cross matching+ Antibody Detection]	14169	13617
Blood Units Collected	2753	2870
Platelet Pheresis	1118	967
HLA Lab		
HLA Typing	SNA	4061
Antibody Screening	SNA	117
OTHER CLINICAL SERVICES		
Central Venous Access Devices (CVAD) Clinic	SNA	SNA
Stoma Clinic	SNA	SNA
Occupational Therapy	SNA	SNA
Physiotherapy	11268	6498
Speech & Swelling Therapy	SNA	SNA
Psychiatry and Clinical Psychology	SNA	SNA

	2019	2020
Dental Services		
General Dentistry	4999	2406
Prosthetics Services	145	100
Tissue Bank		
Allografts Produced	SNA	SNA
Palliative Medicine		
Number of Patients	SNA	SNA
Home Care Visits	SNA	SNA
Medical Social Service		
Number of Beneficiaries for Accommodation	3143	1000
Number of Beneficiaries for Financial support	127	264

Wherever applicable, mention:

DNA for Data Not Available.

NA for Not Applicable

SNA for Services Not Available

Name	2019	2020
Education		
Total PG Students admissions	NA	NA
Number of passed outs		
PhD (Health Sciences)	Nil	1
MD	NA	NA
DM	NA	NA
MCh	NA	NA
Others	NA	NA
Residents	48	52
Fellow(Medical)	7	7
Kevat, Patient Navigation Course	NA	NA
Nursing Trainees	2	1
Paramedical Students	Nil	Nil
Medical Physicists Trainees	2	2
Medical Laboratory Trainees	6	1
Medical Observers	15	16
Research Profile		
Extramural Projects	2	3
Pharmaceutical Company Sponsored	0	0
Intramural + Extramural Projects	0	2
Institutional Intramural Projects	6	5
Nil Funding	10	34
Postgraduate Student Thesis (Dissertation)	4	10
Publications		
International	64	111
National	24	20
Books	Nil	Nil
Book Chapters	2	Nil
Conferences/ Workshops/ Seminars	20	3
Value of Medicines Dispensed from Dr. P. Bhat – Med. Superintendent	Rs.356845739.1	Rs.288783561.7

	Number only	Details
Extramural Projects	40	
Pharmaceutical Company sponsored Projects	2	1. Title: To evaluate the role of T cells in colorectal cancer; Funding Agency: Bristol Meyers Squibb (BMS); Duration: March 2017 to March 2022, PI: Dr. S. Chiplunkar 2. Title: Assessing quality of plasma isolated by blood plasma separation micro-device for liquid biopsy application Funded by Embryyo Tech., Pune In collaboration with IIT-Bombay PI: Dr Sejal Patwardhan
Intramural Projects + Extramural Projects	78	
Nil Funding	10	PI : Dr Shilpee Dutt (2 projects) PI: Dr. M. Chilkapati (1) PI : Dr. S. Hasan (1) (IRB 900671) PI: Dr Jyoti Kode (4 projects) PI : Dr. Manoj Mahimkar (2 projects)
Postgraduate Student Thesis (Dissertation)	32	
Publications	77	
International	71	
National	5	
Books	Nil	
Book Chapters	1	
Conferences/Workshops/ Seminars	9	2 were virtual
Patents	3	Indian and PCT patents filed; Antibodies Against Lipocalin-2 And Uses –PI: Dr. Sorab Dalal Patent Has Been Filed- In/Pa-121 PI: Dr Shilpee Dutt. Title - “Nanoparticles Incorporated Self-Gelling Composition As Drug Delivery System Provisional Patent filed – PI: Dr. Pritha Ray on Novel peptides targeted to cisplatin resistant ovarian cancer cells.
Awards and Recognition	6	

	Number only	Details
Extramural Projects	NA	
Pharmaceutical Company sponsored Projects	NA	
Intramural Projects + Extramural Projects	11	PI: Dr. Rajesh Dikshit (7) PI: Dr. Sharayu Mhatre (3) PI: Dr. Atul Budukh, Dr. B. Ganesh (1)
Nil Funding	NA	
Postgraduate Student Thesis (Dissertation)	NA	
Publications	12	
International	9	
National	3	
Books	Nil	
Book Chapters	Nil	
Conferences/Workshops/ Seminars	14	Few Examples: 1. Course on setting up cancer registry Kolhapur, Maharashtra (CanReg5) 2. District wise training of creating awareness about Tobacco quit line Toll free number : Osmanabad district 3. Training in Molecular Epidemiology (Field + laboratory) for BBCI Guwahati staff
Patents	Nil	
Awards and Recognition	Nil	

Dr. Sudeep Gupta (Director, ACTREC)

Dr. H. K. V. Narayan (Dy. 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. Raghu Thota
Dr. Ketan Kataria
Dr. Ashwini Rane
Dr. Anjana Wajekar
Dr. Mahima Gupta

Cancer Cytogenetics
Dr. Dhanlaxmi Shetty *(OIC)*
Ms. Hemani Jain

Cancer Genetics
Dr. Rajiv Sarin

Clinical Pharmacology
Dr. Vikram Gota *(OIC)*
Dr. Manjunath Nookala

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)*
Dr. Prashant Tembhare *(Clinician Scientist)*
Dr. Gaurav Chatterjee
Dr. Sweta Rajpal
Dr. Shruti Choudhary
Mrs. Swapnali Joshi

Clinician Scientist Laboratory
Dr. Sudeep Gupta

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

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

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

Microbiology and Composite Laboratory
Dr. Vivek Bhat (OIC)
Dr. Preeti Chavan (OIC)

Nursing
Dr. Meera Achrekar
(Deputy Nursing Superintendent)
Ms. Anjali Rawat
(Asst. Nursing Superintendent)

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 Chakraborty

Surgical Oncology
Dr. Vani Parmar
Dr. Sajid Qureshi
Dr. Ali asgar Moiyadi
Dr. Vinay Shankhdhar
Dr. Sudhir Nair (OIC)
Dr. Deepa Nair
Dr. Prakash Shetty
Dr. Vineet Kumar
Dr. Manish Pruthi
Dr. Parthiban Velayutham

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

Translational Research Laboratory
Dr. Indraneel Mittra (Dr. Ernest Borges Chair)
Dr. Ranjan Basak
Dr. Kavita Pal
Dr. Raghuram GV

Anesthesiology, Critical Care and Pain Department

Officer-in-Charge : Dr Bhakti Trivedi

Anesthesiologists : Dr. Reshma Ambulkar, Dr. Raghu Thota, Dr. Malini Joshi, Dr. Ketan Kataria, Dr. Ashwini Rane, Dr. Anjana Wajekar, Dr. Mahima Gupta

Intensivist : Dr. Amol Kothekar

Overview

Anaesthesia, Critical Care and Pain Management services are provided by the Department of Anaesthesiology, Critical Care and Pain of TMC (TMH and ACTREC). These include nine permanent staff members (four new permanent staff members were appointed in the year 2020) and twelve senior residents from ACTREC as well as full-time consultants and residents from TMH.

Service

The service component of the department in 2020 provided its value towards Anesthesia for up to 5 OTs; Major OT, Interventional Radiology, MRI, Radiotherapy operation theatre and Endoscopy. The department also administers Critical Care for a 10-bedded ICU (includes 3 isolation beds) plus a 3-bedded PACU with a CPR team and renders Acute Pain services. A formal Pain team is formed compromising of Anesthesia consultant, resident and nurse who round the wards taking care of the post-operative and chronic pain patients.

During 2020, the department provided Anesthesia services for 2273 major OT procedures, 222 procedures in the Radiotherapy OT, 200 MRI, 207 Interventional Radiology procedures and 6 Endoscopy procedures. Critical care services were provided for 1865 Recovery room admissions, 268 ICU admissions (103 of which were ventilated) and 3 ICU admissions for procedures, as well as 309 Acute Pain Services. Dialysis was done for 9 patients in 29 sessions. Further, in the Pre-anesthesia check-up, physical was done for 919 patients (new + follow-up) and contactless was for 488 patients. As 2020 was the year of the COVID-19 pandemic, all the 5 OTs were functional for 5 months and the remaining 7 months only 3 to 4 OTs were operational. The Department also extended its service towards 50 patients in the COVID-ICU.

Research

The Department had 93 (Investigator Initiated/Thesis: 91; Sponsored: 2) clinical studies, in the year 2020. There are 73 ongoing studies and 20 studies were completed in the year 2020. Project discussion meetings are held at regular intervals where investigators discuss planned projects in the department before submission to the IRB. These meetings were on the virtual platform in view of the COVID pandemic. Members of the Department serve on the Institutional Ethics Committee and the Data and Safety Monitoring Sub-committee.

Education

The department organized a 2-day course (BRITE) for the intensive care trainee in March 2020. Due to the pandemic, the educational activities were transferred to online teaching modules, lectures and classes. The members of the department were invited as faculty for various conferences.

Cancer Cytogenetics Department

Officer-in-Charge : Dr. Dhanlaxmi Shetty

Scientific Officer : Ms. Hemani Jain

Carl Zeiss Axio Imager Fluorescent Microscope

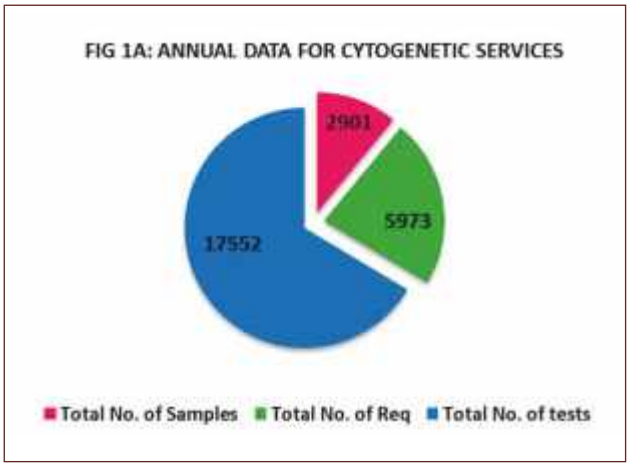
Overview

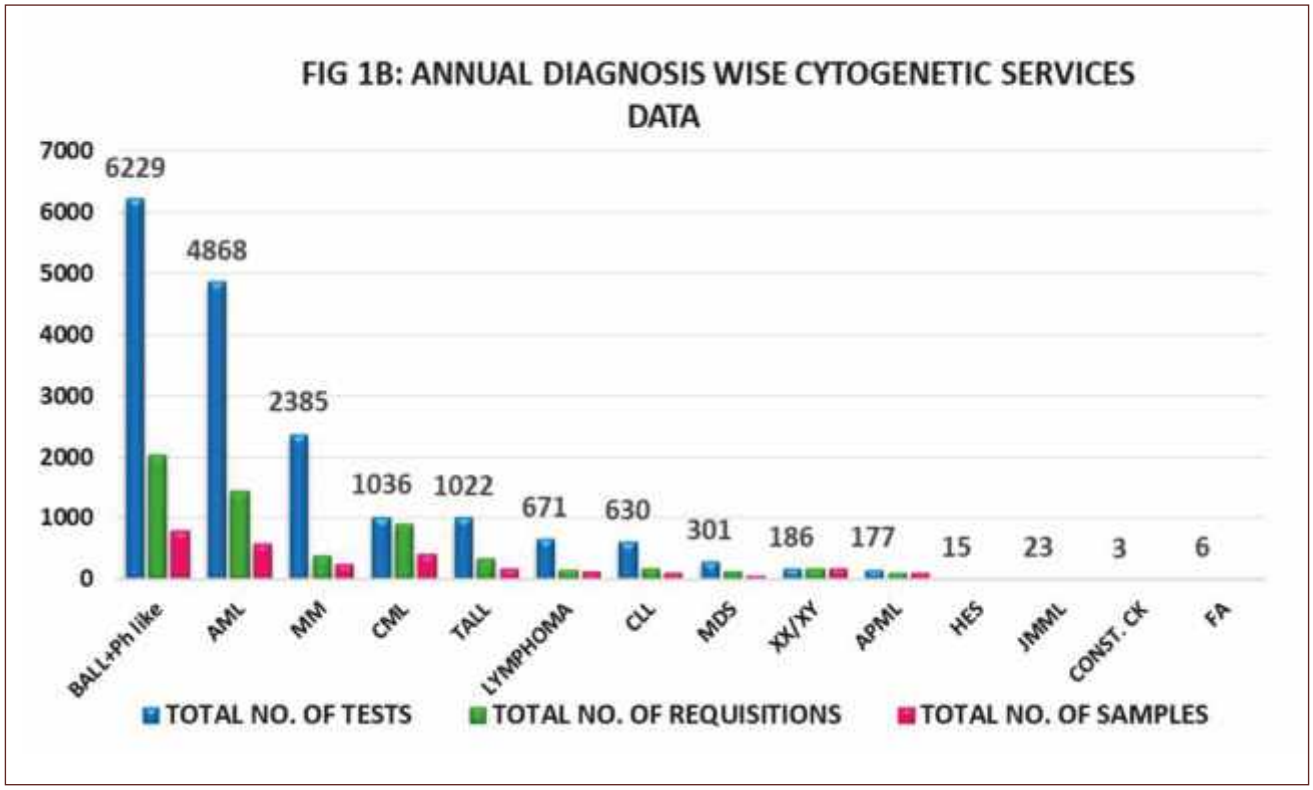
The Cancer Cytogenetics Department is a well-equipped high volume laboratory providing diagnostic services [Conventional Karyotyping (CK) and Fluorescence In-situ hybridization (FISH)] for all hematolymphoid malignancies both in-house and referrals. Comprehensive FISH panels for assessing cytogenetics at baseline and follow-up thereby assisting in diagnosis, risk stratification and guiding clinicians in deciding treatment and monitoring response is some of the expertise provided. The department contributes towards quality patient services and is accredited by National Board of Accreditation for Testing & Calibration Laboratories (NABL) and participates in External Quality Assessment program (EQAS) with College of American Pathologist (CAP) to ensure continual efforts for improving patient care.

Service

In the report year 2020, the department received 2901 bone marrow/peripheral blood specimens, with 5,973 requests for conventional karyotyping and FISH tests. The department performed 17,552 tests including comprehensive FISH panels consisting of 4-12 markers in hematolymphoid malignancies-AML, APL, B-ALL, T-ALL, MDS, CML, CLL, Lymphoma, MM; chimerism studies in sex mismatch post-BMT patients; conventional karyotyping in AML, MDS, CML; ploidy assessment by chromosome counting in ALL; constitutional karyotyping and chromosomal breakage studies in Fanconi Anemia/Aplastic Anemia) (Fig 1A, 1B). The department has been instrumental in establishing and successfully providing diagnostic services for samples received from HBCH Varanasi. The pre-existing panels for

detection of prognostically relevant cytogenetic abnormalities were improvised with the addition of 6 new markers in the Ph-like ALL/B-other ALL panel, ZBTB16-RARA: t(11;17) in variant APL, 4 high-risk markers in MM, IGH characterization in lymphoma cases, t(1;22) in AMKL patients and reviewing of images or stained slides received referrals was introduced. A new T code: "Processing charges" was introduced in the schedule of charges for ensuring refunds where applicable. In 2020, the department initiated EQAS in Cytogenetics (FISH and conventional karyotyping) for proficiency testing with cytogenetic laboratories in the country. The department has procured high throughput scanning system to meet the demands of the high volume laboratory and initiated Cytogenetic inventory management system and bar code labeling for minimizing human errors.





Research

During 2020, the department gained recommendation for funding by external agency for an IEC approved project to determine the incidence and complete clinical, cytogenetic and molecular profile of the B-other ALL subgroup. The faculty members of the department are involved in collaborative clinical trials evaluating the efficacy of new drugs in haematolymphoid malignancies.

Education

The OIC accepted 4 postgraduate trainees as a part of the training program and 2 MSc students for Master's dissertation. Cytogenetic training was provided to doctors from Medical Oncology. The department participated in DMG meetings, joint clinics/multidisciplinary activities. The staff members presented 8 oral papers in 2 national conferences and participated in CME's regularly. The senior faculty was an invited speaker at national conferences in the report year.

Clinical Pharmacology Laboratory

Officer-in-Charge : Dr. Vikram Gota

Scientific Officer : Dr. K. Manjunath Nookala

Overview

The clinical research efforts of this Laboratory are aimed at developing new drugs for radioprotection, and pharmacokinetics (PK) driven optimization of drugs. In addition, critical support and expertise necessary to conduct early-phase clinical trials in oncology is provided by the faculty, as well as training personnel and developing capacity in the field of cancer pharmacology, biostatistics and clinical research operations. This Laboratory is identified as an adverse drug reaction monitoring centre under the pharmacovigilance program of India for capturing and reporting the adverse events due to drugs and devices occurring at TMC.

Service

This laboratory offers therapeutic drug monitoring (TDM) services for voriconazole, posaconazole, mycophenolatemofetil and L-asparaginase. More than 2200 samples [voriconazole (1155), posaconazole (1143), MMF (09) and l-asparaginase (15)] were reported for drug levels in 2020, benefitting more than 500 patients undergoing treatment for acute leukemias and BMT. The TDM capacity was expanded this year with the addition of two more HPLC instruments in the bioanalytical unit.

Research

Notable contributions in the field of research include the development of two novel radioprotectors – Chlorophyllin (CHL) and Diselenodipropionic acid (DSePA). Phase I clinical trials of CHL in healthy volunteers were concluded in the report year. In addition to radioprotection, CHL was also found to have activity against the SARS-CoV-2 virus which led to two large randomized controlled trials of CHL in mild and severe COVID infection. The laboratory is also actively engaged in finding an industry partner for GMP manufacturing and clinical development of DSePA. The laboratory is collaborating with the EORTC for designing and validating quality of life questionnaires in various cancers. Three graduate students are working on the development of phytopharmaceuticals for indications such as lung cancer and graft versus host disease (GVHD). The OIC was granted an Indian patent for developing a liposome-in-gel composition as an injectable drug depot for delivery of radiosensitizers in collaboration with IIT-Mumbai.

Education

The OIC is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute, and four students- Ms. Dievya Gohil, Ms. Megha Garg, Mr. Saurabh Gupta and Mr. Girish Panigrahi are presently working on their doctoral theses. The laboratory continues to offer Fellowship in Oncotherapeutics which attracted a number of applications in 2020. One student of MSc Clinical Research interned from the laboratory in the report year.

Composite Laboratory

Officer-in-Charge : Dr. Preeti Chavan

Consultant : Dr. Avinash Pagdhune

Overview

The Composite Laboratory is NABL accredited and provides 24 hours' services to the hospital. The laboratory consists of three sections: sample collection area, haematology, and biochemistry (routine biochemistry and immunoassay). The laboratory also processes murine and canine blood samples for research purposes. The laboratory conducts a one year advanced training course in Medical Laboratory Technology since November 2015.

Service

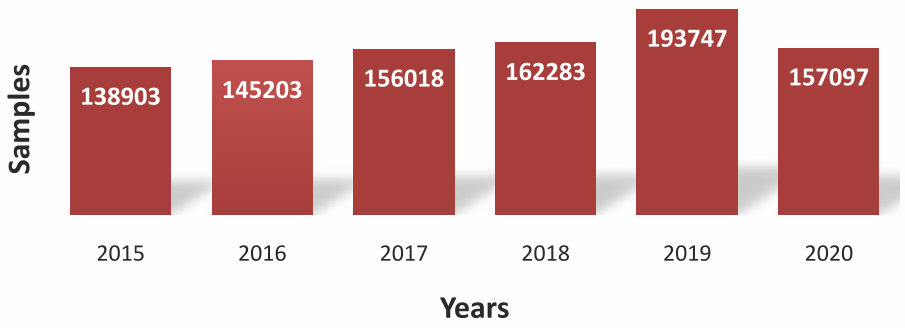
The Composite Laboratory provides the following patient-related hospital services; routine hematology (CBC, coagulation and peripheral blood smear examination), biochemistry (LFT, RFT, electrolytes, cardiac enzymes, osmolality, immunoglobulins, ferritin, tumor markers, assays for vitamin B12,vitamin D, folate, thyroid function tests) and drug assays (cyclosporine, Tacrolimus, sirolimus and methotrexate). In 2020 Interleukin-6 and COVID neutralizing antibody test was initiated in the laboratory. The laboratory performed 1,57,097 tests for routine biochemistry, 5636 immunoassays, 43,601 tests for haematology and 25,403 patient blood collections in sample collection area during the year 2020.

Research: One research paper was published by the faculty in the year 2020.

Education

In the report year 1 student enrolled for advanced training course in Medical Laboratory Technology.

Biochemistry workload over the years



Haematology workload over the years

Blood Collection workload over the years

Clinicians : Dr. Rajendra Badwe, Dr. Sudeep Gupta, Dr. Kumar Prabhash, Dr. Nita Nair, Dr. Shalaka Joshi

Scientists : Dr. Anuradha Choughule, Dr. Sejal Patwardhan

Overview

The major goal of this Laboratory is to delineate the role of hypoxia in cancer progression and metastatic spread, clonal evolution of a tumor leading to therapy resistance, and developing novel assays to monitor tumor burden and anticipate therapeutic outcome. Clinician Scientist Laboratory (CSL) employs a bedside - to bench - to bedside approach wherein, research questions formulated from clinical observations are addressed in the laboratory settings using pre-clinical assays; with an ultimate aim to develop tailored therapeutic strategies.

Research

Hypoxia in cancer metastasis: Data from this Laboratory has previously shown that surgical stress leads to modulation of genes involved in gamut of stress pathways, which projected AP-1 as a key regulator. To further 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 time (1h) and long time (24h and 48h). Concomitant with CA-9 and VEGF (hypoxia markers), AP-1 genes namely c-Fos and c-Jun were highly expressed in hypoxic conditions compared to normoxia and normoxia followed by reoxygenation conditions in a dose dependent manner. The expression of other AP-1 members such as FOSL1, FOSB, JUNB and JUND were also significantly high in hypoxic conditions than normoxia. Further studies target to probe the role of these AP-1 members in hypoxia-induced metastasis using in-vivo mouse model.

Clonal evolution of cancer in triple negative **breast cancer:** Multi-omics analysis of longitudinally collected TNBC samples from three patients identified sequential clonal bursts of evolution that remain sedentary during the course of treatment. Studies from this Laboratory identified founder sub clones that comprise of founder mutations which persist during the course of disease progression in the patient tumors, as well as corresponding plasma samples collected during the course of treatment. Such founding clones might primarily be responsible for therapy failure, which needs further validation using in vitro and in vivo assays. The study is currently undergoing peer-review in a scientific journal.

Non-invasive assays for treatment monitoring: This study constitutes previously biopsied breast cancer patients undergoing neo-adjuvant chemotherapy before the start of their therapy, and at the time of their surgical resection, along with sampling their blood prior to each cycle of chemotherapy. Cell free DNA (cfDNA) from these samples was isolated, which was subjected to sequencing. Recently the sequencing data was obtained and analysis for the same is in progress to identify patterns of mutations as a surrogate marker for tumor burden.

Therapy resistant breast cancer: In this Virtual National Cancer Institute (VNCI) study, with a holistic approach, attempts to understand mechanisms of endocrine therapy resistance in breast cancer patients are underway. Despite difficulties of a pandemic year active recruitment of patients for this study was done (28 in resistant cohort and 41 in the sensitive cohort). Samples collected will be subjected to multi-omics data for further analysis.

Education

Dr Sudeep Gupta is a recognized PhD Health Sciences mentor of the Homi Bhabha National Institute. Presently, three students-Mr. Nilesh Gardi, Mr. Rohan Chaubal and Mr. Jinesh Maniar are working on their doctoral theses. There are 3 Research Fellows, working on different projects in the Laboratory. In the report year 2 trainees were selected for their Master's dissertation and laboratory experience.

Hematopathology Laboratory

Officer-in-Charge : Dr. P.G. Subramanian

Haematopathologist : Dr. Sumeet Gujral

Clinician Scientists : Dr. Nikhil Patkar, Dr. Prashant Tembhare, Dr. Gaurav Chatterjee, Dr. Sweta Rajpal

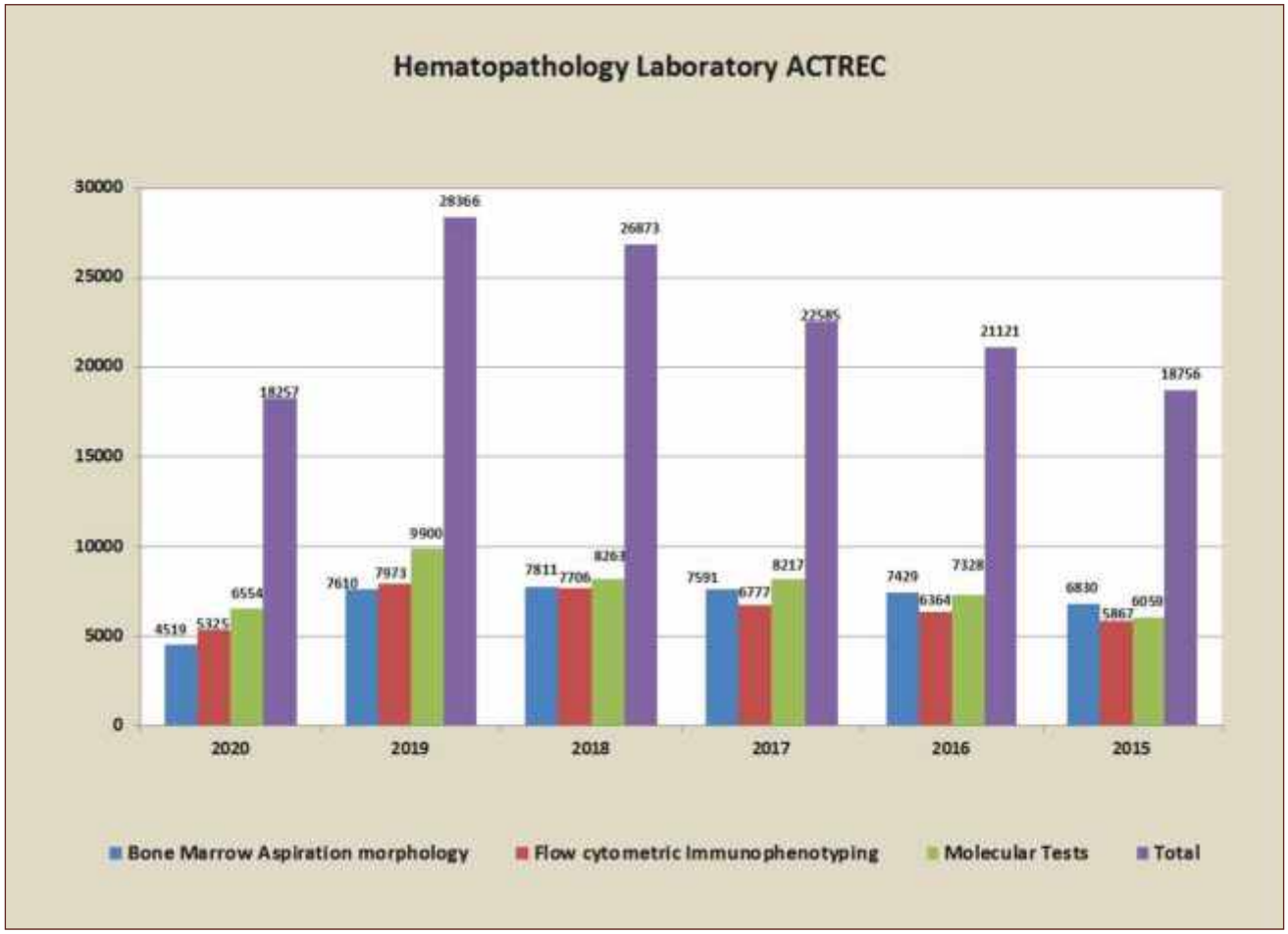
Scientific Officers : Dr. ShrutiChoudhary, Mrs. Swapnali Joshi

Overview

Hematopathology Laboratory is a service laboratory at ACTREC and undertakes the diagnosis and sub classification of hematological malignancies as well as, monitoring of patients while on therapy, for all malignancies. The Laboratory uses morphology, flow cytometry and molecular techniques for diagnosis. The Laboratory does minimal residual disease testing and post treatment monitoring of patients with 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. In 2020, the Laboratory has also established testing for SarsCov2 virus using quantitative PCR in view of the Pandemic.

Service

In 2020, "rising to the occasion"- of the pandemic, the laboratory established qPCR testing and sequencing of SarsCov2 and carried out more than 10000 tests for SarsCov2 in the report year. This laboratory carries out examination of blood, bone marrow and body fluids for the diagnosis of leukemia and lymphoma, does sensitive investigations like detection of Minimal Residual Disease for Acute Leukemia and Multiple Myeloma and involvement of hematolymphoid malignancies in cerebrospinal fluid and other rare sites. Post allogeneic stem cell transplant monitoring for chimerism by analyzing Short Tandem Repeats and extended immune subset monitoring for both post allogeneic stem cell transplant and for patients affected with COVID 19 is done by this laboratory. Further, IL-6 and other interleukin assays required for diagnosing and monitoring cytokine storms as well as molecular testing for diagnosis, subtyping and monitoring of hematolymphoid malignancies has been established by this laboratory. It is of immense value that this laboratory has done the largest cohort of sequencing of SarsCov 2 genome and identified subtypes for epidemiological use. The laboratory carries out Next Generation Sequencing for identifying unknown fusions in the hematological malignancies, which can be targeted with specific drugs for optimal treatment of patients. In 2020, the laboratory has provided molecular diagnostics service to nearly 16000 patients and has the largest hemato-oncology molecular diagnostics workload in the country.


Hematopathology Laboratory ACTREC
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6777
8217
22585
7429
6364
7328
21121
6830
5867
6059
18756
2020
2019
2018
2017
2016
2015
Bone Marrow Aspiration morphology
Flow cytometric Immunophenotyping
Molecular Tests
Total

The following are the total number of tests done in this laboratory in the year 2020.

	Name of the Tests	Total No. of Tests performed
1.	**Bone Marrow Aspiration Smears**	4519
2.	**Cytochemistry**	3448
3.	**Flow cytometric Immunophenotyping**	5325
	Extended Immune subset monitoring	160
	Immune cell subset in Covid 19 positive patients by Flow cytometry	362
4.	**Body Fluids for cell counts & Morphology**	1859
5.	**Molecular Hematopathology**	6554
	Chronic Myeloid Leukemia monitoring by BCR-ABL1 Quantitation	2775
	BCR-ABL1 and other Leukemia Transcript identification	275
	ABL Kinase Domain Mutation studies	274
	Acute Promyelocytic Leukemia PML-RARA Quantitation	229
	BRAF	4
	IGH or TCR gene for clonality and other tests	9
	Chimerism testing by STR markers for Bone Marrow transplantation	1272
	MYD 88	8
	Next Generation Sequencing Assay	1708
6.	**Testing for SarsCov2**	10399

Research

Faculty members are engaged in several research projects, some with a focus on the SarsCov2 virus; Immunological profile and predictors of severity in COVID 19 and sequencing of SarsCov2 virus in cohort of patients at ACTREC. Other projects are on; Minimal Residual Disease (MRD) in both B cell and T cell Acute Lymphoblastic Leukemia and its predictive value in outcome, MRD in Acute Myeloid leukemia using both Flow Cytometry Techniques and Next generation sequencing and its value in Clinical management in Indian context, gene mutations in Acute Myeloid Leukemia and use of Artificial Intelligence algorithms for better risk stratification for management, detection of minimal disseminated disease in pediatric round cell tumors by flow cytometric immuno-phenotyping, investigating value of circulating plasma cells and serum miRNA levels for therapeutic response evaluation in newly diagnosed multiple myeloma and immune reconstitution post allogenic stem cell transplant.

Education

The laboratory conducts specialized courses for pathologists and technicians, a 2-year post MD HematopathologyFellowship program, and a 6-month advanced training program in Oncology for pathologists (2 trainees in 2020). Advanced training courses in Hematology, Flow Cytometry (3 trainees in 2020) and Molecular Hematology (3 trainees in 2020) are also conducted for technologists. In 2020, 50 M.D. Pathologists from various parts of the country came as observers for training in morphology, cytochemistry and flow cytometry.

In 2020, the laboratory has actively run free online program for teaching of resident pathologists during the Lockdown period in India in collaboration with the Tata Trust. The program saw participation from more than 25 countries and attendance by more than 1500 delegates.

Medical Superintendent : Dr. Prashant Bhat

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

Staff Physician : Dr. Amol Patil

Quality Manager & COVID Vigilance Officer: Ms. Chital Naresh

Medical Social Worker : Ms. Bhagyashree Tilu

Physiotherapy : Dr. Mohua Chatterjee

Medical Records Officer : Mr. Madhumohan Maddirala

CSSD (In Charge) : Mr. Sachin Walawalkar,

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

Medical Stores (In Charge) : Mr. N V Chavan

Pharmacy (In Charge) : Mr. K N Chaudhari,

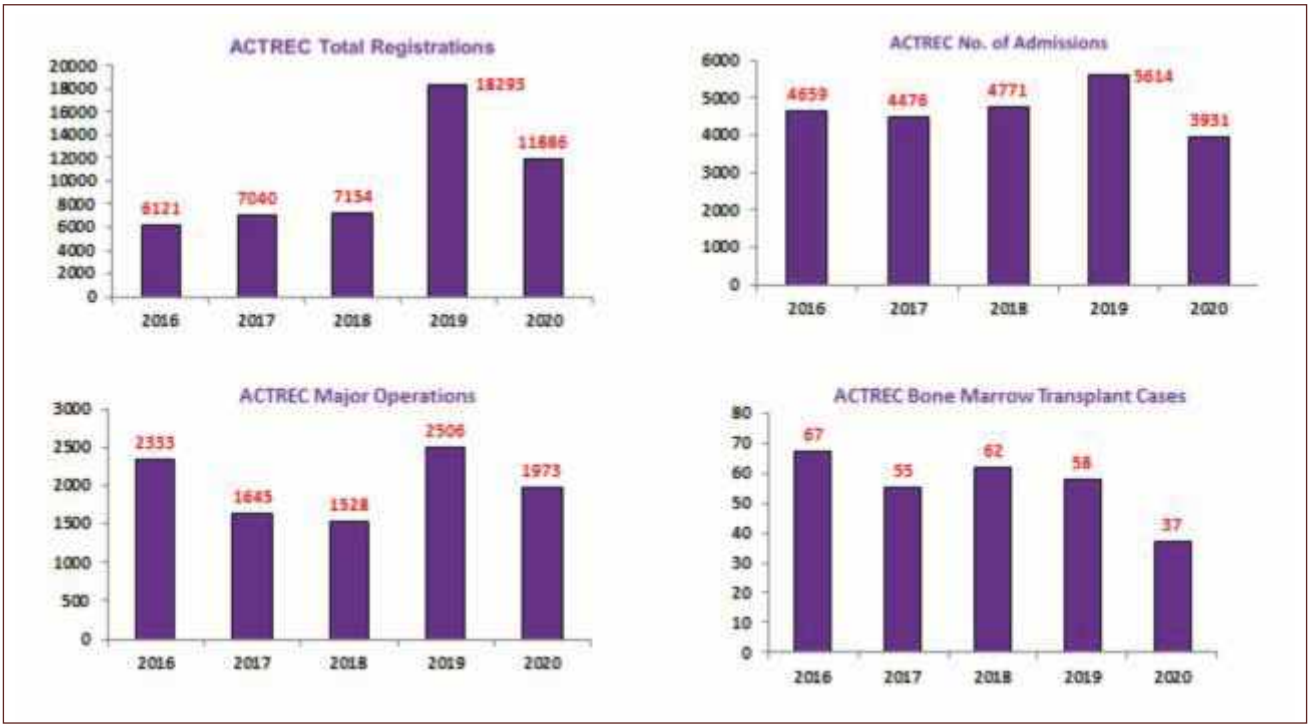
Overview

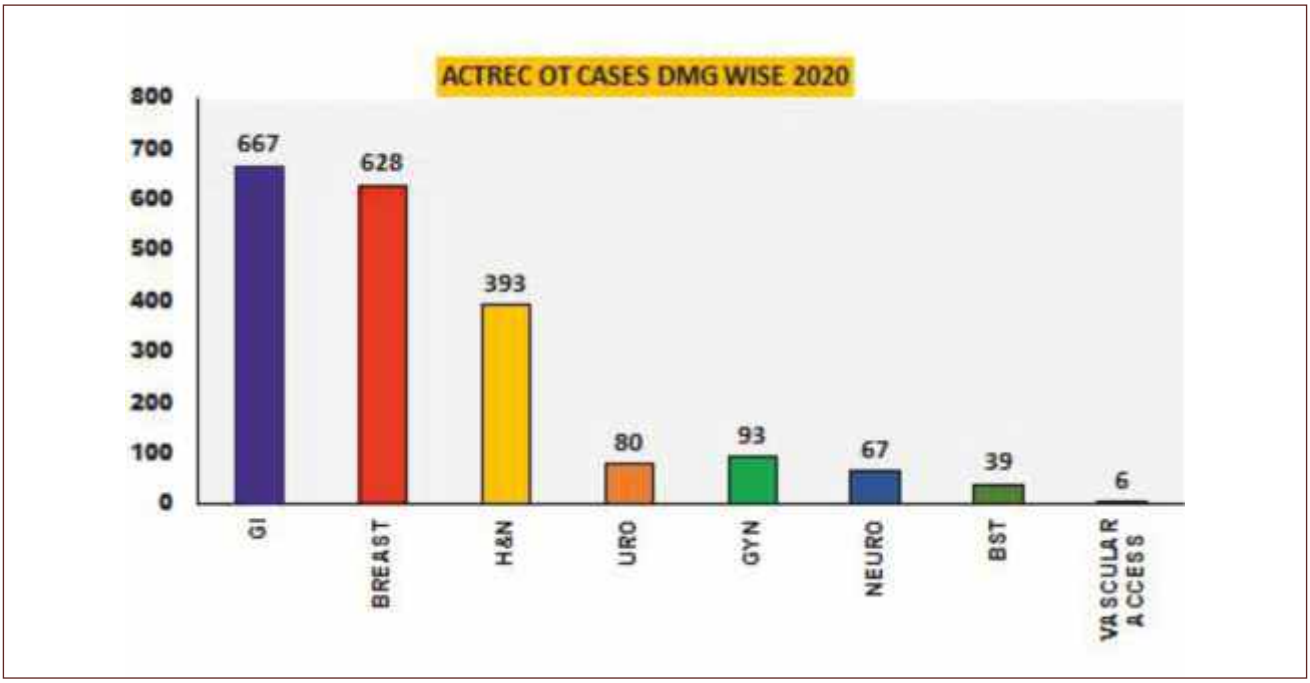
The outpatient, inpatient, diagnostics, clinical and support services together with patient hostel 'Vasundhara' are managed by Medical Administration headed by the Medical Superintendent. The General Medicine for the management of medical co-morbidities, Staff Clinic and super-specialty consultation through honorary specialists is organized by the Medical Administration. Associated clinical services viz. dietetics and patient nutrition, physiotherapy, Patient support services through medical social work and Medical Records are managed by the Office of Medical Superintendent. Pharmacy along with material management of drugs and surgical supplies, procurement of capital equipment for CRC, healthcare government schemes MJPJAY and AYUSHMAN BHARAT implementation at ACTREC is facilitated by Medical Administration. MS office is actively involved in the various infra-structure projects under progress at ACTREC. CSR funding for poor patient treatment support, infrastructure development, equipment donation and small and large monetary donation to various patient welfare funds are liaised and coordinated from MS office. Patient activities organized by NGO's and voluntary organizations are also facilitated by Medical administration.

Research

The year 2020 has seen 1690 new ACTREC registrations, 10196 transfer cases from TMH and 6392 referrals for diagnostic and expert opinion requirement. 337 new patients have used Daycare services. RT new referrals was 1203 and 697 patients have undergone Interventional radiology procedure.

There were 1973 major surgeries and 300 minor surgeries that have been conducted in 2020. Anatomy laboratory was inaugurated on 21st November 2020 after procuring a clearance under the Maharashtra Anatomy Act (1948). The new facility will be utilized to conduct surgical skill enhancement workshops and development of new surgical techniques using human cadavers. The ACTREC Diagnostic laboratories appeared for NABL Desktop Surveillance and were granted continued accreditation until the validity of 19th May 2021.





During the year 2020, the Centre had to gear up to take care of Cancer patients with COVID 19 infection in view of the COVID pandemic, which was a challenge and required expertise for management. Medical Administration spearheaded the activities leading to tackling of the COVID infections and related issues. ACTREC also designed and manufactured masks with near N95 filtration capability with material used in the CSSD which is widely received and appreciated.

The COVID care Centre project was completed within 2 months in the repurposed 3 floors of archival block with corporate funding coordinated by MS, ACTREC, and was inaugurated on 15th August 2020. The 50 bed facility was made available to both cancer patients and staff at ACTREC. COVID cancer patients/ staff (330) were admitted for COVID related complications for treatment since the onset of the pandemic.

Education

COVID Awareness programs were conducted in Hindi, Marathi and English for information to all at ACTREC with display of posters at strategic locations. Vigilance on COVID precautions were undertaken to ensure that the staff and patients were safe in the ACTREC campus.

Medical Oncology Department

Officer-in-Charge : Dr. Amit Joshi

Medical Oncologists : Dr. Sudeep Gupta, Dr. Navin Khattry, Dr. Anant Gokarn, Dr. Sachin Punatar, Dr. Sumeet Mirgh, Dr. Ankansha Chichara

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, ~850 autologous/ allogeneic transplants have been performed with overall transplant related mortality of 10% (2% in autologous, 18% in allogeneic). Since October 2011, adult patients with hematolymphoid neoplasms not undergoing transplant are also being treated in ACTREC.Solid tumor unit is routinely administering chemotherapy in neoadjuvant, adjuvant and palliative setting since 2006.

Service

Bone Marrow Transplantation and Adult Hematolymphoid Unit: In 2020, 67 transplant (30 allogeneic, 37 autologous) patients were admitted in 6 bed HEPA filtered BMT unit. The outpatient visits in BMT and adult hematolymphoid unit in 2020 were 7644 at an average of ~750 visits per month, and ~165 new referrals (non-TMH) were registered while 251 new referrals from TMH were examined. There were 581 admissions in hematolymphoid ward and non HEPA filtered BMT ward for administration of chemotherapy or supportive care. There were 39 PBSC collection done for preforming autologous and 29 for allogeneic BMT. The unit routinely performs matched unrelated donor transplant using HLA matched stem cells from international/national unrelated donor registries, unrelated cord transplants, and the most challenging - haploidentical transplants for patients not having a fully matched related/ unrelated donor.

Adult Solid Tumor Unit: In 2020, 12949 outpatient visits took place, and tumors of the head and neck, breast, ovary, testicular, cervix and gastrointestinal region comprised the bulk of cancers treated by this unit. The seven in- patient beds dedicated to solid tumors had 230 in-patient admissions in the report year.

Pediatric Oncology Unit: In the pediatric oncology OPD and Inpatient Services approximately 3000 outpatient visits and with the five inpatient beds approximately 150 patients were admitted in 2020. Pediatric oncology department began registering new patients in 2020 and 24 new patients were registered in the report year. Approximately 900 OPD procedures including ascitic tapping, bone marrow aspiration and biopsies, intrathecal methotrexate, endoscopy and pleural fluid tapping were performed in the Procedure room. Approximately 16312 patient visits in the Day Care Services (chemotherapy + emergency managements + hydrations) were undertaken in 2020.

Research

Faculty members of the department are associated with several investigator initiated, sponsored clinical trials and collaborative research projects, both in the hematolymphoid and solid tumor units.

Education

The department of Medical Oncology at ACTREC has an active educational program, which encompasses daily academic sessions pertaining to transplantation and hematolymphoid neoplasms for the DM students posted in ACTREC, and a monthly Journal Club that includes faculty and students from the departments of medical, radiation, surgical oncology and other allied branches.

COVID Related Activities

The Department participated in managing COVID related issues with most consultants being a part of the COVID task force, formed to tackle the pandemic at the Centre. Residents from all departments managed the swabbing area and the 3 COVID wards constructed with help from Tata Projects Ltd where a total of 345 persons were admitted. Of these, 245 were cancer patients actively treated for COVID. KEVAT students set up a Call Centre for

Telemedicine consults for patients scheduled for routine follow up during the lockdown period. Approximately 12000 patients were called telephonically and were guided on their problems and queries. A COVID swabbing booth for collection of sample required for the RT PCR test was constructed by the Engineering department, predominantly manned by Surgical Oncology registrars with assistance from residents of various other departments including Medical Oncology.

Microbiology Laboratory

Officer-in-Charge : Dr. Vivek Bhat

Scientific Officer 'E' : Dr. Sujata Lall

Overview

The Microbiology Laboratory is involved in patient service, academics and research. Patient services include processing and reporting of bacteriology, serology, mycobacteriology, molecular microbiology, mycology and other clinical microbiological samples at ACTREC. Sterility testing for Blood Bank services, environmental surveillance, infection control services and waste management support is also provided by this Laboratory. The staff is also involved in research projects and scientific publications. Educational activities include teaching (TMC & other institution) students of MD microbiology, nursing department, TMC laboratory staff and in the Advanced Training in Medical Laboratory Technology (ATMLT) course.

Service

The Microbiology Laboratory provided the following patient related & hospital services at ACTREC in the report year. A total of samples 20732, were processed in the laboratory for the period January – December 2020. These includes Bacteriology cultures for Blood (4060), CSF/Body fluids (119), Drain Fluids (87), Pus(42), urine (567), feces (964), swabs (679), Respiratory samples (127) and others (130). Serology samples for HBsAg (1651), HIV (1634), HCV (1638), HBCT (388), HBCM (362), PCT (2338), Dengue (419) & others (363) were analyzed. Clinical microbiology testing for urine (966), faeces (449), Clostridium difficile (356) &Adeno/Noro virus detection (267), Mycobacteriology (Acid Fast Staining) (68) and Mycology (128) (Identification of fungi in clinical material, susceptibility testing and special staining, Routine Fungal Culture) was completed. Molecular Microbiology- syndromic multiplex PCR panels; (25), Sterility testing for Blood Bank services; PBSC (196), SDP (1159), RDP (49), PCS (694), FFP BHI (78), RDP BHI (49), PCS BHI (25), Cryoprecipitate BHI (4), Others (34) & Environmental surveillance for OT/ICU/ Brachytherapy/ BMT units /CCE & water testing was done. Infection control and waste management support is also provided by the laboratory.

Research

The laboratory is involved in three ongoing research projects, of which two are IEC approved. Research areas include testing for susceptibility profiles and resistance patterns of multidrug resistant pathogenic microorganisms commonly found in hospital patients to newer anti-bacterial agents such as ceftazidime-avibactam and Ceftarolinefosamil. Three articles were published (National & International) by the staff members in the year 2020.

Education

The laboratory is involved in teaching students of MD Microbiology, Nursing department, TMC laboratory staff & housekeeping staff and project/ dissertations for MSc students. The ATMLT (Advanced Training course in Medical Laboratory Technology) is also conducted and coordinated by this laboratory. The faculty and laboratory staff members participated in 3 National/ International Conferences (virtual) in the report year.

Deputy Nursing Superintendent : Dr. Meera Achrekar

Assistant Nursing Superintendent : Ms. Anjali Rawat

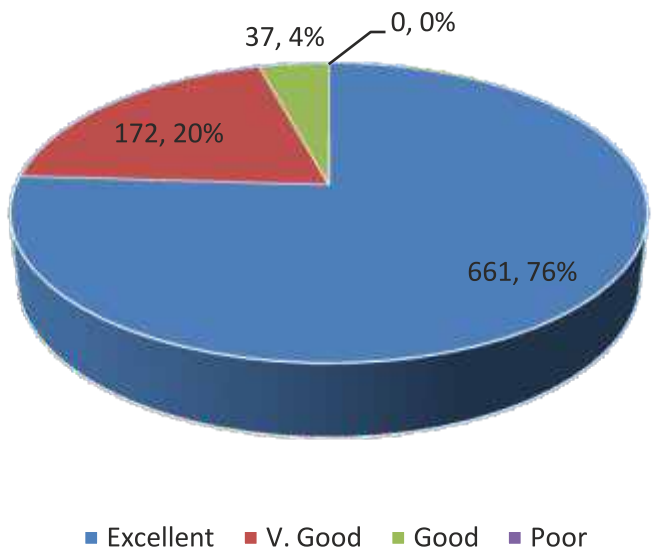
Overview

The Nursing Department at ACTREC, constantly strives to provide safe environment and positive experience to patients/caregivers. The department is committed and focused on bridging the gap between theory and practice through an incessant nursing education program. The year 2020 was designated as the "International Year of the Nurse and the Midwife," in honor of the 200th birth anniversary of Florence Nightingale by the World Health Organization (WHO). In 2020 all nursing efforts and attention were focused on facing the challenges posed by the COVID-19 pandemic. Nurses being the frontline workers had additional responsibilities in combating the pandemic and also could not escape the threat, recording a COVID-19 positivity of 21%. New initiatives taken were planning and execution of new COVID center ward/ICU/quarantine facility, extensive PPE training and meticulous contact tracing of patients/staff. Health education material for BMT patients was finalized. An enrollment for the one year fellowship program in Bone Marrow Transplant Nursing was done, by 1 student. In 2020, the formalities of the Nursing Excellence Certification have been initiated by the Nursing Department.

Service

The emphasis in 2020 was on assisting patients and staff to combat COVID-19. New SOPS for the COVID unit were finalized and implemented. The infection control nurses' focused on training the patients and staff on the importance of hand hygiene, social distancing, and the appropriate use of a face-mask. All nurses were trained on the technique of donning and doffing of PPE and videos were circulated for an easy reference. Extensive training and sensitization led to adherence to the SOPs. Even in these challenging times all patient service continued albeit with utmost precautions. Bed strength of the ward and daycare was reduced to ensure social distancing. Surveillance, monitoring and use of standard protocols helped to maintain the hospital acquired pressure ulcer rate (2020-0.35%) below 2% and fall rate (2020 – 0.17%) below 2%. New admissions to day care were 337 with a total of 16060 sittings. 974 patients underwent minor procedures and 1973 major surgeries were undertaken. Thirty seven patients underwent hematopoietic stem cell transplant: 19 autologous, 12 allogeneic, and 6 haploidentical. Complications were handled with expert medical and nursing care. In the questionnaire handed out to patients', around 96% of patients expressed, 'very good and above' about overall satisfaction with Nursing Care. In 2020, 94 PICC were inserted, and the nurse-led PICC clinics showed good clinical outcomes. 759 patients undergoing GI surgeries attended the stoma clinic. Complications like peri-stomal skin excoriation, high output stoma, stoma retraction were resolved by the specialized stoma care nurses.

Overall Satisfaction with Nursing Care - 2020



Research

Various audits on nursing assessment, biomedical waste management, thrombophlebitis, pain management, hand hygiene were carried out. CLABSI surveillance was also initiated.

Education

Under the Continuing Education Program, the department conducted a 2-day hands-on training workshop on 'Central Venous Access Device (CVAD): care and maintenance', which drew wide participation from various states of India. Abhilasha, soft skill training program was also attended by nurses. Nurses took active part in, 'Care Givers Educational Program' organised by Sanjeevani, (NGO), Virtual conference by ISBMT and APBMT, webinars on CLABSI, critical care skill based, wound management and artificial intelligence in nursing. Three nurses participated in a quiz on Neurology and bagged the 2nd prize.

Pathology Laboratory

Officer-in-Charge : Dr. Sridhar Epari

Staff Pathologists : Dr. Asawari Patil, Dr. Swapnil Rane

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 one pathology consultant, two senior residents and two junior residents (all by rotation).

Service

The Surgical Pathology Laboratory provides diagnostic services for histopathology, 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 processor, automated stainer, cryostat and automated immunostainer. This laboratory is accredited by NABL for all services and participates in EQAS (External Quality Assessment Scheme) offered by national agency (Anand Lab, Bangalore) and an International agency (College of American Pathologists). The cytology samples from ACTREC are processed in the laboratory and the prepared smears are sent to TMH Cytopathology laboratory, which is accredited by NABL.

In the year 2020, the laboratory processed around 3604 histopathology specimens (i.e. 52006 paraffin blocks) and 1353 frozen sections on 520 cases. In the report year, the laboratory has standardized additional 10 antibodies – amounting to a total of 59 standardized antibodies IHC panel and performed around 5993 IHC tests in 2231 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 investigator or co-investigator in many IEC approved DMG projects, junior residents (MD students) thesis projects, as well as projects in collaborations with scientists at 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 and also attend national/ international conferences as expert faculty or for oral/poster presentations. Resident doctors 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 course for NABL.

Radiobiology Laboratory

Radiation Oncologists : Dr. Jayant Sastri Goda, Dr. Tabassum Wadasadawala

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 Mumbai, BARC, Manipal & Yenepoya 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.

Research

The scientific investigations performed in the laboratory, in the area of radiation sensitization and protection, has led to the development and verification of the bio efficacy and bio distribution of novel nano formulations incorporated 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, the manuscripts of which have been communicated to a journal. Besides this, hydrogel and intranasal formulations of temozolamide in orthotopic GBM models is attempted. A novel selenium compound (3-3 DSePA) as a lung radio protector against radiation pneumonitis is in the final stage of development wherein its efficacy as a radiation protector against radiation induced pneumonitis has been proven and the results published in a reputed free radical journal (FRBM). This laboratory in collaboration with Manipal University is co-developing targeted delivery of ligand loaded iron oxide nanoparticle to human glioma in mouse xenograft model. In collaboration with IIT Mumbai, the laboratory is co-developing a liposomal formulation of temozolamide for intranasal delivery of temozolamide. The laboratory is co-developing an active plant extract called lupeol which is an antiangiogenic agent as a radiation sensitizer in orthotopic GBM models. This laboratory along with the department of Pathology is the coordinating lab for international translational research study, BIOEMBRACE. This study is investigating impact of various biomarkers on outcomes of locally advanced cervix cancer (Dr Supriya Sastri, co-lead of the project). The laboratory is actively involved in preclinical development CAR-T cell therapy in GBM in collaboration with IIT Mumbai. Presently, the laboratory has grants from BRNS and DBT.

Education

The faculty associated with this laboratory actively train MSc Biotechnology students in molecular biology pertaining to radiobiology. In the report year, 2 PhD students have been trained in handling radiation based experiments, and 4 MSc students underwent training in the year 2020. In the report year, 1 Indian patent for the delivery of radio sensitizers has been granted, and 1 each of international and national patents have been filed by the senior faculty in collaborative work with other investigators at the Centre.

Radiodiagnosis and Interventional Radiology Department

Officer-in-Charge : Dr. Nitin Sudhakar Shetty

Medical Officers : Dr. Amit Kumar Janu, Dr. Kajari Bhattacharya, Dr. Daksh Chandra, Dr. Nivedita Chakraborty

Overview

The Department of Radio-Diagnosis and Interventional Radiology is equipped with radiography, ultrasonography (USG), Color Doppler, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Mammography (MG), with Digital Breast Tomosynthesis (DBT), and Interventional radiology (IR). The Department provides 24 x 7 radiological services. Some additions in the Department were; two portable direct radiography (DR) machines, one of which is exclusively used for COVID-19 patients, and a high-end USG machine (Samsung RS80 EVO) which provides excellent resolution along with advanced applications for imaging and interventional procedures. With the CT modality, apart from imaging routine cases (shared with Nuclear medicine for PET-CT and Radiotherapy for planning); essential services were provided during the COVID-19 pandemic for diagnostic and follow-up imaging. For the MRI modality, routine MRI and under general anesthesia for patients from pediatric services and adults, advanced MR imaging including perfusion and spectroscopy, is performed. All these services are provided to ACTREC registered patients on priority and further extended to TMH patients to optimize time slots on the machines. Preventive, diagnostic, and follow-up mammograms are performed regularly. Diagnostic and Therapeutic invasive procedures are done under sonographic or fluoroscopic guidance. The on-site cytopathological evaluation has been initiated to assess adequacy and appropriateness of samples collected under image guidance with a dedicated IR-OPD for care of these patients. Emergency services of urgent radiography, sonography, Doppler studies, and CT are available all time. Besides these, USG and CT examinations of animals are also done as part of approved animal research projects. In addition to the regular staff, 3 senior and 6 junior registrars from TMC are posted on rotation to support these activities. The senior registrars in Radiodiagnosis and Interventional Radiology (IR) serve as residential doctors for the department. In this crucial year of the COVID-19 pandemic, this Department has been on the front line in COVID care by imaging these patients (Radiography, CT, USG, and MRI) screening, swabbing and ward duties.

Service

During the report period, a total of 2698 radiographic investigations (average of 225 X-rays/month), 1374 USG/ Color Doppler (average of 115 scans/month), 4497 Diagnostic CT scans (average of 375 scans/ month), 826 Radiotherapy planning CT scans (average 67 patients/month), 3972 MRI (average of 331 patients/month) and 1261 MGs (average 105 patients/month) were performed. In addition, IR performed 877 various procedures (average of 73 patients /month). In an endeavor to provide uninterrupted clinical care during the pandemic

and to prevent crowding, online joint-clinics have been conducted using LAN based True Conf software with other departments.

Research

The department faculty members are PIs on clinical research projects and also promote research of other clinical colleagues by providing support in imaging services. As the emphasis in 2020 was on the ongoing pandemic, research activities on COVID have been undertaken with artificial intelligence applications for X-rays and CT in COVID pneumonia being in the pipeline.

Education

The Officer-in-Charge and other department staff have participated and presented their research work at several national/ international conferences in 2020 using various online platforms. Education programs for residents of the department as well as other departments have been organized. Lectures for imaging spectrum in COVID have been provided to other departments of the institute.

Radiation Oncology Department

Officer-in-Charge : Dr. Vedang Murthy

Radiation Oncologists : Dr. Tejpal Gupta, Dr. Supriya Sastri, Dr. Jayant Goda Sastri, Dr. Tabassum Wadasadawala, Dr. Sangeeta Kakoti, Dr. Priyamvada Maitre, Dr. Shwetabh Sinha, Dr. Jifmi Jose, Dr. Revathy Krishnamurthy

Medical Physicists : Dr. SV Jamema, Ms. Reena Phurailatpam, Mr. Kishore Joshi, Ms. Jeevanshu Jain.

Overview

The department of Radiation Oncology provides comprehensive cancer care and constitutes a team of radiation oncologists, medical physicists and radiotherapy technologists who run the department with dedication and efficiency. The Facility houses three external beam radiotherapy machines of which one is an indigenous telecobalt (Bhabhatron) and two advanced linear accelerators with state of the art capability that enables advanced procedures like IMRT/IGRT/SBRT and adaptive RT. The myeloablative total body irradiation is routinely performed at ACTREC and facilitates bone transplants.

Service

In 2020, the departmental staff was actively involved in COVID care during the pandemic. In spite of the severe implications of the pandemic, 892 patients across all disease management groups with external beam radiotherapy and 83 fractions with brachytherapy were treated. These include about 40 COVID positive patients who received radiotherapy, a unique achievement in the country. The conventional simulator was decommissioned in December 2020. A new HDR Brachytherapy system has been acquired which will be installed shortly.

Research

The OIC and a senior faculty member of the department both presented and published the results of 'Practice Changing' research work in 2020. This contribution received international recognition via press release and discussions at plenary sessions. “Phase III RCT of postoperative IMRT for late toxicity reduction (PARCER) and “Prostate Only or Pelvic Radiotherapy in high risk Prostate Cancer (POP-RT)” is the title of these trials with the latter being published in the Journal of Clinical Oncology. In 2020, this department at ACTREC became the hub for knowledge-based planning protocols for various sites like cancer cervix, prostate, breast and head-neck which would essentially reduce planning time and increase patient turn-over. Besides, several new protocols related to COVID-19 were initiated as well as accomplished. Other senior faculty members published as well as were granted patents for their research contributions in radiation oncology.

Education

The MD students are affiliated to the Homi Bhabha National Institute and undergo rotatory posting at ACTREC for a period of 3 months. A formal and detailed resident orientation program was initiated this year for the fresh batch of students at the beginning of their MD course. Every year two Medical Physics interns receive formal training in a range of treatment planning procedures which helps in capacity building. In addition, the observer -ship program facilitates short term training for national as well as overseas candidates. The faculty give deliberations at various local, national as well as international platforms like Chartrounds India, PG teaching course by ICRO, Oncology Classrooms, Master class courses, Kevat Navigation Program and others. The OIC and a senior faculty member were awarded the Fellow of Indian College of Radiation Oncology (FICRO) in November 2020.

Surgical Oncology Department

Officer-in-Charge : Dr. Sudhir Nair

Surgical Oncologists : Dr. Vani Parmar, Dr. Sajid Qureshi, Dr. Aliasgar Moiyadi, Dr. Vinay Shankhdhar, Dr. Deepa Nair, Dr. Prakash Shetty, Dr. Vineet Kumar, Dr. Manish Pruthi,

Neurophysiologist : Dr. Parthiban Velayutham

Overview

The Department of Surgical Oncology has been providing continued care to a wide range of cancer patients. This includes in-patient care as well as outpatient clinics. The service is running five regular operating theatres five days a week and two operating theatres on Saturdays. The Department also conducts regular OPDs (newly registered as well as pre- and postoperative care follow-up OPDs) for breast, head and neck and neurosurgery.

Service

The breast and head and neck surgical services have regular outpatient clinics 5 days a week and offer all major surgical procedures besides providing emergency services. The speech and swallow therapy service also now conducts outpatient clinics every Thursdays at ACTREC. The neurosurgical services offer intra-operative neurophysiologic monitoring and image guided surgeries, which help to perform safer surgeries in patients with tumors in eloquent areas. The GI services has expanded their activities over last year with regular performance of minimally invasive laparoscopic surgery and other complex surgeries like excentration. The department of plastic surgery has resumed its service at ACTREC helping surgical services to take up cases requiring complex reconstructions. There is a three-fold increase in the microvascular procedures in 2020 compared to previous year.

Despite severe disruption in service due to COVID-19 Pandemic and the national and local lockdowns, more than 1900 major procedures and 300 minor procedures have been performed in 2020. This included major surgeries in Breast (628), Head and Neck (393), GI (667), Uro-Oncology (80), Bone and Soft Tissue (39), and Gynae-Oncology (93). The Breast (5280) and Head and Neck (5462) together had more than 10,000 OPD consultations, which included 557 new registrations for head and neck and 526 new registrations for breast service at ACTREC.

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 is developing an indigenous robotic stereotactic system at ACTREC. The division of Head and Neck is coordinating the multicentre AREST (Adjuvant Radiotherapy in Early Stage Oral Cancer) study funded by the National Cancer Grid involving seven cancer

centres across India. The 3D Modelling lab developed under the guidance of breast service has extended its service in designing and printing customised face shields during the pandemic in a short period of time.

Education

The Division of Plastic surgery has recently opened the anatomy Skills lab and conducted a one day workshop for microvascular training. This skills lab will also be used for organ specific cadaver dissection training programs. The Head and Neck Unit at ACTREC conducts regular teaching program consisting of lectures by faculty, presentations by resident doctors, case discussions and Journal Club on every working Wednesday using online platforms.

Department Of Transfusion Medicine

Officer-In-charge : Dr Shashank Ojha

Associate professor : Dr Sumathi Hiregoudar

Blood Bank Officer : Dr Minal Poojary

Assistant professor : Dr Suryatapa Saha

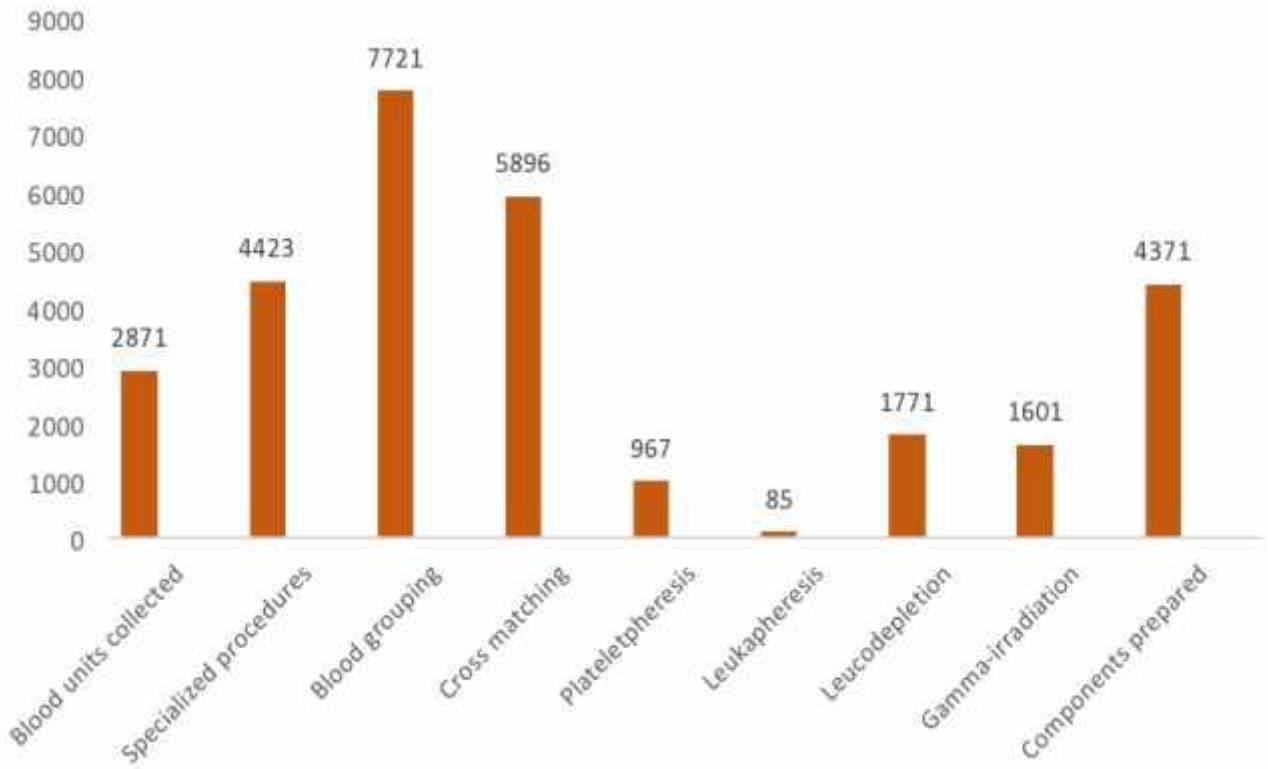
Overview

Department of Transfusion Medicine (DTM) consistently strives to maintain high quality standards in provision of safe and adequate supply of blood components round the clock to meet the specialized hemotherapy need of patients admitted at ACTREC especially Bone marrow transplant (BMT), Hemato-lymphoid, Pediatric 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 includes blood donation and apheresis including plateletpheresis, granulocytapheresis, lymphocytapheresis, 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 for ACTREC and Sion Hospital BMT patients, cryopreservation, storage and inventory management of hematopoietic stem cells (HSCs), leukodepletion and gamma irradiation of blood components. DTM in collaboration with Medical Oncology department has introduced HSC graft manipulation procedures and performed αβ- T cell depletion and CD45RA+ depletion procedures using Clinimacs plus immuno-magnetic cell sorter in haplo- identical HSCT patient. Also, DTM has initiated gradual introduction of newer automated technologies in Transfusion Transmitted Testing (TTI) and Red cell serology (RCS) laboratories in view of anticipated increase in patient workload in ACTREC. During the period from January to December 2020, the department collected a total of 2871 blood units, prepared 4371 blood components, and issued 3866.5 blood components. In addition, 967 plateletpheresis and 85 leukapheresis (66 PBSC, 18 granulocyte concentrates, and 1 lymphocytapheresis) procedures were performed. Under specialized blood components, 1771 units were leucodepleted and 1601 gamma irradiated. Blood grouping and cross-matching was done on 7721 and 5896 blood samples respectively. The department organized 42 outdoor blood donation camps during the challenging situation of COVID 19 pandemic. DTM routinely participates in various EQAS programs like Indian Red Cross society EQAS and BEQAS-Jaipur.

Figure: DTM data-2020



Research

Faculty members are currently involved in one collaborative project with other departments at TMC namely'Exploring the role of indigenously developed Chimeric Antigen Receptor(CAR) modified T- cells in the therapy of relapsed/ refractory B-cell Acute Lymphoblastic Leukemia ineligible for Stem Cell Transplantation- 1st stage of a multi-stage project'. In addition, two projects were undertaken by the senior faculty of the department namely “Retrospective assessment of leukoreduced red cell concentrates and leukocyte filter performance characteristics at a tertiary care hemato-oncology hospital” and “Analysis of transfusion practices in hemato-oncology patients at a tertiary care oncology centre”.

Education

The doctors and staff members imparted training in PBSC harvest and other transplant-related activities to 3 MD students from other centres as a part of their curriculum. One doctor from another hospital underwent training in plateletpheresis and PBSC harvest. 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.

Translational Research Laboratory

Principal Investigator : Prof. Indraneel Mittra
(Dr Ernest Borges Chair in Translational Research)
(Professor Emeritus, Department of Surgical Oncology)

Scientific Officers : Dr. Ranjan Basak

Dr. Kavita Pal

Dr. Raguram GV

Overview

The major focus of research in the Translational ResearchLaboratory is on the role of cell-free chromatin particles in cancer, degenerative disorders and ageing.

Research

The members of the Translational Research Laboratory continue to work on the novel finding that cell-free chromatin (cfCh) that circulate in blood or those that are released locally from dying cells can freely enter into healthy cells to damage their DNA and induce inflammatory cytokines. In 2020 the following novel observations were made by the Laboratory: 1) Genomic integration of circulating cell-free chromatin particles activates all known hallmarks of cancer and Immune checkpoint PDL-1; 2) Metastases arise as new cancers from cells of target organs transformed by cell-free chromatin particles released from dying circulating tumour cells. This finding challenges the dogma that metastasis arises from cells derived from the primary tumour.3) Cell-free chromatin particles released into the microenvironment from dying tumour cells activate cancer hallmarks in surviving cells. This study was performed on advanced squamous cell carcinoma of oral cavity and has therapeutic implications; 4) cell-free chromatin particles activate all known immune checkpoints; 5) cell-free chromatin particles from dying cells are global instigators of ageing and neurodegeneration.

Education

Two trainees worked for gaining research experience in this laboratory in fulfillment of MSc dissertation projects in the report year.

Dr. Sudeep Gupta (Director, ACTREC)

Dr. Prasanna Venkatraman (Deputy Director)

Basic Research Team

- Dr. Sharathchandra Arandkar
- **Dr. Dibyendu Bhattacharyya**
- **Dr. Kakoli Bose**
- Dr. Pradip Chaudhari
- **Dr. Murali Krishna Chilakapati**
- **Dr. Sorab Dalal**
- **Dr. Abhijit De**
- Mr. Shashadhar Dolas
- **Dr. Amit Dutt**
- **Dr. Shilpee Dutt**
- Mr. Nikhil Gadewal
- Dr. Poonam Gera
- **Dr. Rukmini Govekar**
- **Dr. Sanjay Gupta**
- Dr. Syed Hasan
- Dr. Arvind Ingle
- Dr. Rohan Khadilkar
- Dr. Jyoti Kode
- Dr. Pradnya Kowtal
- **Dr. Manoj Mahimkar**
- Dr. Sonam Mehrotra
- Dr. Sejal Patwardhan
- **Dr. Pritha Ray**
- **Dr. Rajiv Sarin**
- Dr. Sharada Sawant
- **Dr. Neelam Shirsat**
- **Dr. Tanuja Teni**
- Dr. Rahul Thorat
- **Dr. Ashok Varma**
- **Dr. Nandini Verma**
- **Dr. Prasanna Venkatraman**
- **Dr. Sanjeev Waghmare**
- Dr. Ujjwala Warawdekar

Principal Investigators (PIs) are shown in bold

Bose Laboratory

Principal Investigator : Dr. Kakoli Bose

Overview

The research focus of this Laboratory is the study of macromolecules involved in the apoptotic pathway, and their implications in normal cellular functions and pathogenesis. This laboratory works on the high temperature requirement family of serine proteases (HtrA), the interaction between anti apoptotic c-FLIP and calmodulin, and the Bcl2 family proteins and their interacting partners. Moreover, research in this Laboratory is now entering into application-based translation research that includes enzymes involved in apoptotic and metabolic reprogramming, and their role in altering cancer signaling pathways.

Research

The research highlights of 2020 include revelation of the structural basis of pathogenic HtrA2 mutations; characterization of mode of interaction of HtrA2 with its natural substrates, GRIM-19, Pea-15 and DUSP9; structural and functional characterizations of other HtrA family member's viz. HtrA3 and HtrA4, and their implications in cancer. These crucial pieces of information would provide a means to manipulate HtrA family proteins with desired characteristics. The research findings from this laboratory have resulted in two publications in peer-reviewed journals in the report year.

Education

The Principal Investigator is recognized as a guide for the Ph.D. (Life Sciences) degree of the Homi Bhabha National Institute. In 2020, two graduate students –Ms. SaujanyaAcharya and Mr. K. Raghupathi were awarded the Ph.D. degree. Three other students, Ms. Rashmi Puja, Ms. Aasna Parui and Ms. Rucha Kulkarni are working on their doctoral dissertation. Laboratory members meet once a week for data presentation and journal club, which was mostly done virtually in 2020. The PI was to organize the Indian Biophysical Society Meeting in ACTREC, in March, 2020, that is currently postponed to 2022 due to the world-wide COVID pandemic. In 2020, the PI delivered lectures in several international conferences including chairing a lecture delivered by 2009 Nobel Laureate Prof. Ada Yonath and was also invited as a seminar speaker to Tufts-New England Medical Centre, Boston.

Prasanna Laboratory

Principal Investigator: Dr. Prasanna Venkatraman

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. This Laboratory tries to understand PPIs at different hierarchical levels with a long term goal to expose the Achilles heel in cancer. Current activities include characterizing atypical domain motif interactions with the intent to identify functionally important residues in different molecular chaperones, to direct a repurposed drug towards a specific oncogenic network, assigning functions to PSMD9 and its first neighbourhood interaction and their role in cancer.

Research

New findings include; a) identification of a FDA approved drug that can bind to Gankyrin along with its atomic structure, more importantly, the drug was shown to have Gankyrin specific effect of the drug on growth, b) recognition of an enriched Short Linear Sequence Motif in the PSMD9 interaction network important for mitochondrial homoeostasis and identification of their cognate binding site on PSMD9, c) mRNA co expression and protein interaction based network analysis of BRCA proteasome and identification of stress tolerance mechanism in breast cancer cells, d) conformational changes in PSMD9 and its effect on protein binding deduced by Surface Plasmon Measurements- these studies provide us with new insights on how folding influences binding, e) creation of a well folded monomeric 14-3-3 ATPase null mutant which retains phosphopeptide binding activity, This year saw key publications from this Laboratory.

Education

PI is an active member of the current academic committee and a member of the doctoral committee of more than 20 students and a chair of many doctoral committees. One of the salient features has been a publication on COVID with the help of two B. Tech students (Biochemistry and Biophysics Reports Volume 25, March 2021, 100907).

Administration

As the deputy Director CRI, PI has continued to work on bringing together different stake holders in administration for effective functioning with emphasis on better communication and streamlining of processes. Space allocations to different laboratories and fair distribution of resources have been some of the highlights. Different managing committees for facilities have been constituted for efficient functioning. They have been advised to hold training for the facility staff to enhance their output. Facilities have been allotted some funds for smooth operations. With the help of Directors at ACTREC, DD CRI ensured that the laboratories were functioning at 20-30 % during the COVID period. Within the constraints on funding, new faculties who were

recruited have been assigned laboratory space and funds have been raised by CSR or from project funds by active pursuit. The detailed project reports to DAE were defended and have reached the final stages in two cases.

PI is also a convener of the Board of Studies in Life Sciences and has been active in trying to bring new reforms in faculty assignment and thesis review.

Figure 1 Chaperone mediated regulation of Mitochondrial Homeostasis

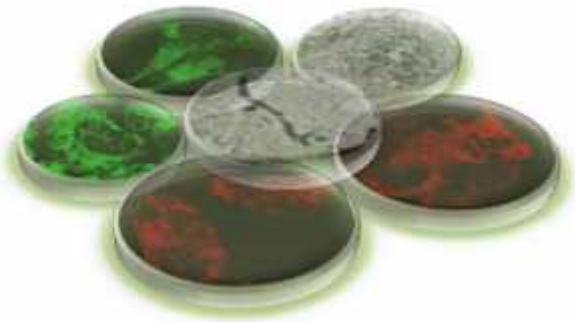
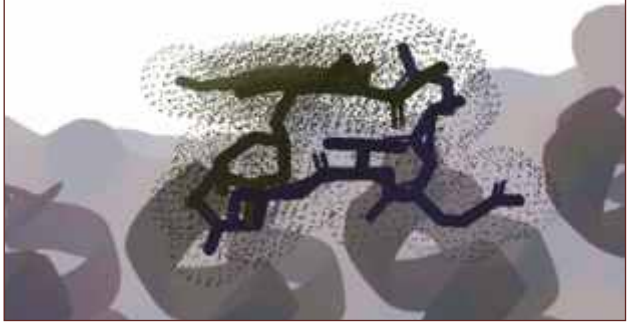


Figure 2 Artistic Rendering of the surface of Gankyrin accommodating EEVD and the drug (Derived from Crystal Structures)



Varma Laboratory

Principal Investigator : Dr. Ashok Varma

Overview

Varma Laboratory continues to contribute to structural genomics of cancer to unravel the pathogenicity of genetic alterations identified in different genes for translational research. Different interdisciplinary approaches such as in-silico, in-vitro, biophysical and structure biology are being used for different cancer associated proteins such as BRCA1, MAPK, FANCI to evaluate folding patterns and functions associated with protein-protein interactions. Some of the important contributions have been observations on impairment in protein-protein interactions and folding patterns due to cancer risk mutations and understanding the expression patterns of serum proteins at different time points of radiation treatment. This laboratory has done excellent serum proteomics work to check the differentially expressed protein in head and neck cancer treated with radiotherapy. Furthermore, a very good protocol to remove highly abundant proteins from serum while retaining significantly low molecular weight protein for proteomics profiling has been optimized.

Research

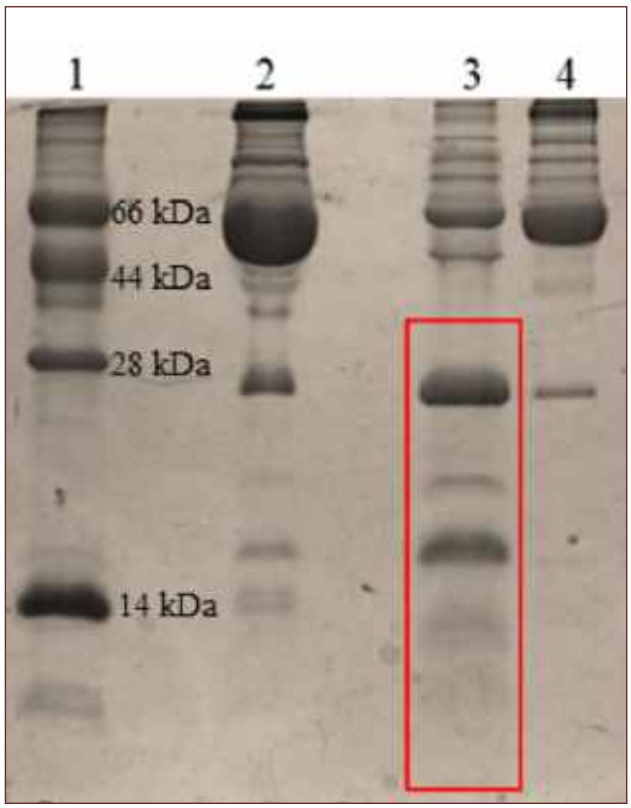
The main goal is to use interdisciplinary genomics, proteomics, biophysical, structure biology and bioinformatics based approach to identify i) genetic signature for pathogenicity of breast cancer ii) enrich standard for serum for global proteome profiling iii) bioactive core using protein-protein interactions iv) three dimensional structural studies of cancer associated protein. Functional domains of different proteins such as BRCA1, BRCA2, BARD1, BACH1, MAPK, EPHs, have been expressed and purified by seven graduate students in the laboratory. The important findings from this Laboratory are; determining the crystal structure of different cancer causing mutations identified in Ephs; identification of differentially expressed signatures / proteins of HNSCC patients at different time points of radiation treatment (The proteome data from this laboratory had identified proteins from serum of head and neck cancer patients and further co-related with response to treatment); exploring the role of new genes in breast cancers done through a very good collaborative Indo-Russia project and evaluation of pathogenicity of genetic variants identified in BRCTs domains.

Education

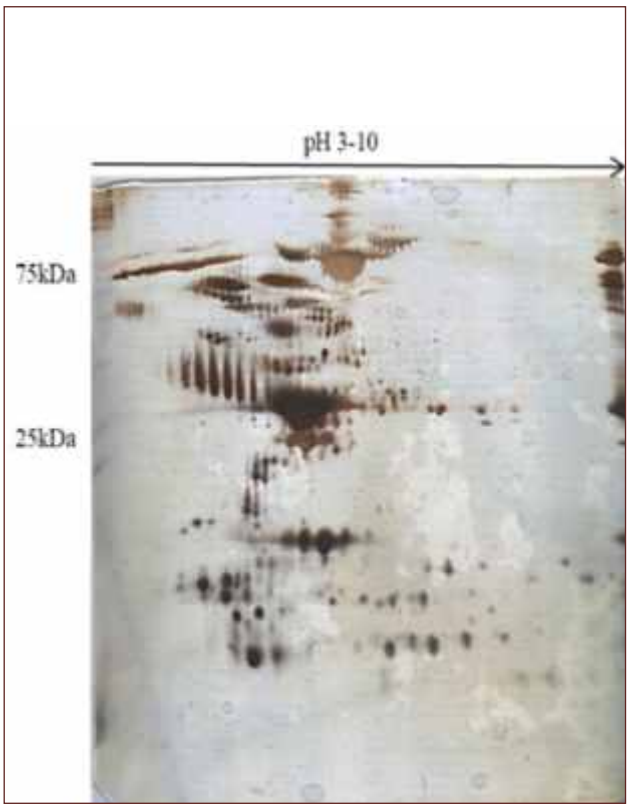
The Principal Investigator is a recognized guide for PhD in Life Sciences of the Homi Bhabha National Institute. Presently seven students - Ms Suchita Dubey, Ms Lipi Das, Mr. Mudassar Ali Khan, Mr. Siddharth Barua, Ms. Neha Mishra, Mr. Subhashish Chakraborty and Ms. Vaishnvee Chikhale are working towards a doctoral thesis. Different project trainees from nearby institutes have completed dissertations on topics covering ; cloning, expression and purification of brca2 -sem1 interacting domain and molecular modeling and structural characterization of BACH1-BRCA1 BRCT binding interface to evaluate conserved phospho specific binding

interface. The PI is actively engaged in education and training program of the academic faculty from North-East Region/Other parts of the country, on Gene Cloning, Protein Biochemistry, and Structure Biology & Bioinformatics, fully supported by Department of Biotechnology – Government of India (DBT-GOI).

(A)



(B)



(A) Gel picture showing serum enrichment by acetonitrile precipitation

(B) The enriched fraction in 2D- gel electrophoresis.

Rukmini Laboratory

Principal Investigator : Dr. Rukmini Govekar

Overview

The focus of this Laboratory is the use of 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 leave non-responder CPs and 80% of patients in terminal stage of Blast Crisis (BC) without an effective treatment option. Delineation of mechanism of resistance to TKIs is expected to; identify potential therapeutic targets for the non-responders and identify early markers to predict which of the initially responding CP patients would turn resistant during therapy. To study these aspects specific projects were undertaken.

Research

Chromosomal Aberrations (CAs), such as amplifications, deletions and translocations are major genomic abnormalities in leukemia's. The profile of these CAs in DNA from CD34+ cells from peripheral blood of patients in CP and BC (either sensitive to IM or identified as resistant by the prevalent diagnostic molecular analysis) was studied by array CGH. Aberrations in different chromosomes are present in CP or BC patients who remain sensitive to Imatinib throughout treatment and those which are present in patients who are resistant at diagnosis or turn resistant during the course of treatment. The pattern of aberrations can serve as a basis of segregating the responder versus the resistant population and are potential markers for identification of patients who could develop IM-resistance during the course of treatment. The CAs in specific chromosomes observed in patient population was also seen in cell lines which were made resistant to IM. This not only confirmed the association between the profile of CAs and resistant phenotypebut also authenticated the utility of the developed IM-resistant cell lines as appropriate models for investigating IM-resistance. Differential proteomic analysis of IM-resistant and -sensitive cell lines representative of BC highlighted that in spite of activation of one of the known mechanisms of resistance, inhibition of activity of BCR/ABL in the IM-resistant cells was comparable to the IM-sensitive cells. This observation corresponds with the inhibition of BCR/ABL activity by IM in 40% of IM-resistant BC patients. The proteomic data obtained from this Laboratory has demonstrated that BCR/ABL signaling is active in resistant cells despite of inhibition of BCR/ABL activity. Among the constituents of the pathway shown to be active in resistant cells, it was demonstrated that activity of p38MAPK is elevated by active BCR/ABL and is further increased in IM-resistant cells wherein BCR/ABL is inactivated by IM. Inhibition of p38MAPK activity thus has the potential to be explored as a therapeutic strategy for TKI-resistant CML.

Education

The Principal Investigator is a recognized PhD Life Sciences mentor of the Homi Bhabha National Institute. In 2020 Ms. Mythreyi Narasimhan was awarded the PhD degree and presently three graduate students - Mr. Rahul Mojidra, Mr. Manish Bhat and Ms. Neha Agarwal are working towards their doctoral degree. Two trainees worked in this Laboratory in the report year.

Teni Laboratory

Principal Investigator : Dr. Tanuja Teni

Overview

The research programs of the Teni Laboratory aim to gain insights into the molecular basis of oral and cervical tumorigenesis. Studies to identify the mutant p53 interacting partners that impact it's stability in oral cancer cells and deciphering the role of TCTP in DNA damage response using the established radioresistant oral cancer cell lines are on-going. This Laboratory has established for the first time chemo radioresistant cervical cancer cell lines with the goal to understand the molecular mechanisms of chemo radiotherapy resistance and the plausible role of HPV16. Studies to decipher the role of Mcl-1 in radiation induced DNA damage and autophagy, the novel nucleolar functions of CLU and regulation of Activin A by p63 in oral cancer cell migration are in progress.

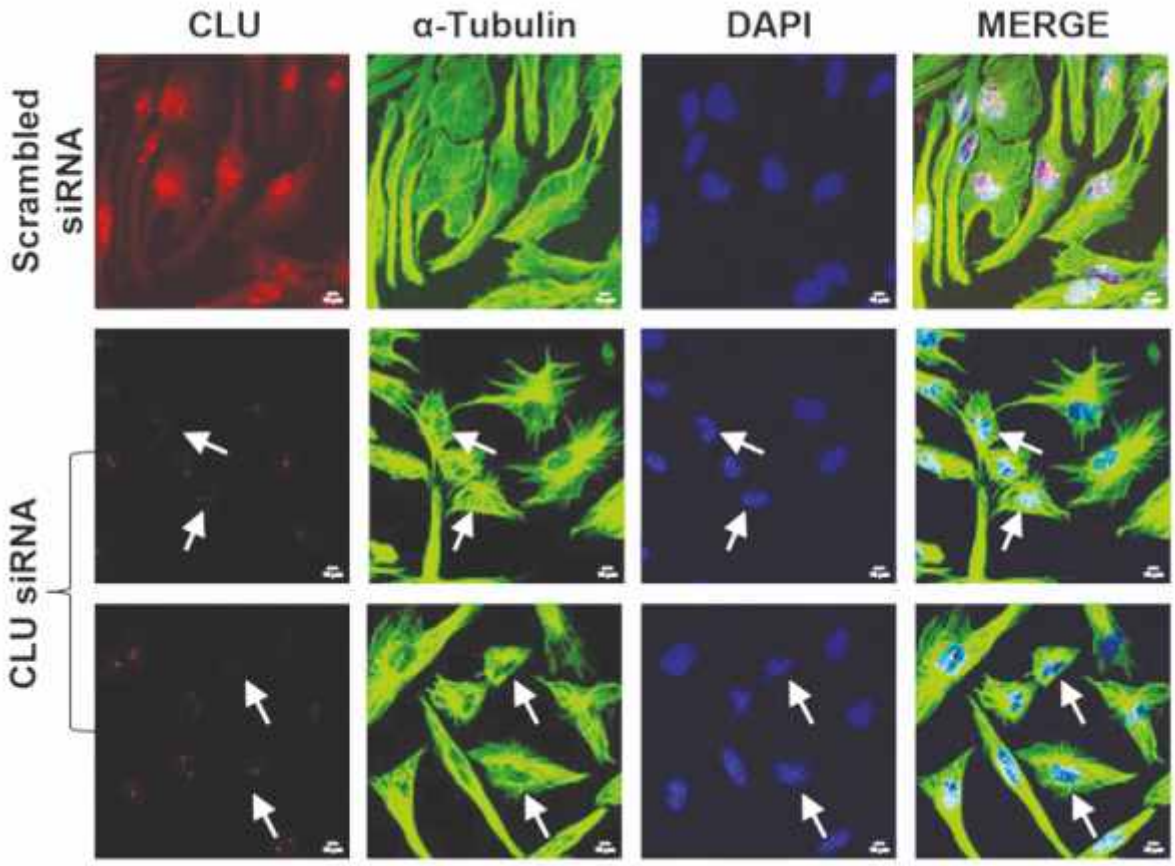
Research

Mutant p53, unlike Wild Type p53 is highly stabilized and hence with the aim of targeting its stability, deubiquitinases (DUB's) - USP9X, USP5 and UCH37 were identified as its interacting partners and inhibition of the activity of these DUBs by WP1130 resulted in a dose and time-dependent decrease in mutant p53 protein levels in cancer cells. In the established radio resistant versus parental oral cancer cells, TCTP knockdown significantly reduced the levels of γH2AX, pCHK2, pBRCa1, pRad51 leading to their radio sensitization. The successful establishment of the first of its kind in vitro chemo radioresistant cell line model for cervical cancers was achieved using HPV16 positive SiHa cells and by simulating treatment of concurrent chemoradiotherapy delivered to cervical cancer patients in the clinic. Further Mcl-1 knockdown led to delayed phosphorylation of H2AX & decreased phosphorylation of CHK1 & ATM and decreased lipidation of LC3BII, post radiation treatment indicating a role for Mcl-1 at an early upstream stage in DNA damage response and autophagy pathways. Interestingly post CLU knockdown, increased ribogenesis and decreased proliferation indicated its possible tumor suppressive role in oral cancers. Knockdown of sCLU also resulted in decreased NPM1 and Fibrillarin levels, shrunk cytoskeletal filaments and abnormal nuclear shape (Figure). Oral tumors overexpressing Activin A were associated with advanced tumor stage, positive lymph nodes, poor overall and recurrence free survival. Intriguingly the expression of Activin A negatively correlated with p63 expression in these tumor samples.

Education

The Principal Investigator is a recognized guide for PhD in Life Sciences of the Homi Bhabha National Institute. Presently six students – Ms. Rajashree Kadam, Ms. Dhanashree Mundhe, Mr. Abhay Uthale, Ms. Dipti Sharma, Mr. Swapnil

Oak and Ms. Reshma Reddy are working on their doctoral theses. In 2020 three trainees worked in this Laboratory for Master's dissertation or research experience. The Laboratory also has an in-house program of data presentations and Journal club held every week. Faculty and students of the Laboratory attended 2 national conferences and presented their research findings in the form of oral or poster presentations.



Knockdown of CLU resulting in abnormal nuclear shapes due to shrunk tubulin cytoskeletal structures as indicated arrows. Scale bar: 10 µm.

Sorab Laboratory

Principal Investigator : Dr. Sorab Dalal

Overview

The two major areas of research in this Laboratory are the regulation of cellular pathways by 14-3-3-proteins and identifying pathways downstream of a loss of desmosome function that contributes to neoplastic progression. The Laboratory has demonstrated that the secreted protein LCN2 confers radio and chemo resistance to cells in vitro and in vivo and that this might be a potential target for therapeutic intervention in multiple tumor types including colorectal cancer. Further, the Laboratory has identified mechanisms by which 14-3-3-ligand complexes form and dissociate, and determined the relevance of this mechanism to centrosome duplication.

Research

Previous work from this Laboratory demonstrated that loss of 14-3-3ε and 14-3-3γ resulted in an increase in centrosome duplication. In collaboration with Prasanna's Laboratory, a novel process by which 14-3-3 ligand complexes form has been identified and the role this process plays in regulating centrosome duplication has been determined. In addition, though loss of both 14-3-3ε and 14-3-3γ leads to an increase in centrosome duplication, loss of each protein has very different consequences for cellular transformation and the reasons for this difference are currently being explored.

The initiation of desmosome formation is dependent on the plaque protein plakophilin3, and that loss of plakophilin3 leads to increased neoplastic progression and metastasis due to an increase in the expression of the secreted siderophore binding protein, LCN2. The increase in LCN2 levels is required for the increase in radio and chemo resistance observed upon plakophilin3 loss both in vitro and in vivo. In addition, an analysis of tumor samples from patients with colon cancer demonstrates that over 60% of the patients show an increase in LCN2 expression. A new study to determine whether LCN2 levels correlate with the response to NACTRT in locally advanced rectal cancer is currently underway. LCN2 could be a potential therapeutic target in multiple tumor types. In collaboration with a company, a potential therapeutic agent has been developed and Indian and PCT patent applications have been filed.

Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute and six students; Sarika Tilwani, Nazia Chaudhary, Amol Lonare, Bhagyashree, Monika Jaiswal and Rinki Doloi worked on their doctoral thesis in this laboratory during 2020. Five students; 3 for Master's dissertation and 2 for experience were trained in this Laboratory in the report year. Members of the Laboratory participated in weekly in-house seminars and journal club and presented their findings in a conference in February 2020.

Bhattacharyya Laboratory

Principal Investigator : Dr. Dibyendu Bhattacharyya

Overview

The focus of work in the Bhattacharyya Laboratory is on vesicular trafficking and intracellular organelle biogenesis and dynamics. Organelles' size and shapes are greatly altered in cancer and such alteration is a hallmark of cancerous cells. Using basic cell biological approach along with advanced microscopic techniques, attempts are being made to understand the underlying mechanisms that govern the size control mechanism of Golgi, nucleus and nucleolus. Yeast cell lines and cultured neurons are being used as model systems to understand the ultra-structures of ER and Golgi. The Laboratory also has a research focus to develop novel tools for different forms of microscopy.

Research

Presently, the Laboratory is studying ultra-structures of several organelles including Golgi, ER, Nucleus, nucleolus and mitochondria's. Previous work from this Laboratory has shown that the GTPase ARFI and several other factors including the oncogene homolog VPs74 are capable of controlling Golgi size by altering cisternal maturation kinetics. The important roles of nuclear import for size control of nucleus and nucleolus of human cells were discovered. Further, recently shown that ER arrival of COPI vesicles via ER arrival sites(ERAS) is associated ER exit sites and have discovered that GRIP domain Golgin mediate Golgi stacking which is regulated by Arl-GTPase cascade switch. Ongoing work is on exosome uptake in human cells and organelle dynamics and inter-organelle contact sites in neurons. Optimizing of photo changeable fluorescent proteins such as mEos3 which are essential for super resolution microscopy is also being done.

Education

The Principal Investigator is a recognized guide for PhD in the Life Sciences of Homi Bhabha National Institute. Presently 4 PhD students; Ms. Sudeshna Roychowdhury, Ms. Naini Chakraborty, Ms. Shreyosi Chatterjee and Ms. Roma Dahara are working on their doctoral theses. Five PhD students, alumni of the Laboratory; Dr. Madhura Bhave, Dr. Abira Ganguly, Dr. Bhawik Kumar Jain, Dr. Prasanna Iyer and Dr. Pravin Marathe are presently carrying out postdoctoral studies in reputed research laboratories in the Unites States. All the laboratory members participated in weekly data presentation sessions, and presented their work findings at four local/ national conferences in 2020.

Scientific Officer 'F' : Dr. Ujjwala Warawdekar

Overview

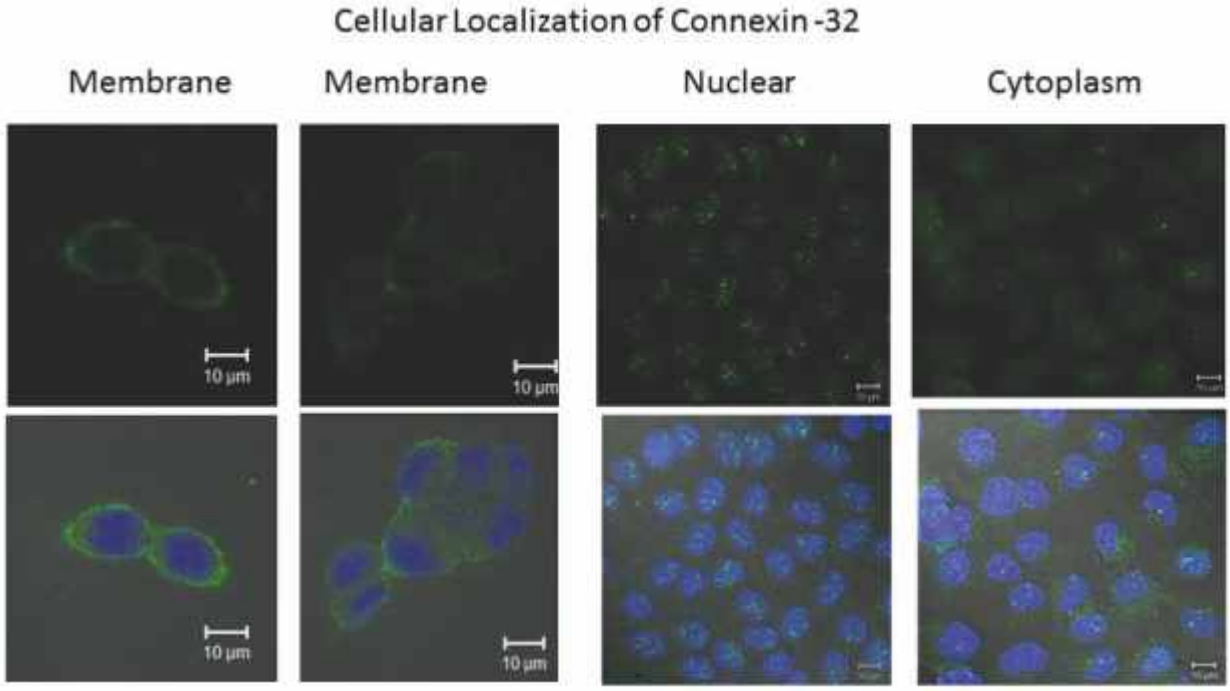
Gap junctions have been implicated to assist in the antineoplastic effect of therapeutic regimens adopted to treat cancer. This facilitation is by virtue of the presence of the family of constitutive proteins called Connexins. Expression of Connexin type is cell and tissue specific, reported to be reduced in malignancies resulting in compromised therapeutic outcomes. Efforts in this laboratory are to validate the functionality of gap junction communication and identifying Connexin types in different cancers. Tumor cell derived signalling through expression and activation of proteins can lead to change in stromal remodelling and invasive properties, and may contribute to cellular dis-regulation and transformation. One such protein is cellular Fibronectin. The interest is to assess differences in expression and protein levels in different subtypes of breast cancer, other cancers and evaluate therapeutic outcomes.

Research

The efficacy of therapy would be dependent on efficient communication between many cell types like tumour- tumour cells, tumour and endothelial cells as well as tumour and the surrounding microenvironment which is comprised of the Extracellular Matrix. Current work involves a quantitative analysis for expression and protein levels of Connexins, cell surface and ECM proteins; in breast cancer cell lines classified by sub types, lung cancer cell lines, in primary specimens from early operable and metastatic breast cancer and, in primary specimens from NSCLC and adjacent normal biopsies. Connexin 43, 32 and 26 proteins were assayed by immunostaining and RT-PCR in breast and lung cancer. Other markers assessed for expression were CD44, Vimentin and Fibronectin in the biopsies from patients with metastatic cancer of the breast. Novel observations are the atypical localization of Connexins in tissue biopsies comparable with the cell line observations. Changes in expression patterns are a cause or consequence of malignancy which results in therapeutic challenges, merits further study (Figure). Previous work funded by CSIR, India, on modulating gap junction communication with HDAC inhibitors and differentiating agents was published in the report year.

Education

In the year 2020, the faculty participated in the Centre's academic and training program, was a member of the organizing committee as faculty in the DBT- sponsored ten day workshop on, 'Cell and Molecular Biology' held from 27nd Jan 2020 to 7th Feb 2020 in ACTREC, for research students and faculty of the North East Region of India. Also, was invited and participated as a speaker in a five day online AICTE- ATAL sponsored Faculty Development Program by Bombay College of Pharmacy, themed “Drug Engineering” held from September 21- 25, 2020. Two trainees for Master's dissertation were accepted in this laboratory in the report year.


Cellular Localization of Connexin -32
Membrane
Membrane
Nuclear
Cytoplasm
10 µm
10 µm
10 µm
10 µm

Scientific Officer 'E' : Dr. Syed Hasan

Overview

The major focus of this Laboratory is to understand the signalling between anti-apoptotic proteins and cyclin dependent kinases and combining their targeted actions for the improved therapeutic strategies to overcome apoptotic resistance in Acute Myeloid Leukemia (AML) and Breast cancer. Functional and molecular aspects of novel agents in leukemia using xenografts models of AML is another important research focus of the Laboratory. With the advent of targeted therapy using arsenic trioxide (ATO) and All-Trans Retinoic Acid (ATRA) very high cure rates (>90%) can be achieved in low/intermediate risk group Acute Promyelocytic Leukemia (APL). However, high risk group patients (white blood cell counts >10000/l) still require chemotherapy. The majority of post-remission deaths and relapses are linked to high risk group patients due to toxicity associated with chemotherapy or acquired ATO resistance.

Research

The survival of Acute Myeloid Leukemia (AML) blasts is dependent on the mitochondrial apoptotic pathway involving BCL-2 family of proteins. Most of the agents, regardless of their categorization as 'cytotoxic' or 'targeted' ultimately function by activating the mitochondrial apoptotic pathway. In AML, BCL-2 inhibitor (ABT-199) has shown encouraging anti leukemic activity but resistance is emerging due to high expression of MCL-1. In collaboration with Aurigene discovery technologies a CDK7 inhibitor (CRI-256) which reduces MCL-1 expression in AML cells without affecting the transcriptional profile of normal cells has been developed. The purpose of the present study is to determine whether a selective and targeted BCL-2 inhibitor (ABT-199) would cooperate with highly specific CDK7 inhibition to kill AML cells, and to elucidate the molecular mechanisms underlying this phenomenon using in vitro and ex vivo models of AML. From January-December 2020, this Laboratory has published three important articles on Acute Myeloid Leukemia and one on Breast cancer where the major technical limitation of introducing stop codon to switch off a protein using CRISPR-Cas9 system in breast cancer cells was addressed and solved. This helped to demonstrate the functional role of a nonsense mutation of pregnancy zone protein (PZP) gene in Breast cancer. Regarding APL as discussed above, high risk APL patients have inferior survival compared to low and intermediate risk groups. In low and intermediate risk groups, arsenic trioxide works synergistically with ATRA to cure the disease while high-risk group patients still require chemotherapy. There is no systematic study to genetically and molecularly characterize high-risk APL and associated features (such as FLT3-ITD), therefore, using proteomics and genomics based approaches, this Laboratory is working to molecularly and genetically characterize high risk APLs.

Education

The Scientific Officer is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. Presently Ms Tarang Gaur and Ms Deepshikha Dutta are working towards their doctoral thesis. During 2020, Ms Tarang Gaur was selected for a very prestigious Newton-Bhabha PhD placement fellowship. Three trainees were accepted in the Laboratory in 2020.

Shirsat Laboratory

Principal Investigator : Dr. Neelam Shirsat

Overview

Medulloblastoma consists of four subgroups WNT, SHH, Group 3, and Group 4. MiR-193a, a WNT-subgroup specific microRNA, was found to down regulate MYC oncogene's activity and thereby brings about widespread repression of gene expression. MiR-193a, therefore, has therapeutic potential in the treatment of MYC overexpressing aggressive cancers. Proteomic analysis identified enrichment of RNA surveillance pathways and extensive metabolic reprogramming in adult SHH and Group 3 medulloblastomas, respectively. Up regulation of CRX and haploinsufficiency of ARID1B was found to be instrumental in the pathogenesis of Group 3 and WNT subgroup medulloblastomas, respectively.

Research

Medulloblastoma is a common malignant brain tumor in children. The canonical WNT signaling pathway primarily drives the pathogenesis of WNT subgroup medulloblastomas. MYC, a crucial downstream target of WNT signaling, is often also overexpressed in Group 3 medulloblastomas. MiR-193a expressed in the WNT subgroup and silenced in Group 3 subgroup was found to down regulate the activity of the MYC oncogene and thereby has a tumor-suppressive effect on medulloblastoma cells. MiR-193a, therefore, is likely to contribute to the excellent survival of the WNT subgroup tumors and has therapeutic potential in MYC overexpressing aggressive cancers.

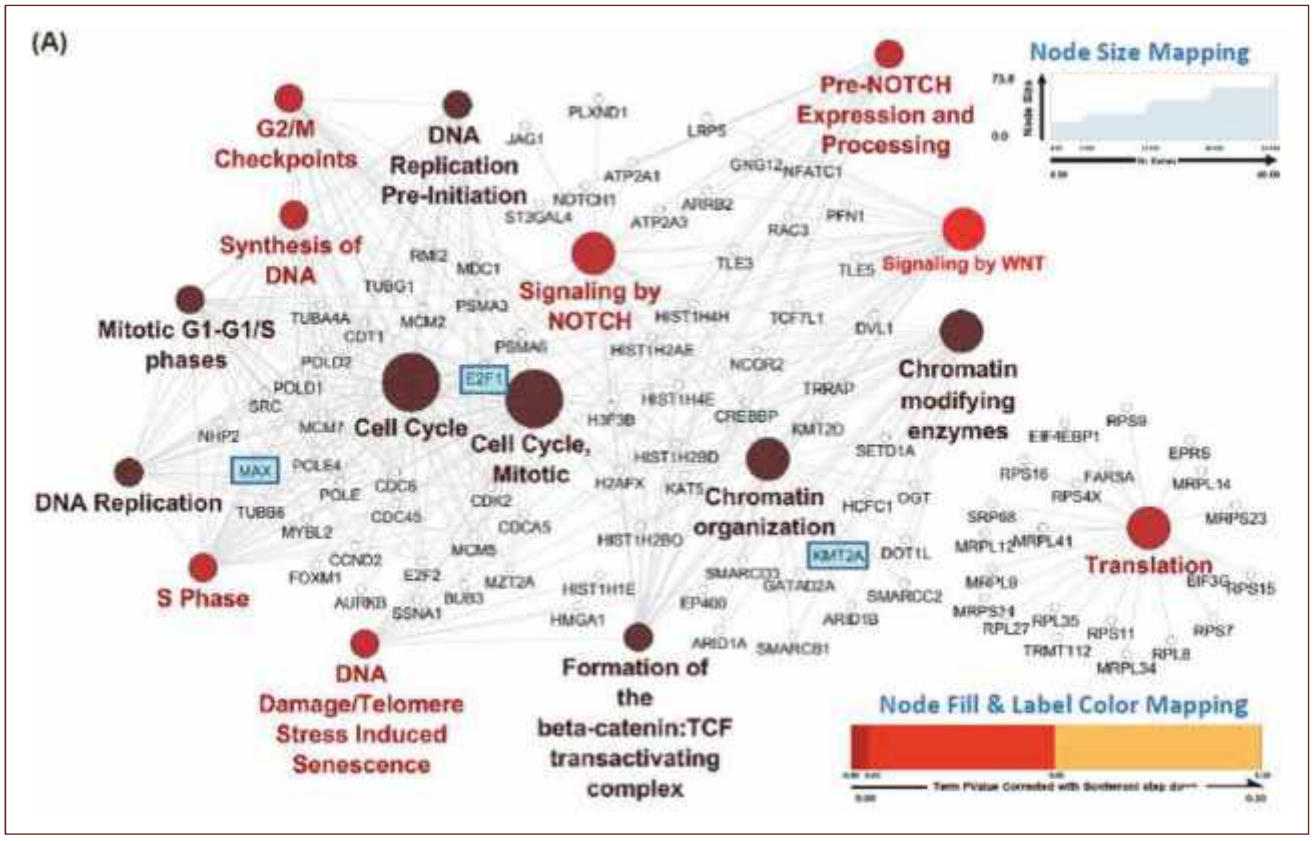
Proteomic analysis of medulloblastomas identified enrichment of RNA surveillance pathways like mRNA splicing, 5' to 3' RNA decay, 3' to 5' RNA decay by the RNA exosome, and the N6-methyladenosine modification of RNA in adult SHH tumors. The increased expression of the RNA surveillance pathways may be essential for the viability of adult SHH subgroup medulloblastomas, which carry mutations in the U1 snRNA encoding gene and could be a vulnerability of these tumors. Group 3, Group 4 medulloblastomas overlap in their expression profiles and underlying genetic alterations. Group 3 proteome was distinctively enriched in several metabolic pathways like; glycolysis, gluconeogenesis, glutamine anabolism, glutathione mediated anti-oxidant pathway, and drug metabolism pathway. This extensive metabolic rewiring could contributeto the aggressive clinical behaviour of Group 3 tumors.

Loss of function mutations were identified in the ARID1B gene in WNT subgroup medullo-blastomas. Transcriptome sequencing identified a decrease in levels of several negative regulators of the canonical WNT signaling accompanied by upregulation of WNT and ERK/ERK2 signaling pathways upon ARID1B downregulation in medulloblastoma cells. Thus, ARID1B appears to

act as a tumor-suppressor in WNT subgroup, whose downregulation activates multiple signaling pathways.

Education

The PI is a recognized guide for Ph.D. in Life Sciences of the Homi Bhabha National Institute. Five students - Ms. Shalaka Masurkar, Ms. Raikamal Paul, Mr. Harish Bharambe, Mr. Akash Deogharkar, and Ms. Purna Bapat worked on their theses in 2020. One student (Ms. Raikamal Paul) submitted the PhD thesis in 2020. A post-doctoral fellow (Dr. Annada Joshi) and 4 students accepted as trainees worked in the Laboratory in the report year. The Laboratory organized a ten-day workshop on, 'Cell and Molecular Biology' from 27nd Jan 2020 to 7th Feb 2020 attended by research students and faculty of the North East Region of India, (DBT-GOI funding to ACTREC). The PI has filed a patent on “SHH Medulloblastoma protein biomarkers, and uses thereof", and has a project on, “Method for identification of Medulloblastoma, and subgroups thereof, based on proteomic signatures” in collaboration with IIT, Bombay.



Protein-protein interaction network analysis shows multiple oncogenic pathways downregulated upon miR-193a expression.

Sarin Laboratory

Principal Investigator : Dr. Rajiv Sarin

Co-Investigator : Dr. Pradnya Kowtal

Overview

Sarin Laboratory aims to understand the molecular basis of inherited and somatic cancers and develop translational algorithms through molecular biology and functional genomics. These questions are addressed through: A) Large cohort of over 9300 families with various inherited cancer syndromes using banked DNA and lymphoblastoid cell lines; B) BRCA-GEL case control study with 2800 breast cancer cases / matched healthy controls; C) TMC International Sarcoma Kindred Study (TISKS) a case control study with 500 osteosarcoma cases / matched controls enrolled from TMC; D) International Cancer Genome Consortium (ICGC) project covering 465 Gingivo-Buccal SCC patients with full clinico-pathological annotation, follow up and somatic / germline NGS analysis and functional studies.

Service

The PI runs a Cancer Genetics Clinic to provide genetic counselling to the families enrolled at ACTREC and TMH. During 2020 the clinic enrolled 774 new families and 67 family members registered and conducted counselling for 913 families. Follow up counselling and risk management guidance was provided to ~1826 new and previously enrolled families. Clinically relevant genetic test reports were issued to ~198 individuals.

Research

In inherited cancer syndromes, this Laboratory performed genetic analyses of mutational hotspot or full gene using Sanger sequencing or NGS and MLPA of various cancer predisposition genes. Recurrent germline mutations in BRCA1, BRCA2, MLH1 and MSH2 genes were found to be associated with various geo-ethnic groups of the Indian population. In the year 2020, 9 new recurrent germline mutations in BRCA1, 2 in BRCA2, 3 in MLH1 and 1 in MSH2 were detected amongst 3 or more families with inherited cancer syndromes belonging to various geo-ethnicities.

Under the Other-ICGC (O-ICGC) project 6 new primary cell lines were established from different brain tumors. A total of 10 cell lines from primary and recurrent brain tumors have been established till date. At present genotype phenotype characterization of these cell lines is underway.

Education

The Principal Investigator is a recognised guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. Two doctoral students – Ms Anuja Lipsa and Ms Vasudha Mishra were awarded their PhD degree during 2020.The Laboratory provided training to 7 students - 3 for Master's dissertation and 4 for work experience in cancer genetics counselling. The Laboratory conducts an active weekly academic program in which the updates in Laboratory work, seminal research papers and interesting research papers are presented.

Gupta Laboratory

Principal Investigator : Dr. Sanjay Gupta

Overview

Histone proteins and their site specific post translational modifications regulate processes like gene expression, DNA repair, and are emerging as key players in cancer and therapy resistance mechanisms. Recent advances from this Laboratory strongly indicate a role for histone, HIST2H2AC and H3C14 and also the part of 3'-UTR organization of histone genes for the genomic instability in human liver, gastric and breast cancers. Further, the critical role of chromatin modifiers like mitogen and stress activated kinase 1, protein phosphatase 1 and class 1 histone deacetylase for H3 serine 10 phosphorylation along with site-specific acetylation in DNA damage response have been identified in human cell lines and gastric cancer tissues.

Research

Data from this Laboratory has shown an overexpression of histone HIST2H2AC and HIST2H3A/C isoforms in various human cancer cell lines and tumor as compared to normal samples. Also, the overexpression of HIST2H2AC is positively regulated by interaction between YY1 and E2F1 transcription factors and this study also highlights the tissue and lineage-specific expression profile of H2A isoforms. The upregulation of HIST2H3A/C in gastric cancer is regulated through EGFR-FOXC1 axis. Further, studies in a sub-group of gastric cancer patients' have shown high HDAC activity- low HAT activity and altered histone phospho-acetylation levels which emphasizes the importance of patient stratification for HDAC inhibitor based treatment in combination with chemotherapeutic drugs for improved clinical outcome. H3 phosphorylation and acetylation plays an important role in the radio-sensitivity of mitotic cells, is regulated by the enhanced stability of the phosphatase and PP1α, and reduced translation of MSK1 kinase. Observations with hypoxia and re-oxygenation of hypoxic cells studies have shown influence on chromatin dynamics with concomitant changes in histone modifiers with alteration in site-specific histone acetylation/methylation. Additionally, alterations in histone acetyl transferases in cisplatin-resistant liver cancer cells, in an in vitro and in vivo model have been identified.Doxorubicin resistant liver cancer cell lines have alteration in mitochondrial properties, high levels of ROS and activation of pro-survival mechanism via autophagy induction. Further, cross resistance is not observed between cisplatin and doxorubicin resistant liver cancer cell lines. Presently, the Laboratory is also focused on deciphering the stress associated changes in stem-loop binding protein for the regulation of 3' tail organization of canonical H2A histone mRNAs and cell ploidy.

Education

The Principal Investigator is a mentor for Ph.D. in Life Sciences of the Homi Bhabha National Institute. In the report year, eight students were working toward their doctoral theses - Ms. Asmita Sharda (awarded the Ph.D. degree in 2020), Mr. Ramchandra Amnekar, Mr. Sanket Shah, Mr. Mudasir Rashid, Ms. Tripti Verma, Mr. Abhiram Natu, Ms. Sukanya Rauniyar and Ms. Anjali Singh. The PI is a member of the

doctoral committee of students in the Ph.D. program at ACTREC as well as other institutes like BARC and NIRRH. During 2020, 5 trainees worked in the laboratory; 4 for experience and one as an observer. In the report year, laboratory members participated in in-house data presentations, journal club and in national/ international conferences.

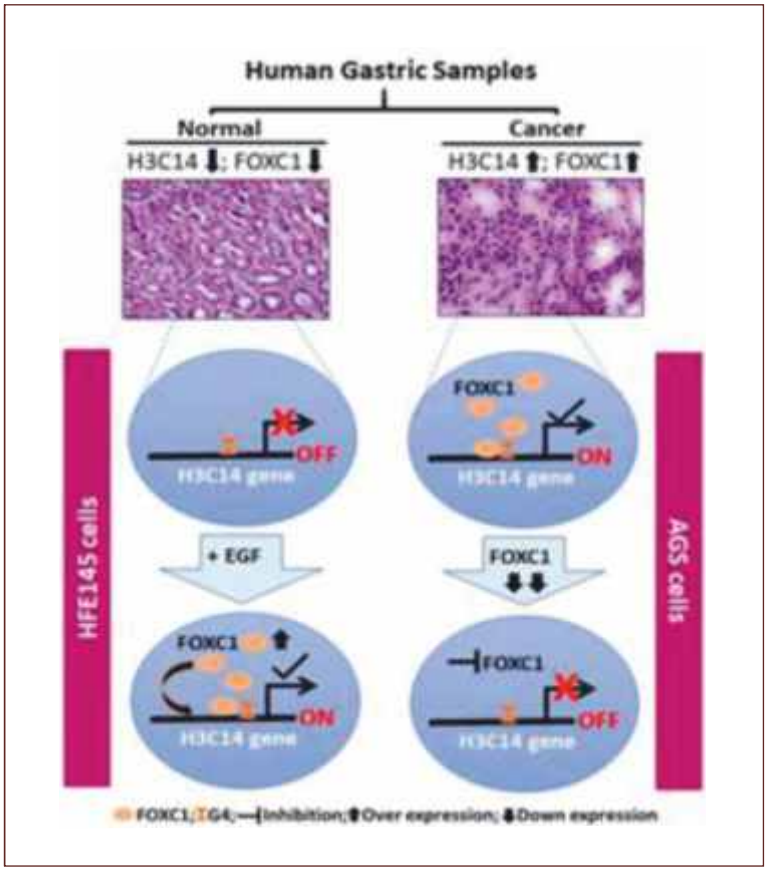


Figure: Model showing positive regulation of H3C14 expression by FOXC1 transcription factor in gastric adenocarcinoma.

Mahimkar Lab

Principal Investigator : Dr. Manoj Mahimkar

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 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. In parallel studies, the chemopreventive 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 hamsters is being tested. The Laboratory has demonstrated that administration of PBPs in drinking water throughout the carcinogen treatment period significantly decreases the multiplicity of tumors in both model systems in pre as well as post treatment settings.

Research

Research in this Laboratory has led to the identification of 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. Integrative analysis of genomic, transcriptomic and methylomic data revealed specific signature of differentially methylated promoter and gene copy associated with shorter survival. Validating targets with real time PCR based analysis revealed ANO1 (11q13.3), DVL1 (1p36.3) to be amplified in more than 90% of the cases. Association of these targets with survival will help establish prognostic biomarkers for shorter survival. Limited studies have explored clinically relevant biomarkers predictive of EGFR targeted therapy response which can guide treatment decisions in HPV negative HNSCC patients. A study from this Laboratory shows both prognostic and predictive significance of nuclear HIF1α expression. Analysis suggests that nuclear HIF1α expression is an independent negative prognostic factor in HPV negative HNSCC patients. Addition of nimotuzumab to CRT significantly improves the clinical outcomes in high HIF1α expressing patients. HIF1α status showed significant qualitative interaction with treatment effect. EGFR or pEGFR expression or EGFR gene copy number did not have any prognostic or predictive significance in these patients.Studies in this Laboratory on the chemopreventive efficacy of polymeric black tea polyphenols (PBPs), abundantly found in black tea, have shown to inhibit carcinogen induced lung adenoma in A/J mice and oral tumors in hamsters. PBPs exhibit chemopreventive activity by modulation of xenobiotic metabolizing enzymes decreasing BPDE-DNA adducts (anti-initiation) and inhibition of carcinogen induced inflammation, cellular proliferation and induction of apoptosis possibly via modulation of signaling kinases (anti-promotion). Further, research from this Laboratory first demonstrated that administration of (1.5% 3%, 5% & 10%) PBPs in drinking water throughout the treatment period significantly decreased the multiplicity of

macroscopic tumors as well as microscopic tumors.

Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences of the Homi Bhabha National Institute. Presently - Ms. Usha Patel, Ms. Mayuri Inchanalkar, Ms. Vaishnavi Nimbalkar and Mr. Zaid Shaikh are working towards their doctoral theses. The Laboratory participates in the Centre's training program and during 2020, three trainees were accepted for their Master's dissertation, whilst two for experience.

Dutt Laboratory

Principal Investigator : Dr. Amit Dutt

Overview

The goal of the Dutt Laboratory is to understand the somatic genetics of human cancer and help develop the next generation of effective targeted therapies to improve treatment of cancer patients. This Laboratory specifically focuses on the genomic features of genetic alterations underlying oncogenesis and cancer progression in the lung, breast, cervical, gallbladder, head and neck, and other cancers. The major aspect of research involves:

Cancer Genomics: Using computational genomic approaches to uncover somatic genetic alterations in cancers develop computational tools such as HPVDetector, TMC-SNPdb, as a resource for the community.

Functional Genomics: The genome-discovery efforts are paired with biochemical and molecular experimental approaches, using tumor-derived cell lines and transgenic mouse models.

Pathogen Discovery: The group has developed a computational pipeline to detect pathogens in cancer and to explore a possible pathogenic basis for cancer.

Service

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

Research

ACTREC-SARS-CoV-2 kit: A rapid, easy to implement real-time PCR based assay with automated analysis using a novel COVID qPCR Analyzer tool with a graphic user interphase (GUI) to analyze the raw qRT-PCR data in an unbiased manner at the cost of under $3 per reaction and turnaround time of less than 2h, to enable in-house SARS-CoV-2 testing across laboratories, was developed in this Laboratory. A manuscript detailing the findings was published in a Cell Press internationally peer-reviewed journal Heliyon. Through an institutional MOU, the kit was transferred to Vekaria Healthcare LLP for commercialization.

Raman Spectroscopy Based Detection of RNA Viruses: A novel non-invasive Raman spectroscopy-based statistical model to detect RNA viruses in saliva with a prediction accuracy of 91.6% (92.5 % sensitivity and 88.8 % specificity) was developed in this Laboratory. Furthermore, a GUI based analytical tool 'RNA Virus Detector (RVD) ', with potential application in managing the COVID-19 pandemic was also developed. A manuscript detailing the findings was published in the Journal of Biophotonics.

Infectious Pathogen Detector (IPD): An automated computational tool, Infectious Pathogen Detector (IPD), to identify the presence of 1,060 different pathogens in any genome sequence, along with a SARS-CoV-2 was developed in this Laboratory. It generates an automated report with information about the abundance of SARS-CoV-2 sequence in the sample, mutations present and to ascribe a

phylogenetic clade assignment to the sample. A manuscript detailing the findings was published in Briefings in Bioinformatics. Further, using IPD, the most comprehensive analysis of 2.58M mutations from more than 200K samples, was described which has not been described before! A manuscript detailing the findings is currently under review and submitted to a preprint server.

Education

The Principal Investigator is a recognized guide for PhD in Life Sciences of the Homi Bhabha National Institute. Presently 8 students –Mr. Sanket Desai, Mr. Asim, Mr. Bhaskar Dharavath, Ms. Neelima Yadav, Mr. Suhail Ahmad, and Ms. Supriya Hait are working towards their doctoral theses. During 2020, the Laboratory presented their research findings as invited oral presentations at 10 national meetings.

Waghmare Laboratory

Principal Investigator : Dr Sanjeev Waghmare

Overview

The focus of this Laboratory is to unravel the molecular mechanisms that control both the adult stem cells and cancer stem-like cells regulation in human epithelial cancers; on the molecular signalling pathways such as Wnt/Notch/Sonic-hedgehog and others that regulate self-renewal and differentiation of stem cells. The principal investigator and students of this Laboratory are investigating these aspects using skin model and human epithelial cancers such as head and neck cancer as experimental models. Unravelling the molecular signatures that regulate and maintain cancer stem cells would open up an avenue for future clinical implications.

Research

Secretory phospholipase A2 group-IIA (sPLA2-IIA) catalyzes the sn-2 position of glycerophospholipids to yield fatty acids and lysophospholipids. sPLA2-IIA is deregulated in various human cancers. The Laboratory demonstrated that a transgenic mice over expressing sPLA2-IIA results in depletion of hair follicle stem cells pool mediated through enhanced activation of c-Jun. sPLA2-IIA knockdown in oral cancer cell lines showed decreased tumorigenic potential through c-Jun/JNK activation.

SFRP1 (Secreted frizzled related protein),a Wntinhibitor is down regulated invarious human cancers. Cancer stem-like cells isolated from the Sfrp1 knock out tumors showed higher tumorigenic potential. Molecular profiling revealed up regulation of epithelial to mesenchymal transition (EMT) markers and also stem cell marker, Sox2. This inverse co-relation of Sfrp1 and Sox2 was observed in human oral and breast cancer patient samples.

Dab2 (Disabled-2 protein) is an adaptor protein and acts as a Wnt inhibitor. Findings from this Laboratory showed that Dab2 knockout mice decreased cell proliferation and stem cells lose their colony forming ability. Further, skin induced tumor using DMBA/TPA application in the Dab2 knock out skin showed decreased proliferation of the cells and also the tumors do not progress into squamous cell carcinoma.

Oral cancer patients at an advanced stage have a poor clinical outcome. Cancer stem cells (CSCs) within the tumor escape chemo-radiotherapy leading to recurrence of disease post-treatment. This Laboratory is investigating the regulatory mechanisms involved in the maintenance of CSCs and has developed the primary oral cancer cell lines from the advanced stage treatment naïve samples. Thus the ongoing studies would provide insight on the molecular mechanism underlying the maintenance of these cancer stem cells. Importantly, the molecular signatures obtained will be utilized to stratify responders and non-responders to chemotherapy.

Education

The Principal Investigator (PI) is a recognized guide for the Ph.D. degree in Life Sciences under the HBNI. Currently, five PhDstudents - Mr. Raghava R Sunkara, Mr. Sushant Navrange, Ms. Sayoni Roy, Ms. Priyanka Joshi and Mr. Darshan Mehta are pursuing their doctoral training. The PI accepted two research trainees in the report year. PI and the students engage in weekly in-house presentations and journal club. The PI and his 2 students presented their research findings at an International conference at Tezpur University, Assam in February 2020.

Ray Laboratory

Principal Investigator : Dr. Pritha Ray

Overview

The focus of this Laboratory is to delineate the key molecular signatures associated with acquirement of resistance and metastasis in Epithelial Ovarian Cancer (EOC) and Gastric Cancer (GC). The research findings from this Laboratory in 2020 have led to deeper understanding of the role of different mutants of P53 in platinum resistance and PIK3CA signalling, role of protein-protein and protein-lipid interaction in conferring multi-drug resistance in platinum-resistant EOC cells, role of autophagy in maintaining drug induced homeostasis in cancer stem cell population, transcriptional regulation of IGF1R by co-operative interaction of RUNX1 and FOXO3a and their consequences, delineation of temporal dynamics of Notch3 signaling in real time and identifying the molecular players involved in lung metastasis of chemoresistant cells in an orthotopic mouse tumor model during acquirement of chemoresistance. Research on understanding the molecular signature in Indian gastric cancer patients is in progress.

Research

Among the important observations of the on-going studies, S100A4, a calcium binding secretory protein as a major determinant for the lung metastasis of late resistant EOC cells in orthotopic tumour xenograft mouse model by Bioluminescence imaging and subtractive MS/LS analysis has been identified. Genetic and pharmacological inhibition of S100A4 led to absence of lung metastasis as well as reduction in intestinal, liver and spleen metastasis. The study on the regulation of dynamics of autophagy flux during combinatorial treatment of platinum-taxol and ERK by non-invasive optical imaging is currently under review in the journal, Cell Death and Disease. Understanding and measurement of autophagy dynamics in cancer stem cells are also in progress. Highly sensitive and specific co-culture models of EOC cell-fibroblast/cancer associated fibroblast (heterotypic) and EOC cell-EOC cell (homotypic) have been developed in this Laboratory which has demonstrated dynamics of Notch3 activation by differential level of Jagged-1 (ligand) expression. Monitoring differential activation of Notch signalling in different subtypes of EOC from Indian patient cohort are in progress. Effect of various mutant p53 on tumor biology, platinum resistance and PIK3CA signalling using cell lines and ascites derived primary cancer cells of platinum resistant relapse and platinum sensitive relapse patients are also under progress. Articles from this Laboratory on co-operative interplay between FOXO3a and RUNX1 in transcriptional regulation of IGF1R have been published in the report year in BBA-Molecular Basis of disease.

Education

Currently seven Ph. D students – Mr. Aniketh Bishnu, Mr. Abhilash Deo, Mr. Souvik Mukherjee, Mr. Pratham Phadte, Ms. Megha Mehrotra and Ms. Priti Shenoy are working on their doctoral dissertation under the mentorship of the PI. One student (Mr. Ajit Dhadve) has submitted the PhD

thesis and another (Mr. Abhilash Deo) defended the PhD synopsis seminar. Due to the pandemic, only one student (Mr. Aniketh Bishnu) could attend the EACR International Conference on 'A Matter of Life or Death: Mechanisms, Models and Therapeutic Opportunities' at Bergamo, Italy between 12th-14th February 2020. The PI is actively involved in; teaching for the ACTREC course work, served as external thesis examiner for students from New Castle University, Australia and is a member of the doctoral committees for ACTREC (12) and NIRRH Ph.D. students.

Shilpee Laboratory

Principal Investigator : Dr. Shilpee Dutt

Overview

Shilpee Laboratory is working towards understanding the molecular mechanisms that govern radiation and chemo resistance in Glioblastoma and Leukemia. For this the Laboratory has developed in vitro cellular models from primary patient samples and in vivo pre-clinical orthotopic mouse models that allows for systematic identification of signals and pathways that are relevant to resistance, thus providing the critical information necessary for therapeutic interventions. Collaborations with clinicians from Tata Memorial Hospital to explore the translational aspects of the discoveries from this Laboratory are ongoing.

Research

Therapy resistance is the longstanding fundamental problem in cancer therapeutics that has been chosen for study in this Laboratory. A significant body of work in the field of Neuro-Oncology and Leukemia has emerged over the last five years from this Laboratory using elegant genetic, molecular biology, biochemical and mouse-xenograft combined with compelling studies in human patients, have not only presented a higher resolution picture of how the residual resistant cells survive therapy and relapse but also provided the critical information necessary for therapeutic interventions in Glioblastoma and Leukemia. In 2020, a landmark study from this Laboratory identified that SETMAR (histone methyltransferase) - NHEJ (Non-Homologous End Joining DNA repair) regulatory axis is essential for the survival of clinically relevant radiation resistant residual disease cells, abrogation of which prevents recurrence in GBM. In a parallel study, the dynamic activity of PARP-1 (DNA damage response protein) is important for resistance to radiation in GBM, was delineated. Yet another important study showed that in leukemia, metabolic rewiring in drug resistant cells exhibit higher OXPHOS and fatty acids as a preferred major source to cellular energetics and can be targeted for reversal of resistance. A fourth study established that HER2 borderline is a negative prognostic factor for primary malignant breast cancer, and these patients can be treated with HER2 based targeted therapies. This Laboratory has also contributed to the ongoing COVID crisis and was involved in determination of methods for rapid detection of SARS-CoV-2. Towards this, in a collaborative effort with the Dutt Laboratory at ACTREC, a one-step, one-tube real-time RT-PCR based assay with an automated analysis for detection of SARS-CoV-2 was developed. Furthermore, in an innovative approach it was demonstrated in this Laboratory that Raman Spectroscopy can be used to detect RNA viruses from Saliva. All of the above mentioned studies are being followed up for delineating the mechanistic and translational aspects of the findings, by this Laboratory.

Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences of the Homi Bhabha National Institute. Presently eight students - Ms. Jyothi Nair, Ms. Anagha Acharekar, Ms. Saket Vatsa Mishra, Ms. Tejashree Mahaddalkar,

Ms. Madhura Ketkar, Ms. Debashmita Sarkar, Ms. Bhawna Singh and Mr. Archisman Banerjee are working towards their doctoral theses. The laboratory has two postdoctoral fellows- Dr. Atanu Ghorai (ACTREC post doc fellow) and Dr. Safi Sayed (DST-NPF post-doctoral fellow). Two students were accepted as trainees in 2020.

The PI delivers lectures for the core course and electives, and marks the assignments. The Laboratory conducts regular data presentation and journal clubs. Students presented their research findings as oral presentations in 3 conferences in 2020.

Nandini Laboratory

Principal Investigator : Dr. Nandini Verma

Overview

Nandini Laboratory is interested in the molecular mechanisms underlying the response and resistance to first-line chemotherapeutic agents in a distinct breast cancer (BC) type called Triple Negative Breast cancer (TNBC), which has become highly prevalent among Indian women during the last decade. TNBC is an aggressive BC type that lacks expression of targetable receptors like estrogen and progesterone hormone-receptors, and human epidermal growth factor receptor-2, therefore, the clinical management of TNBC primarily relies on the cytotoxic chemotherapeutic agents. TNBC responds better to chemotherapy as compared to hormone-positive BCs, however, a large number of patients are either intrinsically unresponsive or develop resistance and relapse within 2-5 years of treatment, resulting in very poor prognosis. Since, till now there are no approved targeted therapies for TNBC, therefore, improvement in chemotherapy response and patient's outcome after treatment is one of the most desirable clinical prerequisites.

Research

Studies in different types of cancers have demonstrated that clinical resistance in primary and metastatic tumors evolves due to a significant molecular reprograming during treatment, resulting in a drug-resistant cellular adaptive response. It has been demonstrated that this molecular reprograming not only involves re-orchestration of the cellular signaling pathways, but also might induce alteration in epigenetic regulators in the tumors and its interaction with tumor microenvironment (Figure.1). Therefore, systematically investigating the molecular and epigenetic landscapes in tumor cells and profiling the tumor secretome can potentially unmask novel drug resistance mechanisms and specific therapeutic strategies to resensitize chemoresistant TNBC tumors to cytotoxic therapies and hence, can prevent tumor relapse. In light of this hypothesis, the study from this Laboratory objectively investigates the drug-resistance associated molecular reprograming in different TNBC subtypes by analysing the proteomics and transcriptomic landscapes, epigenetic regulators and tumor secretome in a systematic manner using clinically driven in-vitro and in-vivo model systems. As an initial approach toward these research objectives the basic research setup including infrastructure, development of subtype and drug-specific cellular experimental model systems and required reagents were constantly under progress during 2020.

Education

The PI is an HBNI affiliated assistant professor since December 2020, a member of the academic committee at ACTREC and involved in the review, planning and execution of the annual academic activities. In the year 2020, the PI participated in the Institutional weekly student lectures and monthly BSRG meetings, as a DC member of 2 Ph.D. students and evaluated the annual research work of the JRF-2019 batch at ACTREC. The PI participated in framing of the JRF ACTREC entrance examination 2021 question

paper , delivered lectures in the course work modules at ACTREC and guided 2 Masters' students for dissertation work. Virtual attendance of the 32nd EORTC-NCI-AACR Symposium, Molecular Targets and Cancer Therapeutics, (Oct 24-25, 2020) and AACR Annual Meeting 2020 (June 22-24, 2020) was fulfilled by the PI in the report year.

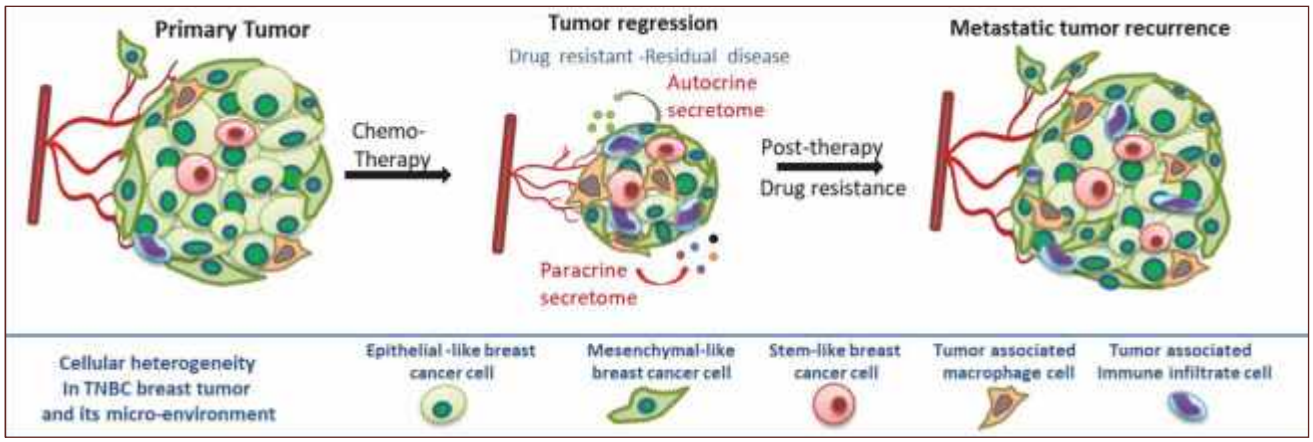


Figure 1. Schematic representation of the potential role of molecular, epigenetic and tumor secretome factors in drug resistance and tumor relapse in TNBC.

De Laboratory

Principal Investigator : Dr. Abhijit De

Overview

Research in the De laboratory involves development and use of imaging methodologies suitable for estimating molecular functions in vivo. A wide spectrum of experimental medicine and novel concept therapeutics in model systems using non-invasive molecular imaging techniques are tested. The Laboratory has the mandate to acquire diverse translational experimental therapeutics developed through research with appropriate technical support from permanent and project staff.

Research

Based on previous findings from this Laboratory reporting natural endogenous expression of human sodium iodide symporter (NIS) gene in breast cancer (BC) patients, efforts to achieve a differential NIS expression in breast cancer cells using cellular transcriptional regulatory mechanisms are on-going. This has led to identification of the benzamide class of HDACi as a potential modulator and established the molecular basis of benzamide inhibitors action elevating NIS expression specifically in breast cancer cells, but not in thyroid cells. This work was published in the prestigious American Society of Gene Therapy journal in 2020. The strategy developed opens new possibility of treating BC patients with benzamide HDACi drug followed by radio-iodine treatment, thus delivering an effective treatment only to the tumor cells. Over the years, the Laboratory has also worked on designing molecular sensors for imaging STAT3 activation. STAT3 regulates important oncogenic signaling cascades in BC. Significant progress was made in validating this molecular PhosphoBRET sensor based on optical reporter resonance energy transfer principle, and thus leading to an Indian patent application. The characterization work on patient tumor tissue samples revealing the importance of phospho-serine post-translational modification as a measure of STAT3 activation in triple negative breast cancer (TNBC) subtype was completed and published in 2020.Another promising line with exceptional potentials of clinical application, in collaboration with faculty at IITB, Mumbai, is the testing of biocompatible gold nanospheresfor photothermal therapy efficacy. Triggered precision treatment of palpable tumors with accumulated nano-sized particles when briefly exposed to NIR laser irradiation confers excellent tumor tissue ablation while keeping the surrounding tissue safe. The efficacy of this fast and cost-effective procedure against human drug-resistant and radio-resistant tumor was done in preclinical model. In the current year two novel organic NIR dye molecules with exceptional PTT efficacy were discovered and published. In addition, the on-going international bi-lateral project (DBT Indo-Russia) on the utility of a novel mushroom

luciferase as a new imaging reporter progressed in 2020.

Education

The PI is affiliated to Homi Bhabha National Institute as a guide for Ph.D. degree in Life Sciences. In 2020, eight students- Mr. Arijit Mal, Mr. Sumit Mishra, Mr. Pranay Dey, Mr. Aaiyas Mujawar, Ms. Chetna Patnaik and Ms. Mansi Joshi were working towards the Ph.D. degree and Ms. Shalini Dimri and Ms. Maitreyi Rathod have completed the PhD degree. Dr. Swathi Raju, TMC Postdoctoral Fellow continued important work/role in the laboratory. Due to the pandemic situation, visiting students of collaborating labs and student for Master's dissertation were limited. The group routinely conducted weekly meetings to discuss new results and review published research in the field. The PI has actively served for international and one national journal editorial board. The PI and students have represented their work in national and international conferences, and a student has received best poster (1) presentation award in 2020.

Chilakapati Laboratory

Principal Investigator : Dr. Murali Krishna Chilakapati

Overview

Optical diagnostics, also often referred to as optical pathology, optical diagnosis, optical biopsy, spectral diagnosis, spectromics, describes applications of spectroscopic and/or optical based methods in disease diagnosis. As these methods have been explored to monitor therapeutic response - surgical demarcation, tumor radio/chemo response and recurrence prediction, can also be termed as optical theranostics, which encompasses both diagnostic and therapeutic aspects. Raman spectroscopy is one of the optical spectroscopy tools, been actively pursued for non-invasive, clinical applications. Cancer is a leading cause of death with over 10 million lives lost globally each year, and 70% deaths in developing countries. The high mortality rate, attributable to late detection and recurrences, is ascribed to limitations of conventional diagnostics. Hence this laboratory is actively pursuing Raman based methods: (a) Development of in vivo/in situ methods for routine screening and diagnosis; (b) Development of minimally invasive micro-spectroscopy methods using body fluids and cell smears; (c) Synthesis, optical and photothermal characterization of metallic nanoparticles for biomedical applications; (d) Exploring Raman and Infrared spectroscopy for oral cancer diagnosis using serum and saliva; and (e) Investigations on experimental carcinogenesis in animal models.

Research

Chilakapati laboratory has been actively pursuing non-invasive and minimally invasive applications of Raman spectroscopy in cancer. The laboratory'sin vivo Raman spectroscopy studies on oral cancer demonstrated stratification of normal, premalignant and malignant conditions as well as identified early events (cancer field effects and malignancy-related changes). Early identification of recurrence/ second primaries andvalidation studies are also carried out. Exploring utility in disease free survival and other prognosis, as also classifying different premalignant conditions and recurrence are some of the focus areas. Raman studies on brush-biopsies and sera demonstrated stratification of healthy subjects, tobacco habitués, oral premalignant subjects and subjects that are prone to second tumour/ recurrence. Protocols developed for salivary Raman spectroscopy have demonstrated stratification of healthy, habitués and tumour subjects. Further studies are being carried out to stratify premalignant subjects. Serum Raman spectroscopy studies of hamster buccal pouch models are being carried out to evaluate utility of this minimal invasive tool in cancer applications. Raman maps of cells and tissues are being carried out for understanding therapeutic monitoring. This Laboratory has also been actively involved in other Raman applications such as COVID detection and trace analysis of pesticides.

Chilakapati Laboratory is actively involved in several collaborative programs with BARC Mumbai, BARC Visakhapatnam, IPR Ahmedabad, IIT Mumbai, IIT Kharagpur, IIT Dharwad and BHU, Varanasi at the national level and also internationally with the University of Eastern Finland, Finland; Swansea University, England and Shimane University, Japan.

Education

The laboratory participated in the Centre's training program and accepted 3 trainees for research experience in the year 2020. Dr. Kshama Pansare (Post-Doc), Priyanka Jadhav (JRF) and external PhD students (E Duckworth [Swansea University, UK,]; S. Ausgustine [IPR, Ahmedabad]) continued working in the Laboratory during 2020. Laboratory members attended 2 international conferences to present their research finding sin the report year.

Tumour Immunology and Immunotherapy Group

Scientific Officer 'F' : Dr. Jyoti Kode

Overview

This Laboratory focuses on investigating; immune phenotype, soluble factors landscape and immune evasion in patients, understanding crosstalk of stem cell niche, immune cells and mesenchymal stem cells in the tumor microenvironment in oral cancer, Hodgkin's lymphoma and acute myeloid leukemia, and also on understanding the role of hypoxia in differentiation and effector functions of T cells in oral and pancreatic cancers. Immunomodulatory effects of ayurvedic formulations are being tested in two clinical trials on patients with ovarian and oral cancer. This Laboratory has identified CD26, an immunoregulatory-enzyme and few immune subtypes as prognostic biomarkers for Graft-versus-Host disease in stem cell transplant patients.

Research

Cell-cell and cell-soluble factor interactions between immune cells, MSC and stem cell niche in Acute Myeloid Leukemia have demonstrated involvement of NLRP3 innate immune pathway markers. Studies are underway to decipher role of NLRP3 pathway in AML blast survival. Study involving immune mapping of cell surface/soluble factors from stem cell donor harvest and peripheral blood of transplant recipients, provided leads that surface immunoectoenzyme CD26 expression, sPD1 expression and NKT+ cells may serve as potential predictors of post-transplant clinical outcome which needs to be further validated in a larger cohort. Prospective, single arm, observational study conducted on Hodgkin's Lymphoma patients as a pilot study provided leads on sCD30, sTIM3, and immunosuppressor adenosine as serum biomarkers that correlated with interim and end of treatment PET-CT based clinical outcome. Work continued on ongoing projects of Dr. Chiplunkar, (PI) Chiplunkar Lab. Activated γδ T cells obtained from oral tumor microenvironment having hypoxic condition, demonstrated increased frequency of γδT17 cells and secretory IL-17a. To evaluate mechanistic details, AW13516 oral cancer cells were treated with cell-free supernatant of hypoxia-exposed activated γδT cells. It showed increase in ICAM-1 and vimentin expression on oral tumor cells, indicating their role in regulation of EMT pathway. The anti-tumor potential of γδ T cells stimulated by a novel nanoparticle formulation has shown promising results in the in vitro studies done. Currently, protocols to validate the impact of nanoparticle-stimulated γδ T cells in reducing the tumor burden in immunodeficient mice models bearing xenografts are being standardized.In an ongoing phase II clinical trial to study efficacy, toxicity and immunomodulatory effect of Carctol-S in high grade serous epithelial ovarian cancer, preliminary experimental data revealed increase in T cell proliferative responses to mitogens post Carctol-S treatment. Responder case demonstrated decrease in immunosuppressor PGE2 levels after three months of Carctol-S

treatment which also correlated with CA-125 tumor marker.

Education

The Scientific Officer is a recognized guide for PhD Life Sciences of the Homi Bhabha National Institute. In 2020 three students – Ms. Shruti Kandekar, Ms. Manasi Nagare and Mr. Naythan Dcunha continued work on their Ph.D. thesis. Five students from other universities were trained and Laboratory members participated in two international and five national conferences in the report year.

Scientific Officer 'D' : Dr. Sonam Mehrotra

Wellcome DBT – IA Intermediate Fellow

Overview

Dr. Mehrotra's research involves understanding mechanisms that regulate response to replication stress in cells. It specifically concerns investigating the proteins involved in stabilization and restarting of stalled replication forks using mammalian cell cultures and Drosophila melanogaster as model systems. Many components of homologous-recombination (HR) mediated DNA repair are crucial during replication-stress response where their functions are mechanistically distinct and remain poorly understood. This study focuses towards understanding the functions of a novel BRCA2 and CDKN1A interacting protein (BCCIP) during replication stress and its implications in tumorigenesis.

Research

Understanding replication stress and its implication in resistance to radiation therapy:

This study aims to characterize novel functions of proteins involved in DNA repair pathways during replication stress. Specifically, the function of BCCIP, which associates with both BRCA2 and RAD51 to form a multi-protein complex required during homologous recombination-mediated DNA repair, has been investigated.Study of genome wide perturbations on a single molecular level using DNA fibre analysis, showed that down regulation of BCCIP isoform significantly increased stalled replication forks and reduced replication recovery after hydroxyurea induced replication stress. Since the replication recovery significantly improved upon MRE-11 inhibition, further suggested that BCCIP is required for preventing degradation of nascent DNA strands by exonucleases. Finally, by using a modified version of the proximity ligation assay, it was demonstrated that similar to RAD51, BCCIP protein is also recruited to replication forks that have been stalled for short periods of time. Therefore, these data show that in addition to its role during HR mediated DNA repair, BCCIP plays crucial roles during replication stress. The key findings are that BCCIP is required for protection of nascent DNA from MRE-11 like exonucleases. It is recruited to stalled replication forks and stabilizes them in response to short term replication stress.

Education

Dr. Mehrotra is jointly guiding a PhD student; Ms. Bhawana Singh, and has two Research Fellows on the project. In 2020, the laboratory members participated in one national conference.

Scientific Officer 'D' : Dr. Sejal Patwardhan

Overview

The broad goal of this Laboratory is to understand multifactorial regulation of cancer exacerbation. With a holistic approach of unravelling signaling networks induced by biochemical and biophysical cues encoded by tumor microenvironment, the aim is to identify key regulators at the crossroads of cancer metastasis, therapy resistance and bystander effects in lung and breast cancer models. To achieve this, various approaches covering proteomics, genomics, cell biology and cellular biophysics are being employed. Intriguingly, the key regulators projected from basic research are also evaluated in clinical scenarios to test their translational potential either as diagnostic/ prognostic biomarkers or as therapeutic targets with the ultimate aim of improving the therapeutic gain.

Research

The major research activity undertaken by this Laboratory is to investigate role of ECM dynamics in cancer metastasis. Extracellular matrix (ECM) is a meshwork of proteins that assimilates cells into tissue. Mechanical rigidity (stiffness) of ECM may remarkably govern cell behaviour and fate. Breast cancer progression is often featured by ECM stiffening due to excess deposition and cross linking of collagen fibres. Cancer cells secrete surplus amounts of exosomes allowing fine-tuned exchange of signals. In this project the aim is to decipher the connection between ECM mechanics and exosome secretion and its consequences with respect to biophysical properties, motility and invasiveness of breast cancer cells. By employing collagen coated hydrogel scaffolds of varying stiffness, ECM stiffening promotes exosomes secretion in breast cancer cells, has been established. Blocking of exosome secretion with the use of pharmacological inhibitor GW4869 abrogated stiffness regulated cell spreading, motility and contractility in breast cancer cells. Reciprocally, exogenous addition of stiffness-modulated exosomes triggered EMT-like morphological alterations accompanied with drastic changes in adhesion and protrusion dynamics in exosomes-treated cells culminating in enhanced motility and invasion. To delineate the molecular mechanisms underlying observed phenomena, exosomes isolated from cells grown in different stiffness conditions were subjected to proteomic profiling. Quantitative proteomic analysis followed by over representation analysis and interactome studies revealed enrichment of proteins involved in cell adhesion and cell motility in exosomes obtained from cells grown on stiff ECMs compared to soft ones. The prospective regulators of exosomes-mediated cancer cell migration and invasion have also been identified. Further work is in progress to discern the role of these key players along with their downstream signalling. In parallel, a study demonstrating metastasis prognostic potential of age and serum analytes in non-metastatic lung cancer patients in follow-up conditions has been concluded and published.

Education

One trainee was selected during the year 2020 in this Laboratory. The faculty delivered the core course lecture to the JRF 2020 batch and attended two (virtual) workshops during the report year.

Scientific Officer 'D' : Dr. Sharathchandra Arandkar

Overview

The main aim of this Laboratory is to understand the tumor-stroma cellular interaction and their role in tumorigenesis in tumor-microenvironment. Specifically, the focus is to understand one of the stromal cell type, Cancer Associated Fibroblasts (CAFs) and their interaction with tumor cells. The Laboratory aims to understand the generation of CAFs in the tumor-microenvironment and identification of the responsible extra & intra cellular factors/ signaling molecules in this process.

Research

To achieve these goals, various lung cancer cell lines and patient derived Cancer Associated Fibroblasts from collaborators have been procured. RNA-sequencing and protein secretome data from NFs and CAFs by using the bioinformatics tools have been analyzed. The initial data generated in this Laboratory suggests that various stromal secreted factors have influence on the tumor cell migration. Preliminary analysis revealed that many secreted proteins were differentially expressed between normal vs tumor associated stroma. Currently the validation experiments by using various cell-culture models are being performed. Additionally, in collaboration with Prof. Oren's lab from Weizmann Institute of Science, it has been found that (by using machine learning in ER+Her2- patients METABRIC data) a small subset of wt TP53 tumors displayed gene expression and pathway deregulation patterns markedly similar to those of TP53-mutated tumors (published in Molecular Oncology, doi:10.1002/1878-0261.12736).

Education

In the report year, the Scientific Officer attended; a two-day EACR Congress 2020 Virtual Congress for EACR members between 18-19th June 2020 andgrant writing workshops on India Biostreams (Learn About HFSP Research Grants and Fundamentals of Writing Effective Grant Proposals for Young Investigators) organised by India Bioscience.

Scientific Officer 'D' : Dr. Rohan Khadilkar

Overview

Research in this Laboratory initiated in the month of March 2020 and the focus is to elucidate the effects of organismal ageing on the stem cell – niche micro-environment with Drosophila as a model organism, using its hematopoietic system to answer this biological question. Utilizing the powerful genetic toolkits in Drosophila, the plan is to understand how stem cell properties and the cellular signalling landscape in their environment changes upon modulation of ageing. This will help in understanding the transformation of the hematopoietic stem cell niche into a leukemic niche thereby fostering the onset and progression of leukemia.

Research

Two approaches have been selected to understand the effect of ageing on the stem cell – niche micro-environment and stem cell homeostasis. The two approaches are by a) Accelerating ageing and b) Reversing ageing (anti-ageing). The immune pathways are genetically activated in flies by using genetic mutants that have constitutive activation of the Toll and Imd immune pathways. The observation is that upon chronic immune activation (chronic inflammation), there is induction of DNA damage in the hematopoietic organ in Drosophila marked with gamma-H2Ax foci. This is accompanied by a concomitant increase in blood cell differentiation notably of plasmatocyte and crystal cell differentiation. In the other approach, autophagy is activated which causes an anti-ageing effect by over-expressing Atg8 protein specifically in the hematopoietic progenitor cells resulting into a pro-stem cell self-renewal effect wherein the maintenance of stem cell homeostasis is reinforced. The plan is to mechanistically understand how the signalling landscape in the niche-stem cell ecosystem changes during ageing. This will be done by using various signalling reporters that will report about the activity status of the signalling pathways and help in understanding how a normal physiological stem cell niche transforms into a leukemic niche thereby fuelling leukemic progression.

Education

Three trainees were selected during the year 2020; 2 for experience and 1 for post-graduate dissertation in this Laboratory. The faculty attended one (virtual) international conference during the report year.

Anti-Cancer Drug Screening Facility (ACDSF)

Officer-in-Charge : Dr. Jyoti Kode

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 53 human tumor cell lines, 10 murine tumor models and 38 xenograft models for accomplishing drug screening. During the year 2020, 508 compounds were received from 67 clients, one of which was a corporate R&D and the others academic organizations, from 11 states across India. Four hundred and eighty two compounds were tested for their in vitro activity. Ten in vivo studies have been carried out on 26 compounds which were examined for Maximum Tolerated Dose (MTD) (n=2), tumor development study (n=2) and in vivo efficacy assays (n= 8). In the year 2020, one HT1080 xenograft of fibrosarcoma was generated. For the ongoing study titled 'Affordable Cancer Therapeutics' with CSIR-IICT, Hyderabad facility, standardized Surface Plasmon Resonance and Biophysical binding of compound 9a with target protein Tubulin was done, with collaborative help from BARC, Mumbai. In the year 2020 this facility has published research work in two international peer reviewed journals, namely Bioorganic Chemistry and Carbohydrate Polymers. The facility has contributed work towards two patents submitted to USA and an Indian Patent authority. In the report year, on 23rd January, 2020, this facility demonstrated ongoing activities to a group of 21 students accompanied with one faculty from the Department of Molecular Biology, Yurvaraja's College in Mysore.

Bioinformatics Centre

Officer-in-Charge : Dr. Prasanna Venkatraman

Scientific Officer : Mr. Nikhil Gadewal

The DBT supported Bioinformatics Centre provides infrastructural and technical support to scientists, and students to fulfill bioinformatics requirements in their projects. The major focus of the projects is the data mining of genes of interests from microarray, next-generation sequence data analysis from TCGA and other public domain repositories. In structural bioinformatics area the Centre provides the infrastructural and technical support for molecular docking and dynamics studies. The Centre is also involved in the development and the maintenance of the in-house biological databases hosted on the ACTREC web domain.

Presently, the Centre is well equipped with one nVIDIA Tesla GPU workstation, 5 workstations, 1 webserver and 7 PCs. This Centre provides short term training (3-6 months) to 6 students of B.Tech, M.Sc., and M.Tech for their project dissertation. Every year the Centre also organizes training/workshop targeting college teachers and research scholars of Mumbai and nearby institutions. This year, due to the pandemic the workshop was not conducted.

For high-performance computing in the projects related to NGS-data analysis and Molecular dynamics simulation studies centre provides remote access to the cluster which consists of 3 compute nodes comprising 2TB RAM and 108 computing cores. Access to the cluster is provided for international workshops organized by scientists at ACTREC for NGS data analysis.

The Advisory Committee for the Bioinformatics Centre constitutes of PIs from CRI and are; Dr. Kakoli Bose, Dr. Ashok Varma and Dr. Amit Dutt.

Biophysics Facility

Officer-in-Charge : Dr. Kakoli Bose

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 different projects, enabling the characterization of the intrinsic properties of macromolecules and their assemblies (size, shape, folding and stability) and of the interactions in which they are involved (stoichiometry, thermodynamic and kinetic parameters). This facility is equipped with Jasco J-815 Circular Dichroism Spectropolarimeter, FluroLog -3 Modular Spectrofluorimeter, Dynamic Light Scattering (DLS) DynaPro Plate Reader II, BIAcore T200 for automated surface plasmon resonance (SPR), and MicroCal iTC200 isothermal titration calorimeter (ITC). Along with technically sound instrumentation, the facility on requirement also provides expertise to assist the users in experimental design and data interpretation. Depending on individual needs, either experiments are performed for the users or help is provided to operate these instruments independently with minimal supervision. These services are also available for students, research scholars, and scientists from other academic institutions as well as industries on a payment basis. During the year 2020, in addition to the in-house users, facility services were used by investigators and students from BARC, Bharathidasan University, Goa University, University of Mumbai, Bharat Serums Pvt. Ltd and Premas Biotech Pvt. Ltd.

Biorepository Facility

Officer-in-Charge : Dr. Poonam Gera

ACTREC Biorepository is a facility that collects, annotates, stores, and distributes biological samples to in-house researchers for duly approved research projects. The bio specimens are collected from the Operation Theatre, Frozen room and Surgical Pathology as well as the Out Patient Department (Breast). In the year 2020, with due consent from patients, tissue samples from 626 cases were procured. Majority of the samples were from patients with Head and Neck tumors, followed by Breast tumors. Other tumor types included Gastrointestinal and Neurological. For all the possible cases paired normal samples were also collected and stored appropriately. In addition 35 core biopsy samples were collected from Breast OPD. The Facility in the report year provided cryopreserved tissue samples to 6 Principal Investigators with approved projects.

The OIC of the Biorepository facility with expertise in Pathology is Co-investigator in 10 different projects at ACTREC and has published research articles in peer reviewed journals.

Common Facilities

Officer-in-Charge : Dr. Sanjay Gupta

The common facility operation and maintenance offers supportive services like Chemi-Doc machine, ultra-pure water purification system, radioactive handling room for ^{32}P and ^{125}I, bacterial culture hoods, ice making machines and cold room facility to all the research groups of the Centre. All the facilities are well-equipped with high-end research equipments and are located in different floors and wings of Khanolkar Shodika. ACTREC procured two Chemi-doc machines (Biorad model), one ice-flake machine (Brema) and one autoclave through CSR fund to cater to the growing needs of researchers availing the facility. Along with these, autoclaves and oven in different research groups are also maintained by the technicians of the Common Facilities. All the major equipment under Common Facilities is covered under an Annual Maintenance Contract and the Facility is committed towards providing safe, sustainable, efficient, and reliable service.

Common Instrument Room (CIR)

Officer-in-Charge : Mr. Uday Dandekar

Over the past 43 years, the Institute has maintained a “Common Instrument Room” as a facility, housing vital scientific equipment routinely required by the Centre's staff and students, to optimize utilization and availability uninterrupted 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 usage of the equipment. Requisite spares for centrifuges, low temperature freezers, CO2 incubators and other equipment as well as consumables like centrifuge tubes and thermal paper rolls are procured on a regular basis and stored as stock in the Facility to reduce downtime of the equipment. Altogether, a total of 106 number of equipment are currently housed in this Facility.

Digital Imaging Facility

Officer-in-Charge : Dr. Dibyendu Bhattacharyya

The ACTREC Digital Imaging Facility (ADIF) is a state of the art imaging facility housing several advanced imaging platforms. At present, the facility boasts of the following instrumentation: (1) Multiphoton confocal LSM780 microscope, (2) 3i Mariana spinning disk confocal microscope, (3) Leica SP8 confocal microscope with STED super resolution system, (4) Leica DMI600B microscope - from Bhattacharyya Laboratory, (5) Nikon Ti Eclipse wide field microscope (6) Axio Imager.Z1, and (7) Axiovert 200M. The Facility provides microscopic acquisition and analysis services for wide-field and the different confocal platforms listed above, to the ACTREC faculty and students as well as to users from other institutes and laboratories. The Facility remains busy throughout the year and usage of confocal systems remains extremely high especially for the multiphoton system and Leica Sp8 system.

DNA Sequencing Facility

Officer-in-Charge : Dr. Pradnya Kowtal

The DNA Sequencing Facility has two automated DNA Sequencers, an eight capillary 3500 and a forty - eight capillary Genetic Analyzer 3730 from Applied Biosystems. Both the Sequencers are used for DNA sequencing and fragment analysis. The machines are operated by two Scientific Assistants. The average turnaround time to give out data is one working day after receiving samples. During 2020, the DNA Sequencing Facility at ACTREC was used by researchers for confirmation of cloned inserts, site directed mutagenesis and shRNA and also to analyze sequences of genes implicated in sporadic and inherited cancers for research and diagnosis. The Facility carried out about 2700 sequencing and fragment analysis reactions in the report year. DNA Sequencing Facility demonstrated principle of Sanger sequencing and working of the Facility to under graduate and post graduate students and other visitors at the beginning of the report year.

Electron Microscopy Facility

Officer-in-Charge : Dr. Sharada Sawant

The theme of this facility is to promote, support and initiate research and training in the applications of Transmission Electron Microscopy (TEM). This facility at ACTREC, maintains a JEOL JEM 1400Plus TEM that works at 80-120KV with 0.2 nm resolution and magnification up to X12, 00,000, suitable for biological, polymer, Nano gold and material science applications. This system has been commissioned along with 3D Tomography, EDS and STEM. The Facility carries out routine TEM sample preparation including fixation, resin block making (solid tissues, monolayer cell cultures and single cell suspension), semi-thin sectioning followed by ultrathin sectioning, staining, scanning and imaging. In addition, the Facility also provides service of special techniques such as, Negative staining and immuno-gold labeling.

During 2020, the Facility processed EM samples for 24 working groups from ACTREC and 4 external users from Reliance Life Sciences-Navi Mumbai/NIRRH-Mumbai/Hyderabad University and BARC-Mumbai. A total of 216 tissue and monolayer cell culture specimens were prepared for araldite/epon blocks making, 458 specimens for semi-thin sectioning, followed by ultrathin sectioning of 299 specimens and further 448 grids contrasted using uranyl acetate and lead citrate. Five hundred and eighteen grids were scanned under EM and over 18115 microphotographs were captured at 120 KV. In addition to this, the facility has processed 37 samples for negative staining and 12 samples for immune-gold labeling. Further, quantitative analysis of EM data was done using iTEM software for 6 working groups. Moreover, the interpretation of the obtained results on the basis of ultra-structural observations was done for all the users.

During the report period, several times lecture-demonstration of the Electron Microscope was given; to students on educational visits on 7 different occasions, to JRF academic batch of 2019-20 and to visitors from national and international institutes.

Flow Cytometry Facility

Officer-in-Charge : Dr. Sanjeev Waghmare

The Flow Cytometry Facility is a core facility which provides support to the Principal Investigators and students from ACTREC for their flow-based research. Besides sample acquisitions and cell sorting methods, the Facility extends technical support in experiment designing, data analysis and interpretation as well as development of Flow cytometry based techniques. This Facility is equipped with 4 flow cytometers – FACS Calibur, Attune NxT, FACS Aria-III, FACS Aria-I, which can perform 3-18 color analysis and up to 4 –way sorting. The analysis is done using softwaresviz – FACS Diva, Cell Quest Pro, Flow Jo, FCS Express, Attune NxT, FCAP Array and Modfit.

In 2020, the facility was used by 77 scientists and students from ACTREC (from 20 laboratories). A wide range of research applications were carried out on a regular basis; immunophenotyping with fluorescence tagged antibodies (up to 16 colors), DNA content determination and cell cycle analysis, S-phase detection by BrdU staining, apoptosis studies, detection of mitochondrial membrane potential, stem cell analysis - side cell population, dermal stem cell analysis, detection of fluorescence proteins like GFP , functional and biochemical assays like proliferation assay, oxidative burst analysis, intracellular cytokine analysis, cytometric bead array assay for detection of cytokines, 4-way live cell and single cell sorting.

The Facility also offers its services to investigators from other academic Institutes and private organization on a payment basis. In the report year demonstrations and training were conducted on request for visiting clinicians, scientists and students. The Facility organized a one-day workshop on “Advanced Methods of Flow Cytometry Data Analysis” on 25th February, 2020 in collaboration with BD Biosciences.

Histology Facility

Scientific Officer 'G' : Dr. Arvind Ingle

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, (b) logistic support for frozen sectioning of human/ animal tissues, and (c) blocks of multiple tissues by pecking method using a microarray machine. During 2020, the facility received 4723 tissue samples in fixative and 865 human paraffin blocks, and post- processing, supplied 4331 stained and 11568 unstained slides to 22 research laboratories. In addition, 493 tissues were processed for cryo-sectioning, and 493 H&E stained and 2042 unstained slides were supplied to 5 research laboratories.

Laboratory Animal Facility (LAF)

Officer-in-Charge : Dr. Arvind Ingle

Scientific Officer 'D': Dr. Rahul Thorat

The Laboratory Animal Facility (LAF) aims to breed, maintain and supply laboratory animals to the research groups of the Centre. During the year 2020, LAF undertook planned breeding of 10 (normal strains), 1 (Nude), 1(SCID), 1 (hybrid), 48 (Transgenic/ Knock-Out strains/sub-strains) of mice, 1 rat and 1 hamster strain, and supplied normal (2266), Nude (402), NOD SCID (1286) mice, 84 rats, 177 hamsters to 31 researchers against 107 IAEC-sanctioned research proposals. Towards quality control, LAF examined 221 (stool/ animal) samples and 840 (food, water, pulses, bedding material and room air) samples for routine microbiological testing, 539 (hair/ stool/ cellophane) samples for clinical-pathology, 34 samples for serological detection of 5 rodent pathogens from 15 strains, and carried out PCR-based tests for 12 infectious agents using 56 random samples from 15 different strains. For genetic purity, biochemical marker testing of 40 mice from 8 strains, and PCR based tests for 20 microsatellite markers on 20 DNA samples from 10 mice strains; 5 microsatellite markers on 2 DNA samples from 1 rat strain was done. Skin grafting of 32 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 18 blood samples of Nude/ SCID mice, as also control BALB/c and Swiss mice. In the rodent germplasm freezing program, cryopreservation of rodent sperm and in vitro Fertilization (IVF) using these cryopreserved Spermatozoa has been achieved. Sperms were cryopreserved from 2 different mouse strains in 38 nos. of straws. In 2020, LAF supplied normal(7025), Nude(82), SCID(369) mice, 74 rats and 137 hamsters as breeding nuclei/experimental animals to 16 CPCSEA registered Indian organizations, and provided microbiological monitoring services to 1 national organization. The senior faculty participated in 3 international conferences, and accepted 3 MSc students for dissertation in 2020. The senior faculty is nominated as College Council of ICVP; Chairman, Education Committee, ICLAS and also received Outstanding Contribution to Animal Science Award-2020 of the Dr. B Vasantharaj David Foundation, Chennai. The senior faculty also served as Editorial Board Member of Chinese as well as Korean Laboratory Animal Science Journals.

Macromolecular Crystallography and X-Ray Diffraction Facility

Officer-in-Charge : Dr. Ashok Varma

The Macromolecular Crystallography and X-ray diffraction Facility was commissioned in ACTREC in the year 2012. Since its inception the Facility is actively involved in helping faculty and scientists from ACTREC in crystallization of different proteins, crystal picking and mounting on the x-ray diffractometer. The Facility is very well equipped with crystallization unit, and compact diffractometer comprising (1) Microstar-Microfocus Rotating Anode, (2) Integrated computer controller motorized Image Plate detector and (3) different workstations installed with software used for data processing, structure solution and refinement. Three Investigators; Varma Laboratory, Prasanna Laboratory and Bose Laboratory within ACTREC actively use this Facility. In the year 2020, total 17 crystals have been tested whereas 13 crystals were processed for data collection and one of the crystals diffracted up to a resolution of 2.0 Å. In 2020 the Facility imparted training to national level academic faculty/research scholars through funds provided by the Department of Biotechnology, Government of India (DBT-GOI) and contributed to generate trained and skilled human resource for the country.

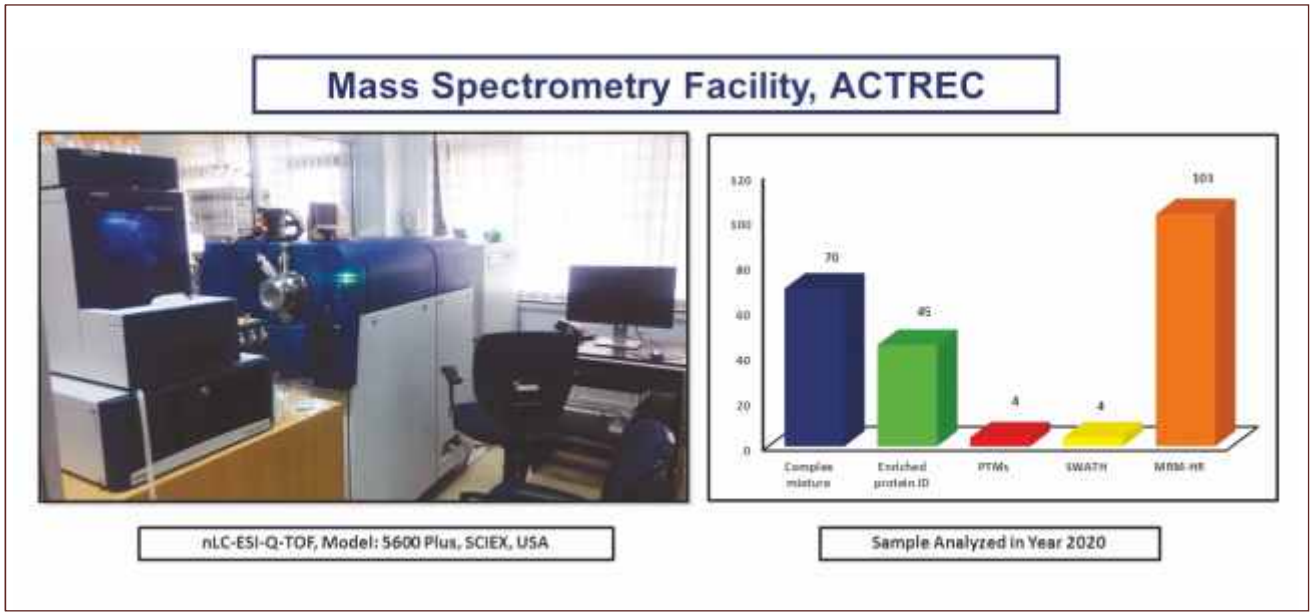
Macromolecular Crystallography and X-ray Diffraction Facility at ACTREC

Mass Spectrometry Facility

Officer-in-Charge : Dr. Rukmini Govekar

Scientific Officer 'D': Mr. Shashadhar Dolas

Mass Spectrometry Facility at ACTREC houses a Nano-LC (SCIEX, Eksigent)-ESI-Q-TOF (SCIEX, Triple TOF 5600 plus) Mass Spectrometer. The platform has been used for applications such as profiling of complex protein mixtures, identification of enriched proteins, label-free quantification (SWATH analysis) of complex protein samples, MRM-HR targeted proteomics and for determination of post translational modifications of proteins. The Scientific Officer attached to the facility demonstrated the working of nLC-ESI-QTOF and MALDI-TOF-TOF on several occasions in the year 2020. Demonstration was conducted on nLC- ESI- QTOF and MALDI TOF-TOF for the participants of NER training program at ACTREC, in January, on 6th and 22nd, and in February on the 26th. A lecture was delivered on February 19th 2020, by the Scientific Officer for the NER training program, on 'Methods Used in Sample Preparation for Proteome Profiling and Quantification by Mass Spectrometry'.



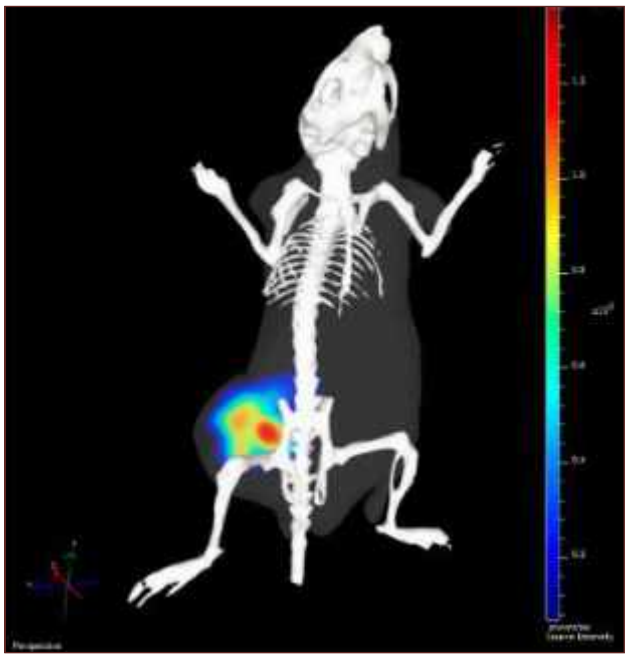
Molecular Imaging Facility

Officer-in-Charge : Dr. Abhijit De

Molecular Imaging (MI) core facility has been providing extensive support to experimental evaluation of various facets of cancer biology, such as therapeutic delivery, treatment response, disease relapse, distant metastasis, material bio distribution, autophagy and other research questions that TMC-ACTREC investigators undertake. MI enables simultaneous visualization and quantitation of cellular processes at the molecular or genetic level in real-time, and has received world-wide recognition as a powerful tool for translating basic research findings to the clinic. Over the past seven years, published research work utilizing this Facility shows successful development of multiple types of orthotopic mouse tumor models for various projects. Preclinical orthotopic xenograft models developed here are of important cancer types for human breast, brain, ovary, lung, pancreas and lymphomas. Besides the in-house investigators, faculty from nearby institutions like IIT Bombay, IISER Pune and BARC were benefitted using this Facility for their studies and thus expanded the scope of interdisciplinary approach to explore solutions for various cancer areas.

The Facility has one IVIS Lumina II and one IVIS Spectrum imaging system installed during 2013 and 2014 respectively. Other necessary infrastructure like gas anesthesia systems,back-up data server and computer terminals for imaging data analysis were added for optimal operation using various extramural funding support given to ACTREC investigators. The installed systems offer fast scanning of multiple mice or rats emitting photonic signals such as bioluminescence, near-infrared fluorescence and Cerenkov luminescence. Salient features of the systems include: high-performance, user-friendly acquisition and fully software-controlled image capture; data back-up storage server linked through ACTREC LAN to enable onsite and remote access for image data analysis. The systems have integrated heated stage and accessories for isoflurane based gas anesthesia needed for the non-invasive scanning procedure; fast scan performance for photon signals primarily in the range of 500–900 nm from tissue culture plates or tubes or from inside the live mice sources can be captured. The excitation/emission filters accommodate majority fluorescent dyes or fluorescent proteins in the green to near infrared spectral range. Other important features of IVIS Spectrum system is spectral unmixing and 3D single-view, diffuse tomographic reconstructions (DLIT and FLIT mode) capacity.

To date, the data generated from this Facility has led to over twenty publications in leading international journals and contributed in filing multiple Indian patents as well. The Facility regularly takes part in educational visits organized by the institute. MI core facility is supported by a Scientific Assistant.



3D reconstructed projection view of a mice bearing bioluminescent tumor xenograft of breast cancer

Small Animal Imaging Facility

Scientific Officer 'G' : Dr. Pradip Chaudhari

Overview

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 Facility is also involved in diagnosis and treatment of pet animals suffering from spontaneous cancers. These cases are being referred to animal oncology clinic for diagnosis and further management. During 2020, 43 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 animal cancer bio-repository for comparative research.

Service

The COVID 19 pandemic has impacted both the programs but it has given opportunities to improve upon conventional working patterns. The introduction of teleconsulting for pet patients was initiated and the visits for local patients have been reduced. Several patients from outside Mumbai were given veterinary medical care services. In the report year few proof-of-concept studies, normal tracer uptake studies and in vivo tumor uptake studies using preclinical imaging modalities have been started. In 2020 a CDA with Advanced Innovative Partners, USA for theragnostic study sponsored by them has been signed.

Research

The research focus of Animal Cancer Care Centre 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. Along with the above research activity the faculty is responsible for the Radioisotope Laboratory, which is a well-equipped laboratory with provisions for various in-vitro assays, cell culture experiments and radioactive counting.

Education

The Facility organized the 9th Interactive Webinar on “In Vivo Preclinical Imaging and Drug Discovery" from December 7- 11, 2020. A total of 714 participants from 13 countries attended this webinar. The OIC was selected as an ad hoc Specialist by AAALAC (The Association for Assessment and Accreditation of Laboratory Animal Care) International, USA, to promote the humane treatment of animals in science through voluntary accreditation and assessment programs. In the report year the OIC participated in several international and national virtual conferences and was invited; as a speaker, visiting faculty and external examiner.The OIC was awarded the Brig. S K Mazumdar Oration of the Society of Nuclear Medicine in December 2020,in recognition of excellent academic and research contribution in the field of Nuclear Medicine and related disciplines. Three students were accepted for training by the OIC in 2020.

CENTRE FOR CANCER EPIDEMIOLOGY (CCE)

Dr. Sudeep Gupta	**(Director, ACTREC)**
Dr. Rajesh Dikshit	**(Director, CCE)**
Dr. Pankaj Chaturvedi	**(Deputy Director, CCE)**

Department of Medical Records & Cancer Registry

Dr. Ganesh B. (Head)

Department of Preventive Oncology

Dr. Sharmila Pimple (OIC)

Dr. Gauravi Mishra

Dr. Subita Patil

Field Intervention and Cancer Surveillance

Dr. Atul Budukh (OIC)

Molecular Epidemiology & Population Genetics

Dr. Sharayu Mhatre (OIC)

Biostatistics

Mr. Sanjay Talole (OIC)

Dr. Atanu Bhattacharjee

Department of Medical Records & Cancer Registry

Head and Professor : Dr. Ganesh B.

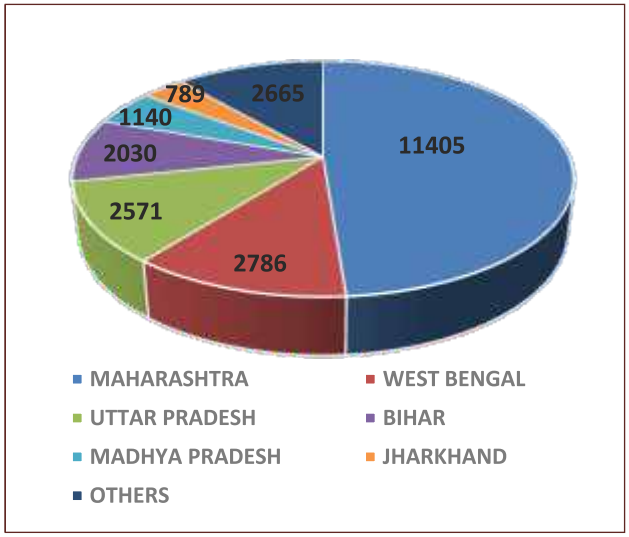
Service

The department provides case files to

- Patients for Treatment and Follow-up.
- Doctors/ Clinicians for Research.
- Administrative purpose; Medical insurance, RTIs, Parliament queries and Medico-legal cases.
- Online Registration of Inpatient Deaths in BMC portal.
- As per the TMC Policy of Retention of Medical Records, all case-files registered prior to 2013 are scanned and linked with EMR. Hence all patient care data was available at all times during the Covid-19 lockdown.

Fig.1a: TMH Registrations - 2020

Fig.1b: Residential Status - 2020



TMH Case-file Registrations	**:**	**23,386**
Tele-Consultation	**:**	**944**
Referral Registrations	**:**	**13,038**
Preventive Oncology	**:**	**16,128**
Total TMH Registrations	**:**	**53,496**
ACTREC Case-file Registrations	**:**	**1,494**
ACTREC Referral Registrations	**:**	**1,181**

Department Activities

a. Hospital Based Cancer Registry

This has been operational in collaboration with NCDIR, ICMR since 1984. In 2018, 35,956 new cancer cases in TMH and 938 new cancer cases only in ACTREC are reported. In both,

the leading site of cancer was Buccal mucosa among males and Breast among females. The abstraction for the HBCR could be done during the Covid-19 period as Work from Home due to the availability of the Online Electronic Records.

Fig : 2a Tata Memorial Hospital – Trends of Patients Registration and Cancer Cases 1941-2020

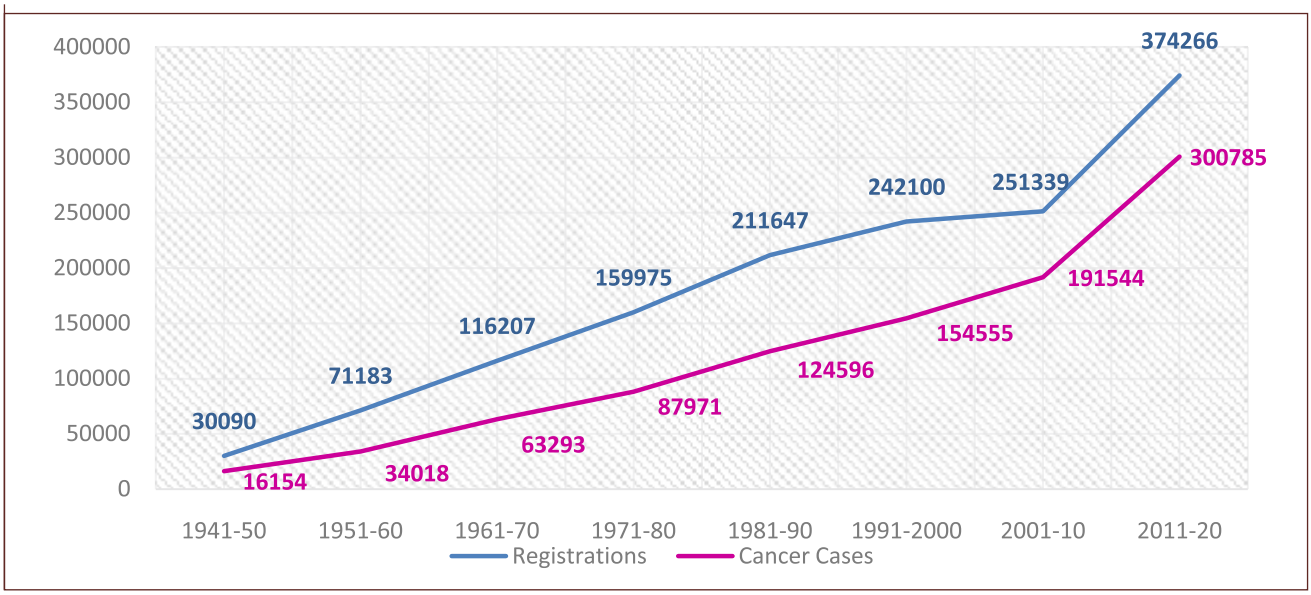
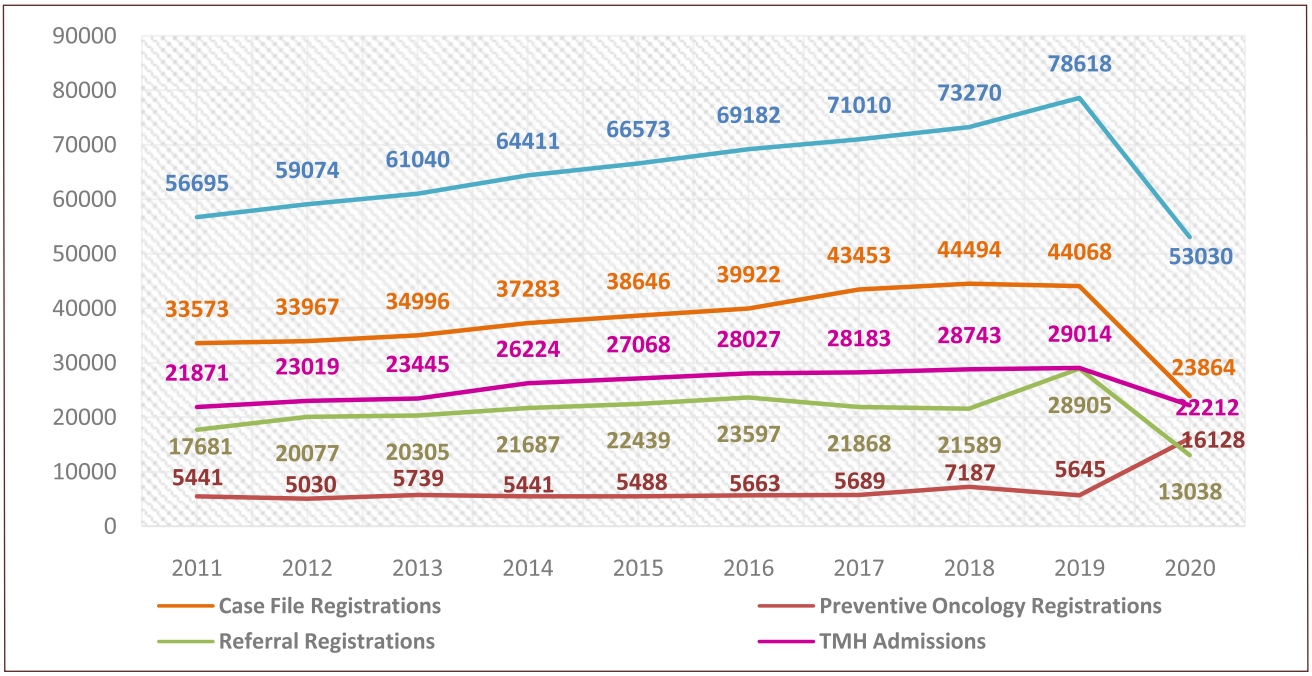
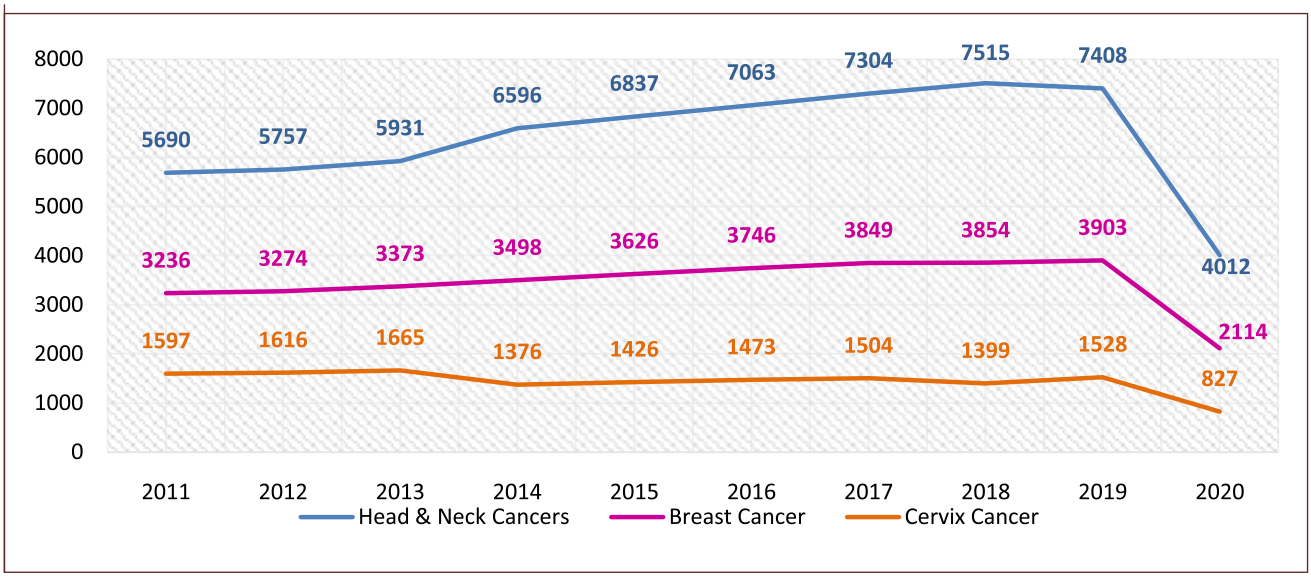


Fig: 2b TMH – Registrations and Admissions Trend



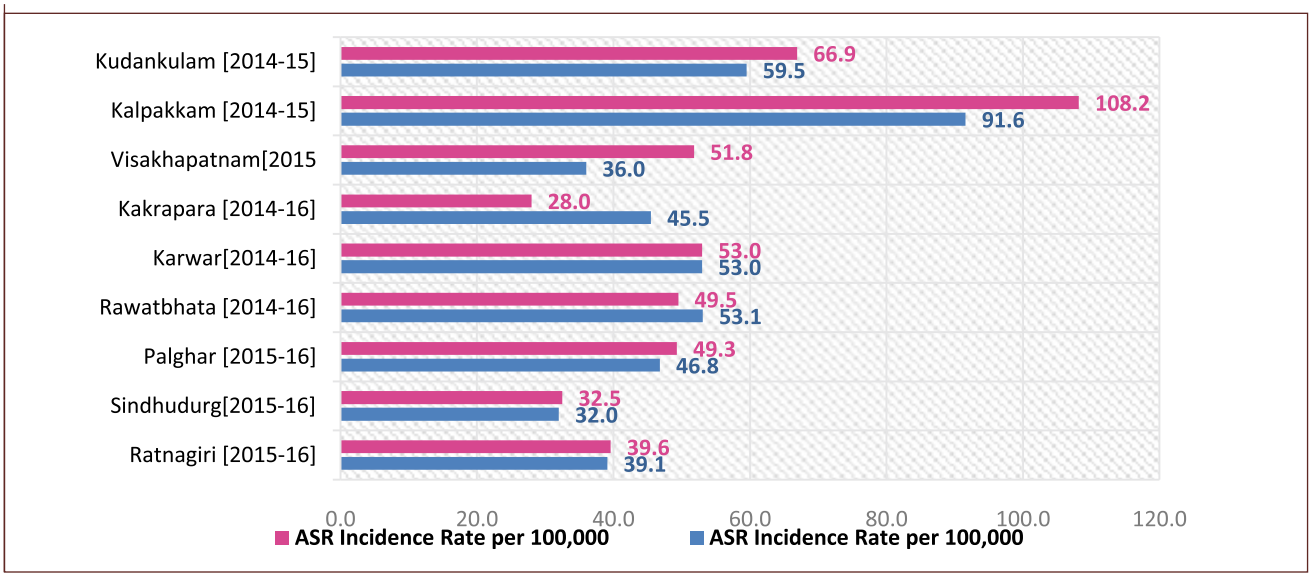
There is a reduction in the registrations due to the Covid-19 Pandemic. However, tele-consultations were given to patients during the lockdown period. The Preventive Oncology registrations have increased due to the Health Scheme for staff provided by Mumbai Police Department.

Fig: 2c Trend in Leading Cancers (2011-2020)



b. Population Based Cancer Registries

Population Based Cancer Registries (PBCR) near the Nuclear Power Plant locations, Tarapur, Karwar, Rawatbhata, Kakrapar, Ratnagiri, Sindhudurg and Visakhapatnam published their report for cancers diagnosed in respective areas during the year 2014-16. PBCR at Kalpakkam and Kudankulam in collaboration with WIA Cancer Institute, Adyar, Chennai also published the first report for 2014-15. The data for these registries is being compiled for the years 2017 onwards for report publication. Tablet-PC was implemented for real-time data capture of cancer registries across all registries. The staff has entered all old data into the Tablet PCs during the lockdown period.



c. Patterns of Care and Survival Studies

Survival and follow-up study in collaboration with NCDIR, ICMR (since 2006) for breast, cancer cervix, head & neck cancers, hematolymphoid malignancies, pediatric and other gynecological cancers. Till date, 16,957 breast cancer, 5,943 cervix cancer and 21,727 head & neck cancers are abstracted for analysis of outcomes (survival rates). Abstraction was initiated for hematolymphoid malignancies, pediatric and other gynecological cancers.

d. Health Survey

Kaiga and Rawatbhata Health Check-up was conducted and the report was submitted to the Chairman, DAE and the Director, TMC respectively.

e. Tobacco Survey

The Tobacco Survey was completed in Ankola and Karwar for a population of 67,195.

Research

Epidemiological Review of Selected Cancers; Pancreas, Gall bladder, Urinary Bladder, Ovary, Liver was published. Consolidated Report for Cancer Registries situated at Nuclear Power Plant was published. The Consolidated Report for the following mentioned Cancer Registries was published; Kalpakkam and Kudankulam, Karwar, Kakrapar, Ratnagiri, Visakhapatnam, Rawatbhata, Tarapur and Sindhudurg. The other areas covered were Biostatistics Consultancy – Research Design, implementation, Statistical Analysis and Interpretation for Clinicians and Students.

Education

Re-orientation program was conducted in Jan. 08-10, 2020 for all Cancer Registries. It covered setting up newer registries and abstraction and ICD coding of diseases. Training in Hospital based Cancer Registry was imparted to Hospital based Cancer Registry staff from Varanasi, Punjab and Sangrur.

Professor and Physician (OIC) : Dr. Sharmila Pimple

Professor and Physician : Dr. Gauravi Mishra

Associate Prof. & Physician : Dr. Subita Patil

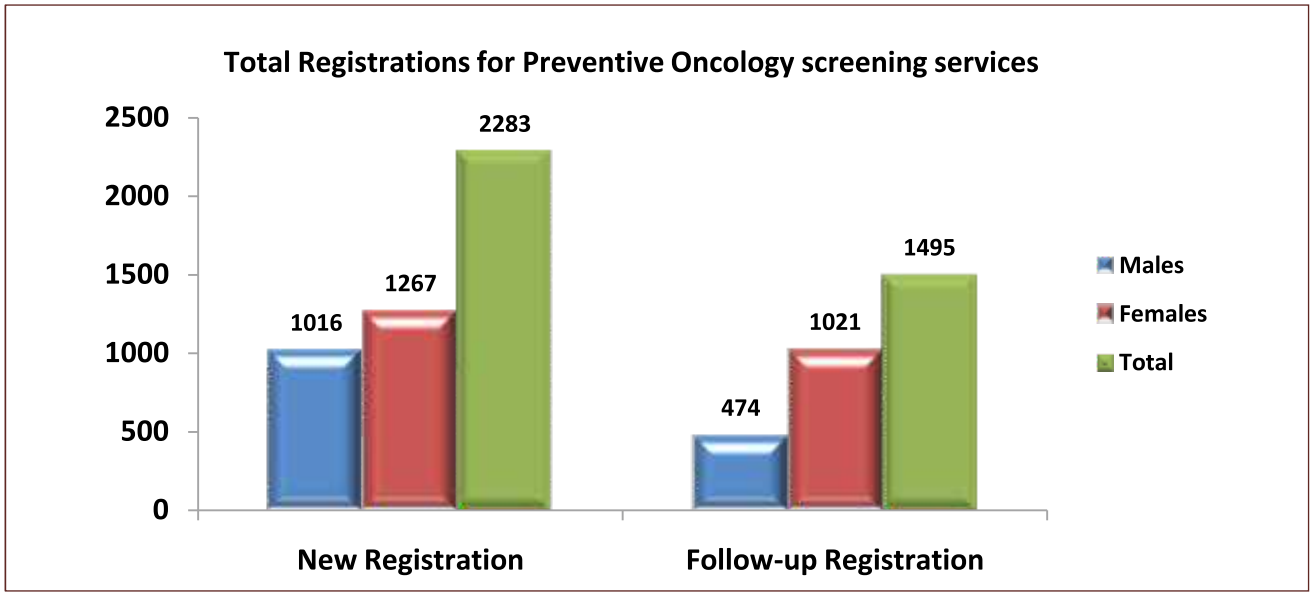
Overview

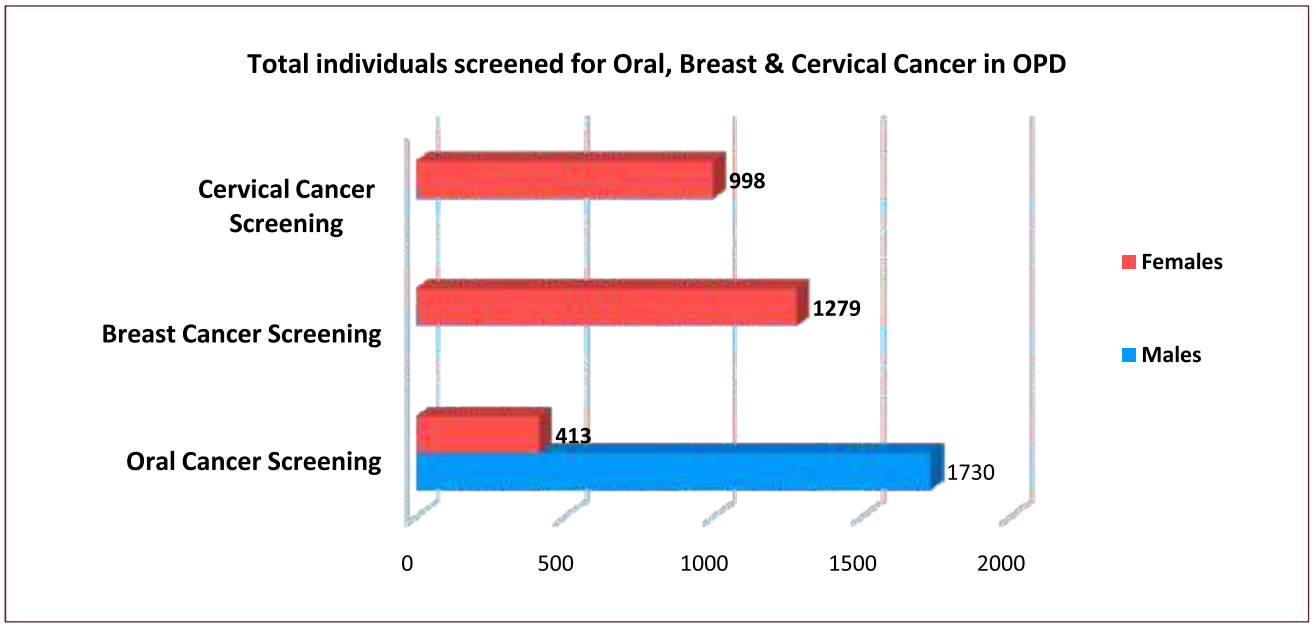
Department of Preventive Oncology is a designated WHO Collaborating Centre for Cancer Prevention, Screening and Early Detection (IND 59), Region SEARO, since 2002 with five main thrust areas:

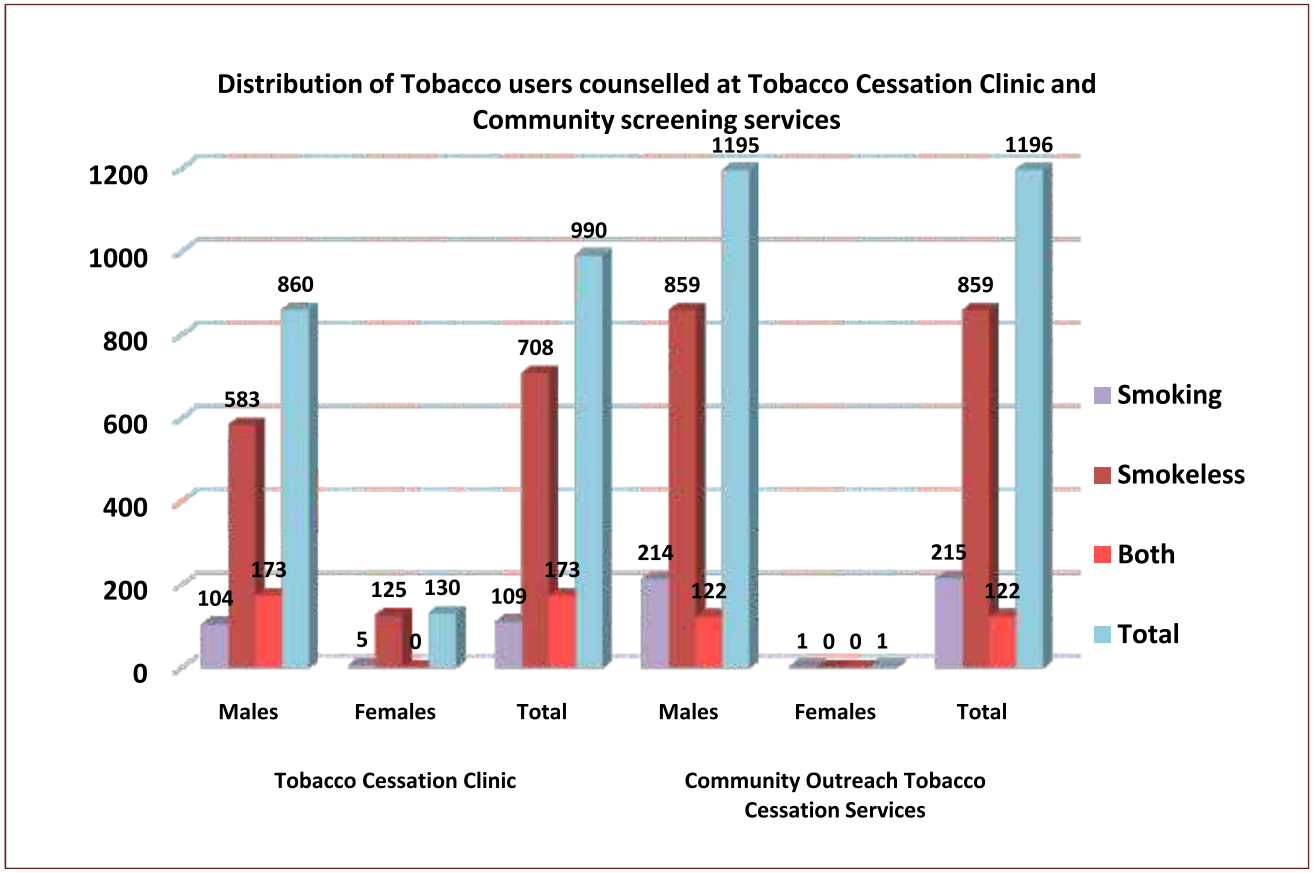
- Information, Education and Communication (IEC); Programs for risk prevention, life style modification and improving health seeking behaviour towards early detection of common cancers in India.
- Clinic and Community-based, Opportunistic-Screening; Programs for Screening of Common Cancers and risk assessment for High Risk cancers.
- Health Manpower Development; for supporting the cancer control programs of the Centre and State Governments.
- Advocacy, NGO-Training and Networking;For Dissemination of cancer control activities
- Research; for developing newer methods and strategies for the prevention and early detection of common cancers in India.

Service

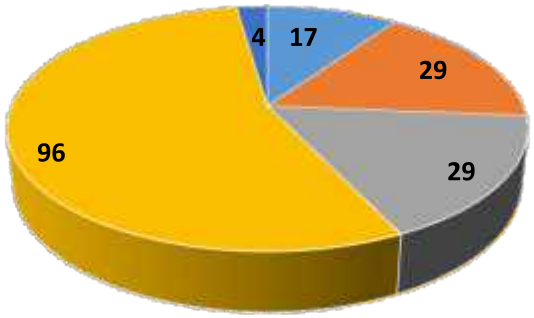
The Department conducts Preventive Oncology Hospital and Community Based Screening Clinics. A total of 2283 new patients were registered for Preventive Oncology services and an additional 1495 were registered for follow-up screening services. A total of 3778 individuals (2288 women &1490 men) availed Preventive Oncology screening services in 2020.




Total individuals screened for Oral, Breast & Cervical Cancer in OPD
Cervical Cancer Screening
Breast Cancer Screening
Oral Cancer Screening
998
1279
413
1730
0
500
1000
1500
2000
Females
Males


Distribution of Tobacco users counselled at Tobacco Cessation Clinic and Community screening services
1200
1000
800
600
400
200
0
104
583
173
860
5
125
0
130
109
708
173
990
214
859
122
1195
1
0
0
1
215
859
122
1196
Males
Females
Total
Males
Females
Total
Tobacco Cessation Clinic
Community Outreach Tobacco Cessation Services
Smoking
Smokeless
Both
Total

Follow up details of tobacco users counseled at Tobacco Cessation Clinic during the year 2020



Research

Listed below are the on-going and completed Research Projects during the report year of 2020-

1. "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®)".
2. "Randomized trial of 2 versus 3 doses of HPV vaccine in India, IARC".
3. "Development and Non Inferiority Evaluation of a portable trans vaginal digital colposcope with smartphone interface for single visit cervix cancer screening in low resource settings".
4. "Evaluation of diagnostic performance of oncogenic Human Papillomavirus DNA verses HPV mRNA as a secondary triage test for women found positive on Visual Inspection based approaches".
5. "Comparative performance evaluation of Artificial Intelligence (AI) based visual inspection test (AI_VIA) with Primary Health Worker administered VIA (PHW_VIA), HPV DNA test and cervical cytology to detect cervical pre-cancer lesions".
6. "Performance of HPVDNA Test in presence of Co-infection with Common Reproductive Tract Infections".
7. "Molecular genetic analysis of clinically high risk oral leukoplakia to identify potentially high risk lesions".
8. "Early Detection of Common Cancers in women in India" (funded by RO1 grant of the NIH, USA; Grant # 5RO1 CA 074801-16).

9. "Collaborative Action for control of Cancer and other Non-Communicable Diseases among Mumbai Police".

10. "Audit to assess safety and efficacy of COVID-19 screening mechanism for delivery of cancer care in TMH."

11. "Living conditions, social determinants and experiences of COVID-19 infection among employees at a tertiary-referral cancer centre – A mixed methods study".

11. "Incidence of Human Immunodeficiency Virus (HIV) among Indian Men who have Sex with Men (MSM)."

12. "A survey for knowledge and implementa-tion of preventive steps for early cancer detection in women affiliated with Tata Memorial Centre"

13. "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".

14. "Prevalence of Human Papilloma Virus in Spouses of Men diagnosed with Oral and Oropharyngeal Cancer".

15. "A prospective observational cohort study to identify the utility of risk-based screening strategy for long term complications in adolescent and adult cancer survivors of leukemia and lymphoma".

16. "Comparative Evaluation of Cancer Awareness Among Project Participants and Similar General Female Population in Mumbai, India".

17. "Acceptability and Validity of Self Sampling for High Risk HPV Detection Among Women In Maharashtra"

18. "Narrow band imaging observed oral mucosa microvasculature as a tool to detect early oral cancer".

19. "Role of toll-like receptors and TLR agonists in modulating response to chemotherapy in TNBC patients"

Education

a) Name of the PhD Student: Dr. Kavita Anand – Enrolment No: HLTH09201304007, Guide: Dr. Sharmila Pimple

b) Training programs / Workshops / CMEs conducted during the year 2020:

The Department of Preventive oncology conducted a total of 33 training programmes and trained 1620 medical and paramedical workers on the cancer screening and awareness.

No.	Topic	Month	No. of delegates / participants
I)	Annual Flagship Training Workshops:		
	Workshop/Webinar on Health Education & Promotion for Para Medical Personnel	Jan, Aug 2020	140
	Workshop/Webinar on Principles and Practice of Cancer Prevention & Control	Feb, Sept 2020	61
	Webinars on Tobacco Control & Cessation	Aug, Dec 2020	131
II)	Specialized Training Programs:		
	A) Sensitization Programme on Prevention & Control of Common Cancers:		
	Sensitization Programme on Prevention & Control of Common Cancers for Teachers of Punjab State, Dist: Sangrur.	January, 2020	16
	Sensitization programme on prevention & Control of Common Cancers' For NSS/NCC Students of Punjab State.	January, 2020	146
	Sensitization programme on prevention & Control of Common Cancers' For Nursing Students of Punjab State	January, 2020	115
	B) Workshop on Prevention and Control of common cancers and Webinars Capacity Building		
	Pre Conference Workshop on 'Tobacco Control, Cessation & Oral Cancer Screening' at DMIMS (DU), Wardha	March, 2020	23
	Webinar on "Early detection & management of common/ preventable cancers"at CCE, ACTREC	July, 2020	100
	Webinar on “When clinical researcher should contact Biostatistician” at CCE, ACTREC	July, 2020	100
	Webinar on Demographic changes & need for population based data at CCE, ACTREC	July, 2020	50
	Webinar on “Sample size determination for medical research" at CCE, ACTREC	July, 2020	100
	Webinar on Fundamentals of Meta analysis at CCE ACTREC	August, 2020	100
	Online Onco Physiotherapy Training program	Sept., 2020	06

<table>
<tr><th>No.</th><th>Topic</th><th>Month</th><th>No. of delegates / participants</th></tr>
<tr><td></td><td colspan="3">C) Training programs organized by Dept. of Preventive Oncology during Covid pandemic:

Academic Program (through Zoom): during April-June 2020, every week

Various topics were covered such as: SOPs for:

oral, breast and cervical cancer screening, for Personal Protective Equipment's, Fever clinic, nursing staff, registration, TCC clinic, Patient Navigation and PO Dept. training workshops.</td></tr>
<tr><td></td><td colspan="3">D) Training of the team working on telephonic interview for COVID-19 Surveillance study, NSCI-Worli at CCE, ACTREC on 16th& 19th June 2020.</td></tr>
<tr><td></td><td colspan="3">E) Training programs for COVID Awareness, Prevention and Control During May –June 2020 for following:

· Staff of HRD and Staff clinic TMH ,Kevat students , Vaccine project, NIH and police project staff at TMH

· Muzaffarpur and Buxar staff, staff of PBCR, HBCR at Varanasi & Sangrur, AVE Project staff at Varanasi, EDP staff at Sangrur

· Total Beneficiaries: Medical Officers: 355, Paramedical Staff: 656, Administrative Staff: 494.</td></tr>
<tr><td>III)</td><td colspan="3">Lectures & Guest lecturers conducted by the Department during the year Jan to Dec 2020:</td></tr>
<tr><td></td><td>Details</td><td>Date</td><td>Beneficiaries</td></tr>
<tr><td></td><td>· Social support at grass root level to woman from low socio economic group.</td><td>15/01/2020</td><td>27</td></tr>
<tr><td></td><td>· Social issues of H& N patients.</td><td>12/02/2020</td><td>27</td></tr>
<tr><td></td><td>Dr Sharmila Pimple

· Invited Speaker on Doordarshan Sahyadri - 'Hello Sahyadri' on World Cancer Day.

· Delivered Zoom Webinar lecture on “Need for See and Treat Point of Care Testing strategies for Cervical Cancer Screening In India “ for ISCCP Online Module for Prevention of Cervical Cancer.</td><td>

04/02/2020

24/04/2020</td><td>—</td></tr>
</table>

No.	Topic	Month	No. of delegates / participants
	· Delivered Zoom Webinar lecture on “Creating Tobacco Free Workplace and Workforce" for Bajaj Electricals Ltd on World No Tobacco Day.	28/05/2020	
	Dr Gauravi Mishra: · Invited Speaker on All India Radio Akashwani Asmita Vahini in Vishesh Dial in show Aarogya Darpan program on eve of World Cancer Day. · Invited Speaker on Doordarshan Sahyadri - 'Sahyadri – News at 09.30 pm' on World Cancer Day. · Delivered lecture on "Cancer Awareness: Prevention, Early Detection, and Treatment" under TISS's flagship skill development programme, the National University Students' Skill Development (NUSSD).	04/02/2020 04/02/2020 Feb 2020	— — 500
	Dr Subita Patil: · Conducted lecture on common cancers for students from CRI · Delivered online lecture on 'Role of Consultant in Tobacco Cessation for TQL Counsellors’	11/05/2020 03/12/2020	10 12
IV)	· Cancer awareness programs for general population by the department; 34 Number of Institution or Organizations.	Beneficiaries / Participants : 3095	

c) A Press Conference was conducted on the eve of World Cancer Day, on 3rd February, 2020 in Tata Memorial Hospital with the theme; 'Catalyzing collective and government action for cancer control: Exploring some of the most urgent issues in cancer'. Some of the education materials released during the Press Conference were educational booklets on cancer prevention, training manuals, training module on Cancer Awareness for prevention and early detection of Oral Cavity Cancer and practical training manual about health awareness on hazards of tobacco and a training module on tobacco cessation counselling for female tobacco users

d) There were 81 numbers of observers / trainees in the Department during the Year 2020.

Section of Field Intervention and Cancer Surveillance

Professor Epidemiology (F) & OIC : Dr. Atul Budukh

Overview

The section provides technical support to the cancer registries in South-East Asia and regularly organizes cancer registration training programs for the South-East Asian region. The section also monitors the cancer burden through population based cancer registries (PBCRs) in Punjab, Uttar Pradesh and Bihar states of India. The section provides the Tobacco Quit Line service for the tobacco users who are willing to quit the tobacco habit.

Service

Tobacco Quit Line services, Centre for Cancer Epidemiology – Tata Memorial Centre, Mumbai, India: Tobacco Quit Line (TQL) centre provides effective counseling to the tobacco users and enables quitting tobacco through a toll-free number 1800-11-2356. Of the total registered 35,743 calls, 14,927 (42%) people were ready to quit tobacco and agreed to attend the regular follow-up calls. The counsellors made a total of 95,139 follow up calls, out of which 51,096 (54%) calls were attended by the clients. There were 5,355 (36%) quitters. This quit rate is in the selected sample.

Research

- Oral cancer screening project, Ratnagiri district, Maharashtra, India:

  In the first round of the intervention arm, 52,737 (70.6%) attended screening from 429 villages of Ratnagiri district. The total screen positive individuals in the first round were 1,046 (2.0%). 1 in 50 individuals is screen positive. In the first round of screening, 40 (0.08%) oral cancer cases were diagnosed and out of which 30 (75.0%) individuals received treatment. The first round was completed in the year 2016. The second round of the intervention arm is on-going. In the second round, 49,854 (77.2%) participants screening have been completed and a total of 31 (0.06%) cancer cases have been diagnosed out of which 25 (80.6 %) cancer patients have received treatment till date. In terms of stage distribution, there is a stage shift in the cancer case presentation. Twenty-four (60.0%) late stage oral cancers cases out of 40 in the first round while in the second round, 16 (51.6%) out of 31 have been detected. In the control arm, the first round has been completed with 350 villages covered. The high-risk populations covered have 52,431 individuals. The second round of control arm is on-going and 37,179 (70.9%) eligible individuals of the population have been covered . These are provisional findings; the data cleaning is in process.

- Early detection program for oral, breast and cervical cancer in Sangrur district of Punjab state

  The objective of this project is to observe the effect of health education, easy access to diagnosis and treatment on stage at presentation, completion of treatment and survival of breast, cervical and oral cancer. Under this project, more than 95,000 individuals of the population (36 villages and

20 wards from Sangrur) have been covered. More than 500 symptomatic cases attended the detection clinic organized at the door step of the population. Out of these, 154 cases were screen positive and 14 precancerous cases were diagnosed and prevented. This exercise diagnosed four Leukoplakia cases, one mild dysplasia, one oral cancer case, one breast cancer and four CIN 1 and one CIN2 cases. Moreover, 3 cancer cases were diagnosed and these cases are under regular follow up at Homi Bhabha Cancer Hospital, Sangrur.

- Cancer registries under this unit

Sr. No	Registry	State	Date of establishment	Population covered	Report Status
1	Sangrur PBCR	Punjab	1st January, 2013	1.7 M	The annual reports for the year 2013, 2014 and 2015-2016 have been published. https://tmc.gov.in/tmh/index.php/en/education-and-research/publications/public-reporting-of-data-publications
2	Mansa PBCR	Punjab	1st April, 2013	0.8 M	
3	Chandigarh PBCR	Chandigarh (Union Territory)	1st January, 2013	1.0 M	
4	SAS Nagar PBCR	Punjab	1st January, 2013	1.0 M	
5	Varanasi PBCR	Uttar Pradesh	1st April, 2017	3.7 M	Annual report for the year 2017 has been published. https://tmc.gov.in/tmh/index.php/en/MPMMCC
6	Muzaffarpur PBCR	Bihar	1st October, 2018	4.8 M	Data collection for the year 2018 is under process.
7	Gadchiroli PBCR	Maharashtra	1st April, 2015	0.1 M	The report (2015-2016) has been published. 2017-2018 data collection is in process.

Sr. No	Registry	State	Date of establishment	Population covered	Report Status
8	Sangrur HBCR	Punjab	1st January, 2017	HBCH, Sangrur	Annual report (2018) has been published. https://tmc.gov.in/tmh/index.php/en/hbch-sangrur Data analysis for the year 2019 is in process.
9	Varanasi HBCR	Uttar Pradesh	1st October, 2019	HBCH and MPMMCC, Varanasi	Data collection for the year 2018 is in process.

* HBCR: Hospital Based Cancer Registry; HBCH: Homi Bhabha Cancer Hospital; MPMMCC: Mahamana Pandit Madan Mohan Malaviya Cancer Centre

'Project Team '[Early detection program for oral, breast and cervical cancer] Homi Bhabha Cancer Hospital (HBCH), Sangrur district, Punjab State

Education

Virtual training programs conducted by this unit under IARC Regional Hub for Cancer registration. Due to COVID-19 pandemic, virtual cancer registration training programs were organized for the participants from India, Myanmar, Bhutan, Nepal, Sri Lanka, Myanmar and Timor-Leste. The list is as follows:

Training programs conducted in the year 2020:

Sr. No	Name of the training program/ workshop	Course date	No. of participants
1	Course on setting up cancer registry (Participants from Kolhapur)	2nd March to 4th Mach 2020	4
2	Cancer registration course for Timor-Leste registry	26th August to 28th August 2020	6
3	Workshop on setting up a cancer registry (Participants from India and Bhutan)	14th September to 19th September 2020	117
4	Workshop on preparation of cancer registry report (Participants from Myanmar)	5th October to 7th October 2020	9

Virtual training programme on cancer registration for Timor-Leste Cancer registry

An agreement for performance of work between SEARO WHO and CCE TMC was made to provide the technical backup for strengthening PBCR in five countries (Nepal, Bhutan, Myanmar, Sri Lanka and Timor-Leste). This unit regularly provides technical support to the cancer registries from these countries. The registries from Nepal, Bhutan and Sri Lanka have published their report.

Section of Molecular Epidemiology & Population Genetics

Scientific Officer 'E' & OIC : Dr. Sharayu Mhatre

Overview

The main goal of the section is to conduct research in the field of Molecular Epidemiology and Population Genetics. The main thrust is on accurate measurement of exposures and investigates life style, environmental and genetic risk factors for common cancer sites in India by using case control and longitudinal cohort study designs.

Research

1. Organized the workshop and training program: The case control studies were expanded to other Centres to identify risk factors for common cancer. Several online training programs were conducted with staff at Varanasi, Guwahati and Barshi. A continuous training was also provided to Silchar staff for conducting gall stone survey in high risk region.

2. Studies related to COVID-19 : A Collaboration was developed with BYL Nair Charitable Hospital, Mumbai and BARC , Mumbai to conduct following studies related to COVID-19:

   a) Cross sectional sero prevalence survey to identify prevalence of COVID-19 (Using rapid antibody test)

   b) Surveillance study to identify risk factors and host genetic susceptibility factors for COVID-19.

International Collaboration: Following collaborations were built with International organizations to conduct collaborative projects:

1. **University of Oxford:** The collaboration is built for teaching and exchange of students and faculty. A collaborative project entitled "Obesity and non-communicable disease in India: an imaging study of 10,000 adults in Barshi" is being developed.

2. **US-National Cancer Institute:** The collaboration is built up with various units of NCI. An MOU has been developed to understand lifestyle and genetic risk factors of breast cancer under Confluence project of NCI.

3. University of Bristol: Collaboration is built up for exchange of staff and faculty.

4. **International Agency for Research on Cancer:** A collaborative agreement is made to identify risk factors using mutational signatures.

5. **University of Minnesota, USA:** Collaboration is developed for exchange of faculty and regularly conducts CME. A project entitled "Biomarker phenotype of air pollution and cancer risk is being developed.

On-going projects:

1. Lifestyle and genetic risk factors for gallbladder cancer: multicenter case control study.

2. Genome-Wide Association Study to Identify Role of Genetic Susceptibility in Buccal Mucosa Cancer.

3. Development of breast cancer risk prediction model using lifestyle factors and polygenic risk score in Indian population.

4. Evaluating The Role of Genetic Susceptibility for Oropharynx Cancer in Indian Origin Population: a case-control study using the candidate gene approach.

5. Prevalence of Gallstone diseases in the regions with the high and low incidence of gallbladder cancer: current status and future perspective for gallbladder cancer prevention.

6. Development of Cohort Study to Identify and Evaluate Transition in Life Style and Risk Factor in Rural Population.

7. Obesity and non-communicable disease in India: an imaging study of 10,000 adults in the Indian Study of Healthy Ageing (ISHA cohort study).

8. Role of water pollution in development of esophageal cancer: a case control stratified by high and low risk regions.

9. Air pollution exposure measurement and cancer risk in India (ApEx-India).

10. To elucidate geographical differences in the incidence of gallbladder cancer by identifying etiologically distinct types of gallbladder cancer through the study of mutational signature.

Section of Biostatistics

Officer-in- Charge : Mr. Sanjay Talole

Assistant Professor : Dr. Atanu Bhattacharjee

Overview

The newly started Section of Biostatistics is now two and half years old and dedicated towards service, research and education in Tata Memorial Centre (TMC).

Service

This section contributes towards statistical consultancy services to various clinical and epidemiological studies as routine work under the Centre for Cancer Epidemiology banner. The section offers service to the principal investigators and clinical scientist researcher of various units of Tata Memorial Centre like ACTREC, HBCH, MPMMCC and TMH Mumbai. Additionally, this section provides support to streamline the statistical services of the CRS of TMH by providing on-the-job training to statisticians deployed at the CRS-TMH.

Research

This section was involved with data science by applying artificial intelligence with Bayesian technology, variable selection, classification algorithm, genomic data analysis and applications in cancer-genomic studies. The objectives were to build statistical methods to address relevant questions in the context of cancer by integrating big data from multiple sources such as cancer registry, national health and family survey, Surveillance, Epidemiology, and End Results and cancer genomics. Research funding support was obtained from government agencies like ICSSR, DST and CSIR to develop artificial intelligence and Bayesian modelling application for nationwide COVID case prediction and cancer data analytics.

Education

Biostatistics requires hands-on training, and difficulties were encountered in conducting education activities due to the COVID-19 pandemic. However, the one-year post-graduate diploma in Biostatistics (2019-20) was successfully initiated in the middle of 2020 and the new batch of students was enrolled. The first batch of four students passed and placed after completion of their course. Different internship and training programs are conducted throughout the year to expand biostatistics in oncology research. During this pandemic year, this section organized three webinars on important topics on Biostatistics in the month of July and August 2020 which has benefitted TMC clinicians and research scientists. The Section is also conducting observer and internship programs in Biostatistics every year.

Sr. Admin. Officer		Mr. M.Y. Shaikh (Officiating -19/11/2019)
HRD	Jr. Admin. Officer (HRD) Jr. Admin. Officer (HRD-OS)	Mrs. Shilpa Sardesai Mr. Devendra Pitale
Estate Management	Jr. Admin. Officer (EM)	Mr. Shyam Anavkar
Accounts	Dy. Controller Accounts Dy. Accounts Officer	Mrs. Kamala Paidipati (Joined in December 2020) Mrs. Anuradha Narayanan
Purchase **Stores** **Engineering** **Security**	Purchase Officer Asst. Stores Officer OIC (ES) Dy. C.S.O. (Gr. II)	Mr. Anandrao Kokare Mrs. Kanchana Gopalkrishnan Mr. Hrishikesh Kelkar Mr. R. M. Chavan

Human Resource Development

This section works towards manpower planning, performance management, recruitment of staff (regular as well as temporary), training and development of employees and maintenance of discipline. Thirty regular staff members were appointed in the year 2020 in the Medical, Scientific, Technical and Administrative cadres, with adherence to the reservation policies of the Government of India.

Eleven Junior Research Fellows were selected for the PhD degree under the HBNI. Various staff under Technical, Non-Technical & Nursing category was appointed on contract to distribute the work load increase due to inflow of cancer patients at the Centre. At present 87 Technical, 111 Non-Technical & 51 Nursing staff, 36 Security Guard, 19 Horticulture Staff, 229 House Keeping Staff, and 90 Miscellaneous Staff are working under outsourced contractor at ACTREC. A total of 130 numbers of staff members on various projects have also been recruited for assisting in research work. Appointing Trainees for various courses at ACTREC is also overseen by this Department. In the report year 7 ATMLT trainees, 4 Cytogenetics trainees, 01 BMT Nursing Fellow, 1 Onco-therapeutics Fellow, 2 Biostatistics Trainees, 5 Molecular Hematology Trainees and 5 Flow Cytometry Trainees were selected.

The Department also is responsible for Career planning through merit based review and promotions of employees, by holding yearly DPCof all the employees. In 2020, day to day administrative functions encompassed e-attendance control, maintenance of leave records, updating of staff records with regard to pay fixation/ re-fixation matters, settlement of personal claims, release of retirement/ terminal benefits maturing on superannuation/ death cases, and payment in time of staff, time to time performance appraisal/ monthly attendance reports, proper follow-up of matters/ decisions taken during various meetings, diplomatic and amicable handling and settling of inquiry matters.

The first one day National Symposium on "Administrative Excellence" was held in Advanced Centre for Treatment, Research and Education in Cancer (ACTREC), Tata Memorial Centre (TMC) on 11th January 2020. The symposium was organized for the administrative staff of ACTREC, New Centres of TMC, HOD's,& Investigators, Managers, Clinicians, Administrators and Management students. About 250 staff of TMC and other neighboring management institutes participated in the one day symposium. Six eminent speakers of renowned administrative disciplines delivered value added motivational talks on human resource and other related subjects for ideating a smooth and flawless functioning of the Administration.

The Computer Programmer has developed and implemented the HRD software/programs viz., new applications to generate offer letter, new web application such as online APAR, Quarterly Assessment Report of probationers etc. Improvised the existing, developed and implemented software/programs viz. FTS application to track file within same department, new LTC Special Package form and auto-generation of call letters.

Timely payment of PRIS, update allowance to eligible employees, providing duplicate Service Book to staff, service verification of staff who have completed 18years of service are other activities executed by the HRD. Implementation of the Reservation Policy of the Govt. of India duly adopted by TMC in respect of SC/ ST/ OBC/ PWD/ Ex-Serviceman is carried out regularly and systematically, and all efforts have been made to ensure and achieve the prescribed percentage of reserved posts. During 2020, 8 staff members attained superannuation and 1 staff retired voluntarily.

Estate Management

The General Administration's Estate Management (EM) is responsible for controlling and managing all the activities of Student's Hostel, Guest House, and Faculty Club. Apart from above, this section also handles various services related activities of staff and patient canteens, Retreat cafeteria, Housekeeping, Transportation, Horticulture, Pest Control Services, Photocopier Machines, Courier/ Post Services. Most of the Annual Maintenance Contract for the above services is also being looked after by Estate Management. Other ancillary services such as; billing of cancer registries, refilling of gas cylinders in laboratories / BMT / Patient Hostels are being taken care by Estate Management. Other major responsibilities of the Estate Management is overseeing and managing the regular housekeeping services of all the buildings within the ACTREC campus, [Khanolkar Shodhika, Paymaster Shodhika, Jussawalla Shodhika, Vasundhara Patient Hostel, Students Hostels (3) Retreat, Faculty Club Guest House] and the areas surrounding the campus [roads, footpaths, car-parking, garden] for cleanliness and neatness to maintain a pleasant environment within the campus. The disposal of capital items/ equipment, E-waste and scrap material is undertaken by the EM section. The Centre takes pride in a large variety of flora on its campus, which is possible by the practice of Horticulture. The campus is well maintained by professionally trained horticulturists and team of gardeners and boasts of more than 100 species of trees, shrubs and climbers, with lawns at different locations. Medicinal shrubs also have been planted at the entrance of the Bio Bank.

ACTREC and Kaivalyadham jointly interacted via an online Google Meet link to celebrate the Sixth International day of Yoga (IDY) on 21st June, 2020. About 60 people comprising of doctors, administrators, staff and family participated online and included yoga practitioners and non-practitioners.

A car (Maruti Dzire) was acquired against condemnation of another (Tata Indigo) in the month of December, 2020.

As per Instructions of Government of India, the following days were observed during the year 2020 at ACTREC.

1. 26th January – Republic Day
2. 30th January - Observance of Silence (Martyrs' Day)
3. 03rd March - HasyaKaviSammelan Program.
4. 05th March – International Women's Day

During the COVID-19 pandemic and the lockdown that ensued, the Administration ensured that all Guideline & Standard Operating Procedures (SOPs) issued from time to time regarding COVID-19 were strictly adhered.

5. International Day of Yoga 2020

6. 15th August - Independence Day

7. 14th – 28th September - Hindi Diwas & Pakwara

8. 31st October - Rashtriya Ekta Diwas (Sardar VallabhBhai Patel Birth Anniversary)

9. Vigilance Awareness Week (As per dates declared by CVC)

10. 26th November, 2020 -Constitution Day.

Some of the Memorandum of Understanding (MOU) undertaken by ACTREC is listed below

1. MOU between Power Grid Corporation of India Ltd & TMC-ACTREC for Equipping Modular OT at Women & Children Centre – Cancer – ACTREC for Nine Months.

2. Agreement between Maharashtra State Security Corporation and Tata Memorial Centre, Kharghar for One year.

3. Instago has installed a vending machine in the ACTREC campus for 1 year as a CSR initiative.

4. MOU between 'Leaf N Light" and ACTREC has been entered on 2nd November, 2020 for a further period of 1 year to run small Organic Garden at ACTREC.

Accounts Department

The main focus of the Finance and Accounts Department has been funds flow management by prudential and judicious budgetary controls and review of financial outflow. Maintenance of requisite documentation and other relevant records in conformity with the instructions issued by Department of Atomic Energy, Govt. of India was ensured. The Accounts Department is responsible for patient billing, receipting and settling of accounts of different categories of patient's payments like smart card, cash payment, trust and company referred. The procurement of various supplies, materials and equipment's required for the Centre was undertaken by following a prescribed purchase procedure. The Department is also responsible for proper utilization of Plan and Non-Plan grants, submission of various reports to DAE regarding utilization of funds and status of planned projects. During the year 2020, hospital and other income to the extent of Rs. 27.24 crores was generated.

In all, there were a total of 218 on-going projects at ACTREC during the year 2020. A sum of Rs 2.77 crore was received from governmental agencies such as DBT, DST, ICMR and others, to meet the expenditure of the funded on-going projects. In addition 8 new extramurally funded projects to the tune of Rs. 12.76 crore for an average three years period were sanctioned by the above mentioned funding agencies, of which Rs. 10.03 crore were received during the report year.

Purchase Section

The Purchase Department aims to provide efficient services to the entire Centre by way of arranging and delivering goods as per the approved quality and quantity within minimal supply time. All the procurement viz; indenting, comparative statements, appropriate approvals, generation of purchase orders and reminders is done with the help of Material Management System (MMS), which is an in-house software developed by the Information Technology (IT) Department. Implementation of MMS assisted in efficient functioning of procurement activities

and obtaining the materials with ease. During the report year, Purchase Department floated 73 E-Tenders through Tenderwizards.com/DAE to maintain more transparency in the procurement system and response from the vendors was satisfactory. This is also important and requisite protocols as per DAE and CVC norms. As per Rule 149 of GFR 2017, 79 purchase orders are being processed through GeM (Government e-marketplace).

During January 2020–December 2020 procurement of the equipment(s) worth value of Rs. 8.11 crores, consumables worth Rs. 28.29 crores and contracts for the supply of Spares / AMC worth Rs. 9.33 crores have been procured/lined up by the department.

Stores Department

The main function of the Stores Department is to stock and support the day to day requirement of various wards / Out Patients units /CRI / CRC / CCE/ Hostel facilities and departments as and when required. The Stores receives all stock and non-stock consumables, spares and capital equipment except drugs and surgical goods

The Stores department handles routine receipt of stock, non-stock and capital Indents. The material is issued after receipt of goods, generation of GRIN and Inspection. Asset Records are maintained systematically. Annual and Half yearly Stock verification are conducted and we provide support for asset verification and audits.

In the Year 2020:

1. Total number of PSN generated : 1130
2. Total number of GRIN generated : 3496
3. Total number of Assets : 340

All the work of Stores Department is carried out digitally (Paperless) like receiving of Indents, generating PSNs through system and forwarding the same to Purchase Department. Purchase Order copies are received in system. Materials are also received through GeM procurement and the GeM protocol for receipt of goods is followed. The member of the inspection committee, post satisfactory physical verification of materials confirms GRIN inspection through the system. Store Officer approves the GRIN online. Delivery note and confirmation of receipt of material are done through online procedures. Asset Numbers and Installation Reports are generated online.

The Stores Department with the support of the IT department has implemented Digital Asset Management System. This system virtually transfers the asset on system from one satellite unit to another unit. All departments can view the status of their assets, including AMC / CMC details on the desk-top.

Engineering Services

Engineering Services at ACTREC, one of the most important department of the institution is committed to provide round the clock support and optimization in the use of facilities pertaining to patient care, research and educational activities of the centre and to make the everyday experiences of the patients, doctors, research scholars and staff hassle-free and better. To ensure all this, the department truly believes in hard work, perseverance, teamwork, ability to communicate effectively and attitude for delivering timely results as its strong pillars. Since the past few years the domain of work is no longer limited to operation and maintenance of various critical engineering systems, campus maintenance viz buildings, roads, water and

sewer lines and other electrical & mechanical allied services but also involvement in liasoning work with local government authorities for obtaining various NOCs and permissions, not so far commencement of project works like construction of Shantilal Shanghvi Paediatric Haematolymhpoid Cancer Centre and out of campus ongoing works like BMT facility at HBCH, Varanasi and recent BMT facility at HBCHRC, Vishakhapatnam. The Department staff comprises of 75 credible and outperforming permanent and contractual taskforce in capacities of Engineers, Jr. Engineers, Supervisors, technicians, plumbers, carpenters, electricians, AC operators, AC technicians, pump operators and auxiliary staffs who put their tireless efforts in bringing out solutions for day today problems into reality. By virtue of this, preparedness exists and the staff is ever ready and confident to carry out duties as assigned by the Management from time to time. The routine engineering work briefly includes the following: operation & maintenance of air-conditioning system with chilling plants, cooling towers, package units, water coolers, refrigerators, deep freezers, medical oxygen system, LPG distribution network, all mechanical and fabrication works; in house repair and maintenance of close to 500 window/split air conditioners; 33KV high tension switch gears, transformers, LT panels, lighting and power distribution, DG sets, cabling, lifts, communication and PA systems and patient calling system; maintenance of water supply, fire hydrant, sanitary and drainage systems; Civil work including all alterations, additions, masonry, plumbing, painting, carpentry, maintenance and revamping of buildings, road and compound wall of 60 acres campus; coordination with architects, planners for construction of new buildings in campus; distribution of liquid nitrogen on a regular basis to research laboratories; maintenance of laboratory equipment, furniture and various hospital utilities; planning and implementing the up gradation and replacement of facilities, carrying out preventive, corrective and deferred maintenance of buildings, making of short term and long term recommendations for financial allocation and budgeting and providing project management services as per requirement.

Security Section

Strict Access Control & regulation of Men, Material and Vehicles on the Campus is maintained to ensure the Safety and Security of ACTREC Property, Personnel, Students & Patients, round the clock is the prime responsibility of this Section. To further strengthen the Security Force M/s Maharashtra Security Force Security Officials are deployed, to enhance the building & peripheral security measures at ACTREC. Imparting on the job training to the security staff has been a periodical exercise, so as to refresh the security measures/aspects to combat with unforeseen situations/ threat perceptions. Improvised Surveillance System has been inducted in the prevailing Security system, which covers the Building/Facilities, vital areas and Main Gate, to prevent unauthorized access and to detect objectionable activities in the campus. Work of improvised Fire alarm and detection system has been completed and work of firefighting system is on the verge of completion to tackle any kind of fire exigencies. The Prime Motto is to have a fear free atmosphere at ACTREC Campus. Security Audits of ACTREC is periodically carried out by the Subsidiary Intelligence Bureau, National Security Guard, State Intelligence Bureau and Maharashtra State Police Force-1. Certain additional Security measures recommended by the above agencies are inducted in the prevailing

Security system to further strengthen the Security measures.

During the pandemic COVID-19 special transport facility was provided to the staff from different rallying points to reach the Centre without any hurdles, as the local transport was not functional. Security Section efficiently co-ordinated various activities related to Staff/patient medical exigencies during the Pandemic period. Vigilance Awareness Week with the theme "**Vigilant India - Prosperous India**" **("सतर्कभारत- समृद्धभारत")** was observed at ACTREC as per the directives and Guidelines issued by Central Vigilance Commission, Govt. of India from 27th October to 2nd November 2020. Dr. Sudeep Gupta, Director ACTREC, took the pledge both in English and Hindi, followed by the Staff/Students. Ceremonial parades were performed on the eve of Republic Day and Independence Day by the Security Staff of ACTREC. Proper liaison is maintained with the local Police, RTO, CIDCO, Municipal authorities, and other outside agencies. Security Section also efficiently manages the Centre's Departmental Transport activities, viz. efficient running of the shuttle bus services, Doctor's Vehicle, Patient related transport facilities, condemnation of old vehicles, obtaining RTO permits / licenses for newly procured vehicles.

Information Technology (IT)

IT Coordinator : Mr. Prasad Kanvinde

Officers : Mr. Padmakar Nagle, Mr. M. Sriram, Mr. Anand Jadhav, Ms. Shraddha Kesarkar, Mr. Amol Khade

In fulfillment of its mandate, IT department provides computational facility, infrastructure and support for information access, processing, printing, archiving and dissemination. ACTREC has a campus wide 1 Gbps LAN with copper/ fiber cable, embellished with ~600 LAN nodes, eight servers and is equipped with secured Wi-Fi network. The campus is connected to the Internet through a 1Gbps shared NKN information gateway with redundant 155Mbps Tata teleservices connectivity. 1Gbps connectivity form Reliance Jio has also been acquired on NCG project and is being utilized for the large data upload and downloads. A summation of the activities of IT department during 2020 is provided below.

Networking: Day-to-day support, upkeep, administration and maintenance of passive and active network components constitute vital networking activities. Support to the exponentially increased online meetings, conferences and webinars was the major task associated with the department in this pandemic year. The Department has also established encrypted and most secured connectivity to its campus resources from the remote places, especially for the "Work from Home" facility in the COVID pandemic period. The Department has planned and initiated tender process for the procurement of wired network components for the upcoming HWCC building.

Hardware: Procurement of PCs, Barcode printer, Barcode readers, and Multifunction / network printers with other accessories for the upcoming HWCC building has been planned and executed. The Department has also successfully established an indigenously developed Patient calling system and procured the various hardware items like Displays, token printers and HDMI extenders.

Software:Patient information processing at the Centre is essentially online, multi-location and round-the-clock. In 2020, updates for PABR, DIS, RIS, ROIS, OT, Accounts, Pharmacy, store & Purchase were made available. Software development/Customization for "Admission of the COVID patients" COVID test reports, free services to COVID patients /staff etc. was also taken up and successfully implemented. Software development for the patient calling system has also been completed. Some of the transactions in HIS were converted in online mode with paperless approach to meet the contactless requirement in this COVID pandemic year.

Librarian : Dr. Satish Munnolli

The ACTREC Library is a resource centre of scientific information, proactively engaged in acquiring, organizing and delivering scientific and clinical information to its users. The Library provides services to its users to support and enhance the research, patient care, and on-going educational programs of the institute. During 2020, the Library has subscribed to 74 journals in cancer and allied areas to serve the user needs. The Library has a collection of 5887 books, 12595 bound volumes of journals, 637 theses, 3560 staff publications, 424 reports and 20 videos. Access to 6 clinical journal titles has been enabled under TMC – Elsevier consortia. Clinical key and Up To Date two clinical online tools have been activated through TMC, cover clinical trials, drug monographs, guidelines, patient education materials, multimedia and others. Under the National Cancer Grid program, 27 online clinical journals were enabled on campus wide access. EzProxy has been subscribed to facilitate remote access to subscribed contents. The library continues to maintain staff publications records, and publishes weekly publications of the Centre through 'Science Sparks @ ACTREC' which has completed 10 years. Services such as publication statistics, citations of publications, h-index, Impact Factor, authenticity of journals, open access models and APC, bibliographic services, reference and referral services are provided in anticipation and on demand throughout the year. Articles on request are one of its most availed services, through which the library has provided 490 articles against 532 requests during 2020. It has also provided 61 documents to government affiliated libraries and individual visitors.

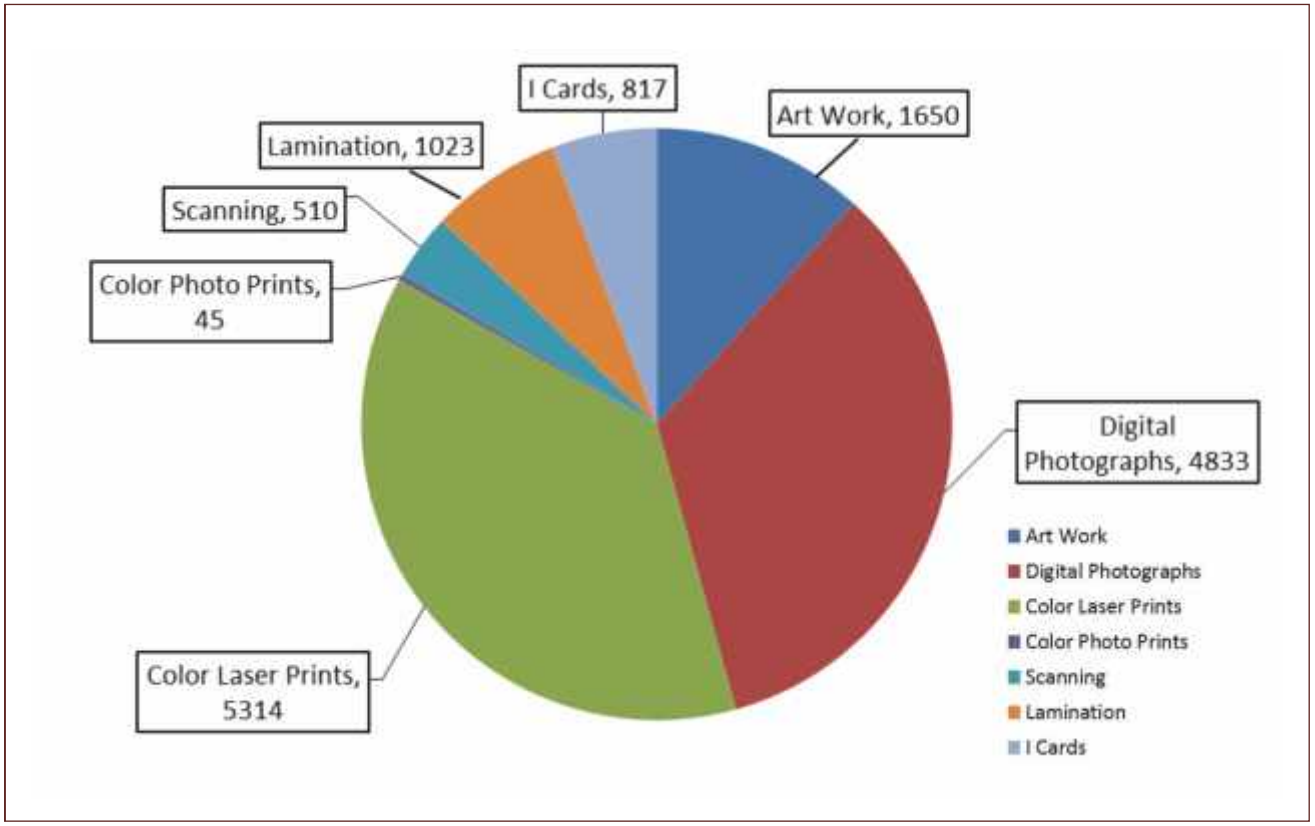
The library follows a scientific approach to procure information requirements and select the most suitable and economical subscription model while subscribing to online journals and resources. The library conducted information literacy programs for new students; a regular and popular program. Apart from users' orientation, one-on-one discussions on literature search techniques, identification of authentic information resources, group discussions on search strategies, research metrics, Impact Factor, h-Index, bibliography management tools and plagiarism tools are organized by the library; 49 individuals benefited by the services that focus mainly on the use of online tools and resources. In Academics, the library staff actively participated in several national and international conferences and presentations. The Officer-In-Charge attended four national virtual conferences as an invited speaker and summarized the conference event as a Rapporteur which has been published in national library science journal. A paper presented in the conference has been published in the conference proceeding volume.

Photography

Officer-In-Charge : Dr. Satish Munnolli

In-charge : Mr. Shyam Chavan

Photography section of ACTREC provides support to the scientific / medical staff and students towards photo-recording of their experimental studies and results. The state-of-the-art facility has high end digital cameras to record images and to get visual clues to research activities. Using the advanced desk top publishing software, this section handles design, printing and display of announcement brochures/flyers, COVID 19 safety signage and guidelines, banners, programs, letterheads, invitation cards, envelopes, badges, certificates, posters, workshop protocols / abstract books and others for 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 users' 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 for administrative and presentation purpose. The section assists users in handling the presentation equipment in the seminar / conference / meeting / board rooms and mini auditorium. During 2020, the facility provided photographic support for 27 events held at ACTREC (national and international events, workshops, conferences & other programs) including Art work for CRI, CRC and CCE departments with digital photographs, colour laser prints, photo printing, lamination and scanning.



Categories of work done in the Section in 2020

Science Communication and Professional Education (SCOPE) Cell

Officer-in-Charge : Dr. Satish Munnolli

The SCOPE cell has a mandate of managing two vital programs of ACTREC, namely, science communication and professional education.

Science Communication

A major responsibility of this Cell is to maintain a close liaison with core infrastructure groups of the Centre for support and smooth functioning of all scientific meetings and seminars at ACTREC. Close supervision of the Steno Pool's handling of venue bookings and dissemination of information about in-house seminars and meetings through emails and circulars is done by the Cell. The Cell manages the routine maintenance and updates of Principal Investigators' webpages, conference webpages, as well asJRF intake related uploads and routine uploads of advertisements on to the Centre's website. On account of COVID-19 pandemic many activities were held virtually and the Cell coordinated in setting up the virtual scientific meetings.

Professional Education

The Centre's doctoral program is its prime academic endeavor. In support of the Centre's research projects, the Cell efficiently handled the absorption of JRF 2020 students under the doctoral programs. In collaboration with Tata Consultancy Services (TCS), on-line entrance exam was conducted at 5 major cities of the country – New Delhi, Kolkata, Bangalore, Mumbai and Pune for selecting students for the research program. In coordination with Academic Committee, the staff of the Cell was involved in finalization of the JRF advertisement, call for projects, and pre-screening of applications with support from the Steno Pool against 14 projects. Overall, 1146 applications were received in the first round which was reduced to 76 applications in the 2nd round. The applications were filtered as per the set criteria, coordinated with TCS for conducting the online exam, declaration of final results and conducting interviews. On account of the COVID-19 pandemic, final interviews of shortlisted candidates were conducted on virtual mode using 'Zoom'.

The staff of the SCOPE Cell ensured the smooth management of the academic coursework for the fresh batch of students, which involved schedule preparation, conduct of orientation and Laboratory visits, handling PI Laboratory choices, timely conduct of the core course/ elective lectures and exams, seeking elective choices, Doctoral Committee formation, 1st year seminar presentations, correcting papers, collating marks and preparing final mark sheets/ transcripts. Based on guidelines from the Academic Committee, the SCOPE Cell planned and conducted Friday Seminars for research scholars at ACTREC.

In support of the Centre's training program, the SCOPE Cell staff handled the Trainee intake procedures, and provided all the backing for smooth training in students' selected laboratory

and handled the activities till the end of training program. In 2020, 94 Trainees (32 for Master's dissertation, 34 for research experience, 3 on collaborative projects, 3 JRF trainees, 21 observers and a visiting scientist) were allocated to senior and mid-level faculty/ staff of the Centre.

During 2020, the Cell also provided logistics for four educational visits for students from different colleges, institutes and universities as a part of their academic tour programs. The groups were students from Yuvraj College, Mysore (January 2020), Zoology students from Kirti College, Mumbai (February 2020), K.J. Somaiya College, Mumbai (February 2020) and Wilson College, Mumbai (February 2020). ACTREC continued its education mandate of conducting ACTREC Open Day which was done by virtual mode in the year of the COVID-19 pandemic, on 31st December 2020. The recorded video clip of various facilities was streamed live on the website and on ACTREC YouTube channel for wider dissemination.

Core Committees in ACTREC

ACTREC Apex Committee for Research and Academics (AACRA)

AACRA, which was established in April 2006, acts as the apex research and academics committee: to carry out the mandate given to ACTREC by the Scientific Advisory Committee, promote basic, interdisciplinary, translational and disease oriented research, recommend and coordinate measures for achieving excellence in research and academics.

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

Basic Sciences Research Group (BSRG)

BSRG is a forum of basic scientists at ACTREC where scientific issues related to academic and research programs, infrastructure development, organization of symposia and meetings, updates on research support facilities, opportunities for extramural and intramural funding support and related matters are discussed.

Chairperson	Dr. Sudeep Gupta, Director, ACTREC
Co-Chairperson	Dr. Navin Khattry, Dy Director, CRC-ACTREC
Co-Chairperson	Dr. Prasanna Venkatraman, Dy Director, CRI – ACTREC
Member Secretary	Dr. Tanuja Teni, SO 'G' (up to September 2020)
	Dr. Rohan Khadilkar, SO 'D'(October 2020 – onwards)
Members	All Principal Investigators & Co-Investigators
	In-Charges of Facilities in CRI

Institutional Animal Ethics Committee (IAEC)

IAEC reviews the maintenance of the ACTREC laboratory animal facility as well as animal study proposals, and also advises the investigators to ensure optimal use of the animals as per the guidelines laid down by the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Ministry of Environment, Forests and Climate Change, Govt. of India. As per guidelines, both CPCSEA registration and IAEC is to be renewed and reconstituted every three years, and accordingly the IAEC of ACTREC has been reconstituted in 2015. The Laboratory Animal Facility of ACTREC itself is registered with the CPCSEA for breeding and conducting experiments on small laboratory animals, vide registration no. 65/GO/ReBi/S/1999/CPCSEA.

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)

IBSC serves as the nodal point for implementation of the biosafety guidelines for recombinant DNA research, their production and release into the environment, and setting up containment conditions for certain experiments as set by the Recombinant DNA Advisory Committee of DBT. Research projects involving the use or production of microorganisms or biologically active molecules that might cause a biohazard must be notified to the IBSC in the DBT-prescribed format. The IBSC permits genetic engineering activity on classified organisms only at places where such work should be performed. The committee members are empowered to subject the storage facility, work place, etc. to inspection.

Chairperson	Dr. Tanuja Teni, Scientific Officer 'G', ACTREC
Member Secretary	Dr. Sanjay Gupta, Scientific Officer 'G', ACTREC
DBT Nominee	Dr. T R Ganapathi, Head, Plant Cell Culture Technology, NABTD, BARC
Members	Dr. Manoj Mahimkar, Scientific Officer 'G', ACTREC- Internal Expert
	Dr. Shilpee Dutt, Scientific Officer 'F', ACTREC- Internal Expert

	Dr.Bhavani Shankar, BARC,Trombay- Outside Expert
	Dr.Vainav Patel, NIRRH - Outside Expert
	Dr. Shashank Ojha, CRC, ACTREC -Biosafety Officer

Institutional Radiation Safety Committee (IRSC)

IRSC is mandated to ensure that the guidelines of the Atomic Energy Regulatory Board for the use, storage, handling and disposal of radioactivity are followed in the respective areas by the designated officers, along with guidelines defined by IRSC. At ACTREC, radioactive sources are used for in-vitro assays, radiation treatment and radiodiagnosis procedures in clinical and preclinical setup. IRSC monitors the safe handling, use and disposal of radioactive sources, and occupation safety aspects while working in the radiation areas. The duration of this committee is up to March-2022.

Chairperson	Dr. Sudeep Gupta, Director, ACTREC
Member Secretary	Dr. Navin Khattry, Dy. Director CRC-ACTREC
Members	Sr. A.O. ACTREC
	Dr. Vedang Murthy, OIC, Dept. of Radiation Oncology, ACTREC
	Dr. Pradip Chaudhari, Scientific Officer 'G', CRI, ACTREC
	Dr. Swamidas Jamima, Medical Physicist 'E' CRC, ACTREC
	Ms. . Reena Devi, CRC, Medical Physicist 'E', CRC,ACTREC

Academic Committee

The Academic Committee oversees all matters pertaining to the JRF program and coordinates the academic coursework (core course and electives), JRF entrance exam paper setting, and ensures the smooth conduct of the course exams.

Chairperson	Dr. Abhijit De
Members	Dr. Rukmini Govekar
	Dr. Nandini Verma
	Dr. Sanjeev Waghmare
	Dr. Syed Hasan
	Dr.Shilpee Dutt
	Dr. Kakoli Bose

Internal Complaints Committee (ICC)

In pursuance of section 4 read with its applicable sub-clauses of the aforesaid act, the Internal Complaints Committee (ICC) at TMC-ACTREC is empowered to enquire into the complaints related to the sexual harassment of women at the workplace. The duration of this committee is up to March-2022.

Chairperson	Dr. Meera Achrekar, Prof. & Dy. Nursing Supdt, ACTREC
Members	Dr. Arvind Ingle, OIC Lab Animal Facility & Scientific Officer 'G', ACTREC
	Dr. Prafulla Parikh, Prof., General Medicine F, ACTREC
	Dr. Rukmini Govekar, Scientific Officer 'G', ACTREC
	Mrs. Bhagyashree Tillu, Medical Social Worker, ACTREC
	Mr. Devendra Pitale Jr. Administrative Officer, ACTREC
	Dr. Nasreen Rustomfram, Prof. & Chairperson, Centre for Life Long Learning, Tata Institute of Social Sciences, Mumbai - Outside expert

Anti-Ragging Committee

In May 2014, an Anti-Ragging Committee was constituted at ACTREC in terms of the decision taken by the Government of India, duly notified through the Homi Bhabha National Institute (HBNI) under whose affiliation the Centre conducts its Ph.D. program in Life Sciences. This committee looks into the matter of complaints of ragging at ACTREC. The duration of this committee is fromApril-2019 to March-2022.

Chairperson	Dr. Prasanna Venkatraman
Members	Dr. Amit Dutt
	Dr. Kakoli Bose
	Dr. Vikram Gota
	Dr. Ujjwala M. Warawdekar
Student Members	Mr. Joyel Christie
	Mr. Sanket Desai

Grievance Committee

Grievance Committee has been constituted to redress the grievances of all regular staff as well as of temporary staff, registrars and students working at ACTREC, TMC. The duration of this committee is from April-2019 to March-2022.

Chairperson	Dr. Arvind Ingle, Scientific Officer 'G'
Member Secretary	Dr. Vani Parmar, Professor and Surgeon 'G'
Member	Dr. Ashok Varma, Scientific Officer 'G'
Member	Dr. Preeti Chavan, Lab Manager-DS, SO'E'
Member	Mr. M. Y. Shaikh, AO [EM]
TMHWU Rep	Mr. J. K. Rane, technician 'G'
Student Members	Mr. Rohan Chaubal
	Ms. Sarika Tilwani

Students' Council of ACTREC (SCA)

In July 2013, the Centre constituted SCA for the PhD research scholars of ACTREC enrolled under HBNI. SCA organizes various student welfare and recreation (academic, sports and cultural) activities, and also acts as a 'liaison' between students and ACTREC faculty/ management for academic and non-academic issues - including grievances. The core committee consists of five members with no hierarchy. The committee includes one student from each batch up to the 5th year, which includes at least one hostel resident and one female candidate. Core committee members are selected on the basis of nominations from each batch and membership is for one year. SCA meetings are held twice a month and whenever needed.

Members	Mr. Aaiyas Mujawar (De Laboratory)
	Mr. Siddharth Barua (Varma Laboratory)
	Mr. Sanket Desai (Dutt Laboratory)
	Ms. Neha Agrawal (Rukmini Laboratory)
	Mr. Archisman Banerjee (Shilpee Laboratory)

Institutional Ethics Committee III
TMC IEC – III (ACTREC)

Dr. Sudhir Nair
Member Secretary
TMC-IEC III

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 July 2020 to 30th June 2022. The committee has met 109 times in the past 12 years and 546 projects have been discussed till December 2020. 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	Gender	Expertise
1.	Dr. Surekha Zingde Chairperson	Trustee, Indian Women Scientists Association (IWSA), Former Deputy Director, CRI, ACTREC , Scientific Officer 'H'	Female	Basic Scientist
2.	Dr. Siby K. George Member	Professor of Philosophy Department of Humanities & Social Sciences, Indian Institute of Technology Bombay, Powai, Mumbai - 400 076, India	Male	Philosophy
3.	Dr. Sudhir Nair Member Secretary	Prof. Head and Neck Surgical Oncology, ACTREC, TMC	Male	Clinician (Surgical oncology)
4.	Dr. Pramila Yadav Member	Prof, Dept. of Pharmacology, Dr D Y Patil Medical College, Nerul, Navi Mumbai	Female	Clinical Pharmacologist (Basic Medical Scientist)

Sr. No	Name & Position	Affiliation	Gender	Expertise
5.	Mrs.Deepa Ramani Member	Ex-play group teacher, store and purchase in-charge, Zenith Spinners Ltd. Member of IC-SCR, ACTREC	Female	Layperson
6.	Mr. Akil Hirani Member	Head of the Transactions Practice and Managing Partner Majmudar& Partners, International Lawyers, India	Male	Legal Expert
7.	Dr. Punit Jain Member	Consultant Hematologist/ Hemato-Oncologist & Bone Marrow Transplant Physician, Apollo Hospitals, Belapur, Navi Mumbai Member of IC-SCR, ACTREC	Male	Clinician (Medical Oncology)
8.	Dr. Uma Dangi Member	Consultant Medical Oncology Fortis Hospital, Mulund, Vashi and Kalyan	Female	Clinician (Medical Oncology)
9.	Dr. Tanuja Teni Member	Principal Investigator and Scientific Officer 'G' ACTREC, TMC	Female	Basic Scientist
10.	Dr. Naveen Mummudi Member	Associate. Professor, Dept. of Radiation Oncology, ACTREC, TMC	Male	Clinician (Radiation Oncology)
11.	Dr. Reshma Ambulkar Member and DSMU Secretary	Professor, Dept. of Anaesthesia, Critical Care and Pain, ACTREC, TMC.	Female	Clinician (Anaesthetist and Intensivist)
12.	Dr. Shalaka Joshi. Member	Associate Professor, Dept. of Surgery, Tata Memorial Hospital, TMC.	Female	Clinician (Surgical oncology)
13.	Dr. Bhausaheb Bagal Member	Professor and Consultant, , Dept. of Medical Oncology, Tata Memorial Hospital, TMC	Male	Clinician (Medical Oncology)
14.	Dr. Nitin S Shetty. Member	Prof. Interventional Radiology Tata Memorial Hospital, TMC	Male	Clinician (Interventional Radiology)

Other staff members

Sr. No	Name	Qualification	Job responsibilities
1	Ms. Kasturi Awatagiri	MSc	IRB administrator
2	Mrs. Bharati Bhosale	MSc	DSMU Coordinator
3	Mr. Vikram M	BSW	Admin Assistant

Regulatory Registration:

- IEC is registered with CDSCO (Registration No. ECR/149/Inst/MH/2013/RR-19) on 09.12.2020 and it is valid up to 20th April 2024.
- IEC registered with Dept. of Health Research (DHR) (Registration: EC/NEW/INST/2020/934) on 28.08.2020.
- IEC III is also register with HHS and IORG No. IORG008037.
- Institution had a Federal Wide Assurance with Dept. of Health and Human Services (DHHS) through the Office for Human Research Protection (OHRP). The assurance no is FWA00025032.

IEC-III PERFORMANCE 2020

The committee conducted 11 full board and 1 expedited committee meetings in 2020 for meticulous scrupulous examination of the scientific and ethical contents of submitted projects, owing to which 179 new projects and 24 old projects from 2018-2019 were examined.

Table 1: Review type

Review type	2019	2020
Full Board	37	166
Expedited	26	08
Exempted	0	5
Total	**63**	**179**

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

Full board review	2019	2020
Approved	20	123
Approved with modification	8	27
Resubmit	7	13
Not approved	1	0
Withdrawn by PI	0	1
Deferred	1	2
Under review process	0	0
Review exempted	0	2
Total	**37**	**168**

Table 3: IEC decision on expedited review projects

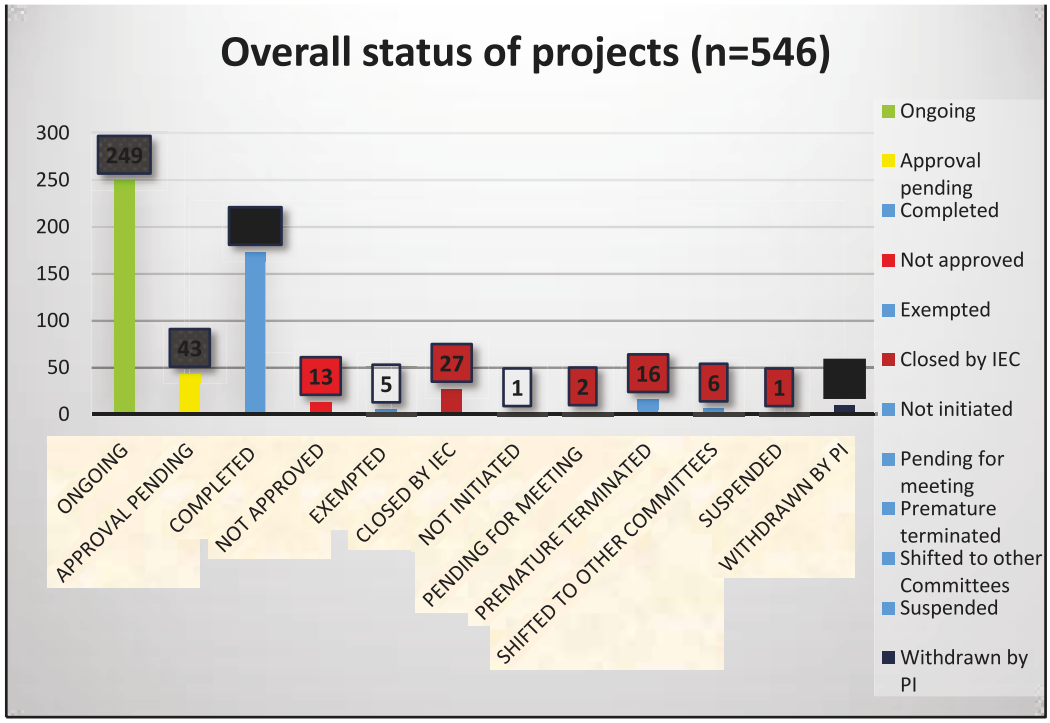
Expedited projects	2019	2020
Approved	20	7
Revision with minor modification	4	0
Revision with major modification	2	0
Not approved	0	1
Total	**26**	**8**

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

Projects carried forward	2019 Full board	2020 Full board	2020 Expedited
Approved	4	14	6
Resubmitted	1	0	0
Closed by IEC	1	1	0
Revision with minor modification	1	0	0
Withdrawn by PI	1	0	0
Exempted from review	0	0	0
Carried forward to next year	0	3	0
Total	**8**	**18**	**6**

Table 5: Summary of the source of funding

Source of funding	2019	2020
IM	13	11
EM	2	13
IM + EM	5	10
Pharma	0	0
Others	0	0
Non funded projects	43	145
Total	**63**	**179**



Achievements

- **Accreditation: Nil.**

Education: Training and Education for EC members:

Sr. No	Training details	Training conducted by	Meeting Dated
1	IEC SOPs training	Ms. Kasturi R	10.07.2020
2	Over view of IEC functioning and COI management	Dr Sudhir/ Kasturi	10.07.2020
3	Roles and Responsibilities of IEC members	Dr Durga Gadgil	10.07.2020
4	IEC Common Policies	Dr Sudhir Nair	10.07.2020
5	Introduction of online review of new project	Mr. Sandeep Kalsekar	10.07.2020

Research projects approved by IEC III-2020

PI	PROJECT TITLE
Dr. Abhishek Chatterjee	Medulloblastoma Radiomics As A Molecular Adjunct In Diagnosis (MERMAID)
Dr. Abhishek Mahajan	Compartmentalization Of High InfratemporalFossa In Head And Neck Squamous Cell Cancers And Its Impact On Clinical Outcome.
Dr. Abhishek Mahajan	Postoperative Neck Ultrasonography Surveillance After Thyroidectomy In Patients With Differentiated Thyroid Carcinoma
Dr. Akshay Baheti	Audit Of Emergency Ct Scans Done In Tertiary Care Cancer Hospital.
Dr. Akshay Baheti	Accuracy Of CT In Assessing Pediatric Renal Mases To Differentiate Wilms' Tumors From Non-Wilms' Tumors
Dr. Akshay Baheti	Radiological Assessment Of Pancreatic Adenocarcinomas Treated With Neoadjuvant Therapy And Correlation With Surgical Pathology Or Response
Dr. Aliasgar Moiyadi	Evaluation Of Pattern Of Use Of Intraoperative Ultrasound And Utility In Intraoperative Decision-Making During Neuro-Oncological Surgeries &Ndash; A Service Audit
Dr. Ameya Puranik	Utility Of F18-FET PET/CT In Differentiating Between Recurrence And Post Treatment Changes In Patients With High Grade Glial Tumors
Dr. Ameya Puranik	Prognostic Value Of Metabolic Parameters On Baseline 18f-Fdg Pet/Ct Scan In Multiple Myeloma
Dr. Amit Janu	An Audit Of CT Guided Core Needle Biopsy Of Lung Lesions At A Tertiary Cancer Care Center.
Dr. Amit Joshi	Comparison Of Viral Transport Media(VTM) Versus Molecular Transport Media(MTM) For Detecting COVID-19 Positivity (VTMT Study).
Dr. Amita Maheshwari	Clinical Outcomes In Uterine Papillary Serous Carcinoma And Clear Cell Carcinoma Of Uterus: A Retrospective Study
Dr. Amita Maheshwari	Serum Tumor Marker Profile In Treatment Naive Patients With Suspected Or Diagnosed Ovarian Neoplasm

PI	PROJECT TITLE
Dr. Amita Maheshwari	Restaging Of Early Cervical Cancer According To Revised 2018 FIGO Staging System And Its Implications.
Dr. Amrita Guha	The Impact Of A Novel BTRADS Scoring System In The Multidisciplinary Management Of Post-Treatment Gliomas.
Dr. Anant Ramaswamy	Retrospective Study To Analyse The Outcomes And Prognostic Factors Of Gallbladder Cancer
Dr. Anil Tibdewal	Hippocampal Avoidance WBRT And Simultaneous Integrated Boost For Limited Brain Metastases: Dosimetric And Survival Outcomes
Dr. Anil Tibdewal	Retrospective And Prospective Observational Cohort Study Of Postoperative Radiation Therapy (PORT) In Lung Cancer
Dr. Archi Agrawal	Retrospective Audit Of Utilization And Impact Of Fdg Pet/Ct In Renal Cell Cancer.
Dr. Archi Agrawal	Comparison Of Skeletal Metastases Evaluation In Prostate Cancer With 68Ga PSMA PET/CT And 18F-Naf PET/CT.
Dr. Archi Agrawal	A Retrospective Study To Evaluate The Impact Of 68Ga- PSMA On Clinical Decision Making In Initial Staging Of Intermediate And High Risk Prostate Cancer
Dr. Archi Agrawal	Impact Of FDG PET/CT Scan In Changing Management Of Well Differentiated Neuroendocrine Tumours With Ki67 Index Less Than Or Equal To 5%
Dr. Arpita Sahu	Magnetic Resonance Imaging Predictors In Detection Of Isocitrate Dehydrogenase And O-6 Methyl Guanine Methyl Transferase Mutation In Glioblastoma Multiforme.
Dr. Arpita Sahu	Imaging Of SupratentorialEpendymomas With Radio-Pathological Correlation
Dr. Arpita Sahu	Magnetic Resonance Imaging Features Of Sporadic Optic Pathway-Hypothalamic-ChiasmaticGliomas With Histopathology Correlation
Dr. Arpita Sahu	Atypical Imaging Presentation Of Herpes Simplex Virus(Hsv) Encephalitis In Paediatric Immunocompromised Oncology Patients

PI	PROJECT TITLE
Dr. Arpita Sahu	Magnetic Resonance Imaging Vs Amino Acid Pet Imaging To Differentiate Tumor Recurrence From Radiation Necrosis In Treated Cases Of Grade Iii And Iv Gliomas
Dr. Arpita Sahu	TumourRadiomics For Prediction Of Isocitrate Dehydrogenase Mutation In Glioblastomas
Dr. Ashish Gulia	Implant Survival And Functional Outcomes Of Endoprosthetic Replacement For Tumours Of The Distal Humerus
Dr. Ashish Gulia	Functional And Oncological Outcomes Of Primary Bone Tumors Of Clavicle: A Single-Centre Experience.
Dr. Ashish Gulia	Type B III Hip Rotationplasty: Oncological And Functional Outcomes.
Dr. Ashish Gulia	Functional Outcome Of Rotationplasty Done For Failed Limb Salvage
Dr. Ashwini Budrukkar	Clinical Outcomes Of Consecutive Patients With Primary Squamous Cell Carcinoma Of Oropharynx Treated With Radical Radiotherapy With Or Without Concurrent Chemotherapy.
Dr. Atanu Bhattacharjee	Baysian Individual Level Modelling Of The Spread Of Covid 19 Pandemic.
Dr. Atul Kulkarni	Audit Of Compliance Of An Intubation Bundle In Critically Ill Patients At Tertiary Care Oncology Hospital
Dr. Badira Parambil	Assessment Of Tumor Epstein-Barr Virus (EBV) Status And Its Impact On Outcomes In Intermediate And High-Risk Childhood Classic Hodgkin Lymphoma (Chl) Treated At A Tertiary Cancer Center In India
Dr. Badira Parambil	Prognostic Significance Of FDG-Positron Emission Tomography (FDG-PET) Response Post Chemotherapy And Definitive Radiotherapy In Pediatric Rhabdomyosarcoma
Dr. Bhausaheb Bagal	Phase II Study Of Methotrexate, Lenalidomide And Rituximab Induction In Newly Diagnosed Primary CNS Lymphoma
Dr. Bhausaheb Bagal	Retrospective Analysis Of Clinical Profile And Outcomes Of Patients With Haematological Malignancies Admitted To Intensive Care Unit.
Dr. Chetan Dhamne	Exploring NK Cell Immunotherapy In AML: Infusion Of Haploidentical Cytokine-Induced Memory-Like Natural Killer Cells For Acute Myeloid Leukemia (AML)

PI	PROJECT TITLE
Dr. Dhanlaxmi Shetty	Deciphering 'B-Others-Acute Lymphoblastic Leukemia': A Prospective Cytogenetic And Molecular Study For Identification And Evaluation Of Predictive Prognostic Markers.
Dr. Gagan Prakash	Retrospective Evaluation Of Oncologic And Surgical Outcomes Of Groin Node Dissection In Patients With Clinically Node Negative Penile Cancer. Short Title: GND For N0 Groins
Dr. Ganesh Bakshi	Retrospective Study Of Trends In The Clinico - Demographic Characteristics, Treatment Decisions And Clinical Outcomes Of Prostate Cancer Patients Registered At Tata Memorial Hospital. (Restcap)
Dr. Gouri Pantvaidya	Accuracy Of Neck Ultrasonography In Recurrent/Residual Thyroid Cancers
Dr. Hasmukh Jain	Statistical Modeling Of Induction Related Mortality In Acute Myeloid Leukemia.
Dr. Hasmukh Jain	A Retrospective Study To Evaluate The Utility Of Deep Learning Techniques In Classifying Diffuse Large B-Cell Lymphoma According To The Cell-Of-Origin.
Dr. Hasmukh Jain	A Retrospective Study To Evaluate The Accuracy Of Staging And Risk Stratification Of Adolescent And Adult Patients With Hodgkin's Lymphoma Registered In The Lymphoma Clinic At Tata Memorial Centre.
Dr. Jai Prakash Agarwal	Radiotherapy Treatment Non-Compliance In Patients Planned For Radiotherapy: A Retrospective Audit
Dr. Jai Prakash Agarwal	Using Texture Features To Predict Pathological Response To NACTRT In Operable Esophageal Cancer
Dr. Jai Prakash Agarwal	Salvage Radiation Therapy With Or Without Chemotherapy For Oligo-Recurrences After Radical Treatment Of Esophageal Cancer
Dr. Jayant Goda	Long Term Clinical Outcome And Sequelae Of Primary Mucosa Associated Lymphoma Of The Ocular Adnexa Treated With Radiation Therapy.
Dr. Jyoti Bajpai	Demographic Profile And Outcome Of Young Breast Cancer Patients From A Tertiary Care Centre In India

PI	PROJECT TITLE
Dr. Jyoti Bajpai	Evaluation Of Compliance In Hormone Receptor Positive Early (Non-Metastatic) Breast Cancer Patients Receiving Hormonal Therapy From A Tertiary Care Cancer Center.
Dr. Jyoti Bajpai	Evaluation Of Molecular Signature Of Pregnancy Associated Breast Cancer
Dr. Jyoti Bajpai	Demographics, Pattern Of Care, Outcome Analysis, And Prognostic Markers Of Skin And Soft-Tissue Tumors Among Extremity And Non-Extremity Sites.
Dr. Jyoti Kode	Understanding Mechanistic Role Of Seaweed Nanocomposite Formulation FK-59-5 And Medicinal Plant Extract FK-94-1 As Immunomodulatory And Anti-Cancer Compounds Against Acute Myeloid Leukemia
Dr. Jyoti Kode	Pilot In Vivo Study In An Animal Model To Explore The Scope Of Umbilical Cord Wharton's Jelly Derived Mesenchymal Stem Cells (UC-MSC) And Conditioned Media (MSC- CM) For Anticancer Potential
Dr. Kakoli Bose	Targeting C-FLIP-Cam Interaction To Resensitize Tumor Cells To Death Ligands For Potential Anticancer Treatments
Dr. Kedar Deodhar	Histopathology Review Of Endocervical Adenocarcinoma Cases, Their Morphologic Assessment For HPV And Non-HPV Associated Features, Corelation With P16 Immunohistochemistry And RNA Based In Situ Hybridisation And Reclassification As Per The International Endocervical Adenocarcinoma Criteria And Classification (IECC) System.
Dr. Kumar Prabhash	An Open-Label Randomized Study To Compare CrizotinibVsCrizotinib And Chemotherapy In ALK-Rearranged Non-Small Cell Lung Cancer In Palliative Setting.
Dr. Kumar Prabhash	Efficacy And Toxicity Of Weekly Paclitaxel/Carboplatin In The Neoadjuvant Setting In Esophageal Cancer: A Retrospective Observational Study
Dr. Kunal Gala	Retrospective Evaluation Of The Accuracy Of The Computed Tomography Guided Biopsy Of The Bone Lesions.
Dr. Lavanya G	Audit Of Clinical Outcomes Of Locally Advanced Cervical Cancer Patients Treated With Neo-Adjuvant Chemotherapy Followed With Or Without Concurrent Radical Chemo-Radiotherapy Or Radical Radiotherapy Alone And Brachytherapy At Tata Memorial Centre (TMH+ACTREC)

PI	PROJECT TITLE
Dr. Lavanya Naidu	Retrospective Analysis Of Outcomes Of Cervical Cancer In HIV Positive Women Treated With Radiotherapy
Dr. Madhavi Desai	Anaesthetic Management And Perioperative Outcomes Of Children Undergoing Neurosurgeries In A Tertiary Cancer Center: Retrospective Audit Of Prospective Data
Dr. Madhavi Shetmahajan	Audit Of Perioperative Anaesthesia Management And Outcomes In Patients Undergoing Pneumonectomy For Lung Cancer
Dr. Manish Bhandare	Local Recurrence Following Curative Surgery For Periampullary Cancers.
Dr. Mary Muckaden	Child's Understanding Of Advanced Cancer At A Tertiary Cancer Centre When Faced With Advancing Disease - A Retrospective Chart Review
Dr. Maya Prasad	Late Effects In Survivors Of Childhood Cancer : A Retrospective Study
Mrs. Meera Achrekar	Use Of Peripherally Inserted Central Line (PICC) In A Tertiary Care Cancer Centre In India
Dr. Mukta Ramadwar	Analysis Of Ckit And PDGFRA Mutations In Patients With Gastrointestinal Stromal Tumours (Gists)
Dr. Munita Bal	Clinicopathological Review Of Salivary Gland Neoplasms Of Head And Neck Region
Dr. Munita Bal	Mixed Neuroendocrine Non-Neuroendocrine Neoplasms (Minen) Of Gastroentero-Pancreatic Origin : A Clinicopathological Study
Dr. Nandini Menon	A Retrospective Study On The Patterns Of Care In Recurrent High-Grade Gliomas In A Tertiary Care Centre In India
Dr. Naveen Mummudi	Incremental Value Of Endoscopic Brush Cytology In Response Assessment After Chemo-Irradiation For Esophageal Cancer
Dr. Navin Khattry	Prospective Evaluation Of Patients With Primary CNS Lymphoma Undergoing High Dose Consolidation Chemotherapy With LACE.
Dr. Neha Mittal	Utility Of P16 As A Surrogate Marker For Detection Of HPV Related Oropharyngeal Squamous Cell Carcinoma In The Indian Cohort.
Dr. Nikhil Patkar	NARASIMHA: Novel Assay Based On Targeted RNA Sequencing To Identify Chimeric Gene Fusions In Hematological Malignancies

PI	PROJECT TITLE
Dr. Nikhil Patkar	Machine Learning Derived Genomics Driven Prognostication For Acute Myeloid Leukemia With T(8;21).
Dr. Nikhil Patkar	Unravelling The Genomic Context Of Relapse Initiating Cell Populations In Adult Acute Myeloid Leukemia (AML)
Dr. Nikhil Patkar	Retrospective Single Centre Study Of Clinical And Pathological Correlation Of Ph-Like (BCR-ABL1like) B-ALL Patients.
Dr. Nilendu Purandare	Brain Metastases In Lung Cancer: Role Of PET/CT And MRI Brain
Dr. Nilendu Purandare	Role Of Whole Body FDG PET/CT In Detection Of Peritoneal Metastases In Gastroesophageal Junction Adenocarcinoma.
Dr. Nilesh Sable	Comparison Of Pre And Post Ablation Changes Of Metastatic Liver Lesions With Contrast Enhanced Ultrasound (CEUS) And Correlation With 18 FluoroDeoxy-Glucose (FDG) PET-CT.
Dr. Nilesh Sable	Imaging In Assessment Of Post Treatment Head And Neck Cancers To Determine Further Management Using NIRADS. (Neck Imaging Reporting And Data System)
Dr. Nirmalya Moulik	Retrospective Study On Children With Burkitt Lymphoma (BL) And Diffuse Large B-Cell Lymphoma (DLBCL) Treated At Tata Memorial Hospital
Dr. Nita Nair	A Retrospective Audit To Evaluate If We Can We Avoid Axillary Lymph Node Dissection In Patients With 1-2 Positive Sentinel Lymph Nodes In The Indian Setting
Dr. Nita Nair	Validation Of Breast Cancer Nomograms For Predicting Non-Sentinel Lymph Node Metastasis After A Positive Sentinel Lymph Node In The Indian Setting
Dr. Nitin Shetty	Clinical Relevance Of Incidentally Detected COVID-19 Infection Among Asymptomatic Cancer Patients Undergoing Routine CT Scan
Dr. Palak Popat	A Retrospective Audit Of Ultrasonography Guided Fine Needle Aspiration Cytology In Preoperative Planning Of Groin Node Dissection In Penile Cancer Patients
Dr. Palak Popat	A Retrospective Analysis To Estimate Diagnostic Accuracy Of VI-RADS Scoring In Multiparametric Bladder MRI For Prediction Of Muscle Invasion And Extravesical Extension In Bladder Cancer.

PI	PROJECT TITLE
Dr. Poonam Joshi	Retrospective Audit Of Parapharyngeal Space Tumors In TMH.
Dr. Poonam Joshi	Retrospective Analysis Of Reconstruction Of Full Thickness Cheek Defects With Loco-Regional Flaps At Tata Memorial Centre (ACTREC)
Dr. Prabhat Bhargava	Retrospective Analysis Of Advanced Pancreatic Adenocarcinomas Treated In TMH Between June 2013 To Dec 2019
Dr. Prakash Nayak	Non Invasive Radiomics Approach To Grading Chondrosarcoma
Dr. Prakash Shetty	Evaluating The Role Of Extent Of Resection In Medulloblastomas In Context Of Molecular Sub Grouping
Dr. Prakash Shetty	Intraoperative Neuromonitoring Cases Performed At Tertiary Neurosurgical Oncology Centre - A Retrospective Study
Dr. Prashant Tembhare	A Retrospective Analysis Of The Immunophenotypic Profile And Flow Cytometric Minimal Residual Monitoring In Acute Leukemias Of Ambiguous Lineage.
Mrs. Prathepa Jagdish	A Study To Assess The Psychosocial Aspects Of Care For Cancer Patients Afflicted Post COVID-19 At Tata Memorial Hospital
Dr. Priti Desai	Role Of Granulocyte Transfusions In Management Of Febrile Neutropenia In Hemato-Oncology Patients
Dr. Priya Ranganathan	Anaesthetic Management Of Patients With Airway Tumours: An Observational Study
Dr. PriyaS.r.	Retrospective Analysis Of Outcomes In Papillary ThryoidMicrocarcinomas.
Dr. Raghu Thota	Intravenous Patient Controlled Analgesia (Iv-Pca) In Patients Witth Thoracic Epidural Analgesia :A Review Of Practices And Safety Profile
Dr. Rahul Krishnatry	Institutional Patterns Of Care & Outcomes For DIPG
Dr. Rahul Krishnatry	Review Of Institutional IGRT Data For Cranio-Spinal Irradiation.
Dr. Rahul Krishnatry	Combining Urinary Symptoms And Cytology To Decrease The Need Of Cystoscopies At Follow-Up Assessments After Bladder Preserving Tri-Modality Treatment (TMT) In Muscle Invasive Bladder Cancer: A Retrospective Study

PI	PROJECT TITLE
Dr. Reena Engineer	Texture Analysis As Imaging Biomarker Of Tumor Response To Chemo-Radiotherapy In Patients Of Adenocarcinoma Of Rectum Studied With Magnetic Resonance.
Dr. Reshma Ambulkar	Individualised Home-Based Exercise Program In Major Gastrointestinal Surgeries As A Part Of Prehabilitation: A Randomised Clinical Trial. (IMPACT)
Dr. Reshma Ambulkar	Retrospective Audit On Post Operative Pain Management In Colorectal Surgeries In Tertiary Care Cancer Hospital
Dr. Rima Pathak	Ambispective Registry Of Unconventional Adjuvant Radiotherapy Dose Fractionation In Breast Cancer Patients Treated At Tata Memorial Centre
Dr. Rima Pathak	Developing A Registry Of All Synchronous And MetachronousOligometastatic, Oligoprogressive And Oligopersistent Breast Cancer Patients Treated At Tata Memorial Centre
Dr. Sangeeta Desai	Pathological Assessment Of Post Chemotherapy Response In Breast Cancer
Dr. Santosh Menon	Retrospective Audit Of The Pathology Of Penectomy With Validation Of Risk Scoring And Staging Systems
Dr. Sarbani Ghosh	To Evaluate The Outcomes Of Adjuvant IMRT In Head & Neck Cancers Treated At Tata Memorial Hospital.
Dr. Selma Dsilva	Implications For NK Immunotherapy: Killer Immunoglobulin Like Receptor-Human Leukocyte Antigen Ligand Match/Mismatch In Post Cyclophosphamide T Cell Replete Haploidentical/Mismatched HSCT Outcomes In AML
Dr. Shalaka Joshi	A Retrospective Audit Of Synchronous And Metachronous Malignancies Of Breast And Ovary
Dr. Shalaka Joshi	Retrospective Study Evaluating The Utility Of Surveillance Mammographies In Breast Cancer Survivors- Clinico-Radio-Pathological Correlation
Dr. Shashank Ojha	Analysis Of Platelet Transfusion Practices In Hemato-Oncology Patients At A Tertiary Care Oncology Centre

PI	PROJECT TITLE
Dr. Shashank Ojha	Retrospective Assessment Of Leukoreduced Red Cell Concentrates And Leukocyte Filter Performance Characteristics At A Tertiary Care Hemato-Oncology Hospital
Dr. Sheila Myatra	Sedation, Analgesia And Delirium Management: An International Audit Of Adult Medical, Surgical, Trauma, And Neuro-Intensive Care Patients
Dr. Shilpee Dutt	Targeting Minimal Residual Disease And Refractory Relapse AML By Understanding Their Mechanisms Of Resistance
Dr. Shiva Kumar Thiagarajan	A Retrospective Audit Of Clinical Presentation, Treatment Received,Histopathological Details And Outcomes In Patients With Differentiated Thyroid Cancer (DTC).
Dr. Shiva Kumar Thiagarajan	Patterns Of Care And Outcomes Of T4 Larynx And Hypopharynx Carcinoma.
Dr. Shiva Kumar Thiagarajan	Does The Reporting Of Preoperative FNA Of Salivary Gland Neoplasm By Head And Neck Pathologist Have A Better Agreement With The Final Histopathology Report?
Dr. Siddhartha Laskar	Radiation Therapy For NK-Tcell Lymphoma - An Audit
Dr. Sneha Shah	To Evaluate Role Of FDG PETCT In Detection Of Marrow Disease At Staging Of Neuroblastoma And Its Feasibility As A Prognostic Marker.
Dr. Sohan Solanki	A Retrospective Study Of Preoperative Assessment And Optimization Of High Risk Surgical Patients Posted For Gastrointestinal Cancer Surgeries And Their Perioperative Outcomes
Dr. Sohan Solanki	A Prospective Observational Study Of Preoperative Assessment And Optimization Of High Risk Surgical Patients Posted For Gastrointestinal Cancer Surgeries And Their Perioperative Outcomes
Dr. Sorab Dalal	A Pilot Study To Evaluate Significance Of LCN2 Levels In Predicting Resistance To Therapy And Survival In Triple Negative Breast Cancer.
Dr. Sudhir Vasudevan Nair	Clinico-Pathological Evaluation And Treatment For Malignant Neoplasms Arising From Major Salivary Glands- A Retrospective Multicentric Study
Dr. Sudhir Vasudevan Nair	Differences In Clinicopathological Parameters And Survival Outcomes Between Tongue And GingivobuccalSubsites Of The Oral Cavity.

PI	PROJECT TITLE
Dr. Sudhir Vasudevan Nair	Patterns Of Care And Outcomes In Post-Cricoid Squamous Cell Carcinoma: A Retrospective Multicentric Study.
Dr. Sujay Srinivas	Retrospective Study To Analyze The Outcomes And Prognostic Factors Of Gastric Cancers.
Dr. Supriya Chopra	Compliance To Cervical Cancer Chemoradiation Guidelines: A Multicentric Implementation Audit
Dr. Supriya Chopra	Development Of New Scale For Late Toxicity Reporting In Radiotherapy Trials For Cervical Cancer
Dr. Supriya Chopra	Evaluation Of Serial Bone Density Changes In Women Undergoing Pelvic Radiation For Early Cervical Cancer.
Dr. Syed Hasan	To Study The Functional And Molecular Aspects Of Podoplanin In Acute Promyelocytic Leukemia Associated Coagulopathy And Its Modulation Through Cyclin-Dependent Kinase 7 Inhibitor
Dr. Tejpal Gupta	Ki-67 Proliferation Index For Tailoring Long-Term Follow-Up In Surgically Treated Intracranial Meningioma Patients: A Meta-Analysis Of Xxx Individual Patient Data
Dr. Tejpal Gupta	Clinico-Radiological Outcomes In WNT-Pathway Medulloblastoma (CROWN Study)
Dr. Tejpal Gupta	Prognostic Glioma Re-Irradiation Scoring System (PROGRESS Study)
Dr. Vanita Noronha	A Two-Arm Randomized Open Label Prospective Parallel Design Phase III Clinical Trial To Evaluate The Efficacy Of A Multidisciplinary Patient Navigation Program And Symptom Monitoring With Patient- Reported Outcomes In Lung Cancer Patients
Dr. Vanita Noronha	Retrospective And Prospective Analysis Of The Results Of A Comprehensive Geriatric Assessment Of Older Patients With Cancer Who Have Been Evaluated In The Geriatric Oncology Clinic At Tata Memorial Hospital
Dr. Vasundhara Patil	CT And MRI Imaging Appearances Of Paediatric Extra Cranial Head And Neck Masses And Correlation With Clinicopathological Findings.

PI	PROJECT TITLE
Dr. Vedang Murthy	Toxicity And Outcomes In Gleason Grade Group 5 Prostate Cancer Treated With Radical Radiotherapy: An Indian Multi-Institutional Retrospective Study
Dr. Vijay Patil	A Phase 2 Study Of Low Dose Bevacizumab Plus CCNU In Relapsed - Recurrent High Grade Glioma.
Dr. Vijay Patil	Phase 2 Going To Phase 3 Randomized Study For Evaluation Of Nivolumab And Metronomic As Palliative Therapy In Head And Neck Cancer.
Dr. Vikas Ostwal	Retrospective Analysis Of Neuroendocrine Neoplasms Treated In TMH Between 2014 To 2020
Dr. Vikram Gota	Model Based Dosing Of Docetaxel In Indian Elderly Population With Advanced Cancers
Dr. Vivek Bhat	Evaluating In Vitro Susceptibility Of Multi Drug Resistant Escherichia Coli And KlebsiellaPneumoniae To Ceftazidime&Ndash;Avibactam And Fosfomycin
Dr. Vivek Bhat	In Vitro Susceptibility Profile Of Staphylococcus Aureus, Escherichia Coli And KlebsiellaPneumonaie To CeftarolineFosamil

Data Safety Monitoring Unit
DSMU- III, ACTREC

Dr. Reshma Ambulkar
Member Secretary

The Data Safety Monitoring Unit (DSMU), 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 DSMU comprises of an intensivist, basic scientists, medical oncologists, surgical oncologists and radiation oncologists. The members of the DSMU are trained in causality assessment as per WHO criteria and routinely implement the criteria in assessing the relatedness of adverse events.

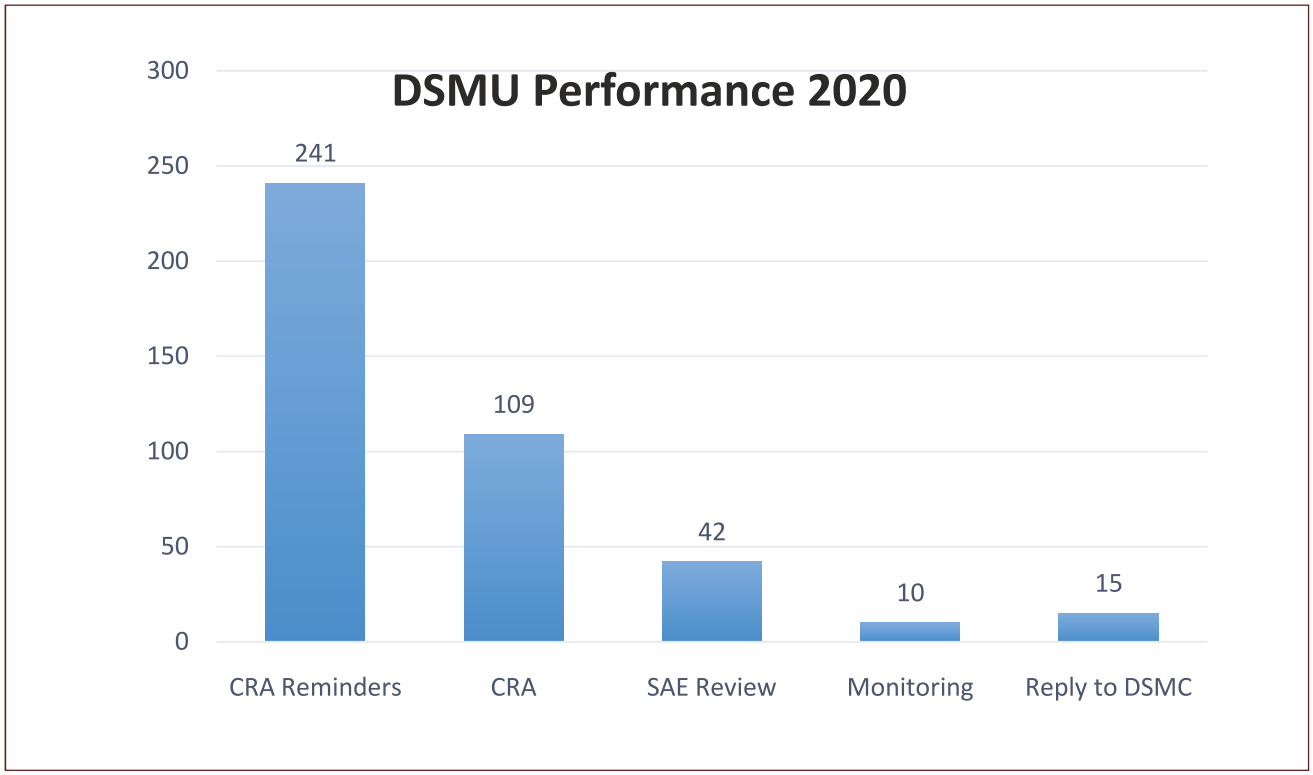
The composition of the current DSMU (1st July 2020 to 30th June 2022) is given below:

Sr. No	Name	Affiliation	Gender	Expertise
1	Dr. Reshma Ambulkar, Member Secretar (IEC-III Member)	Professor &Anaesthetist 'F', Dept. Of Anaesthesia, Critical Care &Pain, Advanced Centre For Treatment, Research & Education In Cancer (ACTREC) & Tata Memorial Hospital, TMC.	Female	Clinician (Anaesthetist& Intensivist)
2	Dr. Sachin Punatar Member-Joint Secretary	Assistant Professor & Medical Oncology 'E', Advanced Centre For Treatment, Research & Education In Cancer (ACTREC)	Male	Clinician (Medical Oncology)
3	Dr. Ashok Varma, Member	Scientific Officer 'G', Advanced Centre For Treatment, Research & Education In Cancer (ACTREC)	Male	Basic Scientist
4	Dr. Vikram Gota Member	Associate Professor & Clinical pharmacologist 'F', Department Of Clinical Pharmacology, Advanced Centre For Treatment, Research & Education In Cancer (ACTREC)	Male	Basic Medical Scientist (Clinical-Pharmacologist)

Sr. No	Name	Affiliation	Gender	Expertise
5	Dr. Purvi Thakkar, Member	Assistant Professor 'E', Consultant Surgeon, Tata Memorial Hospital, TMC	Female	Clinician (Surgical Oncology)
6	Dr. Anant Gokarn, Member	Asst. Professor, Medical Oncology (Adult HL) Advanced Centre For Treatment, Research & Education In Cancer (ACTREC)	Male	Clinician (Medical Oncology)
7	Dr. Madhavi Desai, Member	Associate Professor &Anaesthetist F, Dept. Of Anaesthesia, Critical Care & Pain, Tata Memorial Hospital, TMC	Female	Clinician (Anaesthetist& Intensivist)
8	Dr. Sonam Mehrotra, Member	Scientific Officer D, Advanced Centre For Treatment, Research & Education In Cancer (ACTREC)	Female	Basic Scientist
9	Dr. Syed Hasan, Member	Scientific Officer E, Advanced Centre For Treatment, Research & Education In Cancer (ACTREC)	Male	Basic Scientist
10	Dr. Sharayu Mhatre, Member	Scientific Officer D, CCE, Advanced Centre For Treatment, Research & Education In Cancer (ACTREC)	Female	Basic Scientist (Epidemiologist)

DSMU activities (2020)

The DSMU conducted 11 meetings (3 Physical and due to COVID pandemic, 8 were conducted virtually through zoom and Skype mode) during 2020, 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) on email by a group of four members consisting of the two lead discussants and Member Secretary of DSMU and IEC. The committee conducted 10 site monitoring visits, reviewed 42 SAE reports and sent 241 reminders to PIs for Continue Review Application submission as required. A detailed initial review of 109 Continue Review Applications (CRA) was done by DSMU Member Secretary and comments from the DSMU were forwarded to the IEC for further action. At every IEC meeting, the DSMU Member Secretary or representative of the DSMU presented the minutes of DSMU meeting to IEC for further action. Eight monitoring reports were discussed in the full board (Two monitoring reports will be carried forward to 2021 for further decision.)and based on IEC comments, recommendation and query letters were issued to PIs. In all, 15 replies were reviewed by DSMU 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.

Education is one of the three mandates of ACTREC, and the on campus environment is strongly supportive of Academics. The Centre's educational endeavors include: (a) its Ph.D. program that accepts research scholars from across the country through an online written examination followed by interview to conduct doctoral research, (b) its training program that accepts undergraduate and postgraduate students from colleges and universities from within and outside India, (c) its organization of local, national and international Conferences, Symposia, Workshops and Training Courses in the biological/ life sciences as well as CMEs and CNEs on various disciplines within oncology, (d) its conduct of research seminars delivered by visiting national/ international scientists and clinicians, (e) its acceptance of educational visits from college/ university students from across the country, and conduct of an Open Day at the Centre to showcase some of its research facilities, and (f) conduct of a National Research Scholars Meet by its research scholars. The Centre also conducts a public outreach program to create cancer awareness. Faculty and staff members are encouraged to attend CMEs, CNEs, workshops and training courses and to present their findings at national/ international conferences. The academic fervor on campus is strengthened by the regular in-house data presentations and journal clubs conducted by basic and clinical scientists.

Doctoral Program

The Academic and Training Program Office, chaired by Dr. Sorab Dalal, oversees the Ph.D. (Life Sciences) program at ACTREC, which is affiliated to the Homi Bhabha National Institute (HBNI) - a deemed university established in 2006 under the aegis of the University Grants Commission and covers all the constituent units of the Department of Atomic Energy, Government of India. The Program Office maintains a close liaison with HBNI to resolve any queries, conducts the students' annual doctoral committee (DC) meetings and ensures that at least four DC meetings are held during their tenure, collates documentation of these meetings, and submits the reports to HBNI. The Office also handles the pre-synopsis documentation, submits synopses and theses (spiral bound/ final bound) to HBNI, corresponds with external examiners and HBNI, conducts the open viva voce, and submits final reports to HBNI. The Academic Committee of ACTREC oversees the smooth running of the JRF-ACTREC entrance examination and doctoral program with support from SCOPE Cell and Steno-pool for student intake and academic course work, from ACTREC Administration for enrolment and fellowship matters, and from the Program Office for HBNI matters.

Between January and December 2020, a total of 105 graduate students were working towards the Ph.D. degree in Life Sciences at ACTREC; these included 11 JRF 2020 batch students who joined in November 2020(see photograph below).

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

During the year 2020,11 students completed research towards their doctoral dissertation and were awarded the Ph.D. degree (see the tabulation that follows).

No.	Name of the student	Thesis title
1	Ms. Anuja Lipsa, ACTREC-SRF, Sarin Lab	Genomic landscape of Hereditary and Early onset Sporadic Colorectal Cancer
2	Ms. Vasudha Mishra, DST Inspire Fellow, Sarin Lab	Elucidating the genetic pathways of RET driven Medullary Thyroid Carcinogenesis
3	Mr. K. Raghupathi, ACTREC-SRF, Bose Lab	Deciphering the mode of regulation and understanding protein-protein interactions of human HtrA serine proteases
4	Ms. Saujanya Acharya, ACTREC SRF, Bose Lab	Characterization of high temperature requirement serine protease and its binding partners
5	Ms. Maitreyi Rathod, ACTREC SRF, De Lab	Identifying mechanisms that regulate human sodium iodide symporter gene (hNIS) in breast cancer
6	Ms. Shalini Dimri, ACTREC-SRF, De Lab	Molecular Imaging of STAT3 signaling *in vivo*

No.	Name of the student	Thesis title
7	Ms. Mahalakshmi Harish, ACTREC-SRF, Prasanna Lab	Fine specificity of domain-motif interaction and the role of structure: a case study with proteasomal chaperones
8	Ms. Asmita Sharda, UGC-SRF, Gupta Lab	Histone H3 modifications and their role in DNA damage response
9	Mr. Raghava Reddy Sunkara, ACTREC-SRF, Waghmare Lab	Defining the molecular signaling mechanism in epidermal stem cell regulation and cancer
10	Ms. Raikamal Paul, ACTREC-SRF, Shirsat Lab	Role of miR-592 and miR-204 in medulloblastoma pathogenesis
11	Ms. Mythreyi Narasimhan, ACTREC-SRF, Rukmini Lab	Proteomic profiling of leukemic cells in Philadelphia chromosome positive leukemia

Training Program

ACTREC's training program encompasses (a) undergraduate/ graduate students seeking to work on small projects for their Bachelor's/ Master's dissertation, (b) individuals who have completed studies and wish to gain research experience, (c) undergraduate students who come as summer trainees during their college break, and (d) students of colleges/ universities or staff of hospitals who pay short visits as observers to learn specific techniques. ACTREC's training program had 94 participants during 2020, of which 32 trainees worked towards their MSc dissertation, 3 were on collaborative projects, 34 trainees came for research experience, 21 were observers, 1 was a Visiting Scientist and 3 were project trainees. The trainees worked under the close supervision of senior or mid-level scientists, clinicians and other officers.

Advanced Training Course in Medical Laboratory Technology

The Advanced Training Course in Medical Laboratory Technology (AMLT), conducted jointly by Dr. Preeti Chavan, Dr. Vivek Bhat and Dr. Shashank Ojha who are in charge of the diagnostic laboratories of ACTREC, is designed to provide both theoretical knowledge and practical training leading to advanced specialization in various medical laboratory technologies. Coursework is designed in such a way that, at the end of the course, the student is able to work as a skilled technologist under the supervision of consultants in an accredited laboratory attached to a hospital or in a small, independently functioning laboratory carrying out advanced tests with effective quality control and provide patients with reliable reports. The duration of the course is one year, and the course is followed by a bond period of one year. The AMLT course was started at ACTREC in November

2015 and the first batch comprising of two students completed their coursework in November 2016 and served the bond period until November 2017. Presently the fifth batch of AMLT comprising of one student is undergoing training, and started coursework in January 2020. Using state-of-the art instrumentation such as automated analyzers and advanced technologies, the AMLT students receive hands-on training in Hematology (CBC, coagulation, cytochemistry, manual differential count and body fluid cell count), Clinical Biochemistry (routine biochemistry, tumor marker/ drug assays, and calibration of tests), Microbiology (bacteriology, mycology, clinical microbiology, serology and media preparation), Histo-pathology (sample accession, grossing, tissue processing, embedding, trimming/ cutting, staining and submission of stained slides, frozen section and immunohistochemistry) and Transfusion Medicine (medical screening of blood/ platelet donors, outdoor blood camps, apheresis, blood component separation, transfusion transmitted infection testing, blood grouping, cross-matching, antibody titration as well as procedures for hematopoietic stem cell transplant). They also participate in academic activities, and receive training in the implementation, interpretation and documentation for internal quality control programs, as well as the external quality assurance programs of these departments.

Educational Visits

To provide an exposure to students, ACTREC facilitates the educational program tours of various institutes. The educational visits begin with an overview of research and clinical activities of ACTREC followed by visits to various departments and facilities of the Centre. During 2020, four educational visits were arranged. Twenty two M.Sc. Molecular Biology students from Yuvraj College in Mysore visited the facilities of the Centre in January 2020. There were three visits from students of Mumbai Colleges in the month of February; Forty-eight final year undergraduate students of Microbiology from Wilson College, Mumbai visited the Centre on February 1st 2020, twelve students doing the Cancer Biology Certificate Course from the K J Somaiya College of Science visited the Centre on February 14th 2020 and eight students of MSc Zoology from Kirti College came on a special Animal House visit on the 27th of February, 2020.Subsequent to the month of February in the year 2020, the Centre did not encourage visits due to the world-wide pandemic of COVID-19. The staff and students were strictly following the pandemic protocol and the Centre was adhering to all the rules and regulations laid down for combating the pandemic. Thus further planned visits of the year were cancelled.

Clinical Research Secretariat-ACTREC

Officer-In-Charge : Dr. Jayant Sastri Goda

Data Manager 'E' : Mrs. Sadhana Kannan

Overview

Clinical Research Secretariat (CRS) has a mandate to provide clinical and basic researchers at ACTREC, support for research activities including research methods, operations, training and education. The vision is to become a vital cog in the wheel for clinical research at Tata Memorial Centre and to uphold its pre-eminence as a frontier institute for cancer research in India.

Service

The CRS at ACTREC provided scientific and technical inputs needed to support basic and clinical research investigators spanning the range of activities from protocol development to manuscript publication. It has also been actively supporting phase II and III clinical trials, which are single or multi-centric, through services such as randomisation (20 trials- TMH & ACTREC), CRF development, electronic data capture, clinical data management through REDCap and statistical analysis.

Research

The lead statistician executed advanced statistical analysis in the area of systematic reviews and meta-analysis which contributed to high impact publications. The CRS staff contributed significantly and featured as co-authors in 16 publications in the year 2020. The CRS in 2020 received a NBM BIRACS grant fund of Rs. 138 lakhs for capacity building and carrying out projects in the field of new device/drug development.

Education

The CRS has been involved in teaching Biostatistics to the doctoral students of Life Sciences, MSc Nursing students of the ACTREC/TMH and junior residents of Radiation Oncology of TMH. A post graduate diploma course in Biostatistics was initiated during the year 2019-20. Four students have been trained on the Module-Statistical methods in Clinical Research for a period of six months. The CRS lead statistician is pursuing a PhD in Health Sciences. On-the job training was also imparted to junior statisticians of CRS-TMH. The CRS statisticians have given lectures and attended various webinars, training workshops in clinical research methodology, held at various places across the country. Five abstracts of the students and statisticians of CRS have been accepted by the International Society for Clinical Biostatistics in 2020

Key quality indicators

Service provided	Number of studies	status
Statistical consultation for design of the studies	75	Completed
Consultations for sample size estimations	25	Completed
Consultations for data analysis	120	Completed
Studies in which CRS is taking part in randomization of subjects	22	On- going
Studies in which CRS is taking part in data management	6	On-going

Open Day 2020

Open Day at ACTREC is an eagerly awaited event for undergraduate and graduate science students from colleges in and around Mumbai. The tradition of showcasing research activities and infrastructure facilities was initiated in 1995 by the then Cancer Research Institute (CRI) located in Parel, Mumbai and is continued after the institute transformed and moved to Kharghar, Navi Mumbai with the new name of, 'ACTREC'. This event is organized by the SCOPE Cell of ACTREC as a two-day episode in the first week of December every year,with invitations sent out to students from nearby colleges,and with the sole purpose of exposure to the work in research laboratories and an encouragement to curious minds to pursue careers in scientific research. Both the research wings of the Centre - CRI and CRC, actively participate in ACTREC's Open Day. In the year 2020, the world-wide COVID-19 pandemic changed the approach of

organizing conferences and events and so the Open Day was set-up on 31st December 2020 in the virtual mode. In the welcome address, Deputy Director, CRI, Dr. V. Prasanna briefed the objectives of Cancer Research to understand Basic Cancer Biology and the importance of these findings in treating and managing the disease. Dr. Abhijit De, Convener, Academic Committee, informed about the various academic and research programs offered at the Centre. The video recordings of research experiments on - Raman Spectroscopy, Cloning & Protein Purification, Mass Spectrometry Instrument & Applications, Western Blotting Techniques, and Laboratory Animal facility were streamed live on ACTREC YouTube channel for broader dissemination.

16th National Research Scholars Meet (NRSM 2020)

L to R: Dr. Sudeep Gupta (Director, ACTREC), Dr. Prasanna Venkatraman (Dep. Director,CRI), Dr. Navin Khattry (Dep. Director, CRC), Ms. Vaishnavi Nimbalkar (Organizing Secretary, NRSM 2020).

The 16th National Research Scholars Meet was held at ACTREC on 11th December 2020. The students of ACTREC who organize this event every year with flair and enthusiasm bring the best of speakers from across the country and sometimes internationally. Traditionally, NRSM is organized with zeal of enthusiasm as a two day event. These couple of days are embellished with talks by distinguished scientists from varied and distinct fields, oral and poster presentation by aspiring researchers, scientifia for fun, creative platform to showcase the extra-curricular talent of researchers, polarizing but often insightful debates/discussion and lastly cultural activity to soothe the eyes and relax the mind after the heavy feast for the brain.Considering the COVID threat world over and at the same time to keep the tradition alive, NRSM 2020 was conducted virtually with a one day webinar at ACTREC. Two esteemed speakers who have effectively translated the high end technologies from the bench to the bedside were invited. Prof. Siddhartha Laskar from Tata Memorial Hospital, in his plenary talk discussed about radiation oncology from pitchblende to particle and Dr. Partha Majumdar, Distinguished Professor and Founding Director NIBMG, expressed his views on genomic drivers of oral cancer and their

proximal metastasis. Along with these stimulating eminent oral presentations, few aspiring researchers also presented their research work as part of Oral presentation competition.The Research Scholar fraternity is deeply grateful for the motivation and guidance from Dr. Sudeep Gupta in these precarious times, without whom NRSM-2020 would have remained just a dream. The constant support from Dr. Navin Khattry in organizing the event is also much valued. The organizing batch is thankful to Dr. Prasanna Venkatraman for her faith and guidance, throughout the event. The support of all the Principal investigators as well as the enthusiastic young researchers who have immensely contributed to bring this event from a dream to reality is treasured.

Conferences, Workshops, Seminars, EBMs & CMEs at ACTREC

11 Jan	**1st National Symposium on "Administrative Excellence"** Mr. M.Y. Shaikh, Administrative Officer (EM), ACTREC
18 Jan	**CNE for Nurses** Dr. Meera Achrekar, ACTREC
13 - 24 Jan	**DBT-BTIS (NER) Workshop – For Faculty** Dr. Ashok Varma,Course-Coordinator-Bioinformatics
27 – 31 Jan	**DBT-BTIS (NER) Workshop – For Faculty** Dr. Neelam Shirsat, Program-Coordinator-Bioinformatics
3 – 7 Feb	**DBT-BTIS (NER) Workshop – For Research Scholars** Dr. Neelam Shirsat, Program-Coordinator-Bioinformatics
6 – 8 Feb	**Pharmaceutical Modeling and Simulation (Pumas)** Dr. Vikram Gota, ACTREC
17 - 28 Feb	**DBT-BTIS (NER) Workshop – For Research Scholars** Dr. Ashok Varma,Course-Coordinator-Bioinformatics
25 Feb	**One day workshop on "Advanced methods of flow cytometry data analysis"** Dr. Rushikesh Patil, DST-INSPIRE Faculty, Convener, Flow Cytometry Facility
27 – 28 Feb	**Central Venous Access Device (CVAD): Care and Maintenance** Dr. Meera Achrekar, ACTREC
9 Mar	**ACTREC Alumni Association** Dr. Ojaswini Upasani, ACTREC
9-11 Dec	**9th Annual Workshop "In Vivo Preclinical Imaging and Drug Discovery" (Webinar)** Dr. Pradip Chaudhari, ACTREC
11 Dec	**16th National Research Scholars Meet 2020 (NRSM) [Virtual]**
31 Dec	**Open Day 2020 [Virtual]**

National Symposium on Administrative Excellence

Organizer : ACTREC Administration

The first one day National Symposium on "Administrative Excellence" was held at ACTREC, Tata Memorial Centre on 11th January 2020.The symposium was essentially organized for the Administrative staff of ACTREC, new Centres of TMC, HOD's, Investigators, Managers, Clinicians, Administrators and Management students. About 250 staff of TMC and other neighboring management institutes participated in the one day symposium. Six eminent speakers of renowned administrative disciplines delivered value added motivational talks on 'Human Resource' and other related subjects for ideating a smooth and flawless functioning of the Administration. The speakers were Mr. A.N. Sathe-CAO, TMC, Professor Zubin Mulla, Mr. Uday Ghag, Mr. Deepak Patil, Mr. Anand Kulkarni, and Mr. Swapnil Bhopi.

The salient features of efficient Administration discussed and highlighted in the symposium were that of work culture, talent management, leadership, and innovative programs focused on the secrets behind the amazing employee ecosystem. The speakers emphasized on specialization in data mining within an institution to help the team take ownership of the problem and the solution, hence to create a healthier work ambience.

The speakers also focused on adapting to workplace trends by connecting in the digital age to unleashing the power and perspective of every generation, in predicting how to better plan for the new world of "Administrative Excellence".

Biotechnology/Bioinformatics workshop

Organizer : Dr. Ashok Varma, ACTREC

A DBT supported Biotechnology/Bioinformatics training centre conducted national level workshop on the topic "Gene Cloning, Protein Biochemistry, Structure Biology and Bioinformatics" targeting academic institutions from North-East region and other parts of country. The training program was divided into two modules first for faculty from January 13-24, 2020 and second for research scholars from February 17 -28, 2020. Total 35 participants actively participated in the workshop and performed experiments on gene cloning of different genes, and furthermore validated their product by DNA sequences. During protein purification, the participants used GST and Ni-NTA affinity chromatography to purify the crude extract from bacterial system. Finally participants purified the protein using FPLC size exclusion chromatography, and learned the purification techniques. Crystallization of the protein using sitting and hanging drop methods were performed. The participants were also trained to pick the crystal for x-ray diffraction analysis. The eminent invited speakers from ACTREC and different parts of country have delivered informative lectures covering from basic concepts of the techniques to the applications. The participants were acquainted with different major equipment's including X-ray diffractometer for structure biology work. During training program, faculty participants were also looking for inter institutional collaborations.

Workshop on 'Advanced Molecular Biology Techniques and Bioinformatics'

Organizer : Dr. Neelam Shirsat, ACTREC

Hands-on workshops on 'Cell and Molecular Biology' were held at ACTREC from 27th Jan -7th Feb 2020. The workshops were organized for the students and faculty from the North East Region of India and were funded by the Department of Biotechnology. Dr. Ashok Varma, Dr. Neelam Shirsat, and her lab personnel organized the workshop. The faculty included Dr. Ujjwala Warawdekar, Dr. Sharda Sawant, Ms. Vaishali Kailaje, Ms. Tanuja Durve, Shirsat lab staff, and students. Dr. Krishanu Ray from the Tata Institute of Fundamental Research gave a guest lecture on 'Axonal transport – implications in neuronal functions and plasticity'. Dr. Dibyendu Bhattacharya gave an invited talk on 'Interplay and relative positioning of functional sites of early secretory pathway'.

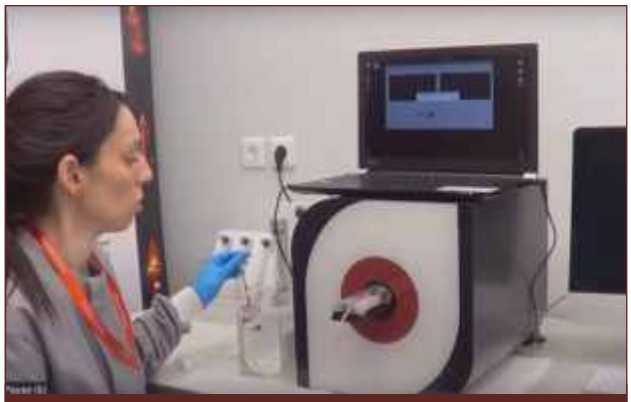
These were two independent five-day workshops held for the faculty and students. Lectures were given on Good Laboratory Practices including guidelines for the experimental work plan and execution to get reproducible and reliable data. Lectures and demonstrations included mammalian cell culture techniques, cell proliferation assay, and cell cycle-cell death analysis by flow cytometry, assessment of the malignant potential of cells by clonogenic assay, soft agar colony formation assay, and tumorigenicity assay. Assays for the analysis of quantification and modulation of gene expression included shRNA-mediated gene knockdown, gene knockout using CRISPR technology, the luciferase reporter assay, confocal microscopy, electron microscopy, SDS-PAGE, and Western blotting. The participants had the opportunity to perform the cell culture, protein extraction, SDS-PAGE analysis, Western blotting, preparation of cells for flow cytometry, and immunofluorescence. A protocol book that

included detailed protocols for each of these techniques was distributed to the participants.

Participants in the workshop were from the Assam Agricultural University, College of Veterinary Science (Guwahati), CSIR-North East Institute of Science and Technology (Assam), Dibrugarh University, Guwahati University, Himachal Pradesh University, Mahatma Gandhi Institute of Medical Sciences (Maharashtra), Manipur University, Mizoram University, North Eastern Regional Institute of Science and Technology (Arunachal Pradesh), Rajiv Gandhi University (Arunachal Pradesh), Sikkim State Council of Science & Technology and Vasantrao Naik Marathwada Krishi Vidyapeeth (Maharashtra). The workshop was an immensely satisfying experience for both the faculty and the participants.

Virtual Workshop on 'In vivo Preclinical Imaging and Drug Discovery'

Organizer : Dr. Pradip Chaudhari, ACTREC



Virtual Demonstration on PET/SPECT
Dr. Maritina Rouchota; BioEmtech, Athens, Greece

Valedictory Function: Drs. Banavali and Chaudhari

Small Animal Imaging Facility (SAIF), ACTREC organized a five-day virtual webinar series on “In vivo Preclinical Imaging and Drug Discovery” from December 7-11, 2020. Since 2010, hands on training workshops on preclinical imaging and its role in drug discoveryhave been organized by this facility. In 2020, due to the COVID-19 pandemic, the platform was changed and a global webinar was organized.The webinar was inaugurated by the Director ACTREC, Dr. Sudeep Gupta.In this event 714 participants from 14 countries actively participated and benefited from national and international faculty. The delegates in this workshop were students with a biomedical and pharmacy background, scientists, postdoctoral fellows, physicians and veterinarians working in preclinical labs. The objective of the workshop was to stimulate a research interest in the field of non-invasive imaging.

Considering the wide range of imaging modalities and applications, this workshop was structured with lectures and virtual demonstrations from two national and two international centres. The talks covered important and relevant topics to the field of imaging like, 'Basics of Radioactivity', 'Laboratory Animal Anesthesia', and 'Translational Small Animal Optical Imaging Applications'. There were also virtual demonstrations which covered preclinical PET/SPECT applications and image processing and analysis using PMOD. After a rigorous five day program,the workshop was concluded with a Valedictory Speech from Dr Shripad Banavali and a live feedback from the participants.

Ambulkar Reshma

- Implementation of Modified Covid Surgical Safety Checklist at TMH and ACTREC
- Coordinated implementation of Surgical Checklist and Covid Checklist at HBCH Sangrur, HBCH Varanasi and HBCHRC Visakhapatnam
- Mentor for the Life box (UK) Global Surgery Research scheme
- Checklist Implementation Strategies workshop revision group (Life box UK)

Ashar Harsh

- Best Poster Award: 'Defining sPLA2-IIA induced proliferation on murine hair follicle stem cells and human epithelial cancer', International Conference on Emerging trends and challenges in cancer chemo-prevention, diagnosis and therapeutics, Tezpur University , Tezpur, Assam, February 17-18, 2020.

Bhat Prashant

- Expert on Panel for Expansion –Chittaranjan National Cancer Institute, Calcutta
- Assessor for CGHS and ECHS empanelment of Hospitals.

Budukh Atul

- Invitee Reviewer:by International Atomic Energy, Vienna to review the Nepal Cancer Registries under impact review

Chaudhari Pradip

- Brigadier SK Mazumdar Oration of the Society of Nuclear Medicine (India) 2020 in recognition of excellent academic and research contribution in the field of Nuclear Medicine and the related disciplines during 52nd Annual Conference of the Society of Nuclear Medicine-India (SNMICON) held at All India Institute of Medical Sciences (AIIMS), Raipur, India (December 11-13, 2020).
- Founder:NNPR Vet and Onco Foundation.

Dalal Sorab

- Patent Filed: An Indian patent and a PCT patent of antibody targeting LCN2 filed in 2020.

De Abhijit

- Patent Filed: Indian Patent Application entitled “Self-Assembled Niclosamide-Hyaluronic Acid Conjugate Micelles for Site-Selective Regression of Tumor and Tumor Spheroids: Synthesis and Applications Thereof”. [Ref. No. 20202138024, 03-09-2020].
- Patent Filed: Indian patent application entitled “Peptide Target for Platinum Drug Resistant Ovarian Cancer'.[Ref. no. 202021034662, 12-08-2020].

Ganesh B

- Member:Expert Committee of Board for

Research in Nuclear Science (BRNS), DAE for various Health Survey Projects.

Gaur Tarang

- Selected for the Newton-Bhabha PhD placement fellowship jointly funded by Department of Biotechnology, India and British Council, United Kingdom.

Goda Jayant

- Patent Filed: Indian patent application entitled, 'Liposomal in-Gel composition as a injectable drug depot for the delivery of radiosensitizers'.
- Patent filed: US patent application entitled, 'Use of 3,3'-diselenodipropionic acid (DSEPA) as an anticancer agent'.
- Patent Filed: Indian patent application entitled, 'Nanoparticles incorporating self-gelling composition as drug delivery system'.

Gujral Sumeet

- Member of Technical committee of National Accreditation board for Testing and Calibration laboratories (NABL) in Medical testing.
- Member of drafting committee for NABL 112 standards document in Hematology.
- Member of Committee for ICMR Standard Operating Procedures (SOP's) on "Immunophenotyping of Hematolymphoid Neoplasms".
- Editorial Board of “Clinical Cytometry, Part B”.
- Editorial Board of “Indian Journal of Cancer”.
- Editorial Board of “Indian Journal of Pathology and Microbiology”.
- Editorial Board of “National Journal of Basic Medical Sciences”.

Gupta Sanjay

- Member, Project Monitoring Committee for 'NSM Platform for Genomics and Drug Discovery' Centre for Development of Advanced Computing, a Scientific Society under Ministry of Electronics and Information Technology, Government of India.
- Editorial Board Member, Journal of Clinical Epigenetics
- Associate Editor, Journal Of Integrated-Omics: A Methodological Journal
- Associate Editor, Journal of Radiation and Cancer Research

Gupta Sudeep

- Chairperson : Healthcare group BRNS [Board of Research in Nuclear Sciences]
- Oration: Urmil B K Kapoor Oration entitled: 'A Few Steps....And a Journey of Thousand Miles...' instituted by the All India Institute of Medical Sciences (AIIMS), New Delhi, November 26, 2020.

Ingle Arvind

- Outstanding Contribution to Animal Science Award-2020 of the Dr. B Vasantharaj David Foundation, Chennai for outstanding contribution to the “Laboratory Animal Science and Higher Education”.

Kode Jyoti

- US Patent application # 17/003,420 dated 08/26/2020: Use of 3, 3'-Diselenodipropionic acid (DSEPA) as an anticancer agent.
- Patent filed: Herbal extracts with potent cytotoxic properties for management of breast, ovarian and cervical cancer in human. (Applicant: ICAR-Directorate of Medicinal and Aromatic Plants Research, Boriavi-387310, Anand, Gujarat (India)
- Patent submitted through CSIR- Unit for Research and Development of Information Products (URDIP) (A synergistic polyherbal formulation exhibiting potential anti-cancer activity).
- Patent in submission to CSIR-IPU/ IPD (Preparation of anticancer extract using root waste biomass of marine plant and other valuable products to maximum utilisation)
- NCBI registrations: Two chemicals registered at NCBI PubChem SID 405234057, https://pubchem.ncbi.nlm.nih.gov/substance/405234057 2020
- NCBI-GEO: Array sequences of AML (n=16) are deposited in NCBI-GEO database, Accession Series # GSE150070, (GSM4522998 to GSM4523013) (8th May, 2020).
- Secretary, ACTREC Alumni Association (2019-2022).
- Invited Member, Board of RLS (Dhirubhai Ambani Life Science Centre, Rabale) Institutional Committee on Stem Cell Research and Therapy (IC-SCRT/18/20).
- Invited Member, Seth GS Medical College and KEM Hospital Institutional Committee for Stem Cell Research [IC-SCR] committee, Duration 2020-2023.
- Invited Member, Board of Studies meeting for Microbiology at Sophia College (Autonomous), March, 2020.

Mishra Gauravi

- Award IPVC 2020 Registration Grant [GSK]: 'Evolving and Validating New Tool for Training Paramedical Staff in Cancer Awareness and Cervical Cancer Screening with VIA and Collection of HPV and Cytology Samples', 33rd International Papillomavirus Conference of the International Papillomavirus Society (IPVS), Virtual: July 20-24,2020.

Mishra Saket

- Best Oral Presentation: 'DNA Protein Kinase (DNA-PKcs) mediated transcriptional regulation of TOP2β drives chemoresistance in leukemia', 16thNational Research Scholars Meet (NRSM), ACTREC, Navi Mumbai: December 11, 2020.

Mohanty Purvi

- Dr. H M Bhatia & Dr. L D Sanghvi Best oral paper award, 'Frequency and clinical impact of IGH@ gene rearrangements in paediatric and adult BCP-ALL', 43rd Annual conference of Mumbai Hematology Group, Mumbai, March 13,2020.

Murthy Vedang

- Award: Fellow of Indian College of Radiation Oncology (FICRO), November 2020.

Navarange Sushant

- Best Poster Award: 'Molecular profiling to understand regulation of human oral cancer

stem cells', International Conference on Emerging trends and challenges in cancer chemo-prevention, diagnosis and therapeutics, Tezpur University , Tezpur, Assam, February 17-18, 2020.

Oak Swapnil

- Dr. Lalith Kumar Chaganti Memorial Award for best Oral Presentation, 'Role of deubiquitinases in stabilization of mutant p53 in cancer cells', 16th National Research Scholars Meet (NRSM), ACTREC, Navi Mumbai : December 11, 2020.

Patkar Nikhil

- Treasurer: Molecular Pathologists Association of India.

Patle Vijaya

- Second prize for Oral presentation, “Analysis of Transfusion practices in HSCT patients”, TRANSMEDCON, Mumbai, January 9-11, 2020.

Poojary Minal

- Best Poster award, “Comparative analysis of PBSC collection associated adverse events in paediatric autologous and allogeneic donors”, Virtual Asia- Pacific Blood and Marrow Transplant conference, October 9-11, 2020.

Sastri Supriya

- Award: Fellow of Indian College of Radiation Oncology (FICRO), November 2020.

Sawant Sharada

- First Prize: 'In Metallography Contest for Microscopy Techniques', 12th Asia Pacific Microscopy Conference 2020, Hyderabad: February 3-7, 2020.

Subramanian P G

- Lead assessor in NABL and member of Technical committee in Hematology.
- Member of Editorial Board of Pediatric Hemato-Oncology Journal.
- President of Clinical of The Cytometry Society of India.

Suthar Jashoda

- Best poster award: 'Study of immuno-modulatory effects of medicinal plant extracts on healthy peripheral blood leukocytes', International Conference on Disease Biology: Diagnostics and Therapeutics (DBDT-2020), Savitribai Phule Pune University, Pune: March 4-6, 2020.

Tembhare Prashant

- Member of drafting committee for NABL 112 standards document in Hematology.
- Member of committee for ICMR Standard Operating Procedures (SOP's) on "Immunophenotyping of Hematolymphoid Neoplasms".
- NABL assessor for Hematology, flow cytometry & molecular laboratory.
- Secretary of The Cytometry Society of India.

Thota Raghu

- Founder Secretary of Society of Onco Anesthesia & Perioperative care (SOAPC)

- Coordinator of Cancer Pain Special Interest Group of Indian Society for Study of Pain (ISSP)
- Editorial board member of Pain Physician Journal (Official journal of the American Society of Interventional Pain Physicians)

Waghmare Sanjeev

- Member: Committee for Stem Cell Research, BARC, Mumbai.
- Member: Biosafety Committee, BARC, Mumbai.
- Member: Committee for Stem Cell Research and Therapy, NIRRH, Parel, Mumbai.
- Member: Committee for Stem Cell Research, NMIMS, School of Life Sciences,Mumbai.
- Member: Institutional Ethics Committee, National Burns Centre, Navi Mumbai.
- Member: Committee for Stem Cell Research and Therapy, Himedia, Mumbai.

International

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4. Agarwal JP, Sinha S, Goda JS, Joshi K, Mhatre R, Kannan S, Laskar SG, Gupta T, Murthy V, Budrukkar A, Mummudi N, Ganeshan B (2020) - Tumor radiomic features complement clinico-radiological factors in predicting long-term local control and laryngectomy free survival in locally advanced laryngo-pharyngeal cancers. British Journal of Radiology. 93(1109): 20190857. PMID: 32101463

5. Amnekar RV, Khan SA, Rashid M, Khade B, Thorat R, Gera P, Shrikhande SV, Smoot DT, Ashktorab H, Gupta S (2020). Histone deacetylase inhibitor pre-treatment enhances the efficacy of DNA-interacting chemotherapeutic drugs in gastric cancer. World Journal of Gastroenterology. 26(6): 598-613. PMID: 32103870

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“Discovery consists of looking at the same thing as everyone else and thinking something different.”

— Albert Szent-Gyorgyi

ADVANCED CENTRE FOR TREATMENT, RESEARCH & EDUCATION IN CANCER (ACTREC)
TATA MEMORIAL CENTRE
SECTOR 22, KHARGHAR , NAVI MUMBAI - 410210