



TATA MEMORIAL CENTRE

A Grant-in-Aid Institute of the
Department of Atomic Energy,
Government of India



Tata Memorial Centre, Mumbai

HBCHRC, Visakhapatnam
HBCHRC, Mohali



MPMNC, Varanasi

HBCH, Varanasi

CCE, Mumbai



HBCH, Sangrur



ATREC, Mumbai

BBCI, Guwahati



Matrix for Affordable, Accessible
& Advanced Cancer Care

Annual Report 2018 – 2019



Handing over of the Homi Bhabha Cancer Hospital, Varanasi by the Tata Trusts to the Tata Memorial Centre, Mumbai. In picture (from right): Mr. Sanjeev Sood, Director Projects (TMC), Dr. Pankaj Chaturvedi (Surgeon, TMC), Dr. Srikant Mishra, the chief priest of Kashi Vishwanath temple and Swami Shri Varishtanand Ji from Ramakrishna Mission Organization.



Visit of Mr. Piyush Goyal, Union Minister of Railways and Minister of Coal, Government of India at the Homi Bhabha Cancer Hospital, Varanasi with the Director of the hospital, Dr. Satyajit Pradhan on his right side.

ANNUAL REPORT 2018 - 19



Tata Memorial Centre

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Government of India)

Tata Memorial Hospital, Mumbai.

**Advanced Centre for Treatment,
Research and Education in Cancer, Navi Mumbai.**

Centre for Cancer Epidemiology, Navi Mumbai.

**Homi Bhabha Cancer Hospital and Research Centre,
Visakhapatnam.**

**Homi Bhabha Cancer Hospital,
Sangrur.**

Dr. Bhubaneswar Borooah Cancer Institute, Guwahati.

**Homi Bhabha Cancer Hospital,
Varanasi.**

**Mahamana Pandit Madan Mohan Malaviya Cancer Centre,
Varanasi.**

**Homi Bhabha Cancer Hospital and Research Centre,
Mohali.**

Mission and Vision of Tata Memorial Centre



Mission

The Tata Memorial Centre's mission is to provide comprehensive cancer care to one and all, through its motto of excellence in service, education and research.

Vision

As the premier cancer centre in the country, we will provide leadership in guiding the national policy and strategy for cancer care by:

- Promoting outstanding services through evidence based practice of oncology
- Commitment of imparting education in cancer to students, trainees, professionals' employees and the public and,
- Emphasizing on research that is affordable, innovative and relevant to the needs of the country.

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Governing Council



Chairman

Dr. Sekhar Basu (till 19.09.2018); **Dr. K.N. Vyas** (from 20.09.2018)
Chairman, Atomic Energy Commission & Secretary,
Department of Atomic Energy, Government of India.

Members, Ex-Officio

Mr. S. Mervin Alexander
Joint Secretary (Admin & Accounts) Govt of India,
Department of Atomic Energy, Research &
Development Section.

Dr. R.A. Badwe
Director, Tata Memorial Centre,
Parel, Mumbai 400 012.

Co-opted Members

Mr. S.M. Sane (till 08.03.2018);
Mrs. Richa Bagla (from 09.03.2018)
Joint Secretary (Finance),
Department of Atomic Energy, Government of India.

Dr. Snehlata Deshmukh
Ex-Vice Chancellor,
University of Mumbai.

Members

Dr. N.K. Ganguly
Former Director General (ICMR) and Advisor
Translational Health Science & Technology Institute,
National Institute of Immunology, New Delhi.

Shri. Jayant Kumar Banthia
Ex-Chief Secretary,
Government of Maharashtra.

Shri. R. Venkataraman
Sir Dorabji Tata Trust,
World Trade Centre-1, 26th Floor,
Cuffee Parade, Mumbai 400 005.

Mrs. R.F. Savaksha
Secretary & Chief Accountant,
Sir Dorabji Tata Trust,
24, Bombay House, Mumbai 400 001.

Shri Lakshman Sethuraman,
Jamshetji Tata Trust,
World Trade Centre-1, 26th Floor, Cuffee Parade, Mumbai 400 005

Permanent Invitees

Dr. A.K. D'cruz (till 30.11.2018);
Dr. C. S. Pramesh (from 01.12.2018)
Director, Tata Memorial Hospital,
Parel, Mumbai 400 012.

Dr. S.V. Chiplunkar (till 30.11.2018);
Dr. Sudeep Gupta (from 01.12.2018)
Director, Advanced Centre for Treatment Research and
Education in Cancer (ACTREC),
Kharghar, Navi Mumbai 410210.

Dr. K.S. Sharma (till 30.06.2018);
Dr. S.D. Banavali (from 01.07.2018)
Director (Academics), Tata Memorial Centre,
Parel, Mumbai 400 012.

Dr. D. Raghunadharao
Director, Homi Bhabha Cancer Hospital &
Research Centre (HBCHRC),
Aganampudi, Visakhapatnam.

Mr. Sanjeev Sood
Director Admin. Projects, Tata Memorial Centre,
Parel, Mumbai 400 012.

Secretary

Mr. A.N. Sathe,
Chief Administrative Officer, Tata Memorial Centre, Parel, Mumbai 400 012.



Message from Director, TMC



The year 2018 began with a flurry of activity related to construction of a new cancer centre at Varanasi. The Homi Bhabha Cancer Hospital (HBCH) was launched in the month of May 2018 after a complete makeover of erstwhile Indian Railway Cancer Hospital. The hospital was meant for management of lymphoma, leukaemia and children's cancers but in anticipation of the main hospital in Banaras Hindu University being functional in a year, all cancer cases were being planned to be treated at HBCH. In 7 months a record 7000 patients were registered at the hospital and they were offered state of art diagnostic and therapeutic facilities. The first surgery was performed on 10th May 2018 and over 500 surgeries have been successfully performed in the first year. A similar if not bigger number of patients have been looked after for chemotherapy and radiotherapy.

MPMMCC, the hub with 350 beds was built at a breakneck speed with state of art technology and enviable co-ordination, in one year. Safety, innovative ideas, appropriate incentives had induced supersonic speed, excellent quality and grand ambience. The facility was inaugurated by the Hon Prime Minister, Shri Narendra Modiji, in presence of the Chief Minister of UP Shri Yogi, the Hon Governor of UP Shri Ram Naik and Mr Ratan Tata. The facility will cater for whole of central and eastern UP and adjoining states.

Centres at Visakhapatnam, Guwahati, Mullanpur and upgradation of Sangrur has picked up speed and all of them should be functional by the end of 2019. Taking digitization forward all functioning hospitals services are paperless, filmless and cashless. Till date there are 219,824 smart cards supporting 1388980 transactions at an aggregate cost of INR 3,00,00,00,000/-

Kevat & patient needs assessment survey were the patient centric activities that were planned and executed for the first time in India. On one hand to assess patient's needs over and above the planned treatment and on the other create a unique human resource to satisfy those needs. The course had very astute methods employed for selection of candidates, graduates and post-graduates. Knowledge was imparted through didactic talks, workshops and practical experience in clinics and wards. The hallmark of the course was access to a module on medical humanities. As the technology and mercantile thought invades medicine, the first casualty is humane interaction, the humanities module was planned to induce medical faculty and kevat into humane and compassionate component of medical treatment delivery.

Gleaning what we learnt out of service, research and education and putting it for peer review resulted in over 500 (148 national and 388 international) publications in indexed journals with atleast 3 major practice changing results. Five monographs were added to the large repertoire of books published by TMC.

The National Cancer Grid has a mission of creating a network of cancer centres across India with uniform standards of care, common documentation of data and running research of national importance.

The NCG has revolutionized cancer care in India by establishing the largest cancer network in the world with over 190 cancer care delivery facilities under its umbrella. In 2018-19, the NCG undertook or continued the following initiatives in patient care, education & training and cancer research: Uniform standards of care – NCG Consensus Guidelines; External Quality Assurance Schemes (EQAS) in surgical pathology H&E, immunohistochemistry, molecular pathology; Second opinion service for patients – “Navya”; NCG Virtual Tumor Boards; Price Discovery Cell / Group negotiation for equipment, drugs and consumables; NCG National Cancer Library; Traveling Schools of Pathology and Oncology Nursing; Training in Cancer Research Methods – International Collaboration on Research methods Development in Oncology – CreDO workshop; NCG funded multicentric collaborative research amongst others.

Recruiting more minds into research methodology and evolving research protocol was the goal of a six-day residential workshop (CreDO) at Lonavla, near Mumbai between 3rd and 8th March 2019. This workshop was the fourth in a series of workshops and was modelled on similar workshops held in the United States (the AACR/ASCO Workshop on Methods in Clinical Cancer Research, Vail), Europe (ECCO-AACR-EORTC-ESMO Workshop on Methods in Clinical Cancer Research) and Australia (the ACORD Protocol Development Workshop). Participation was open to researchers with training in surgical, medical or radiation oncology or any branch related to oncology with preference being given to early and middle-level researchers working in an academic setting, who demonstrate commitment to continuing research in oncology. The workshop committee selected 55 participants from a total of 154 applicants. A total of 55 full protocols were developed over the week-long workshop. The faculty mentors for each protocol development group selected the best protocol(s) in their group based on novelty, relevance and feasibility. These seven protocols will be considered for funding by the NCG.

TMC has always set high standards for itself and largely lived up to them. However, it will have to adapt itself as it encounters new contexts, both scientific and social. One of the pillars of its eminence has been the ability to conduct research that has impacted the care of cancer patients in the Indian and global settings. The erstwhile Cancer Research Institute, now located within the ACTREC (Advanced Centre for Treatment, Research and Education in Cancer) campus in Navi-Mumbai, has allowed basic researchers to be enmeshed within an ecosystem of patient care.

Nonetheless the time has come when TMC needs to evolve and be able to embrace the transformational cancer research that has been happening in the recent past around the world. Basic and translational research has become a high technology team sport with requirements of sophisticated infrastructure and highly specialised teams of biological scientists. We have gained valuable insights into the underlying mechanisms of initiation, progression and metastases of many cancers. In just one example, tumour immunologists, working predominantly with classical techniques, have changed the face of cancer treatment in the past five to ten years. Technological advances in many disciplines – cellular and subcellular imaging, microfluidics, flow cytometry, high-throughput, high-fidelity sequencing, bioinformatics and computing, mass spectrometry, animal modelling, high-throughput screening, peptide chemistry, protein interactions and many others have played an important role in enabling this research, which was not possible even 25 years ago.

What should TMC do? It needs to create a world-class research centre that would provide cutting edge technology platforms to its researchers to keep pace with

the times. Such a centre should be able to attract the best available talent anywhere in the world and from diverse disciplines so as to create a multicultural ambience that will drive innovation. However, technology is not an end in itself – it is a means to an end. We intend to keep our vision focussed on new ideas and implement them in the development of new treatments for cancer patients. Above all, such treatments should be affordable and available to one and all in India. To fulfil this vision a team of scientists basic & clinical were sent across the globe to identify what's cutting edge in technology as well as novel ideas and create a report that delineates the need for infra-structure, human resource to dabble into new biology. The visits were generously supported by the Tata Trusts which has greatly helped to conceptualise and envision the creation of a new centre.

On one hand we are looking within to improve delivery and access to cost-effective care and at the same time evaluate new, expensive technology for its relevance and utilization in Indian context. In words of Kipling 'Walk with king but not to lose the common touch'.



Dr R A Badwe

Message from Dean Academics, TMC



The Tata Memorial Centre (TMC) is a standalone postgraduate and superspecialty institute affiliated to the Homi Bhabha National Institute (Deemed to be University) under the Department of Atomic Energy (DAE), Government of India (GOI). The Medical Council of India (MCI) has already recognized all the departments in Tata Memorial Hospital like Anesthesiology, Medical Oncology, Microbiology, Nuclear Medicine, Palliative Medicine, Pathology, Radiation Oncology, Radiodiagnosis, Surgical Oncology, etc. for MD / MS / DM / M Ch. TMC is expanding rapidly across India; and, many cancer hospitals have come up and are coming under its wing. Keeping with this increase of cancer hospitals, the medical staff is also increasing and this will result in more postgraduate and super speciality seats being made available to meritorious candidates. The institute conducts many doctoral programmes as well, and encourages research in all sub-sets of cancer biology.

The first batch of two students started their DM course in Interventional Radiology in the last quarter of 2017; the degree being recognized by the MCI, New Delhi. This course is the first of its kind in India.

Another first in the country is the approval of the new superspecialty course, the DM in Oncopathology (03 seats) by the GOI. This course has also been recognized by the MCI, New Delhi and, the first batch of three students have already joined in August 2018.

In keeping with the administrative and paramedical needs, I have proposed to start Masters in Hospital Administration and Masters in Onco-Physiotherapy after due approval from Homi Bhabha National Institute.

The Post-Doctoral Fellowship and the Ph. D programs are conducted in the subjects of 'Life Sciences' and 'Health Sciences' at our basic research facility at the Advanced Centre for Training, Research & Education in Cancer in Kharghar, Navi Mumbai.

Realizing the importance and growth of research in oncology, we felt a need for professionals to manage clinical trial sites. This received good response from science and pharma graduates; in year 2017, the fourth batch in M.Sc. Clinical Research was initiated and it received a very good response.

TMC continues to conduct various 6-month training courses in allied subjects in cancer for sponsored candidates from the Regional Cancer Centres, the Public Sector Undertaking, the State Government and the Central Government Hospitals across the country.

Annually, we have been having many medical specialists from several developing countries, as "Observers" for hands-on training in various aspects of cancer management for a varied period of duration.

Under the Memorandum of Understanding (MoU) signed with Hammadan Medical Centre, Doha-Qatar, their medical and surgical students are being trained in Head & Neck Oncology at the Tata Memorial Hospital (TMH), Mumbai as per Accreditation Council for Graduate Medical Education (ACGME) guidelines.

We have also started training of African and Sub-Saharan oncologist, nurses and radiation technologist at TMH, under the Indo-African Forum Summit – III; this program will continue for a period of three years.

The World Health Organization (WHO) and the Union for International Cancer Control (UICC) acknowledged and lauded our efforts for conducting specialized training programmes in oncology and related subjects for doctors from South East Asia Region and South African countries.

Many specialists trained at our centres are being deputed to the out-patients and day care services in our new hospitals in Sangrur, Punjab and Visakhapatnam. I am very happy to share that we have successfully commissioned Homi Bhabha Cancer Hospital at Varanasi and recently the Hon'ble Prime Minister has inaugurated Mahamana Pandit Madan Mohan Malaviya Cancer Centre at Banaras Hindu University (BHU) campus, Varanasi. Last year Dr. B. Booroah Cancer Institute (BBCI), Guwahati was successfully taken over by Dept. of Atomic Energy, Govt. of India under the umbrella of TMC.

Like every year, a summer school in Oncology for Under-Graduate and Post Graduate Students from medical colleges across the country was organized in collaboration with Kings Hospital, London in month of May 2018 and 150 students (Including 16 students from North East Region) participated in this program. We selected 05 students to undergo a months Internship program at Kings College, London (Guys Hospital & St. Thomas Hospital) on our expense.

It will be unfair to conclude my message without expressing my deep and sincere appreciation of my staff in the Department of Academics and Post Graduate Education. It is with their enthusiasm and the collective efforts of all my faculty members that TMC has become the national and international hub for education and training in the field of oncology and related subjects.



Dr. KS Sharma

Message from Director, ACTREC



The Advanced Centre for Treatment, Research and Education in Cancer (ACTREC) is in a phase of rapid evolution even as Tata Memorial Centre is itself evolving. The main mandate of ACTREC has been to conduct locally relevant basic, translational and clinical research that will advance our knowledge of cancer biology and produce results that will be useful in management of patients. In this respect ACTREC has a proud legacy, including in its earlier incarnations as the Indian Cancer Research Centre and Cancer Research Institute. To mention just one landmark, the first description of association of tobacco with a human cancer (esophageal) was the report by Sanghvi, Rao and Khanolkar in the British Medical Journal in 1955. There have been many other achievements, scientific and otherwise, in the past decades. However, it is now time to look into the future.

Several new projects are on the verge of completion within ACTREC, which will transform ACTREC in the near future into a very large and niche cancer hospital with about 900 beds. The projects are technologically and thematically complex including a Proton Beam Therapy Centre, a Centre to treat children's and hematological cancers, a Centre to treat solid tumors and an advanced centre for nuclear medicine. ACTREC will become the specialized hub of TMC where patients will come from all over India for complex treatments. Several challenges involving funding, logistics, engineering, human resource and others will have to be overcome before this becomes a reality. While overcoming these near-term challenges is crucial, we will have to remain focused on the long-term vision of our institution as a Centre that cares for cancer patients from all sections of the society, provides cost-effective and implementable solutions for oncology related healthcare problems facing our society, creates specialized human resource capacity for the country, and produces top class science. Hopefully our individual professional aspirations will meld into a harmonious amalgam which is in sync with institutional goals and vision.

All hands on the deck please.

Dr. Sudeep Gupta



Message from Director HBCHRC, Visakhapatnam



Bit by bit, inch by inch, we move on, holding onto the imperceptible increments in care of our patients, who continue to swell despite the tin roofs that hardly seem adequate to keep out the oppressive heat or the hurricanes that visit the bay with unfailing frequency.

If one were to judge our 'physical' progress, it would appear only as an eternally dusty layout with just a few additional fly-ash bricks a month, no sight signs of completion.

The proficient on the other hand, is intrigued to see a steady increase in as many screened as are treated or palliated for cancer, as in any busy hospital in a mid-sized town.

The reasons for our success, as several point out, has been a stubborn adherence to some basic principles of care and compassion, laced together with an unstinting promise to support the patient and family from the beginning until the end.

It is perhaps, the unsophisticated, humane approach that is the very essence of our practice: a personal touch to every person crossing our threshold.

We have strived develop those aspects of preventive oncology that are extremely rudimentary in this region – developing a systematised cervical cancer screening program, obtaining the coveted ISCCP accreditation, setting up liquid-based cytology and, high risk HPV identification through PCR. Aided with a strong interaction with committed volunteers and NGOs, we have taken up systematic screening of hamlets, villages, urban slums and housing societies.

The feather in the cap is the selection of our Institute to host the 14th Annual Conference of the Indian Society for Colposcopy and Cervical Pathology in April 2019.

The motivation and screening efforts are spearheaded by Dr. Leela. These are complemented where needed with simple onsite. Her expertise in complex gynaecological oncological surgeries has attracted a steady increase in referrals for multi-modal treatment.

Liquid based cytology, histopathology and immunohistochemistry have steadily become the backbone of our excellent in-house oncopathology efforts, with Dr. Sonali S Nayak's UICC ICRETT Fellowship in the Methodist Hospital at Houston and her team's training at the TMC. We now offer cancer pathology services to several gynaecologists and surgeons in the neighbourhood.

Dr. Narayanarao has efficiently managed the clinical biochemistry and tumour marker lab. He is eagerly waiting to set up an emergency biochemistry lab and nephelometry to further complement our diagnostic armamentarium.

With just 3 modalities of imaging available to us – plain radiography, mammography and sonography, Dr. Subhash Reddy Doni and the fellows posted here from TMC have done wonders in image guided needle and core biopsies to obtain tissue for an accurate diagnosis.

The decision to start palliative care early on has paid rich dividends: through Dr. Vidya Viswanath's efforts, we are not only an IAPC recognised training centre for the basic training in palliative care, but have attracted funding from the Jiv Daya Foundation. We have seamlessly integrated hospice and home care with our hospital care services, in liaison with the Sneha Sandhya Age Care Foundation.

The surgical services continue to be rendered in the Port Hospital within the city. The surgical intensive care is still being managed by the very efficient Dr. Ramkiran, who doubles up as the anaesthetist. Faculty recruitment in several oncologic sub-specialties is in urgent need.

Head & Neck oncology occupies an important place in our surgical practice. Following her training in skull base surgery in Pittsburgh, Dr. Priya and Dr. Chandrasekhar successfully completed a workshop on cadaveric prosection and live head and neck surgery for ENT Surgeons in the districts of northern Andhra Pradesh.

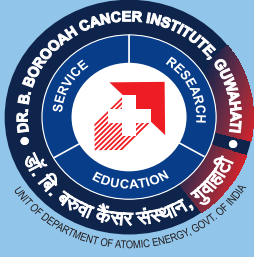
The paediatric cancer services are striking root, with Dr. Nirmalya Pradhan joining the team as faculty.

With no guarantee of an assured livelihood, the moral and commitment of temporary staff runs low, since they have never been able to extract an assurance of a career. Needless to say, at present, their trust in the employer is at an ebb. It is time that we become efficient in managing ourselves. We need to invest more in winning employees trust through an assured livelihood.

Over the ensuing years, we plan to add teaching and training programs in all areas of cancer care – medical and paramedical - nursing, pharmacy, laboratory, and imaging – through, hopefully, starting academic training in the respective oncological sub-divisions.



Dr. D. Raghunadharao



Message from Director BBCI, Guwahati



Dr. B Borooah Cancer Institute, Guwahati (BBCI) has always been a premier Institute in rendering Cancer Care Services to the people of North East India, since its inception in 1973. An essential challenge in Cancer Control is responding to new and changing factors that influence the risk of developing or progression of the disease and we have made commendable progress in mitigating the sufferings of Cancer patients.

In a landmark event on 7th June 2017, the Cabinet Committee on Security under the chairmanship of Shri Narendra Modi, Hon'ble Prime Minister of India, approved taking over of Dr. B Borooah Cancer Institute by Department of Atomic Energy, Govt. of India under the administrative control of Tata Memorial Center, Mumbai.

Accessible quality cancer care goes hand in hand with having trained personnel to deliver it. This realization sparked the beginning of M.Ch in Surgical Oncology, DM in Medical Oncology and MD in Radiotherapy in Dr. B Borooah Cancer Institute. Further in collaboration with the TMH, Mumbai, BBCI has introduced Two Year Post Graduate Fellowship Programme in Surgical Oncology, Medical Oncology, Head and Neck Oncology, Onco- Pathology and Precision Radiotherapy. These elite trained personals will spread the span of cancer care throughout North East India and beyond.

We at BBCI remain committed to advancing scientific progress and facilitating its application in our practice. In this respect, the First Annual North East Evidence Based Management Conference on cancer was held at BBCI from 23rd to 25th November 2018 with support from TMC, Mumbai.

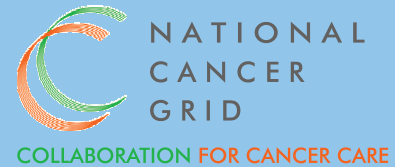
Under the DAE and as an administrative unit of TMC, Mumbai the institute has made a huge leap towards providing affordable state-of-the-art cancer treatment to the people of North East India.

The Institute has partnered with various National organizations and International research groups to combat cancer. BBCI was one of the three participating centers from India to take part in international population based cancer survival study (CONCORD) with Cancer Research UK, which was published in Lancet. It is a matter of pride that PBCR, Kamrup at BBCI under the network of NCRP (ICMR) has been able to publish its cancer incidence in CI-5 report published by IARC, Lyon, France. The Institute has collaborated with the Public Health Foundation of India and also will participate in research under the National Cancer Grid. Emphasis has been laid on community oncology and palliative medicine being important component of cancer control.

We at Dr B Borooah Cancer Institute firmly believe that our devotion holds true for all our patients and we are relentless in our pursuit of delivering the best possible Cancer Care.

Dr. Amal Ch. Katak

The National Cancer Grid



The National Cancer Grid (NCG), an initiative of the Department of Atomic Energy, Government of India, was created in 2012 with the broad vision of creating uniform standards of cancer care across India. Five years later, it has grown to a large network of 171 cancer centres, research institutes, patient advocacy groups, charitable organizations and professional societies. Incorporating virtually all stakeholders of cancer care in India, it has now become a strong, unified and powerful voice in the fight against cancer.

The mission statement of the National Cancer Grid is as follows:

The National Cancer Grid will create a network of cancer centres across India with the mandate of establishing uniform standards of patient care for prevention, diagnosis, and treatment of cancer, creating adequate trained human resources, and facilitating collaborative basic, translational and clinical research in cancer.

Funded primarily by the Government of India through the Department of Atomic Energy, the NCG has revolutionized cancer care in India by establishing the largest cancer network in the world.

Uniform standards of care – NCG Consensus Guidelines

Uniform standards of patient care are likely by consensus on implementation of uniform cancer care to patients from all over the country at their doorsteps by adopting evidence-based guidelines for treatment. The National Cancer Grid guidelines on management of common cancers have been endorsed by all participating centres and are periodically modified as new evidence is generated. Adherence to these consensus guidelines is also being evaluated by conducting institutional peer reviews of the constituent centres. Currently a voluntary initiative, teams of experts drawn from other NCG centres conduct site visits after months of exchange of data and performance metrics, to identify strengths and gaps, and opportunities for improvement which are then shared with centres as a peer review report.

External Quality Assurance Schemes (EQAS)

Quality assurance programmes are underway in surgical pathology and being planned in radiation oncology. A web

based platform has been created as an External Quality Assurance Service (EQAS) in surgical pathology (H&E and immunohistochemistry), similar to the College of American Pathologists' (CAP) programme. This service is provided free to member institutions and has been simplified to create a hasslefree experience for participating centres. Regular feedback with scores and suggestions for performance improvement are shared confidentially with member organizations. The success of this programme has spurred similar quality assurance project plans for other diagnostic laboratories and radiation oncology.

Leveraging technology for patient care

Modern cancer treatment is increasingly complex and mandates that multidisciplinary teams are actively involved in treatment decisions. Three initiatives of the NCG ensure that gaps in quality of treatment decisions are narrowed.

Second opinion service for patients – “Navya”

The first, the TMC-NCG-Navya solution is a second opinion service for patients across India and other countries across the world. Patients can upload copies of their investigation reports, radiology and pathology images, which are curated by a group of trained individuals, who then convert these into a structured format, including patient preferences and opinions. This structured data is shared using a mobile app with experts across the NCG along with evidence and experienced based treatment options using cutting-edge machine learning technology. NCG experts provide an expert opinion which is then transcribed and fed back to patients in easy to understand language.

NCG Virtual Tumor Boards

The second initiative, the NCG Virtual Tumor Boards (VTB) work on leveraging the proven benefits of getting multidisciplinary teams to work on treatment decisions. Complex clinical situations in cancer are presented to peers with expertise and experience in cancer care using a web-based platform – anywhere upto 150 experts log on at a prespecified time and discuss optimal treatment of patients from cancer centres across the country. In addition to assisting with treatment decisions for individual patients, the process reinforces the importance of multidisciplinary

treatment decision making, and provides an excellent opportunity for participants to learn from collective experience and expertise of a large number of oncologists.

Digital Nerve Centre for cancer care

The Digital Nerve Centre for cancer care, established by the Tata Consultancy Services, acts as a one-stop centre for fulfilling most pre-consultancy needs of patients with suspected or diagnosed cancer. Trained doctors and other professionals interact directly with patients with suspected or diagnosed cancers, guide them to the nearest NCG cancer care facility, fix appointments with concerned experts relevant to their disease, and ensure that patients follow up on the prescribed investigations and treatment.

Price Discovery Cell / Group negotiation for equipment, drugs and consumables

Exploiting the volumes of individual cancer centres, an effort is being made to consider the feasibility of group negotiations for equipment, drugs and consumables. Small and medium sized cancer centres find it difficult to negotiate competitive prices with equipment manufacturers and the pharmaceutical industry. By aggregating the demand for these, the NCG is working on a solution wherein “price discovery” of commonly used, high-value items are negotiated with industry, thereby passing on the benefits to member centres and onwards to patients. Using transparent policies for tendering and a web-enabled e-tendering platform, this initiative will bring down current costs of cancer care significantly.

Continuing Medical Education – NCG National Cancer Library

The NCG is a platform for exchange of specific expertise and skills and is likely to reduce the gap in outcomes between more and less experienced centres. It facilitates mentorship and proctoring of specific skills between centres, matching needs with institutions with the requisite expertise. In addition, the NCG has facilitated free unrestricted access to major cancer journals and books to all member centres thereby enabling specialists in these centres to be updated on the latest advances and research in cancer. E-access to over a hundred journals and books on cancer are provided to all NCG members, thereby providing a resource which would have been otherwise out of reach for the smaller centres. Inter-library loans and specific manuscript requests are also handled routinely by the NCG Virtual library.

Unique Educational Initiatives – “Traveling Schools of Pathology and Oncology Nursing”

Recognizing the difficulty of specific regions of the country like north-east India to travel to major cities to participate in continuing medical education programmes, the NCG regularly organizes the “travelling school of pathology”, a fresh initiative which takes training in surgical pathology to the doorsteps of these regions. A team of expert pathologists and surgeons drawn from experienced NCG centres, travel to several cities in the north east, conducting a series of workshops along with local faculty and train hundreds of pathologists and surgeons in best practices in cancer surgery and pathology reporting. Follow up workshops and contact meetings are planned to reinforce the learning from these workshops. Based on the success of the workshops in surgical pathology, similar workshops have also been conducted in oncology nursing. The travelling school of surgical pathology is being replicated in other parts of the country as well, starting with Karnataka.

Training in Cancer Research Methods – International Collaboration on Research methods Development in Oncology – CreDO workshop

The NCG also conducts highly specialized workshops on clinical cancer research methods, training researchers from across the country and abroad. In an intensive residential workshop, assisted by 25 faculty, close to 50 participants convert one page concept sheets on research ideas by junior faculty and trainees into full fledged research protocols ready for submission to ethics committees and granting organizations over six days. In addition to this resulting in several projects being submitted and initiated, this also enables participants to mentor their colleagues and students in their respective institutions. The international Collaboration in Research methods Development in Oncology (CRDO) is supported by the National Cancer Institute (NCI), USA, King’s College London, American Society of Clinical Oncology (ASCO), Indian Council of Medical Research (ICMR) and endorsed by the European Organisation for Research and Treatment of Cancer (EORTC), Medical research Council (MRC), UK, Cancer Research UK (CR-UK) and the ACORD initiative, Australia. Three editions of this highly successful workshop have been held to date.

NCG funded multicentric collaborative research

The NCG facilitates and funds collaborative multicentric research in cancers common or unique to India. By fostering a culture of cooperation and close collaboration between centres, it creates a far more efficient system of conducting clinical trials. The focus of research is on finding cost effective, readily implementable interventions in all levels of cancer care in the country, thereby emphasizing its commitment to provide affordable, equitable cancer care across the country. There is a strong commitment to data sharing, which is a mandatory requirement for funding by the NCG. So far, seven large multicentric clinical trials have been funded and supported by the NCG in different cancers. Currently, nine large multicentric studies have been supported by the NCG

Future Plans

Future plans of the NCG include a concerted and systematic effort at health promotion and cancer awareness, targeted at the general population. This is towards a longer term impact by improving awareness of cancer as a potentially

curable disease if detected early, and healthier lifestyles. Augmentation and optimization of palliative care facilities in India is a priority area – a study to evaluate the gaps in provision of palliative care has already been undertaken by the NCG. With a long term plan to formulate a robust health technology assessment plan for cancer in India, initial steps are being taken to evaluate “value” of various modern cancer treatment. The NCG guidelines are also planned to be classified separately as “minimal”, “optimal” and “optional” to guide patients as well as public health policy makers.

Summary

The National Cancer Grid has grown over the past six years into a large and cohesive organization with significant impact on cancer care, training and education, research and policy in India. It serves as an exemplar for other disease groups to emulate and make a difference in overall healthcare delivery in India. With the continued spirit of collaboration and cooperation between the centres and the ongoing support from the DAE, it seems certain that its role will further expand and transform the way cancer is treated in the country.



Summary, Executive



The over 50 year old Tata Memorial Centre (TMC), an established authority on cancer management in India, treated cancer patients who flocked from all over the country and, churned out trained and qualified cancer specialists who practised oncology globally. All doctoral and post doctoral courses from 2008, were conducted under the Homi Bhabha National Institute (HBNI), a Deemed University established by the Department of Atomic Energy (DAE), Government of India (GOI) in 2005.

The TMC, a Grant-in-Aid institution of the DAE, GOI, comprised of nine centres - the main Tata Memorial Hospital (TMH) in **Mumbai**; the Advanced Centre for Treatment, Research & Education in Cancer (ACTREC) at Kharghar, **Navi Mumbai**; the Centre for Cancer Epidemiology (CCE) at Kharghar, **Navi Mumbai**; the Homi Bhabha Cancer Hospital & Research Centre (HBCHRC) at Aganampudi, **Visakhapatnam**; the Homi Bhabha Cancer Hospital (HBCH) at **Sangrur**, Punjab; the Dr. Bhubaneswar Borooah Cancer Institute (BBCI) at **Guwahati**; the Homi Bhabha Cancer Hospital at **Varanasi**; the Homi Bhabha Cancer Hospital & Research Centre (HBCHRC) at **Mohali**, Punjab. The Mahamana Pandit Madan Mohan Malaviya Cancer Centre (MPMMCC) at Banaras Hindu University (BHU), **Varanasi** was due to be operational by February 2019.

The year 2018 saw the full-fledged activities for the commissioning of the 179 bed Homi Bhabha Cancer Hospital (HBCH), Varanasi in the month of May. Dignitaries like the Chief Minister of Uttar Pradesh, Shri Yogi Adityanath, Union Minister of Railways and Minister of Coal, Shri Piyush Goyal, Chief priest of Kashi Vishwanath temple, Dr. Shrikant Mishra and Swami Shri Varishtanandji from the Ramakrishna Organizations visited the hospital around its commissioning period. There was increased impetus to ensure that the other 350 bed cancer hospital (the Mahamana Pandit Madan Mohan Malaviya Cancer Centre) in the campus of the Banaras Hindu University (Varanasi) was commissioned by the first quarter of year 2019.

The management lauded the efforts of Tata Trusts who were involved in the complete constructions of the two cancer centres in Varanasi and also for equipping one of them, the HBCH - Varanasi.

The bed strength of HBCH, Sangrur was increased from 30 to 100 and, the Government of Punjab donated generously for establishing an Interventional Radiology section in the hospital; the first in the State of Punjab.

Efforts were ongoing to commission the Radiotherapy Block at HBCHRC, Visakhapatnam and, of the HBCHRC in Mullanpur, Mohali at the earliest.

Revamping was also planned for the recently acquired Dr. B. Borooah Cancer Institute, Guwahati. Any deficiency, in terms of facilities, equipment, staffs etc. were to be addressed and the dilapidated Academic block was to be demolished to construct a new Ancillary Building.

Talks were ongoing for the construction of a dedicated cancer wing in the campus of Sri Krishna Medical College (A Bihar Government Undertaking) in Muzaffarpur, Bihar under the aegis of TMC by the DAE and the Government of Bihar.

It should be emphasized here that the cancer related drugs and consumables were supplied to all the patients (of TMC & its satellite centres) at a substantial lower cost than the Maximum Retail Price (MRP). The costs of various investigations were also lower than those prevalent in the respective towns or cities. In general, the cost to patients for their cancer management was cheaper at TMC satellite centres outside Mumbai.

The Information Technology (IT) department played a vital role in the pre-clinical setting up of these above centres. After structural completion, the role of IT was pivotal in the way the centre would be managed, within and in tandem with TMH. For data uniformity that facilitated ease of use and data harvesting, various patient related web-based administrative and clinical information systems, akin to those existing in TMH were implemented in HBCH, Sangrur; HBCH, Varanasi and at BBCI, Guwahati. Work was in progress for similar facilities at HBCHRC, Visakhapatnam and for MPMMCC in Varanasi.

All TMC satellite cancer centres had provisions of smart cards for patients that would enable them to make cashless transactions and also to see their reports online. Provision was also made for seamless patient referrals across these centres without the need for re-registration and, also for their data to be viewed and updated across these centres.

A lot of new activities were seen in the ACTREC campus. There was increased Out-Patient load at ACTREC in the past few years as new patient registrations were accepted there. There were space constraints and in 2018, a new spacious and well-designed patient waiting area was created on the ground floor with all amenities.

The structural work for the installation of the **National Hadron Beam Therapy** in the ACTREC campus in Navi Mumbai had begun and was due for completion in 2020.

The ACTREC campus was also to house a separate building, the Radiological Research Unit (RRU) for conducting scientific & research work in Nuclear & Molecular Imaging, Radiotherapy and Radiodiagnosis. Work for the same was ongoing and the structure would be completed in 2019.

Work had begun for a separate wing in ACTREC, the Hematolymphoid, Women & Children Cancer Centre (HWCC) that was to be dedicated to patients with Hematolymphoid cancers and, for Women & Children with cancer. The work began in the end of year 2017 and was expected to be completed in 2020.

The National Cancer Grid (NCG) funded through the DAE, continued to grow and now had more than 170 centres across India. As its offshoot, the NCG Virtual Tumor Board (VTB) grew as a web-based platform that included online, multiple clinical experts to address complicated patient management issues.

The **TMC-Navya** online second opinion cancer services continued to be popular with the general public. More than **26000 patients** from over **60 countries** have utilized this service.

The first batch of 30 students was enrolled in April 2018 for the first of its kind in India, the one-year Advanced Diploma in Patient Navigation called "**Kevat**". This course, started by TMC was in collaboration with the Tata Institute of Social Sciences (TISS) and with the support from Tata Trusts. The aim of initiating this program was to create a specialized workforce of trained professionals that would help patients manage their medical experience, co-ordinate their care and assist them to navigate through the complicated and multi-step medical system. The navigators would also be empowered to address multitude of patient needs including communication and counselling.

The beneficial TMC training of African, Sub-Saharan country doctors and nurses under the **Indo-African Forum Summit III** was extended for another period of 3 years.

The annual fellowship and exchange programs for cancer research and education continued between King's College, London and TMC.

TMC continued to provide the highest standard of patient care through its services and research, and capacity building by imparting knowledge through various educational activities.

TMC was accepted as a **recognized training center in cancer education and research** by several national and international organizations, including the World Health Organization (WHO), the International Atomic Energy Agency (IAEA) and the International Network for Cancer Treatment and Research (INCTR).

There were few **important scientific contributions** that would make significant positive impact on cancer management, and

these included; that the beneficial effects of pre-operative exposure to progesterone were mediated by modulation of surgical stress; development of a freely available **PDZ** (Post-synaptic density, *Drosophila* disc large tumor suppressor and *Zona occludens*) protein database, the **PDZscape** that consolidated the mutations & diseases associated with PDZ containing proteins; established that the loss of Plakophilin3 (**PKP3**) led to increased tumor formation and metastasis; that the role of proteasomal activity was essential for survival and recurrence of radiation-resistant glioblastoma cells; and, a novel Ribonucleic Acid (RNA) in situ hybridization (**ISH**) based methodology called **RNAscope Assay** that detected Human Papilloma Virus (HPV E6/E7) messenger RNA (mRNA) of seven high risk HPV subtypes in Formalin Fixed Paraffin Embedded (FFPE) tissue samples.



Tata Memorial Hospital (TMH), Mumbai - Maharashtra

The medical and non medical staff created a humane, selfless and timeless work culture in the hospital that was unique to this institution. A great part of this credit was due to the essential contribution of other diligent, silent and strong pillars of the hospital that held all together and made this hospital as one of the best in the world for cancer care. These praiseworthy workers were the Nurses, the paramedical staff and the Class IV employees, who worked selflessly, untiringly and without harnessing any thoughts of recognition, reward or award. This built the strong TMH or TMC selfless work culture that made it different than any other institution in India or abroad. They worked respectfully beyond their call of duty to willingly help the patients and the staff. Reluctance, bias or bribery was unheard of, and honesty was their policy.

The medical and non medical staffs were instrumental in setting up their respective departments and sections at all the TMC satellite cancer centres. This involved frequent travel to the far off centres and offering regular guidance from Mumbai. They ensured that all systems and functionalities were mirrored to those in TMH for the ease and benefit to patients and the staff. The activities included procurement of equipment, their placement, installations, commissioning, the infrastructure and recruitment of all manpower. They worked diligently to make those centres on par with TMH. These activities were performed in addition to their routine work at TMH in Mumbai.

The uniformity of various patient and administrative related web-based modules made it easy for the TMH patients to continue their treatment at other TMC satellite centres, or those who were referred to TMH for management. The live viewing and updating of patient records made it easier for the clinicians to treat patients from any TMC's satellite centre.

To accommodate the growing needs of the hospital and the increasing patient load, the Government of Maharashtra allocated a 5-acre plot of land in the *Haffkine Institute* for Training, Research and Testing in Parel, Mumbai near the hospital. This plot of land would be used to construct a new hospital with residential quarters for doctors and, a Dharamshala for patients. With additional infrastructure, TMH would be in a position to deliver state of the art treatment services to many more needy patients in an effective and efficient manner. For the benefit and convenience of the patients, the Dharamshala would be the first structure to be constructed and, about 25 % of the work was already completed.

The hospital witnessed less patient crowding in the essential service areas due to the efforts of the management that began the process of segregation of the non-essential patient services from the clinical service areas. Restrictions were in place to not permit more than two attendants per patient as another effort towards decongestion of the hospital. The staggered appointment system was enforced and this would further reduce crowding and confusions.

Poor patients of the State were making use of the recently launched, the **Mahatma Jyotiba Phule Jan Arogya Yojana (MJPJAY)** Scheme by the State of Maharashtra.

Taking digitalization forward the hospital became almost paperless, filmless and cashless. More than 95 % of the patients dealt with cashless transactions through the use of their TMH provided smart cards.

Till date, there were 219824 active Smart Card users that carried out 1388980 transactions to the tune of almost INR 3,00,00,00,000/-

The numbers of patients registering online increased to more than 8500. Of the total registration of almost 75000 new patients, majority provided government issued documents like driving license, voters Id, senior citizens card, Aadhar Card etc. to ascertain their identity, and the demographics for travel concessions, epidemiological studies etc.

Mouth and Breast cancers continued to be the leading cancer sites for males and females respectively.

Services

The TMH bed strength remained at **629**, but the new patient registrations increased to **74428**, an increase of almost 4 % from last year. The marked increase was in Preventive Oncology that saw a rise of over 25 % (7179). The patients referred for second opinion numbered over **21582**. Patients from Northern and Eastern parts of India constituted the

maximum numbers, with 10659 and 5625 from Maharashtra and Mumbai respectively.

There were over a thousand foreign nationals who had registered.

TMH continued to provide comprehensive cancer management through the eleven (11) Disease Management Groups (**DMGs**) that applied evidence-based medicine guidelines to all patients. The institution got closer to provide personalized management in cancer. The cancer care was comprehensive and began from early cancer detection and prompt initiation of appropriate therapy that lasted till cancer control and which, continued into palliative measures and rehabilitation. Stress was laid on Quality of Life of patients that extended till End-of-Life care wherever possible. The government along with volunteers and Non Government Organizations (**NGOs**) contributed socioeconomically in many ways to help the poor and needy in all possible manners.

The advances in genotyping, newer variants & types of pharmaceuticals, and molecular studies, the department of **Medical Oncology** became a vital cog in cancer treatment. Many cancers previously being amenable to only surgery / radiation were now treated by newer systemic regimes, especially in Head & Neck cancers. Depending on the type of cancer, the therapy included chemotherapy, targeted-therapies, hormonal therapy, immune therapy and Bone Marrow Transplantation (**BMT**). The aim of the department was to provide as personalized cancer treatment as possible with best outcomes balanced against side effects and toxicity. The department of 29 fulltime medical oncologists attended to more than **42000** new adult and over **2000** patients with childhood cancers. With help from various Non Government Organizations (**NGOs**), the department ensured that there was more than 95 % compliance to treatment. The Treatment Refusal & Abandonment (**TR&A**) in children was at a remarkable 4.4 % and the overall 5-year survival in children with cancer below 15 years of age was more than 70 %.

The **Medical Oncology Molecular Laboratory** started by the department of Medical Oncology, worked in collaboration with the Pharmacology department and other research laboratories at ACTREC. They processed over **2000** samples in 2018. The laboratory offered Sequencing and Next Generation Sequencing tests at low cost testing to all patients across India. Liquid biopsies were recently introduced.

Surgery remained the treatment option for most tumorous cancers. The department of **Surgical Oncology** with a team of 40 surgeons performed over **26000** surgeries. They also continued to offer their expertise to the TMC satellite centres across India. The year saw the crossing of **1000 Robotic surgeries** in TMH. Intra-operative Neuromonitoring (**IONM**) was actively initiated in neuro surgery as a routine. Under the Memorandum of Understanding (**MoU**) with the Government of Maharashtra, the department continued to offer basic surgical facility in about 30 districts across Maharashtra State.

Except in cases for palliative care and to treat few acute cancer-related issues, Radiation therapy usually partnered surgery or chemotherapy in cancer management. The department of **Radiation Oncology** with a strength of 19 consultants and 13 medical physicists, provided radiotherapy using Linear Accelerators (06), Telecobalt (04) and Brachytherapy (01) machines with use of intracavitary and interstitial devices. To accommodate the increasing workload (6742 patients referred out of TMH for radiotherapy), the department increased the daily working hours. External Beam Radiotherapy was provided to **8154** patients; a 11 % increase. For patients with advanced gynaecological cancers, new applicators were procured that facilitated image based Brachytherapy. As part of patient care and for patient's subjected to Brachytherapy, 30 dedicated beds were reserved for radiation oncology department. The number of patients offered Brachytherapy increased by almost 17 % to a figure of **4009**. To ensure accurate and quick data transfer from CT / MRI / PET scans and Treatment Planning System to the Linear Accelerators for conformal radiotherapy, Stereotactic Radiotherapy / Radiosurgery (**SRT/SRS**) and Intensity Modulated Radiotherapy & Radiosurgery (**IMRT/IMRS**), the **Aria Networking System** was in place. The Radiation Oncology Information System (**ROIS**), a web based application, was seamlessly integrated at TMH and ACTREC in 2018. With visions of improvement in workflow and patient safety, a voluntary online error reporting system, the TMC Radiation Oncology Incident Program (**TRIP**) was initiated.

The department of **Medical Physics** complemented the Radiation Oncology department by performing machine Calibrations, Quality Assurances, maintenance of the Teletherapy and Brachytherapy machines, formulating treatment planning & dosimetry, procurements of radioactive sources etc. The department had at its disposal many sophisticated equipment like treatment planning systems TPS (Eclipse, Oncentra, i-Plan, Tomoplan, C-Arm, etc) to carry out these planning, calibrations, tests etc.

The department also looked after the radiation safety aspects at all levels in the department as well as in the hospital. They advised departments like Radiodiagnosis, Interventional radiology, Nuclear medicine, Transfusion medicine, Tissue banking and the facilities at ACTREC for their requirements of radiation protection and safety, Quality Assurance (**QA**), source procurement and their disposal as per the Atomic Energy Regulatory Board (**AERB**) guidelines.

The **Palliative Medicine** department was an unassuming profound section of the hospital that played a vital role when all the above treatment modalities were ineffective and in general, to improve the quality of life of patients and alleviated their sufferings. The popularity of home-care visits resulted in setting up of a new Home Care Team that operated from the ACTREC campus and offered support to **3295** patients (an 55 % increase). There were a total of **7457** new referrals for palliative services that included 333 paediatric patients.

Prevention is better than cure; an old adage. The department of **Preventive Oncology** conducted Information, Education and Communication programmes that created awareness to early warning signs of common cancers, risk prevention and life style modification. The public was made aware of the harmful effects of tobacco and alcohol through cancer awareness drives. Workplace tobacco cessation programs were also in place. The department interacted with all DMG's to identify patients in need of such therapeutic exercises. The department attended to **13387** patients in the year 2018. The department registered **7179** (an 26 % increase) new and 6208 follow-up patients for screening services. The department screened 3788 new women for oral, breast and cervical cancers under its community based cancer screening programs.

The department of **Anesthesiology, Critical & Pain** was the sublime backbone of the hospital with a fulltime staff of 27 that provided anesthesia for surgery and during invasive diagnostic / therapeutic procedures; managed patients during recovery from surgery and, those with treatment or disease related life-threatening complications; and, treated patients with cancer-related acute or intractable pain. There were 16 Operating Theatres and 09 other locations where anesthetic services (**17670** patients) were offered. The Critical Care division looked after 14 beds Intensive Care Unit (**ICU**), 09 beds Surgical ICU and 29 beds Postanesthesia Care Unit. There were **2250** ICU and **9234** Recovery admissions. The Pain group managed **3101** patients of acute pain and **10191** with chronic pain.

The body fluid and tissue analysts held the compass that directed the clinicians towards appropriate treatment in cancer. The department of **Pathology** offered diagnostic services to **64869** histopathology cases. A total number of **5513** frozen section samples along with **145737** immunostained slides were examined; an increase of 19 % from 2017. All pathology and related services were accredited by the National Accreditation Board for Testing & Calibration Laboratories (**NABL**). The department maintained a National Tumor Tissue Repository to facilitate translational research. The External Quality Assurance Scheme (**EQAS**) for immunohistochemistry was continued for the laboratories under the aegis of the National Cancer Grid (**NCG**). Synoptic reporting was initiated from early 2018 that permitted uniform and unequivocal interpretation of reports. In a first in India, the department enrolled three (03) students for a MCI recognized degree in Oncopathology under HBNI.

The **Molecular Pathology** department made use of techniques that aided diagnosis, prognostication and prediction for solid tumors. The department performed **4705** tests on solid tumors. Two (02) new relevant molecular diagnostic assays were introduced in the year 2018. The molecular pathology department worked in tandem with the

Medical Oncology Molecular Laboratory and with other laboratories at ACTREC including their Pharmacology division.

The **Cytopathology** department introduced liquid based cytology as an additional test to improve diagnostic yield. The departmental workload consisted of **23078** samples and **100828** smears. The EQAS of diagnostic cytopathology service showed an 11% increase of participants (260 to 290) compared to the previous year.

The department of **Clinical Biochemistry** performed 52 chemistry assays on less than half millilitre of blood and processed almost 3000 tests in an hour. The Investigations were performed using more than 135 different types of assay analysis. The department's Tumor Marker assays and Serum protein electrophoresis were considered as National benchmark. A total of **3529915** Biochemistry investigations and **234087** tumor analysis were performed. Newer tests introduced were Testosterone, Troponin I, estradiol and Follicle-stimulating hormone.

The department of **Microbiology** had the state-of-the-art equipment for rapid and accurate diagnosis of bacterial, fungal and viral infections. A separate Virology section was planned for the benefit of bone marrow transplant patients and for those with hematolymphoid malignancies. The department had the latest equipment to diagnose and detect drug resistant tuberculosis. Institutional issues pertaining to hospital infection surveillance and prevention, water quality testing and, of waste management were also under their purview. A total of **223062** samples were processed by the department of Microbiology; an overall increase of 9 %.

Stock and supply of safe blood and its components were a necessity in the hospital. The department of **Transfusion Medicine** emphasized on blood collection and its safety. In year 2018, the blood camps collected almost 15000 units of blood. Thirteen platelet donor camps were also conducted and 41437 blood components were made from them.

The clinicians need to know the anatomical origin and extent of the tumor before initiating therapy. The department of **Radiodiagnosis** was fully and adequately equipped with all modalities. The year saw a marked increase in Interventional radiological procedures that more than doubled to reach almost 10000. A total of **189576** investigations were performed in the department. Two candidates were selected of the recently started DM in Interventional Radiology under HBNI.

The **Nuclear Medicine & Molecular Imaging** department continued to perform the largest number of Positron-Emission Tomography (**PET**) scans in the country. The department had three PET-CT (Computed Tomography) and one Single-Photon Emission Computed Tomography (**SPECT**) CT scanner and, **16681** PET-CT and **4925** SPECT scans (almost a 25 % increase) were done in the year 2018. The department had five (05) beds in the hospital for radioisotope therapy isolation.

Mental well being was also an essential part in cancer management for both, the patient and their caregivers. The **Psychiatry** department offered psychological assessment to cancer patients, individually as well as group therapy. The psychoeducational and support activities involved the caregivers and the survivors. In year 2018, their services were utilized by **3722** patients (an 18 % increase).

The physical rehabilitation of cancer patients was performed by the **Physiotherapy** department and **218982** patients benefitted (an 18 % increase). These services included mobilization, ambulation, breathing exercises, management of neck & shoulder dysfunction, etc.

The personal productivity of cancer patients was looked into by the **Occupational Therapy** department in collaborated with their Rehabilitation and Research Centre (**RRC**) at Dr. E.B. Memorial Home Bandra. Limb prosthesis, Back braces, jaw stretcher keys, lymphedema kits etc were provided to patients. A total of **13748** patients were attended upon by the departmental staff.

Speech and swallowing were the common issues with head & neck cancer patients. The services of the **Speech & Swallowing Therapy** were well utilized for dysphagia rehabilitation and for voice modulation. A total of **10892** patients attended the department, of which 5293 were new patients. Twenty three (23) patients were provided with electrolarynx and Laryngectomy Volunteer Support services were initiated in late 2018. The first TMC Fellowship was started in Speech & Swallowing therapy.

Maintaining dental and oral hygiene was very important for clinicians subjecting patients to surgery or radiotherapy for Head & Neck cancers. The **Dental & Prosthetic Surgery** unit was involved in maxillofacial prosthetic rehabilitation & dental care for head & neck, and other cancer patients. The department staff provided consultation to **22652** patients and **1292** patients (a 17 % increase) were offered prosthesis.

Evaluation of the general health of cancer patients, especially the cardiac and respiratory system was of prime importance. The **General Medicine** department looked into the management of medical co-morbidities of the heart and lungs in patients undergoing surgery, radiotherapy and chemotherapy. The department provided a total of **14600** consultations during the year and, performed **12383** echocardiography tests, **4968** (a 16 % increase) pulmonary function tests and **40752** electrocardiograms during the year. The department also had specialty clinics for Acquired Immune Deficiency Syndrome (**AIDS**) Malignancy, Cancer Thrombosis and Cardio-Oncology.

Besides managing gastrointestinal cancers and performing diagnostic and therapeutic endoscopies, the department of **Digestive Diseases & Clinical Nutrition** also provided clinical nutrition services to cancer patients and to the hospital staff. The department performed **7389** endoscopies, evaluated **1994** patients in the hepatology clinic and advised

appropriate nutrition to **22262** cancer patients; a 23 % increase.

The **Tissue Bank** produced over **10000** grafts from amniotic membrane, bone and tooth that were utilized by almost 700 hospitals across the country.

Education

The Academics division of Tata Memorial Centre was affiliated to Homi Bhabha National Institute (**HBNI**), Mumbai – a Deemed University of Department of Atomic Energy (**DAE**), Government of India. The Medical Council of India (**MCI**) recognized all the departments in Tata Memorial Hospital; MD - 08, DM - 06 & M.Ch - 04. As first in the country, TMC started post doctoral courses, the DM in Interventional Radiology and in Oncopathology recently. Keeping the expanding TMC requirements due to establishment of satellite cancer centres across India, Masters Degrees in Hospital Administration and in OncoPhysiotherapy were planned. Recently, the M.Sc. in Clinical Research was also started. Many PhD courses were offered in basic sciences at the research centre at the Advanced Centre for Treatment, Research & Education in Cancer.

Besides the degree courses, the institution offered many short term diploma and fellowship courses that were approved by HBNI or the State of Maharashtra.

In the year 2018, a total of 153 students successfully completed their doctoral and post doctoral degree / diploma courses.

TMC was also a recognized training centre for cancer by several national and international organizations, including WHO, IAEA and INCTR. Many doctors from Middle East and African countries visit the institution for training.

More than 500 national medical specialists visited TMH as observers along with 66 foreign medical faculties.

The academic section continued the Summer School in Oncology – 2018 in collaboration with Kings College, London, UK. One hundred fifty (150) students including sixteen (16) from North East parts of India participated and five candidates were selected for free one month's Internship at Kings College, London.

Research

Research was a strong ingredient of TMC values and formed the core of TMC culture. It was the Clinical Research Secretariat (**CRS**) along with the Department of Atomic Energy Clinical Trial Centre (**DAE-CTC**) that facilitated and promoted research within the institute. The majority of the research works including translational ones, animal studies etc. were carried out at ACTREC, the research arm of TMC. For 18 intramural trials, the DAE-CTC allocated a sum of INR 14496302 /-. Twenty five (25) Clinical Research related articles were published in the year 2018.

The two (02) Institutional Ethics Committees (**IEC**) in TMH ensured the highest standards in scientific research. These IECs were accredited by the National Accreditation Board for Hospitals and Healthcare Providers (**NABH**) and the Association for the Accreditation of Human Research Protection Programs (**AAHRPP**). All research projects, student thesis, and pharmaceutical sponsored trials were scrutinized and approved by the IECs. The IEC received 255 projects in the year 2018; of which, 237 projects were approved.

The Data Safety Monitoring Unit (**DSMU**), one each per IEC ensured the integrity of scientific and ethical aspects of research and, the safety of patients enrolled in those trials. A total of 718 Serious Adverse Events (**SAE**) were reported from 51 clinical trials. The DSMU reviewed 354 status reports and monitored 23 investigator initiated studies.

The Research Administrative Council of TMC (**TRAC**) maintained and improved all aspects of basic, translational and clinical research in the institute. It implemented systemic and comprehensive Human Research Protection Program that afforded protections for all research participants.

There were 388 International and 148 National publications along with four (04) books published and chapter contributions in 56 medical books by the staff. Around ninety (90) conferences and workshops were conducted in the year 2018.



Advanced Centre for Treatment, Research & Education in Cancer (ACTREC), Navi Mumbai - Maharashtra

The **Advanced Centre for Treatment, Research and Education in Cancer** (ACTREC) the R&D wing of the Tata Memorial Centre in Kharghar, Navi Mumbai comprises: (1) the Clinical Research Centre with 120-bedded Hospital that together tackle clinical and translational cancer research and treatment of cancer patients, and (2) the Cancer Research Institute that focuses on basic and applied research on cancer. Clinicians and scientists 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 2018, there were 222 on-going projects at ACTREC; 195 of these projects received financial support of Rs.8.68 crores from governmental agencies such as DBT, DST, ICMR, etc. In addition, 8 new extramurally funded projects were sanctioned Rs.7.66 crore for a three year period by these funding agencies for which Rs. 1.5 crore has been received for the calendar year . Research carried out by faculty of the Centre resulted in 144 total publications in 2018, of which 120 were in reputed international journals, 19 in widely circulated Indian journals, 5 were book chapters and 1 research led to a US patent. During 2018, 52 regular staff members were appointed at the Centre in the medical, scientific, technical, nursing and administrative cadres.

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 120 beds including 88 ward beds, 10 ICU and Recovery beds, 6 bone marrow transplant beds and 16 Day care beds. The hospital renovated and made functional 3 Operation theatres with state of the art technology as part of Phase I of OT/ ICU complex renovation. Each of these theatres take up approximately 50 major cancer surgeries/ month for regions including Breast, Head & neck region, Gastro intestinal and Urogenital. The new Patient waiting area with a seating capacity for 100 patients was made functional. This project designed with patient requirement in mind has helped in creating an optimal waiting facility and made waiting for consultation/Daycare/diagnostic report convenient as well as decongested the OPD area of the hospital. A total of 7154 cases were registered in the year 2018, of which 1219 new cases were registered directly at ACTREC and rest were transferred from TMH. The total numbers of admissions were 4771 with 23315 inpatient days. The Day care ward has taken about 100 patients per day during 2018 for chemotherapy, hydration and transfusion.

The department of **Medical Oncology** administers chemotherapy in the neoadjuvant, adjuvant and palliative setting for solid tumors. In 2018, the adult solid tumor unit dealt with ~16,000 out-patient visits. The Bone Marrow Transplant unit has performed 62 transplants at ACTREC in 2018. Over 10,000 out-patient visits from hematolymphoid and BMT unit took place during 2018. The pediatric medical oncology unit attended to 5000 out-patient visits in 2018. The department of **Radiation Oncology** provides high quality radiotherapy services and generates evidence for the use of advanced radiotherapy technology where 1097 patients received external beam radiotherapy and 699 brachytherapy and 195 procedures were performed in 2018. The **Surgical Oncology** department at ACTREC, provides in-patient care for a wide range of cancer patients, conducts three operating

theatres six days a week and OPDs for newly registered cases, pre- and postoperative care, and follow-up cases. Advanced breast surgical procedures are routinely performed at ACTREC with provision of post-op physiotherapy and rehabilitation. Total of 1528 major surgical procedures in pediatrics, head-neck, breast, gastro-intestinal, gynecology, urology and neurosurgery were performed during 2018. The department of **Anesthesiology, Critical Care and Pain** at ACTREC provides Anesthesia services to three major operation theatres, ICU and peripheral locations such as radiology department and brachytherapy unit. It also runs the pre-anesthesia checkup OPD. The **Radiodiagnosis** department provides a wide spectrum of diagnostic imaging services including conventional radiology, ultrasonography including color Doppler, digital mammography, fusion positron emission, computed tomography (PET-CT), magnetic resonance imaging, as well as interventional radiology procedures during working hours, and extends emergency radiological services 24x7 for patients at ACTREC. In 2018, 3396 MRIs, 2875 diagnostic CT scans, 1600 USGs, 1381 Mammography and 1964 interventional procedures, and 1748 PET CT were performed. The department of **Transfusion Medicine** provides safe and adequate supply of blood components round the clock to meet the needs of patients admitted at ACTREC. Between January to December 2018, 2563 blood units were collected, 4670 blood components were issued, 1060 plateletpheresis and 138 leukapheresis procedures were performed, 1770 and 1853 units of blood components were leucodepleted and gamma irradiated respectively, and blood grouping and cross-matching was done on 5059 and 5634 samples respectively. The department organized 37 outdoor blood donation camps and 3 platelet donation awareness camps. The **Nursing** department provides comprehensive, quality nursing care to all cancer patients undergoing various treatment modalities at ACTREC with due attention focused on the implementation of patient safety goals, continuing education, and research. The **Cancer Cytogenetics** department focuses on diagnostic services for hematolymphoid malignancies using both conventional karyotyping as well as fluorescence in situ hybridization, a boon for risk stratification and disease management. Cytogenetic tests for various types of samples were performed during this year. The laboratory has NABL accreditation to function at the ACTREC campus, and the CAP proficiency testing program has been continued. The **Histopathology** Laboratory at ACTREC provides diagnostic services for histopathology, frozen section and immunohistochemistry for patients treated at ACTREC and referral cases from elsewhere. The laboratory archives all the slides and blocks and, when required, retrieves and issues them for approved projects of pathologists, clinicians and scientists. The laboratory has examined 1593 Frozen section, 2976 Histopathology and 4760 Immunohistochemistry. The

Hematopathology Laboratory is a reference laboratory for flow cytometric minimal residual disease (MRD) monitoring in childhood acute lymphoblastic leukemia. Its molecular unit focuses on establishing low-cost next-generation sequencing assays for prognostication and assays to monitor MRD in myeloid and lymphoid malignancies. Serum micro-RNA kinetics is being monitored at sequential time points for prognostication of multiple myeloma. The **Microbiology** Laboratory provides patient related and hospital services for microbiological testing, as well as sterility testing for blood bank services, infection control, waste management and environmental surveillance for OT, ICU, brachytherapy and BMT. In 2018, the laboratory processed 14040 patient samples. The **Composite Laboratory** is NABL accredited and, during January to December 2018, the laboratory performed 56340 tests for routine biochemistry which includes tumor markers and 54697 tests for routine hematopathology. The **Clinical Pharmacology** Laboratory works on its drug/formulation development pipeline. The preclinical data clearly showed the utility of Withaferin-A for GVHD prophylaxis. Preclinical evaluation of diseleno-dipropionic acid as a lung protector against radiation pneumonitis was completed successfully, and technology transfer for formulation development and clinical evaluation is being sought with pharmaceutical partners. Development of a liquid formulation of 6-mercaptopurine for pediatric ALL is underway, while therapeutic monitoring of mycophenolate mofetil in BMT is being piloted. The **Translational Research** Laboratory focuses on studying the biology of cell-free DNA (cfDNA) and chromatin (cfCh) derived from the billions of cells that die in the body daily. This group was the first to demonstrate that fragmented cfDNA and cfCh are biologically active molecules that can freely enter healthy cells, integrate into their genomes and trigger DNA damage and inflammation. These findings have wide implications since DNA damage and inflammation are integral to ageing and a variety of devastating age-related disorders such as heart attack, stroke and Alzheimer's disease as well as conditions like severe infection, sepsis and trauma. The **Clinician Scientist Laboratory** examines the effects of intra-operative hypoxia in breast cancer. The findings have provided empirical proof of the molecular changes that a tumor undergoes during surgical intervention and also that ischemia/reperfusion injury can serve as a stimulus for a pro-tumorigenic phenotypic behavior of the remnant tumor cells. Use of circulating tumor DNA (CtDNA) in monitoring response to therapy, clonal evolution of breast cancer, and clinical genomics are other areas of interest. Protocols for isolation of CtDNA and diagnostic targeted gene panels with MiSeq NGS platform have been standardized. Sequencing of patient samples to study clonal evolution of TNBC has been completed, and data analysis using bioinformatics tools is in progress.

Cancer Research Institute

The programs of the Cancer Research Institute's Principal Investigator led laboratories continued during 2018, with the on-going projects steadily progressing towards fulfilling their aims and new projects initiated in the area of basic and applied research on cancer.

Chiplunkar Laboratory with a focus on immune dysfunction in cancer patients to develop immunotherapy for cancer, report that histone acetylation/ methylation of promoter region of several key molecules such as the perforin and granzyme B, signalling via Notch and TCR and of the presence of regulatory T cells and myeloid derived suppressor cells in tumor micro environment modulate the anti-tumor functions of gd T cells. Population of Pro tumor subset Tgd17 cells were found increased in hypoxic conditions. They also find that the Mesenchymal stem cells (MSC) from oral tumors contributed to immune evasion while AML MSC supported survival of AML blasts and conferred chemoresistance.

Shirsat Laboratory using a microRNA based real time RT-PCR assay developed in-house, has effected molecular classification of over 250 medulloblastomas, which has been introduced into routine clinical practice at TMH. The Indian cohort shows distinct features like higher proportion of the WNT subgroup patients, higher male: female ratio in group 4 and rare occurrence of group 4 in adult patients. A clinical trial to examine if radiation related side effects can be minimized in WNT subgroup medulloblastoma children is on the anvil. On-going studies from **Gupta Laboratory** show that changes in the H3 variants, their site-specific post-translational modification and deposition machineries of histones affect the process of tumorigenesis. The group also identified the critical role of (a) mitogen and stress activated kinase 1, protein phosphatase 1/2 and histone deacetylase in regulation of cell cycle dependent H3 serine 10 phosphorylation, and (b) neighbouring acetylations in DNA damage response in human cell lines and gastric cancer tissues. **Mahimkar Laboratory** validated previously identified signatures associated with the progression of pre-invasive lesions to invasive OSCC and candidate driver alterations unique to primary tumors with lymph node metastasis, using FISH. 8q24.3 gain in oral precancerous lesions was recognized as a potential early marker of carcinogenesis; 11q22 amplification correlated positively with lymph node metastasis, reduced survival, increased recurrence, and poor response to radiotherapy. In parallel studies, the significant decrease in surface tumors and microscopic lung adenomas in A/J mice co-administered polymeric black tea polyphenols with carcinogens was linked to modulation of xenobiotic metabolizing enzymes, anti-initiation, inhibition of inflammation and proliferation, and induction of apoptosis (anti-promotion). **Sarin Laboratory** focuses on inherited cancer syndromes. They have performed genetic analyses of mutational hotspot or full gene using Sanger sequencing

or NGS and MLPA followed by haplotyping of carriers of recurrent mutation for diverse syndromes. Four new Indian BRCA1 founder and recurrent mutations have been identified and one new founder mutation in mismatch repair genes was identified in a Lynch syndrome family. Whole exome and transcriptome sequencing is being done for thyroid cancer and oral cancer cell lines. Matched tumor and blood samples from medullary thyroid cancer are evaluated for the mutational landscape and possible targets in RET driven MTC. Frequent occurrence of allele dropout not detected earlier by Sanger sequencing was uncovered through NGS in *RET* and *TP53* genes. Four new oral cancer cell lines were established and characterized, and are being used for functional studies with stable knockouts that inhibit the arachidonic acid pathway with a role in head and neck cancers identified earlier through whole exome analysis. Targeted sequencing of oral tumors and adjacent normal tissue is also underway to understand molecular signatures of field cancerization. Tumor microenvironment immune signature has been studied in 110 cases and correlated with the clinical outcome. **Dutt Laboratory** demonstrated in head and neck cancer, that tongue tumors of Indian origin display significantly low HPV infectivity, suggesting an alternative mode underlying the disease. This study reveals a classical tobacco mutational signature C:G>A:T transversion in 53% tongue cancer patients of Indian origin. *NOTCH1* is somatically amplified and over expressed in 31% and 37% of early stage TSCC patients and based on gene-expression analysis have identified up regulation of metastasis related pathways and over expression of MMP10 in 48% early stage tongue tumors. In gallbladder cancer, an integrated analysis of whole exome sequencing, copy number alterations, immunohistochemical, and phospho-proteome array profiling established an activating role of *ERBB2* and *KRAS* somatic mutations. *ERBB2* could be an important therapeutic target in early-stage gallbladder cancer, and the presence of *KRAS* mutations may preclude gallbladder cancer patients to respond to anti-EGFR treatment, similar to the clinical algorithm to opt for anti-EGFR treatment in colorectal cancer. In breast cancer, they have described leads to model a randomized study *in vitro* by elucidating the role of protein kinases that potentially underlie the clinical outcome of pre-operative progesterone intervention. The study also suggests that inhibition of *miR-129-2* reinstates *PR* in breast cancer cells, and hence could potentially be helpful for breast cancer patients with inadequate *PR* expression levels under adjuvant or neo-adjuvant settings along with hormonal therapy. In **Rukmini Laboratory**, comparative analysis of imatinib sensitive and resistant cells by proteomic analysis and array comparative genomic hybridization revealed molecules that are differentially expressed in resistant cells, and demonstrated altered functional pathways associated with resistance. Almost 80% CML patients in blast crisis are resistant to tyrosine kinase inhibitors (TKI); targeted therapy using TKI which has been successful in CML - chronic phase

is ineffective during crisis. A multi-omics approach is employed to identify potential therapeutic targets for CML in blast crisis. **Sorab Laboratory** focuses on two major areas - regulation of cellular pathways by 14-3-3-proteins and mechanisms underlying loss of desmosome function leading to neoplastic progression. Recent data have identified additional mechanisms underlying desmosome bio-synthesis demonstrating that desmosome formation is a highly regulated process. Further, mechanisms by which 14-3-3-ligand complexes form and dissociate have been identified and the mechanism regulating centrosome duplication has been delineated. Data has also revealed that the secreted protein LCN2 confers radio and chemo resistance to cells *in vitro* and *in vivo*, indicating that it might be a potential target for therapeutic intervention in colorectal tumors. **Teni Laboratory** investigates the molecular basis of oral tumorigenesis. Since p53 and p63 are frequently altered in oral cancer, they attempt to identify the differential interacting partners of mutant p53 versus WT p53. Role of p53 target genes Mcl-1 in DDR, autophagy and mitochondrial homeostasis, and of CLU in nucleolus and centrosome maintenance are currently being investigated. DNp63 binding sites on survivin, activin A and Notch promoters are being mapped. The contribution of TCTP and moesin to radioresistance in oral cancers and the underlying mechanisms involved are being addressed. The focus in **Bhattacharyya Laboratory** is on intracellular organelle biogenesis and dynamics primarily on the size control mechanisms of such compartments. Organelles' size and shapes are greatly altered in cancer. 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. The laboratory also has an interest to develop novel tools and forms for different types of microscopy. **Dr. Hasan** works towards understanding the biology of acute leukemia and triple negative breast carcinoma. A multidisciplinary approach is being used to evaluate the pathogenicity of missense mutations causing hereditary breast cancer, using genome editing tools (CRISPR-Cas9). The effects of small molecule inhibitors on primary patient-derived AML blasts are being studied along with anti-tumor activity in patient-derived AML xenograft models. **Dr. Warawdekar** works towards understanding minimal residual disease in solid tumors. The prognosis of cancer patients is largely determined by the blood borne dissemination of tumor cells into circulation (CTC) from the primary site to distant organs. CTC from patients with advanced breast cancer were isolated, cultured and their molecular characterization was correlated with primary tissue biopsy. The use of circulating biomarkers like miRNAs to gauge improved disease free survival in breast cancer patients' consequent to pre-surgery single depot injection of hydroxyprogesterone is in process. Research from **Ray Laboratory** led to a deeper understanding of initiation,

maintenance and molecular players of chemoresistance and cancer stem cells in ovarian cancer cellular and orthotopic tumor models. Innovative role of IGF-1R as a prognostic factor was found in a small cohort of HGSOc patients. **Waghmare Laboratory** examines molecular signaling pathways (Wnt/Notch/ Sonic-hedgehog, TGF- β and EGFR) that regulate stem cell renewal and on deregulation its association with cancer. Data revealed that mice over-expressing secretory phospholipase A2 (sPLA2-IIA) showed increased proliferation and differentiation, followed by depletion of their hair follicle stem cells mediated through increased c-Jun activation. Interestingly, knockdown of sPLA2IIA in human oral cancer cell line led to tumor reduction. Sfrp1 - a Wnt inhibitor that regulates cancer stem cells in squamous cell carcinomas is also down regulated in human cancers. Sfrp1 knockout mice showed increased sensitivity to chemically induced skin carcinogenesis. Oral cancer stem cells (CD44+/ALDH+) isolated from cell lines showed deregulation of Wnt pathway genes. **Shilpee Laboratory** works on understanding the molecular mechanisms of therapeutic resistance in glioblastoma and leukemia using patient derived cellular and pre-clinical mouse models developed in-house. Using these models, the group has identified a novel GCN5-ATM axis, inhibition of which restricts the onset of acquired drug resistance in leukemia. Enhanced proteasomal activity mediated survival and recurrence of resistant glioblastoma cells has also been identified. **Bose Laboratory** focus is on understanding the molecular mechanism of proteins - HtrAs, Pea-15, Bcl2-family proteins, c-FLIP, Calmodulin and ABL - that are involved in regulating apoptotic cell death. The group has clearly demonstrated a complex bipartite HtrA2-Pea-15 interaction mechanism that regulates the antiapoptotic signaling cascade of the latter. The group developed a user-friendly database 'PDZscape' that encompasses the complete information on 58,648 PDZ-containing proteins with their binding partners, identified a novel pathogenic mutation in HtrA2 and solved its crystal structure. **Varma Laboratory** has crystallized different domains of BRCA with its cellular partners and small molecule inhibitors, characterized the pathogenicity of mutations discovered in BRCA gene from Indian and Russian families, and explored a set of proteomics based predictive and prognostic biomarkers in head and neck squamous cell carcinoma treated with radiotherapy. **Prasanna Laboratory** focuses on building protein interaction maps of PSMD9 and PSMD10/Gankyrin -chaperones to identify vulnerable nodes and edges in the network that can be manipulated in diseases such as cancer. Gankyrin-CLIC1 interaction is one such vulnerable edge in the network, and strategies to inhibit this interaction are being developed. Their investigations on the role of PSMD9 sub network in cancer seems to suggest that this protein orchestrates a cell signaling program involved in cytoskeletal changes and cell migration. New lines of investigation on the structural constraints that define phosphorylation confirm the group's earlier prediction on the existence of an expanded 'druggable'

genome space. **Chilakapati Laboratory** is pursuing non-invasive and minimally invasive applications of Raman spectroscopy in cancer. The group has validated its findings on early identification of recurrence/ second primary, and on delineation between healthy subjects, habitual tobacco users and oral premalignant subjects using sera and brush biopsies. Classification of premalignant conditions and identification of recurrence is on-going. **De Laboratory** focuses on developing novel nano-sized material for photo thermal therapy, which is a combination of hyperthermia treatment with near-infrared light, also considered as an alternative cancer medicine, and on creating biosensors using novel fungal luciferase reporter gene. Among other projects, **Dr. Mehrotra** (DBT Wellcome Fellow) focuses on investigating the role of a novel cancer associated gene named BRCA2 and CDKN1A Interacting Protein (BCCIP), specifically in the prevention of replication stress using mammalian cell cultures and *Drosophila melanogaster* as model systems. Many components of homologous-recombination mediated DNA repair, such as BRCA2 and RAD51, are involved in response to replication-stress where their functions are mechanistically different from their roles during HR-dependent DNA repair. This knowledge will be etiologically important for BCCIP deficient cancers.

Academics

To fulfill the third mandate of the Centre, strong momentum is given to its educational programs. 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 2018, a total of 105 graduate students were working towards the Ph.D. degree in Life Sciences at ACTREC; these included 17 JRF 2018 batch students who joined in August 2018. Under the short term and summer training program, a total of 234 trainees (39 for dissertation and 107 for experience/ 5 on collaborative projects; 45 observers; 34 summer trainees and 4 research associates) worked under the close supervision of the Centre's faculty during the year. In 2018, the Centre organized 21 local/ national/ international conferences, symposia, workshops, training programs, etc., beginning with the CNE Workshops on 'Essentials of cardiopulmonary resuscitation' and 'Medication safety' in January and in October the UK-India Cancer Bioinformatics Workshop on 'Next- Generation Sequencing Data Analysis'. In December the centre conducted the ACTREC Open Day held annually, where close to 500 students and 35 faculty members from science degree colleges of Mumbai and Navi Mumbai visited and participated in the program, and lab-walk tour organized. Another student –centric event managed in December 2018 by the graduate student fraternity of the centre, is the annually held National Research Scholars Meet [NRSM] in Life Sciences, with enthusiastic participation of students and young researchers

from across the country. In April 2018, the Centre conducted its annual Science & Society Oration and on 10th May 2018 organized the Nurses' Day oration. During the course of the year, the Centre hosted 16 national/ international experts who delivered research seminars on a variety of topics in the life sciences and cancer. The Sadbhavana Diwas was arranged in August 2018 with the Sadbhavana Pledge administered by the employees. The 'Swaccha Bharat Mission' was celebrated in September 2018 with students' participation in cleaning activity, pledge ceremony and essay writing competition. The Vigilance Awareness Week was observed between October 29th and November 3rd with an oration on the theme, 'Eradicate corruption –Build a new India'. The Centre conducts Yoga sessions as a part of the staff welfare activity and organized cancer awareness programs aimed at the general public and educational/ support/ entertainment programs for cancer patients and their caregivers in 2018.

New Infrastructure Projects at ACTREC

Several important **TMC new infrastructure** projects located at ACTREC were initiated between July and September 2018 and will transform this institution in the next 2-5 years.

The important ones are:

Proton Beam Therapy

The construction activities are in full swing with completion of the Cyclotron bunker and 3 Gantries for the facility. The support facilities have also been completed and the final inspection of the facilities by IBA (OEM) in the form of a BOD document is slated for June 2019. The site is being prepared to receive the equipment and when operational, the facility will cater to patients requiring High Precision Radiotherapy to conserve vital organs in the vicinity of the tumours. Patients from poor socioeconomic background will benefit from this treatment which otherwise is prohibitively expensive.

Hematolymphoid & Women & Children Hospital

This facility is in an advanced stage of completion with the structure expected to be completed in June 2019 and the facility expected to be operational by April 2020, will cater to around 10000 surgeries each year.

Radiation Research Unit

This facility being established in collaboration with BARC will provide fertile ground for research in Medical Physics, and Diagnostic and Therapeutic Nuclear Medicine. The construction of the facility is expected to be completed in the middle of 2020. Diagnostic and Therapeutic services using radioisotopes are planned and are likely to improve the precision and efficacy thereby reducing the treatment time and cost.

Pediatric Haematolymphoid Unit

This facility is supported by a CSR donation. This unique facility dedicated to children, will have advanced treatment facilities including Bone Marrow Transplant Facility. The hospital is in an advanced stage of planning and construction is likely to begin in 2019.

Residential Patient Hostel

A patient residential facility sponsored by a CSR donation is being constructed comprising of 265 individual rooms. This facility is expected to be completed in Sept 2020.

With the commissioning of the above facilities, **ACTREC** will have about 900 beds with emphasis on highly specialised radiation and nuclear medicine facilities and treatment for haematological and pediatric cancers, specifically benefitting women and children.



Centre for Cancer Epidemiology (CCE), Navi Mumbai - Maharashtra

The Centre for Cancer Epidemiology (CCE) was fully functional now and had the Departments of Medical Records, Biostatistics & Epidemiology, and Preventive Oncology under its umbrella.

The CCE published the first year report of Population Based Cancer Registry in Gadchiroli.

The CCE project of improving the Cause of Death certification was extended to the entire State of Maharashtra.

The Biobank that was recently procured was being well utilized and could store about 3000000 million samples for epidemiological research.

Research was focussed on modifiable factors for gall bladder cancer and the role of genetic susceptibility in buccal mucosa cancers.

Training programs and workshops were conducted in India and its neighbouring countries for setting up their cancer registries, viz, Kolhapur, Bhutan, Nepal, and Myanmar etc.



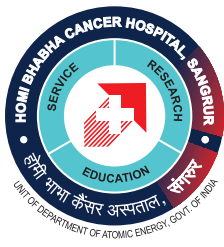
Homi Bhabha Cancer Hospital & Research Centre (HBCHRC), Visakhapatnam - Andhra Pradesh

The Out-Patients facilities for chemotherapy and Palliative care services were started from 2nd June 2014. The main Hospital, the Radiotherapy and patient Registration blocks were due for commissioning by end 2019. In the interim period, the surgical and Intensive Care Units and ward facilities at the Visakhapatnam Port Trust hospital were being utilized.

The Radiotherapy machine, Bhabhatron was installed and was waiting commissioning after its calibration.

At present, the hospital offered a range of services: cancer prevention and screening services, cancer diagnostics including biochemistry with tumour markers, histo-cyto-hematopathology and immunohistochemistry, molecular tests, digital radiography, mammography and sonography, the entire range of chemotherapy, and, palliative care services, all on an outpatient basis.

More than **3500** new patients registered in the year 2018 and **600** surgeries were performed. Chemotherapy was administered to over **5000** patients.



Homi Bhabha Cancer Hospital (HBCH), Sangrur - Punjab

The hospital was commissioned on January 20, 2015 and had bed strength of 100. The hospital was well equipped with the latest technology and was in the process of started Interventional Radiology, Plastic & Reconstructive Surgery and Palliative Medicine.

It is the only hospital in the State of Punjab to offer Immunohistochemistry services.

There were **2696** new patient registrations in the year 2018 and, over **1200** surgeries were performed.

More than **60000** laboratory investigations and over **9000** radiodiagnostic procedures were performed in the year 2018. Radiotherapy was offered to over **2000** patients and chemotherapy to more than **7500** patients.

Educational activities were ongoing and five B.Sc courses in paramedical subjects were already in place. These courses and the newer ones to be introduced would be conducted through Baba Farid University of Health Sciences, Faridkot, Punjab.



Homi Bhabha Cancer Hospital (HBCH), Varanasi - Uttar Pradesh

The Indian Railways Cancer Institute and Research Centre in Varanasi lacked the resources to offer medical services to cancer patients. It was a 101 bed hospital. Annually, around 20000 patients used to register there and no experienced doctors could tackle the cancer patients. Then, on the request by the Honourable Prime Minister of India, Mr. Narendra Modi, the hospital was taken over by the DAE to be managed by TMC. The Tata Trusts volunteered to revamp the dilapidated structure and also to equip the hospital with the latest technology.

The new 179 bed hospital was named the Homi Bhabha Cancer Hospital and was officially commissioned from May 1st 2018.

There were **7844** new patient registrations with **1643** being admitted for varying reasons. Radiotherapy was offered to **641** patients and chemotherapy to over **7000** patients.



Dr. Bhubaneswar Borooah Cancer Institute (BBCI), Guwahati - Assam

The Dr. B. Borooah Cancer Institute was a premier centre in the North East India from 1973 funded by the B. Borooah Cancer Society Trust. It was formally inaugurated on 18th November 1973 but was operational from 1974. On

August 6th 1986, it was handed over to the Government of Assam. From November 1989, it was managed by the North Eastern Council, the Government of Assam and the Department of Atomic Energy, Government of India. It was on June 7th 2017 that the 100 bed BBCI was taken over completely by the DAE and to be managed by TMC, as per the Cabinet Committee on Security. The formal take-over was on 27th November 2017. The management of BBCI under DAE-TMC service rules and regulations were initiated from July 1st 2018.

The 1st North East Annual Evidence Based Medicine conference was held from 23rd – 25th November 2018 through supports from TMH.

As per the population Based Cancer Registry, the North Eastern Region had the highest incidence of cancer in the country.

Over **10000** new patients were seen annually at the centre.



Mahamana Pandit Madan Mohan Malaviya Cancer Centre (MPMMCC), Varanasi - Uttar Pradesh

Almost 25 % of cancer patients at TMH, Mumbai were from Uttar Pradesh (UP) that had a very high cancer burden. It was estimated that UP would have 1.5 new cancer cases every year; thus the need for state of the art cancer centres in Varanasi.

Fifteen (15) acre of land within the 1360 acre campus of Banaras Hindu University (BHU) was donated to the Department of Atomic Energy (DAE), Government of India (GOI) to construct a cancer hospital with the latest and modern facilities. The centre was named, the Mahamana Pandit Madan Mohan Malaviya Cancer Centre (MPMMCC). The construction cost was borne by the Tata Trusts and the hospital was to be managed by the Tata Memorial Centre (TMC), Mumbai.

The Memorandum of Understanding (MoU) for the above was made on 21st September 2017. The construction by Tata Trust began in April 2018 and was to be completed in a record time by end February 2019.



Homi Bhabha Cancer Hospital & Research Centre (HBCHRC), Mullanpur - Punjab

This centre was located on a 50 acre plot of land, donated by the Government of Punjab in Mullanpur Village of Mohali District.

The Detailed Project Report was made on 12th October 2012 & the hospital was to be commissioned by March 2017. Due to financial & logistic issues the project was delayed.

The structural construction of the main hospital building, the staff residential blocks and Dharmashala for patients was completed.

This centre was rescheduled for commissioning in early 2020.



Tata Memorial Hospital (TMH)



Performance Statistics

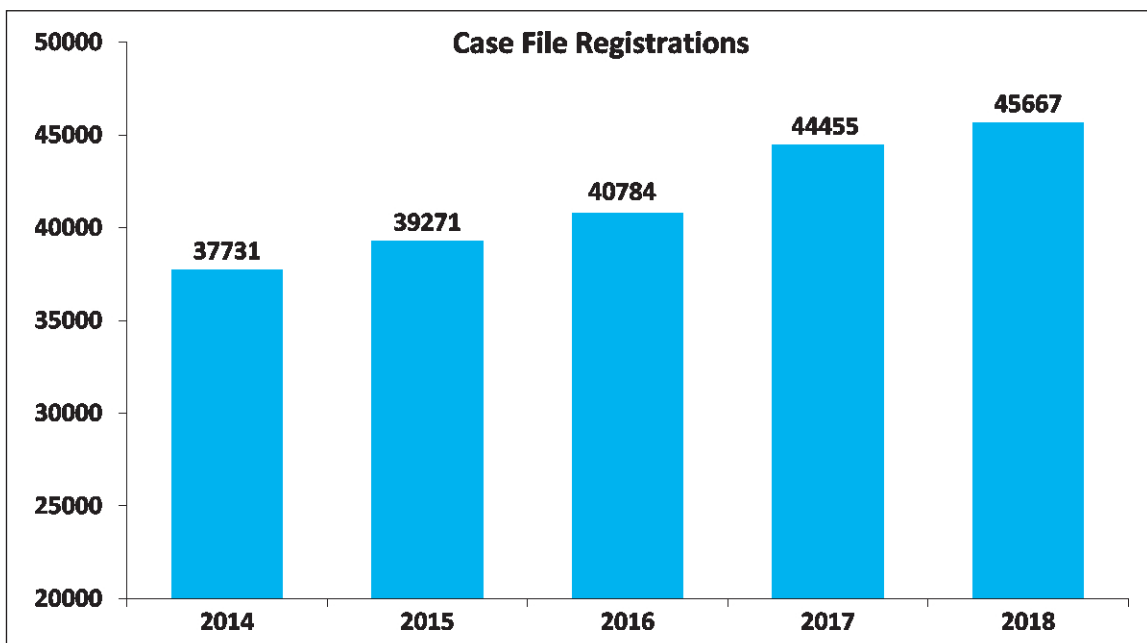
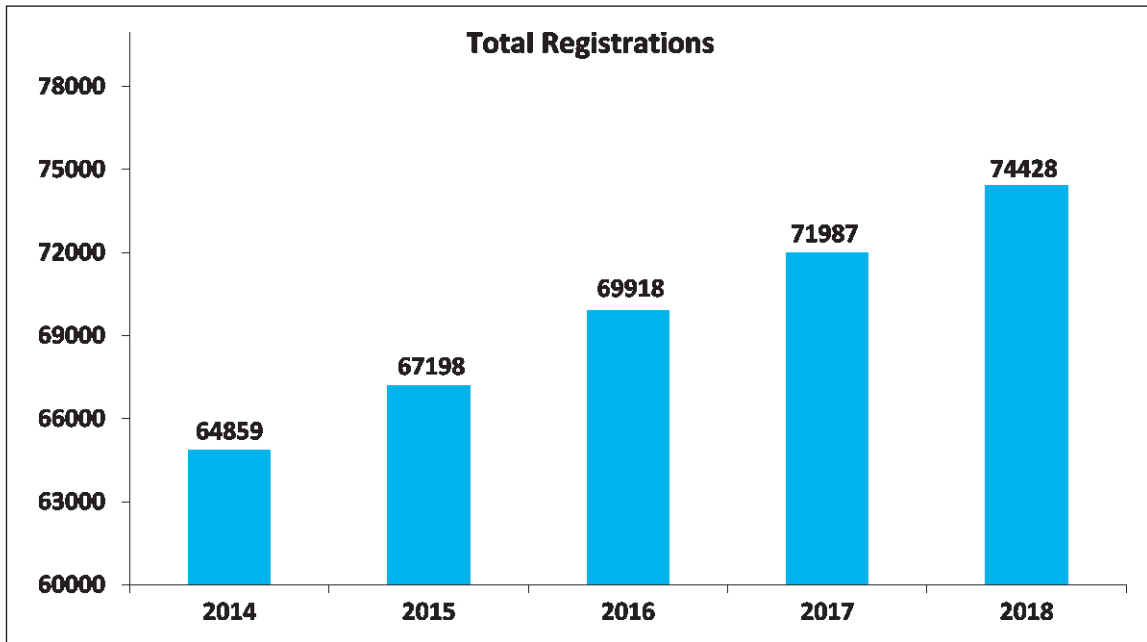
	2017	2018
Patient Chart Files- General	29319	30454
Patient Chart Files- Private	15136	15213
Patient Chart Files- Total (A)	44455	45667
Referrals for Investigations / Second Opinion (B)	21853	21582
Preventive Oncology (C)	5679	7179
Total Registrations (A+B+C)	71987	74428
INPATIENT SERVICES		
Admissions		
No. of Admissions	28191	28374
Average Length of stay (Days)	5.7	5.57
Bed Occupancy %	91	90.86
SURGICAL ONCOLOGY		
Major OT Procedures	8394	8519
Minor OT Procedures	36474	44894
Robotic Surgery	259	264
MEDICAL ONCOLOGY		
Day Care		
Day Care- General	119289	133367
Day Care- Private	33273	33967
DIGESTIVE DISEASES AND CLINICAL NUTRITION		
Endoscopies	7168	7389
Nutrition Clinic	18101	22262
ANESTHESIOLOGY, CRITICAL CARE & PAIN		
No. of ICU Admissions	2218	2250
Patients in Recovery Ward	12626	9234
Pain Clinic	8829	8212
RADIATION ONCOLOGY		
External Beam Therapy	7323	8154
Brachytherapy	3431	4009
Treatment Planning / Beam Modification	17530	16538
IMAGING SERVICES		
Radiology		
Conventional Radiography	67878	82111
Ultrasonography / colour Doppler	39946	41155
Mammography	14193	15262
C.T. Scan	31991	32636
M.R.I Scan	8111	8555
Interventional Radiology	3665	9857

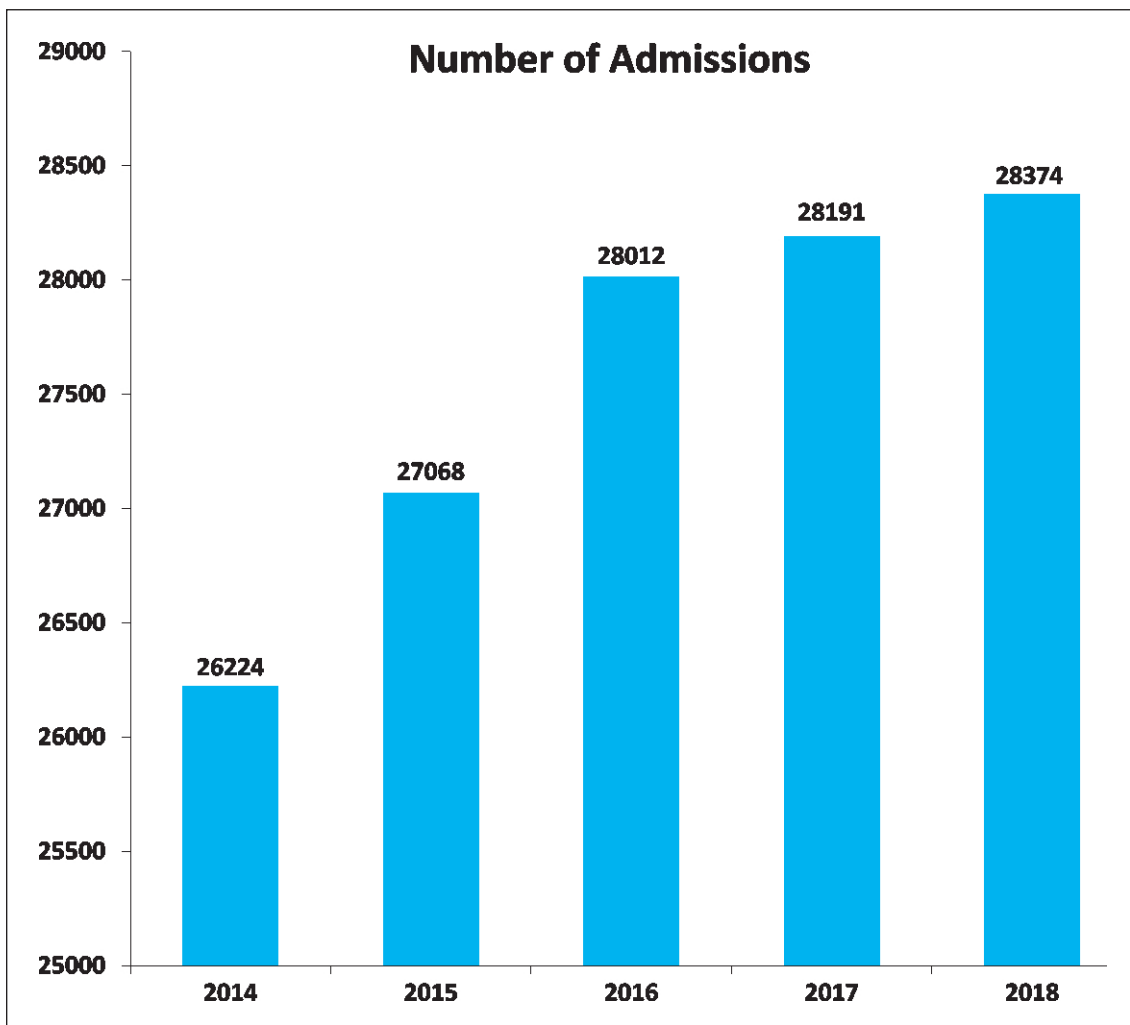
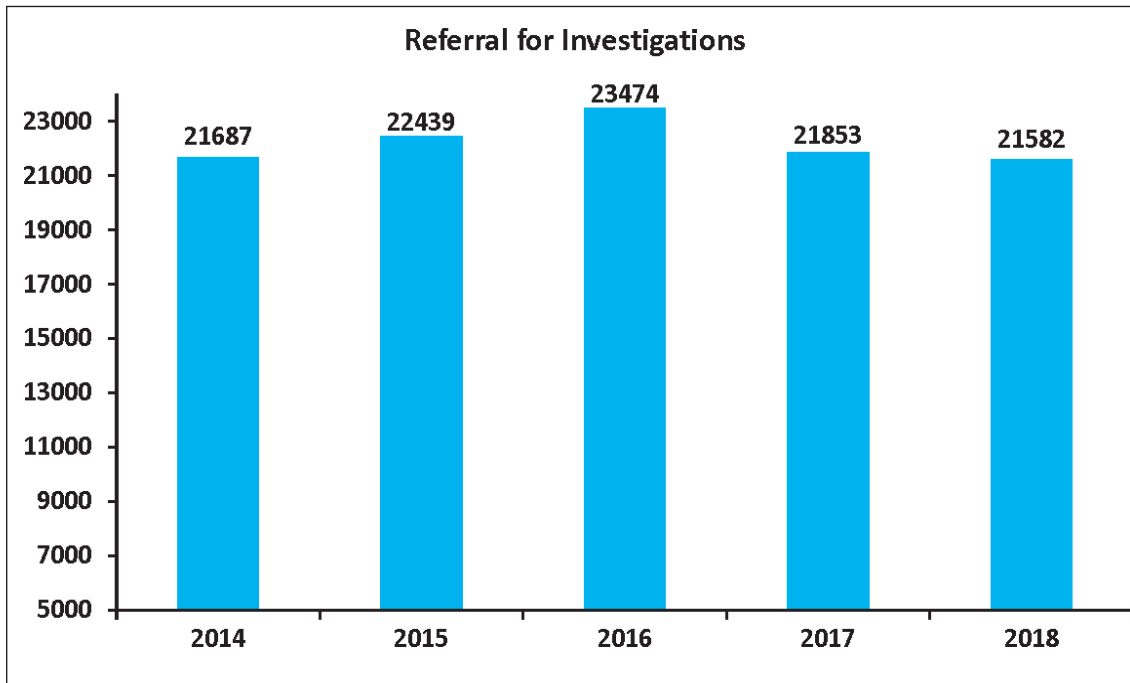
	2017	2018
NUCLEAR MEDICINE		
PET-CT	16081	16681
SPECT-CT	3947	4925
GENERAL MEDICINE		
ECG	38584	40752
Echo Cardiography	11562	12383
Pulmonary Function Tests	4264	4968
LABORATORY DIAGNOSTICS		
Pathology	190263	216119
Biochemistry	3584215	3764002
Cytopathology	25207	23078
Molecular Pathology	4672	4705
Microbiology	210373	223062
TRANSFUSION MEDICINE		
Blood Components Prepared	54423	53818
[Whole Blood + Packed Red Cells + Platelets (RDP) + Fresh Frozen Plasma + Cryoprecipitate + Factor VIII Deficient Plasma]		
Single Donor Platelets (SDP) Prepared	4791	4698
Specialised Procedures	35955	37263
[Irradiation of Blood products + Granulocyte harvests + Therapeutic phlebotomy+ Therapeutic leukapheresis + Therapeutic Plasma Exchange]		
Laboratory Investigations	95861	104371
[Blood Grouping + Crossmatching + Antibody Detection + HLA typing / antibody screening]		
OTHER CLINICAL SERVICES		
Stoma care	7059	7425
Occupational Therapy	12461	13748
Physiotherapy	18422	21898
Speech Therapy	10775	10982
Psychiatry and Clinical Psychology	3141	3722
DENTAL SERVICES		
Prosthetics Services	1102	1292
TISSUE BANK		
Allografts Produced	11009	9577
PALLIATIVE MEDICINE		
No. of Patients		
Home Care Visits	13234	15850
	2121	3295

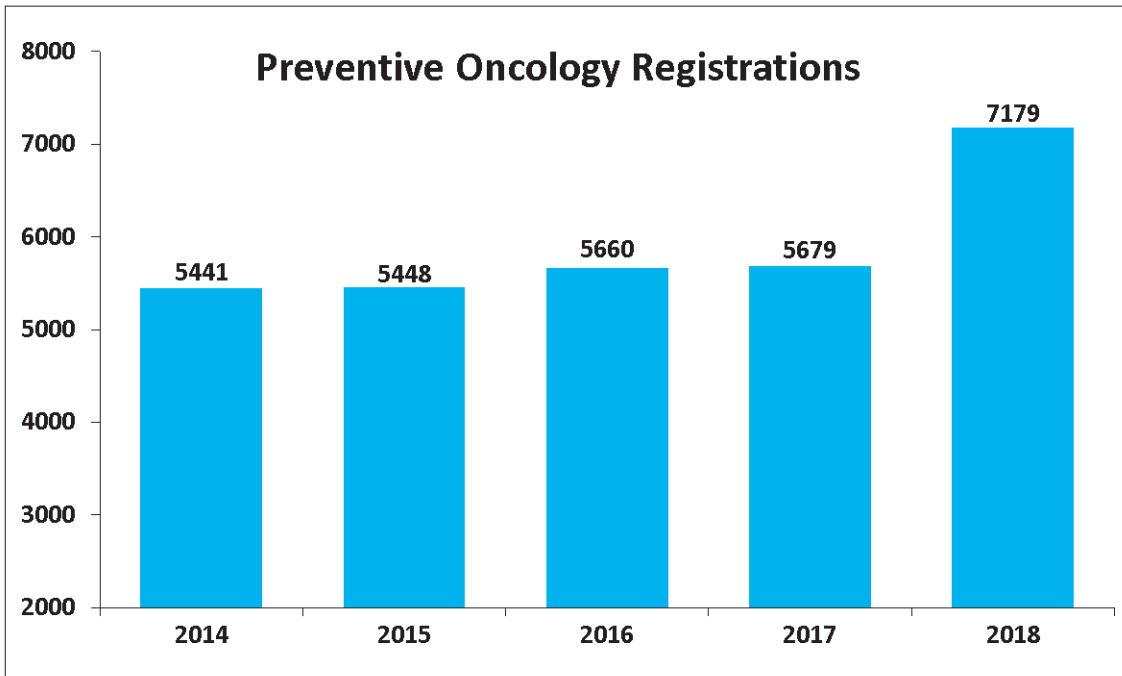
	2017	2018
MEDICAL SOCIAL WORK		
Guidance	30000	38000
Counseling	28433	23000
EDUCATION		
Residents & Others	189	194
Fellows	12	07
Medical Observers	481	529
Nursing Trainees	35	60
Paramedical Students	38	44
RESEARCH PROFILE		
Extramural Projects	11	15
Pharma Sponsored	08	22
Intramural + Extramural Projects	14	15
Institutional Intramural	25	43
No Funding	114	142
P.G. Thesis (Dissertation)	84	56
PUBLICATIONS		
International	341	388
National	165	148
Book Chapters	15 (+5 books)	56 (+4 books)
Conferences / Workshops / Seminars	108	87



TRENDS







Visiting Dignitaries & Annual Events

Tata Memorial Hospital (TMH), the premier cancer institute in India and one of the largest in Asia provided the best cancer treatment to even the poorest population in the country. The institute saw a vast variety of cancer cases that were managed with the latest innovations in cancer care.

People from all walks of life from India and abroad visit the institution and extend their help and support. Every year, the institute received prominent personalities who interacted with the management and the patients.

The few renowned personalities who visited the hospital, included:

- Mr. Vishal Sharma, Independent Director, Bharat Petroleum Corporation Limited
- Mr. Joacim Lindoff, President & CEO Arjo AB, Sweden
- Mr. Andre Musto, Regional Vice President of Merck
- Dr. B.P.S. Reddy, Chairman, Hetero Drugs Limited
- Hon. Brad Hazzard, Minister for Health and Medical Research, NSW Government, Australia
- Ex Sri Lanka cricket team captain Mahela Jayawardene
- Joint Commissioner Members from Vietnam.



Mr. Brad Hazzard, Minister for Health and Medical Research, Australia (NSW) with Chief Administrative Officer of TMC, Mr. AN Sathe and Senior PRO, Mr. SH Jafri.



Sri Lanka ex cricket team captain, Mr. Mahela Jayawardene with Director Academic Dr. KS Sharma and Director TMC, Dr. RA Badwe.



Joint Commissioner Members from Vietnam with Director TMH, Dr. CS Pramesh; Head of Radiation Oncology Dr. JP Agarwal and Sr. PRO Mr. SH Jafri.

69th Republic Day Celebrations

The Indian Republic Day on 26th January was celebrated with a parade by the security staff of the hospital in presence of the Director Projects, TMC Mr. Sanjeev Sood, the Chief Security Officer Mr. Johnson Lukose and other hospital staff.

The Indian national flag was hoisted and the National Anthem sung. This was followed by presentation of awards to the security staff for their meritorious service.



Director Projects TMC, Mr. Sanjeev Sood with Chief Security Officer, Mr. Johnson Lukose.

20th Terry Fox Run

On 28th January 2018 'Terry Fox Run' was organized in India by Terry Fox Foundation to create awareness and generate funds for the Tata Memorial Hospital and cancer research.

The run started at 6:30 am from the National Centre for the Performing Arts (NCPA) Nariman Point to Marine Drive Flyover and back to Brabourne Stadium. Medical and non-medical TMH staff participated in the run.



Participants and Organizers after the end of the Terry Fox Run.

16th Evidence Based Medicine Conference



From left: Pediatric Surgeon, Dr. Sajid Qureshi; Medical Oncologist, Dr. Jyoti Bajpai; Head & Neck Surgeons, Drs. PS Pai and AK D'cruz; Prof. Brian O'Sullivan; Director TMC, Dr. RA Badwe and Director Academics Dr. KS Sharma.

The Evidence Based Management (EBM) meetings were started about a decade and half ago. The philosophy behind the meeting was to identify and answer focused questions relevant to oncology practice in India. National faculties and International faculty members were invited every year, and who were experts in their field of oncology. The deliberations which typically continued for 2-3 days included talks on a particular topic in context with the Indian scenario.

The 16th EBM was focused on 3 modules viz. a) Head and Neck Cancers, b) Cancer Immunotherapy, c) Paediatric Solid Tumors which were simultaneously organized from 23rd to 25th February 2018. The meeting was a huge success with 949 delegates. Three (03) EBM books were released during this conference and were uploaded on the TMC website for access to all. Abstract submission was a new feature and the conference received seven (07) abstracts for Head and Neck cancers, thirteen (13) for Cancers Immunotherapy and four (04) abstracts were submitted for Paediatric Solid Tumors. In addition, Pre EBM Continuing Medical Education (CME) on recent advances in Head and Neck pathology was organized on 22nd February 2018 with a total of 178 participants.

The Head and Neck cancers module – Amongst the Head and Neck sites, cancers of the Nasopharynx, Paranasal Sinus, Salivary Gland, Parapharynx and Skull base presented a challenge to the treating Oncologist due to their relative rarity and anatomic location. These cancers apart from being uncommon had a wide variety of histology with varying biological behavior.

Treating these subsites of the head neck region required expertise, skill and delivery by a multidisciplinary team. In EBM 2018, management of these relatively uncommon

cancers was discussed with global leaders in the field highlighting evidence based practices in diagnosis, evaluation and treatment. Live Surgery relay from the Operation Theatre to the Auditorium of Endoscopic Skull Base Surgery with reconstruction was held on 23rd February 2018 with interactive sessions. A total of 547 participants attended the meeting.

Pre EBM CME on Recent advances in Head and Neck pathology – This one-day academic bonanza was a complete and exhaustive crash course in head and neck pathology. From basic approach to the latest updates, this meeting was intended to deal with the nitty-gritty's of head and neck pathology.

Cancer Immunotherapy module - The last three decades of immuno-oncology research showed that a large number of tumors were recognized by the immune system and their development could be interrupted via immune-surveillance, and immune checkpoints functions were vital for this process. The oncology community witnessed the success of the immune checkpoint inhibition by means of the antibodies targeting the Cytotoxic T-Lymphocyte Antigen-4 (CTLA-4), Programmed Death receptor-1 (PD-1), and its Ligand, PD-L1, in treating many historically difficult-to-treat tumor types. The EBM focused on the application of the knowledge of immunotherapy in varied indications; practice guidelines would be formed based on the evidence and practicality of applying them in Indian context. The discussions aimed to provide the right directions for the patients and care providers in Indian context. A total of 213 participants attended the meeting.

Paediatric Solid Tumors - Neuroblastoma, Wilms Tumour, Germ Cell Tumour, Rhabdomyosarcoma and Retinoblastoma



Professor Brian O'Sullivan with Director TMH, Dr. AK D'Cruz, Director TMC, Dr. RA Badwe and Director Academics, Dr. KS Sharma.

were the most common of the Paediatric Solid Tumors and were the main focus in these discussions. The relevance and applicability of evidence in the Indian context for the management of these tumors were addressed and common controversies debated, where ideal would not always be optimal. The present EBM discussions was an attempt to delineate the best way forward for patient care, research and advocacy through integration of principles of multi-disciplinary care in India. A total of 189 participants attended the meeting.

The Hospital Day Oration was given by Professor Brian O'Sullivan, Professor of Radiation Oncology, University of Toronto, Canada on the topic entitled **"Evolution of Staging and Prognostic Classifications: A global challenge for the**

UICC and AJCC"* on 24th February 2018. Prof. O'Sullivan is a Professor in the Department of Radiation Oncology and in the Department of Otolaryngology / Head and Neck Surgery at the University of Toronto. He holds the Bartley-Smith/Wharton Chair in Radiation Oncology in the Department of Radiation Oncology at the Princess Margaret Hospital. Professor O'Sullivan is the immediate past-Chair of the Head and Neck Oncology Committee of the Canadian Clinical Trials Group (CCTG) and current co-Chair of the US National Cancer Institute, Head and Neck Steering Committee of the Coordinating Center for Clinical Trials, Cancer Therapy Evaluation Program (CTEP).

* **UICC**, Union for International Cancer Control; **AJCC**, American Joint Committee on Cancer

77th Annual Hospital Day Celebrations

The 77th Annual Hospital Day Function of Tata Memorial Hospital was held on Wednesday, 28th February 2018 from 6:00 pm to 10:00 pm at Sri Shanmukhananda Fine Arts & Sangeetha Sabha. The Hospital Day Committee under the Chairmanship of Mr. S.H. Jafri, Senior PRO organized **"Sur Sanjeevani"** Orchestra (See Picture). The staff came for the program with their family members. People of all age group were present in the audience and thoroughly enjoyed the program. In this function, the Labour and the Super staff who completed 30 years as on 28th February, 2018 were felicitated. Nine (09) working employees were selected as 'Best Workers' for the year 2017. These persons were felicitated by Dr. Kailash Sharma, Director Academics, Shri. Sanjeev Sood, Director (Projects), Dr. Sudeep Gupta, Dy. Director, ACTREC, Dr. Sarita Khobrekar, Medical Superintendent and Dr. S.D. Banavali, Head Dept of Medical Oncology. Dr. Shailesh Shrikhande (Surgical Oncology) and

Dr. Rohini Kelkar (Head, Microbiology) also graced the occasion along with other senior medical faculties.



“Best Workers Award - 2017”

Name	Department
Mr. Satish Uttam Pawar	HRD
Mrs. Sujata Vishwanath Karane	Nursing
Mr. Moreshwar Govind Shirke	Engineering
Mr. Kamalashil Dharma Gamre	Engineering
Mrs. R. Vishnu Priya	Gen. Administration (Telephone)
Mr. Devdas Devjibhai Solanki	Personnel section
Mr. Sanjeeva Honnaya Sapaliga	Personnel section
Mr. Santosh Gajanan Shinde	Personnel section
Mrs. Vanita Vaman Parab	Personnel section

71st Independence Day Celebrations



Director Academics TMC, Dr. SD Banavali with Chief Security Officer, Mr. Johnson Lukose.

The Independence Day on 15th August was celebrated by unfurling of the National Flag. The Indian National Anthem was sung and the guard of honor was Dr. SD Banavali, Director Academics - TMC. Mr. AN Sathe, Chief Administrative Officer, TMC was also present.

The maiden CANTHON Marathon Run

Cancer awareness Marathon Run ‘CANTHON’ was held in Mumbai on Sunday, 28th October 2018 at the Goregaon Sports Club. This event, an initiative of TMH with the Goregaon Sports Club, was organized under the aegis of Mumbai Suburban District Athletics Association. The run promoted the belief of Cancer Awareness with Health and Health with Awareness. The theme of this maiden event was “Run for Cancer”.

Mr. Maninderjeet Singh Bitta, chairman of the All India Anti-Terrorist Front (AIATF) and former chief of Indian Youth Congress was the chief guest.



Entertainment during the Canthon Run 2018.

The organizers planned 12 such Runs every year and also to have blood donation camps across the city. It was proposed to undertake 26 Blood donation drives along with the marathon for cancer awareness drive as a campaign to gain maximum benefit, and to create records for maximum blood collected in a year.



Sr. Admin. Officer TMH, Wing Cdr (Retd) AK Tiwari with Mr. MS Bitta, who flagged off the CANTHON Run.



Volunteer Patient Services

Over 40 Non-Government Organizations (NGOs) and over 150 volunteers helped patients and their relatives during their journey in the hospital in varied manners and contributed to lower their socioeconomic burden. There were also many unknown charitable workers who provided patients and their family with finance, food, clothing etc.

Many companies also contributed through their Corporate Social Responsibility (CSR) towards bearing some cost of

patient treatment, procurement of some medical equipment, refurbishment of some areas in the hospital, patient transport etc. Mr. S. H. Jafri, Senior Public Relations Officer was in charge for the same.

The management appreciated the contribution of these individuals / organizations that helped ease the sufferings of cancer patients, in any manner possible. The list could only be compiled as they required guidance from the management to offer their altruist help to patients.

List of Volunteers / Volunteer Organizations & their Activities

Access Life Assistance Foundation	Provides accommodation.
Abu Dhabi Commercial Bank	Bearing part cost of some patients subjected to Robotic Surgery.
Aditya Kalyan (Mr)	Arranges magic shows and OPD activities.
Airport Authority of India	Funding for some underprivileged children with cancer.
Al Musaddiqah Women Welfare Organization	Supplies snacks and lunch etc.
Ameeta Bhatia (Ms)	Counsels, emergency support, birthday celebrations on personal basis Annual event "Hope".
Asha Mehta (Ms)	B.P. checking and medicine compliance.
BrajGauri Trust	Providing free Cloak Room facility for cancer patients at backside of GJ building from Monday to Friday Morning 8 AM to 5 PM Celebrating Rose day & select a patient for the 'Winner-in-life' awards in the month of September.
Detniners Private Limited	Bearing part cost of patients with gynaecological cancer.
CanKids	Emergency medical assistance Adoption of children for non-formal education at the "Chattal" clinics held in OPD & formal education at "CanShalla" (Special School for Cancer Children).
CPAA	Proving nutrition supplement for paediatric.
Cuddles Foundation	Proving nutrition supplement for paediatric & full time dieticians support Providing Infection Control Products.
Government of Assam	Giving voluntary service to cancer patients Providing shelter home.

Gunwanti J. Kapoor Trust	Financial help to breast cancer patients through JASCAP
	Chemo education given to all OPD patients
	Providing guidance to all patients
	Providing adult dietician
	Providing research fellowship for molecular lab
	Providing LCEF powder to Head&Neck cancer patients
	Providing ration facility
	Provided accommodation reimbursement through ICS.
	Coordinating for the support group meeting
	Arranging platelets drive for paediatric and adult patients.
	Gurnani Sati Charitable Trust
ImPaCCT Foundation	Giving holistic support to paediatric patients
	Providing midday meal to paediatric patients
	Counselling to the patients
	For any paediatric patient with no proper documents, free treatment is given by the foundation
	Bereavement support – if any paediatric patient expires during the treatment, all services like ambulance, funeral arrangement etc. are provided
	Educational support to paediatric patients.
Indian Cancer Society	Guiding for ration and other financial help.
India Ideas Com. Ltd.	Part funding for some Radiotherapy patients.
JACAF	Providing shelter home
	Awareness and detection camps
	Counselling
	Arrangement of blood and platelets for cancer patients
	Financial support to pediatric patients.
JASCAP	JASCAP has published over 500 Booklets and fact sheets in English and other various languages; CD's and DVD's are available for cancer patients at a nominal cost
	Financial assistance to a poor patients through the Social Service department of TMH
	Emotional support and counselling on all fronts to cancer patients is provided by their Cancer Information Centre.
Karo Trust	Volunteering to assist patients in their needs.
Konark Cancer Foundation	Providing guidance to all patients.
Little More	Arranging entertainment program for patients & Birthday Celebration
	Educational support to paediatric patients
	Giving ration to needy patients
	Counselling
	Helping in organizing Diwali Celebration & Christmas Programme.
Love & Care	Providing ration & distributes gifts.
MADAT Trust	Helping needy patients & free wig
	Counselling patients
	Providing OLA Cab services for patients at 20 % Discount.
Make a Wish Foundation	Fulfilling special wish of the paediatric patients.
Mumbai Port Trust	Building & land in Sewri for rehabilitation of pediatric cancer patients.

Narendra Nadkarni (Mr)	Medicine compliance and B.P. monitoring.
Niyati S. James (Ms)	Counselling and arranges cash for emergencies.
PayalSangrajka (Ms)	Arranges emergency funds and distributes gifts.
Pooja Bangia (Ms)	Arranges Art activities in wards.
Sadbhavana Trust	Giving guidelines to patients for financial assistance
	Guidance for accommodation for cancer patients
	Giving voluntary service to cancer patients.
Sanjivani Life Beyond Cancer	Counselling
	Financial Support
	Arranging Cancer Detection Camps, Documentary Films & Conference for the cancer survivors to share their experience with other patients.
Save, Nandini& Nitin	School programs.
Shraddha Foundation	Providing accommodation for cancer patients
	Financial help for needy patients
	Counselling patients
	Arranging entertainment programme twice a year
	Arranging awareness and detection camp all over Maharashtra, Gujarat and Orissa.
Shilpi Mehta (Ms)	Arranges emergency funds.
Society for Service for Voluntary Agencies (SOSVA)	Providing guidance to all patients.
SSAUT	Giving voluntary service to cancer patients.
St. Jude Trust	Counselling at Main Building Pediatric Outpatients department
	Guidance for ration and other financial help.
	Free accommodation for needy patients.
Stock Holding India Ltd.	Free bus shuttle service between TMH and Dadar TT station.
TajSats (Taj Hotels, Tata Group)	Free lunch daily to about 275 registered patients.
Tarun Mitra Mandal	Providing guidance to all patients
	Financial help
	Fruit distribution in wards.
Thiagarajan P (Mr)	Fund support, small software application development & counselling.
UGAM	Self Empowerment of the young survivors
	Helping children during cancer treatment
	Social awareness and re-bonding with society; national and international.
Utkal Jagruti Seva Sang	Volunteering to assist patients in their needs.
Vasanta Memorial Trust	Providing financial help to Breast &Leukemia cancer patients
	Arranging various programme for paediatric patients
	Financial support to paediatric patients
	Celebrating cancer survivor day.
Vcare	Distribution of gifts to children at the time of discharge
	Gifts at Cancer Survivors Day
	Issuing products of Infection Control Kit from the V Care office
	Counselling patients in wards as well as OPD's
	Cancer Information Books
	Help supervise the toy room in pediatric ward.

VCan Trust	Providing guidance to all patients.
Women's Cancer initiative	Arranges one day conference on the information of latest technology transfer in Breast cancer for Doctors and, funds patient care and research.

Companies through their CSR Support

Baccarose Perfumes & Beauty Products Pvt. Ltd.	Procurement of essential equipment.
Bharat Petroleum Corporation Limited	Linear Accelerator machine for Radiotherapy
Bridgestone India Pvt. Ltd.	Fluoroscopy Imaging device
DRT-Anthea Aroma Chemicals Pvt. Ltd.	Fibreless bronchoscope & Video laryngoscope
Hindustan Petroleum Corporation Limited	Nanostring short version ncounter, FLEX sprint for molecular studies
Nuclear Power Corporation of India	Advanced intraoperative Neuronavigation with integrated Ultrasound system.
Oglivy & Mather Pvt. Ltd.	Droplet Digital Polymerase Chain Reaction system & Automated Rotary Microtome.
Parle Biscuits Pvt. Ltd.	Refurbishment of the Golden Jubilee block's Out-Patients section.
Shrivan Sudhir (Mr)	Philips Intellivue multi-channel touch screen anesthesia monitoring system.
Supreme Z Group of Industries Ltd.	Bronchoscopy machine.
Zeus Air Services Pvt. Ltd.	Peri-operative support for cancer children.

CSR = Corporate Social Responsibility

The hospital management is deeply appreciative of the humanitarian services offered by these volunteers and organizations towards patient welfare.



Clinical Services, the Disease Management Groups (DMG)



Adult Hematolymphoid - DMG

Convener:

Dr. Sumeet Gujral (Pathology)

Secretary:

Dr. Manju Sengar (Medical Oncology)



ACTREC Scientists

Dr. Jyoti Kode
Dr. Rukmini Goverkar
Dr. Shilpee Dutt
Dr. Syed Hasan

Clinical Pharmacology

Dr. Manjunath K.
Dr. Vikram Gota

Cytogenetics

Dr. Dhanashree Shetty
Ms. Hemani Jain

Hemato- Pathology

Dr. Nikhil Patkar
Dr. P.G. Subramanian
Dr. Prashant Tembhare

Medical Oncology

Dr. Anant Gokarn
Dr. Avinash Bonda
Dr. Bhausahab Bagal
Dr. Hasmukh Jain
Dr. Lingaraj Nayak
Dr. Navin Khattry
Dr. Sachin Punatar

Medical Social Worker

Ms. Aarti Tillu - ACTREC
Mrs. Sunita Jadhav - TMH

Nuclear Medicine & Molecular Imaging

Dr. Archi Agarwal
Dr. V. Rangarajan

Pathology

Dr. Sridhar Epari
Dr. Tanuja Shet

Psychiatry

Dr. J. Deodhar

Radiation Oncology

Dr. Jayant Sastri Goda
Dr. Nehal Khanna
Dr. Siddhartha Laskar

Radiodiagnosis

Dr. Akshay Baheti
Dr. Nilesh Sable
Dr. Nitin Shetty
Dr. Suyash Kulkarni

The Adult Hematolymphoid Disease Management Group (AHL-DMG), a multidisciplinary group catered to the management of a variety of hematological malignancies in a comprehensive manner. This was the largest group dedicated to treating hemato-lymphoid malignancies in the country.

The Medical Social Worker and the volunteers counseled the patients in depth, regarding the required financial support, accommodation and other logistics to start or sustain therapy. They also assisted the treating consultants in taking decision for adopting (fully / partially) those patients with curable malignancy, who were unable to start or sustain therapy due to financial / psychosocial challenges. The support plan was revisited at frequent intervals to understand the gaps.

The DMG maintained ongoing quality improvement measures with continuous audits of the protocols,

chemotherapy regimens, their morbidity and mortality, treatment compliance in long-term therapy and implementation of modifications derived from such audits.

The treatment for all stable lymphoma, myeloma and certain leukemia patients was started in the Day Care. Blood, platelet transfusions and Intravenous hydration were given in the Day Care.

Patients with advanced disease not amenable to treatment and those treated multiple times outside were considered for palliative care.

Sick patients and those with complications or with oncological emergencies (such as tumor lysis syndrome, superior vena cava syndrome and impending paralysis) were admitted in the ward or in the casualty for emergency management.

Stable patients were followed-up in the OPD till their diagnostic and staging workup was completed.

Volume Indicators

The AHL group registered **5778** patients in the year 2018; three thousand one hundred thirty one (3131) in general category, 1406 in private category, 1241 foreign nationals category including those for Second Opinion. There were 65244 follow-up patients.

Disease-wise Distribution

Diagnosis	Number of Patients
Acute Lymphocytic Leukemia ALL	459
Acute Myelogenous Leukemia AML	471
Acute Promyelocytic Leukemia APML	76
Mixed-Phenotype Acute leukemia MPAL	11
Chronic Myelogenous Leukemia CML	580
Chronic Myeloproliferative Disorders CMPD	36
Non Hodgkins Lymphoma NHL	1443
Hodgkins Lymphoma HL	307
Myelodysplastic Syndromes MDS	56
Other Cancers	147
Plasma Cell Dyscrasia	395
Acute Leukemia	43
Under Diagnosis	01
No malignancy	132
No diagnosis at TMH	610
Second Opinion	977
Other Hematological Malignancies	34
Total	5778

Diagnosis	Treatment (n = 3911)					
	Treated in TMH	Palliative Treatment	No Treatment	Observation	Only for Investigations	Referred Back
Acute Lymphocytic Leukemia ALL	360	30	41	0	13	15
Acute Myelogenous Leukemia AML	285	48	96	0	25	17
Acute Promyelocytic Leukemia APML	67	0	05	02	01	01
Mixed-Phenotype Acute leukemia MPAL	11	0	0	0	0	0
Chronic Myelogenous Leukemia CML	499	08	35	0	10	28
Chronic Myeloproliferative Disorders CMPD	24	02	10	0	0	0
Non Hodgkins Lymphoma NHL	1018	37	192	12	164	20
Hodgkins Lymphoma HL	233	03	37	01	28	05
Myelodysplastic Syndromes MDS	25	05	18	0	04	04
Plasma Cell Dyscrasia	326	03	39	03	07	17
Acute Leukemia	0	27	11	0	02	03
Other Hematological Malignancy	15	01	06	06	06	0
Total	2863	164	490	24	260	110

Patients treated with diagnosis (3911)

There were 1100 Patients who dropped out prior to initiation of treatment.

Outcome Indicators

The mortality was measured between less than 30 days, between 30 & 200 days and over 200 days.

Diagnosis	Mortality 2018			Total
	< 30 days	30 – 200 days	> 200 days	
Acute Lymphocytic Leukemia ALL	05	01	04	10
Acute Myelogenous Leukemia AML	19	11	07	37
Acute Promyelocytic Leukemia APML	28	13	02	43
Chronic Myelogenous Leukemia CML	06	00	06	12
Hodgkin's Disease HD	12	00	00	12
Non Hodgkins Lymphoma NHL	25	17	18	60
Myelodysplastic Syndromes MDS	00	01	02	03
Malignant Myelanoma MM	01	00	01	02
Total	96	43	40	179

The phases of treatment in which, there were 179 deaths

Diagnosis	Under Evaluation	Supportive Care	Relapsed	Follow-up	On Treatment	Total
ALL	07	06	05	01	18	37
AML	05	08	02	01	27	43
APML	00	04	00	00	08	12
CML	01	03	05	00	01	10
HD	00	02	01	00	00	03
NHL	10	14	14	01	21	60
MDS	00	01	01	00	00	02
MM	01	04	05	00	02	12
Total	24	42	33	03	77	179

Research

The departmental staff had 15 publications and one book chapter contribution.

Investigator Initiated Trials	Registry Trials	Pharma Sponsored Trial	Overall Patients Accrued
16	02	04	5966

Bone & Soft Tissue - DMG



Convener:

Dr. Ashish Gulia (Surgical Oncology)

Secretary:

Dr. Amit Janu (Radiodiagnosis)

Medical Oncology

Dr. Girish Chinnaswamy
Dr. Jyoti Bajpai
Dr. Siddharth Turkar
Dr. Tushar Vora

**Nuclear Medicine &
Molecular Imaging**

Dr. Nilendu Purandare
Dr. Venkatesh Rangarajan

Occupational Therapy

Dr. Manjusha Vagal
Dr. Rebeka Marri

Palliative Medicine

Dr. Kruttika Girkar

Pathology

Dr. Bharat Rekhi
Dr. Mukta Ramadwar

Physiotherapy

Dr. Anuradha Daptardar
Dr. Vincent Singh

Radiation Oncology

Dr. Nehal Khanna
Dr. Siddhartha Laskar

Radiodiagnosis

Dr. Amitkumar Choudhari
Dr. Amrita Guha
Dr. Arpita Sahu
Dr. Kunal Gala
Dr. Nitin Shetty
Dr. Subhash Desai
Dr. Suyash Kulkarni

Surgical Oncology

Dr. Ajay Puri
Dr. Prakash Nayak

All patients attending the Bone & Soft Tissue DMG were seen on the day of registration by a surgeon or a medical / radiation oncologist and management initiated on same day. The entire DMG team met every Tuesday and decided upon an integrated management plan for all patients. Clinico-pathological meetings were conducted on every Thursday to further discuss the challenging cases. The weekly patient rehabilitation clinic added a significant component in the holistic management of patient treated for musculoskeletal malignancies.

A monthly DMG meet was held on the first Friday of every month to discuss new projects, student thesis and DMG related issues, for effective integrated functioning and quality check over the discussed issues in the past meetings.

Various DMG members were actively involved in research and teaching activities. A large majority of research

conducted within the DMG was investigator initiated, including prospective and retrospective studies. The primary focus of research was aimed at identifying novel immunohistochemical and molecular diagnostic markers; new imaging methods and modalities, looking at treatment outcomes, in terms of disease control; usage of newer, non-invasive options and towards lesser morbidity and improved survival outcomes; and, to reduced treatment related complications and improved functional outcomes.

Academic lectures were initiated for DMG members, fellows and residents to further enhance the knowledge in this field via lectures by various faculty members across specialties.

The newly acquired Brainlab navigation system enabled the BST services to undertake complex and precise pelvic bone resections.

Volume Indicators

In the year 2018, there were a total of **2671** new patient registration, of which, 1602 were in the General and 502 in Private category. The DMG attended to 567 patients referred from other DMG's.

Radiodiagnosis	Pathology	Surgery Oncology	Radiation (Adult)	Medical Oncology Phy (Th)	Occ (Th) &
Diagnostic procedures: 4675 . Interventional procedures including image guided biopsies: 536 .	Biopsies specimens, slides, paraffin blocks etc. 2929 .	Major surgeries: 607 . Minor procedures: 837 .	Total - 309 . RT Intent (Ext+Br): Rad - 191 Pall - 118 Ext Radiation Therapy - 291 Brachytherapy - 18 Conventional - 182 / 291 (63 %) 3D-CRT/IMRT – 109 / 291 (37 %)	Chemotherapies planned per patient - 243 Neoadjuvant chemotherapy - 205 Palliative chemotherapy - 38 Patient receiving chemotherapy at TMH - 233 Patient referred outside - 10	Occ (Th) Total – 2234 . IPD (New) - 295 IPD (FU) - 603 OPD (New) - 281 OPD (FU) - 860 Phy (Th) Total – 2006 . OPD - 1475 IPD - 531

RT, rad = Radiotherapy; **Ext** = External; **Br** = Brachytherapy; **CRT**= Conformal Radiotherapy; **IMRT** = Intensity Modulated Radiotherapy; **Occ** = Occupational; **Phy** = Physiotherapy; **Th** = therapy; **OPD** = Out-patients; **IPD** = In-patients; **FU** = Follow-up
3D-CRT = Three Dimensional Conformal Radiation Therapy

Complications & Mortality Rates

Surgical Oncology	Radiation Oncology	Medical Oncology
Mortality (30 days) - 01 Morbidity: Vascular injury - 10 Neural Complications - 09 Infection requiring wound wash (Bone) - 26 Flap related complications (flap failure, flap necrosis) - 08 Wound dehiscence requiring debridement - 18	Mortality (30 days) - Nil Morbidity: Acute toxicity: Grade I - 73 % Grade II - 44 % Grade III - 10 %	Mortality (30 days) - 05 Total Chemotherapies planned = 243. Osteogenic Sarcoma (OGS) - 118 Ewings - 74 Soft Tissue Sarcoma (STS) - 30 Others - 21 Neoadjuvant chemotherapy - 205 Palliative chemotherapy - 38 Toxicity : Non Hematological – 54 / 243 (22 %) Hematological – 118 / 243 (48 %)

Survival Rates

- The 738 operated extremity and pelvic non metastatic high grade Osteosarcoma patients had an Overall Survival (OS) of 53 % and an Event Free Survival (EFS) of 47 % at 5 years.
- For patients treated with “OGS 2012” chemotherapy protocol (n = 173), the OS was 64 % and 58 % at 3 and 5 years respectively.
- For Ewing’s sarcoma, the 3 - year OS was 70 % and Disease Free Survival (DFS) of 66 %.

- For Chondrosarcoma, the Overall Survival for 5 years was 75 %. The 5 years OS for non metastatic cases of grade II chondrosarcomas was 81 % compared to 59 % for grade III and 93 % for grade I chondrosarcomas.

Compliance to treatment (3-month period)

The overall compliance referred to the percentage of patients who were recommended treatment and who, undertook the same. This included patients who were lost to follow-up, as non-compliant.

There were a total of 452 patients of which, 342 were cancerous, 93 benign and 17 not tumors. The compliance for malignant bone tumors were as indicated:

		Osteogenic Sarcomas (75)	Ewings Sarcomas (68)	Soft Tissue Sarcomas (116)	Chondrosarcomas (16)	Others (67)
	Lost to Follow-up	01	0	02	0	08
	Palliative Care	12	06	14	0	15
	Referred Out	01	1	02	0	08
	Treated	58	50	73	13	27
	Died	0	01	01	0	01
	Observation	0	0	06	0	04
Compliance	Yes	71 (95 %)	56 (82.3 %)	95 (82 %)	13 (81.2 %)	55 (82 %)
	No	04	12	21	03	13

Research

Total number of Clinical Trials		Completed Trials		Ongoing Trials		Overall patients accrued
Investigator Initiated / Thesis	Sponsored trials	Investigator Initiated /	Sponsored trials	Investigator Initiated /	Sponsored trials	InvestigatorInitiated
16	0	02	0	14	0	600 +

The DMG members had 15 publications in the year 2018.



Breast Oncology - DMG

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Secretary:

Dr. Nita Nair (Surgical Oncology)



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Dr. Vani Parmar

TMC Research Administrative Council (TRAC)

Ms. Rohini Hawaldar

The Breast Cancer Working Group (BCWG), with one of the highest workload in Tata Memorial Centre, provided high quality and holistic multidisciplinary care to a large number of patients with breast neoplasm from all over the country. A large number of patients from within and outside India also came for expert opinion. The management decisions were guided by the current scientific evidence as applicable for the Indian population. The clinicians, trial coordinators, rehabilitation experts and nurses in the group worked closely

with several (NGO's) and Students of the advanced diploma in Patient Navigation (KEVAT) to assess and offer financial assistance, rehabilitation and psychosocial counseling that improved treatment compliance and, took care of any survivorship or Quality of life issues during and after treatment. Some of the ongoing clinical trials like neoadjuvant hormone therapy and other innovative drugs in different types of breast cancer would impact patient survival in long term.

Volume Indicators

	TMH		ACTREC	
	2017	2018	2017	2018
Private	2046	2012	072	074
General	2408	2505	346	509
Total	4454	4517	418	583

Preventive Oncology Registration	TMH		ACTREC	
	2017	2018	2017	2018
	1103	1430	62	111

Surgical Data:

	Type of surgery	TMH		ACTREC		Total	
		2017	2018	2017	2018	2017	2018
	Major Surgery						
1	Breast conserving surgery - BCT/ BCT + LD/BCT + Oncoplasty / BCT with HDR + Axilla alone surgery	831	705	194	211	1025	916
2	Mastectomy - MRM/SMAC/SMAC + LD/SM/Completion mastectomy/ Revision mastectomy	669	748	368	414	1037	1162
3	Others	27	21	18	12	45	21
4	TOTAL	1527	1474	580	637	2107	2111
	Additional Procedures: (Ovarian ablation, Oncoplasty, Pedicled flaps, Reduction Mammoplasty, Whole breast reconstruction, Implant/ Expander, Supraclavicular fossa clearance, Port corrected, HDR, Microdochectomy/ wire guided localization, Margin Revision, Internal mammary node clearance)	523	533	105	186	628	719

BCT=Breast Conservative Therapy; **MRM**=Modified Radical Mastectomy; **LD**=Latissimus Dorsi Flap;
HDR=High Dose Radiotherapy; **SMAC**=Simple Mastectomy with Axillary Clearance; **SM**=Simple Mastectomy

Radiotherapy Data:

Year	2017		2018	
	TMH	ACTREC	TMH	ACTREC
Total patients treated	1233	199	1393	268
Telecobalt	261	29	397	96
Linear accelerator	963	131	969	130
Tomotherapy	09	39	24	42
Palliative	649	43	741	57
Adjuvant	584	156	651	211
Telecobalt	105	13	159	59
Linear accelerator	470	104	469	113
Tomotherapy	09	39	24	39
Brachytherapy	24	24	40	20
Referral letter	1667		NA	NA

Chemotherapy Data:

Chemotherapy Type	2017	2018
NACT and Adjuvant	1924	2240
Palliative Chemotherapy	1217	1425
Total	3141	3665
Referred outside	2713	1524

NACT = Neoadjuvant Chemotherapy

Rehabilitation Department:

	No. of patients
In - Patients	384
Out - Patients	1869
Post Surgery Breast Care Class	1561
Shoulder rehabilitation, Breast prosthesis & MRM Bra	607
Lymphedema	982
Total	5403

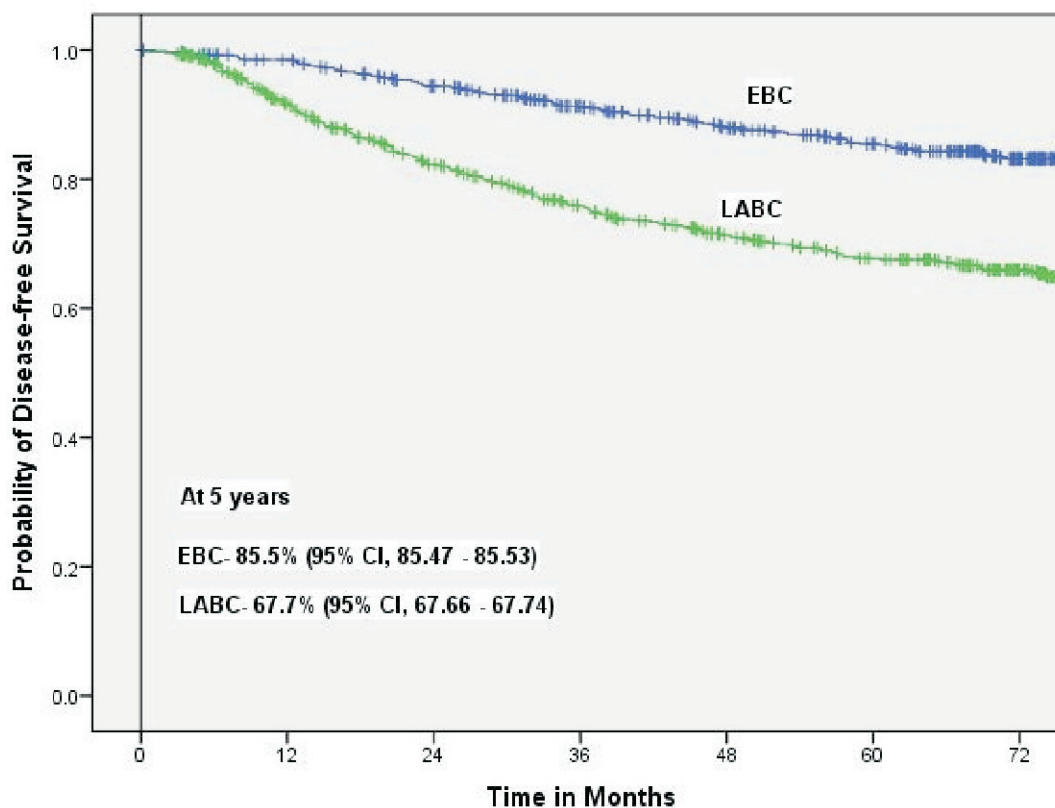
- Surgical morbidity – 24.88 %
- Positive margin and re-excision rates – 4.51 %
- Average hospital stay – 2.5 days
- Nodal dissection:- Only axillary sampling was done in 52 cases Median number of nodes 8 (3-19).

Outcomes

The BCWG published the survival data on 2192 patients of with breast cancer with ages ranging from 18 to 94 years with median of 50 years. Of these 888 (40.5 %) were operable, 833 (38 %) were locally advanced and 471 (21.5 %) were denovo metastatic or relapse cancer at presentation. The 5 year Disease Free Survival in Early Breast Cancer (**EBC**) patients was 85.5 % (95 % CI 83.4 to 86.4 %) and for Locally Advanced Breast Cancer (**LABC**), it was 67.7 % P<0.001 (see the graph below). The survival rates in this study were

30 - Day Mortality & Complication Rates

- Surgical mortality - 02 (01 palliative mastectomy & 01 recurrent Locally Advanced Breast Cancer with chest wall resection)



CI = Confidence Interval

equal to the documented global rates; nodal disease burden emerged as the most important prognostic factor. In addition, in EBCs, a lack of hormone receptor expression and in LABC, HER2neu overexpression appears to worsen the outcome. This analysis would serve as a benchmark for future studies. **

** Nair N, Shet T, Parmar V, Hawaldar R, Gupta S, Budrukkar A, *et al.* Breast cancer in India – An audit from a tertiary cancer center with outcome analysis. Indian J Cancer 2018.

Compliance

- Surgical compliance (Planned and completed surgery) - 88 %
- Radiation therapy (RT) to all Breast Conservative Therapy patients: 100 %
- RT to all post mastectomy patients with nodes > 3 and/or primary Tumor > 5 cm: 100 %
- Adjuvant chemo planned for node positive patients: 100 %
- Appropriate hormonal adjuvant tamoxifen /Aromatase Inhibitors to all Human Epidermal Growth Factor Receptor (HER) 2 positive patients: 100 %.

Research

Projects			Completed			Ongoing			No. of Pts.
Investigator Initiated	Sponsored	Collaborative	Investigator Initiated	Sponsored	Collaborative	Investigator Initiated	Sponsored	Collaborative	
80	24	08	05	01	00	75	25	08	2716



Gastrointestinal - DMG

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The Gastrointestinal (GI) Disease Management Group (DMG) delivered comprehensive care to patients with gastrointestinal cancers in a multi-disciplinary approach. These included gastric cancers (including Gastro-oesophageal junction cancers), gall bladder cancers, pancreatic cancers (including periampullary cancers, neuroendocrine tumors, cystic tumors and Intraductal Papillary Mucinous Neoplasms), liver cancers, colo-rectal cancers, retro-peritoneal tumors and lesions in the spleen.

The group members were geared towards improving the speed and quality of service, alongside education and research. The medical social worker support group met

monthly for redressal of patients' socioeconomic and logistic issues.

Volume Indicators

The total number of patient registrations for GI services was **8410**.

Surgery:

The total numbers of surgeries performed were 1738 (Elective, 1433; Emergency, 305) and the General to Private patient Ratio was 52:48.

Trends in Clinical Services

Year	Reg.	Adm.	Surgery TMH			Surgery ACTREC	Mortality
			Elective	Emergency	Total		
2017	9591	1964	1113	280	1393	265	19
2018	8410	2051	1104	305	1409	329	31

Surgical Details

Sr. No	Name of the procedure	
1	Pancreatoduodenectomy / Whipple procedure.	154
	Vascular Resections.	09
	Multivisceral resections.	11
	Distal / Subtotal Pancreatectomy.	14
	Median Pancreatectomy.	04
	Enucleation.	02
	Robotic resections / reconstruction.	07
	Laparoscopic resections / reconstruction.	17
	Total Resections	185
	2	Liver resections ≥4 segments.
< 4 segments.		(<3 seg) 47
Robotic.		06
Total Resections		104
3	Radical cholecystectomies.	41
	Revision cholecystectomies.	51
	Simple Cholecystectomies.	54
	Extended resections for Ca GB.	02
	Excision of bile duct.	17
	Robotic cholecystectomies.	12
	Total Resections	165
4	Open Gastrectomies.	215
	Laparoscopic /	09
	Robotic assisted Gastrectomy.	98
	Distal Radical Gastrectomy.	59
	Total Gastrectomy.	11
	Left Thoracoabdominal (Total / Proximal Gastrectomy).	
	Multi Visceral Resection.	09
	Wedge Resection.	15
	CRS+HIPEC.	18
	Others (adnexectomy / D1 excision / antrectomy).	09
	Total Resections	224

Sr. No	Name of the procedure	
5	Colonic resections / Total Colectomy /TPC.	140
	Colon – Multivisceral resection. AR/LAR/Hartmann.	25
	Intersphincteric Resections.	127
	Abdominoperineal resections.	41
	Cytoreductive Surgery± HIPEC.	66
	Stoma closures.	39
	APR + Beyond TME	34
	(Pelvic exenteration, ELAPE, VY Plasty, sacrectomy.)	73
	LAR/ISR+ Beyond TME	
	(Suprlevator exenteration, Seminal vesicle, Denonvilliers, lateral pelvic node.)	20
	PIPAC.	02
	Laparoscopic.	227
	Robotic.	57
Total Resections	567	
6	Retroperitoneal tumor excisions (Total).	56
	Vascular.	07
	Multi Viscera.	23
7	Miscellaneous (stomas, bypass procedures, staging lap, small bowel resection anastomosis, scar excisions, emergency explorations)	440

APR = Abdominopelvic Resection;

AR = Anterior Resection;

Ca GB = Cancer of Gall Bladder;

CRS = Cytoreductive Surgery;

ELAPE = Extralevator Abdominoperineal Excision;

HIPEC = Hyperthermic Intra Peritoneal Chemotherapy;

ISR = Intersphincteric Resection;

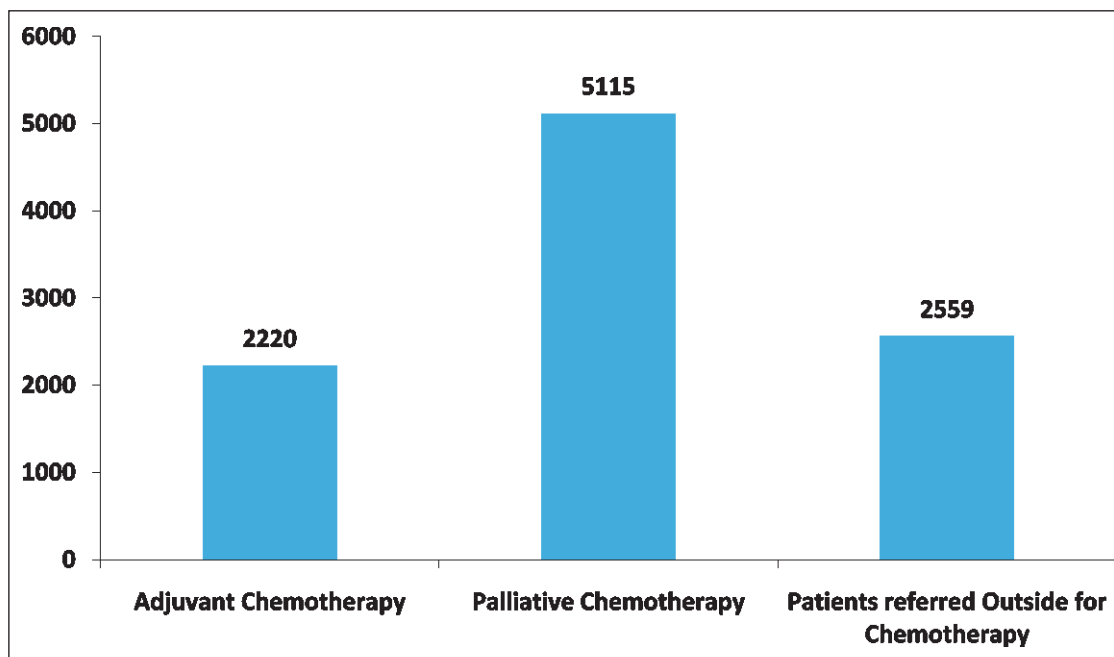
LAR = Low Anterior Resection;

PIPAC = Pressurized Intraperitoneal Aerosol Chemotherapy

TME = Total Mesorectal Excision;

TPC = Total Proctocolectomy;

Medical Oncology:

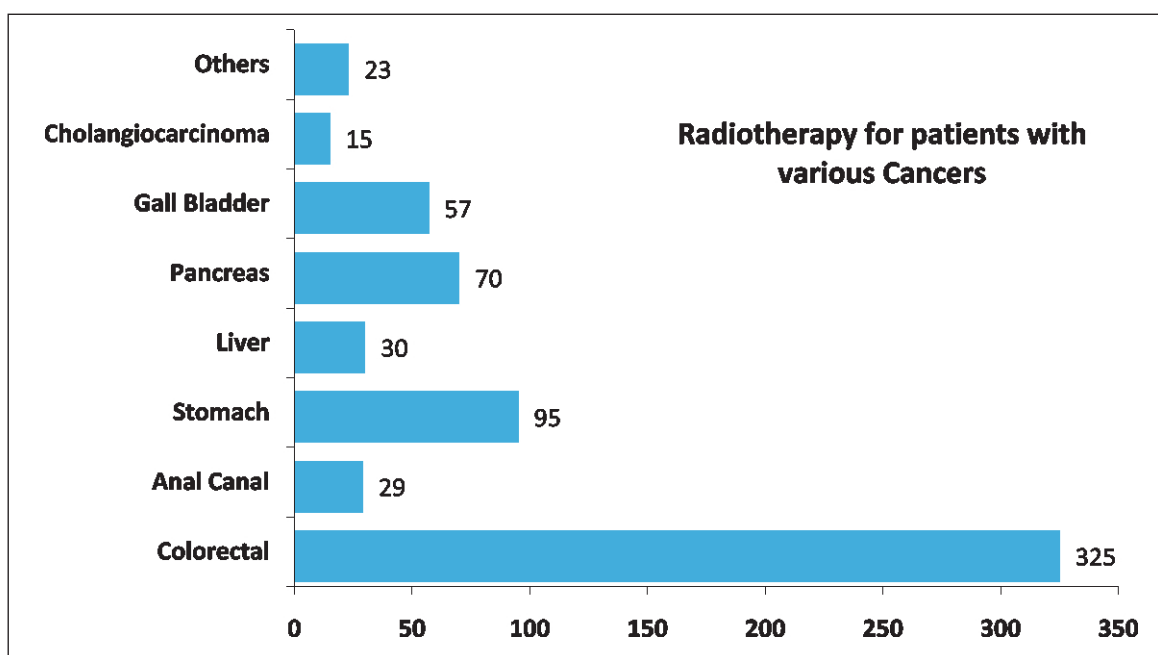


Radiation Oncology:

Due to limited slots availability for Radiotherapy machines the focus was on using Radiotherapy techniques using hypofractionation in various sites such as rectal, pancreatic and liver cancers. Six hundred forty four (644) patients were given radiotherapy in TMH and 521 patients were referred outside.

Interventional Radiology (IR):

The division of Intervention Radiology dealt with a wide range of image guided intervention procedures. These included elective major procedures like TACE, TARE, RFA, PTBD, preoperative angioembolization and emergency procedures like angioembolization in case of acute hemorrhage. Minor procedures like image guided biopsies and pigtail drainage procedures were also done.



Specific IR procedures	Numbers
Angioembolization	66
Chemoembolization	180
Radioembolization	17
Radiofrequency Ablation	53
Microwave Ablation	20
IRE	01
Drainage & related procedures	1075

IRE = Irreversible Electroporation

PTBD = Percutaneous Transhepatic Biliary Drainage;

RFA = Percutaneous Radiofrequency Ablation;

TACE = Transarterial Chemoembolization;

TARE = Trans-Arterial Radioembolization;

Nuclear Medicine & Molecular Imaging:

The department of Nuclear Medicine & Molecular Imaging started providing radionuclide therapy to selected hepatic and neuroendocrine cancers.

Transarterial Radioembolization (for Liver cancer)	14
Lu PRRT (for GastroIntestinal Neuroendocrine tumors)	08

Research

The GI DMG has published over **50** scientific papers in peer reviewed indexed journals in addition to several book chapters.

Total Number of Clinical Trials: 107 (Ongoing / Approved+Completed)			Completed Trials: 46			Ongoing Approved Trials: 61			Ongoing / Overall Patients accrued
Investigator Initiated	Sponsored	Thesis	Investigator Initiated	Sponsored	Thesis	Investigator Initiated	Sponsored	Thesis	Ongoing Trials No of Patients to be accrued: 11599 No. of patients accrued: 7211 62.16 %
51 Others = 03 Thesis = 09	09	35	14 Others = 01 Thesis = 03	03	25	37 Others = 02 Thesis = 06	06	10	Completed Trials No. of Patients to be accrued: 6762 No. of patients accrued: 5500 81.33 %

Morbidity & Mortality Rates

Surgical:

- Overall Mortality (N): 31 (1.8 %)
- Mortalities in Elective Surgeries: 12 (0.8 %)
- Mortalities in Emergency surgery: 19 (6.2 %)
- Morbidity (Clavien Dindo Grade III and IV): 14 %.

Medical Oncology (Chemotherapy):

- G1 toxicities: (53.67 %)
- G2 toxicities: (09.57 %)
- G3 toxicities: (04.13 %)
- G4 toxicities: (0.45 %)

Radiation Oncology:

The acute radiotherapy complication rates of patients undergoing radical treatments:

- Grade 0 – 168 (43.3 %)
- Grade 1 – 159 (41 %)
- Grade 2 – 55 (14.2 %)
- Grade 3 – 19 (2.9 %)
- Grade 4 – 01 (0.2 %)
- Grade 5 – 0

Gynaecology - DMG

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Dr. Rajendra Kerkar
Dr. Shylasree T.S.

The dedicated Gynaecology Disease Management Group (DMG) team members focussed on treatment of gynaecological cancers and gave their valuable inputs for the managements of such patients. The multidisciplinary team worked towards treating women with gynaecological cancers with the aim of obtaining the best clinical and oncological outcomes.

Volume Indicators

A total of **3893** new patients were registered under Gynaecologic Oncology DMG in the year 2018; out of which 2617 were in General category and 1276 were in Private category. Table.1 shows the site wise break up of these patients.

Diagnosis	Total	Private	General
Cancer Cervix	1484	354	1130
Cancer Endometrium	345	180	165
Cancer Ovary	1034	401	633
Uterine Sarcoma	28	18	18
Cancer Vagina	28	11	17
Cancer Vulva	35	14	21
Cancer Vaginal Vault	100	22	78
Others	501	138	363
No Malignancy	116	54	62
Unknown	214	84	130
Total	3893	1276	2617

Surgery:

The DMG performed a total of 733 major surgeries (663 at TMH & 70 at ACTREC).

Major Surgeries (TMH+ACTREC)

Disease sites	TMH	ACTREC
Cervix	43	00
Ovary	373	58
Endometrium	128	08
Uterine Sarcomas	16	00
Vulva	15	00
GTN	02	00
Miscellaneous	86	04
Total	663	70

GTN = Gestational Trophoblastic Neoplasia

The 30-Day surgical mortality was 1.2 % (08 / 663). Major surgical morbidity was 19.5 % (129 / 663) that included 8.7 % (58 / 663) intra-operative and 10.7 % (71 / 663) post-operative complications.

Radiation Oncology:

Sites treated with External Radiation	TMH
Cervix Cancer	618
Endometrial / Uterine Cancer	67
Ovarian Cancer	34
Vulval Cancer	19
Vagina & vault Cancer	48
Others	02
Total	788

A total of 968 patients received radiation treatment out of which 788 received radiation at TMH & 168 at ACTREC.

Operative Brachytherapy was given to 715 patients in TMH and to 196 in ACTREC.

The radiation complications stood at 10 % for Grade II and < 03 % for Grade III - IV.

Chemotherapy toxicity:

Chemotherapy Toxicities	Ovarian cancer	Endometrial cancer	Cervix cancer
Number of patients	863	310	985
Grade III / IV Myelosuppression	20 %	7 %	4 %
Febrile Neutropenia	4 %	-	-
Peripheral neuropathy Grade III / IV	8 %	3 %	13 %
Hypersensitivity reaction	5 %	2 %	2 %
Defaulted treatment	2 %	-	-

Preventive Oncology:

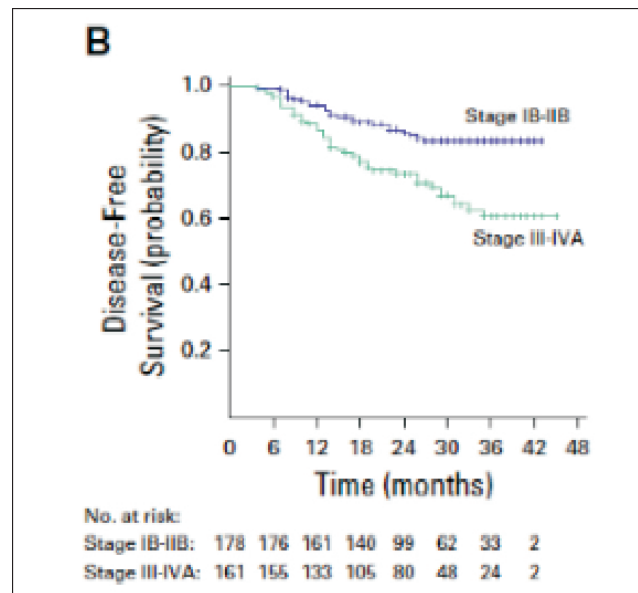
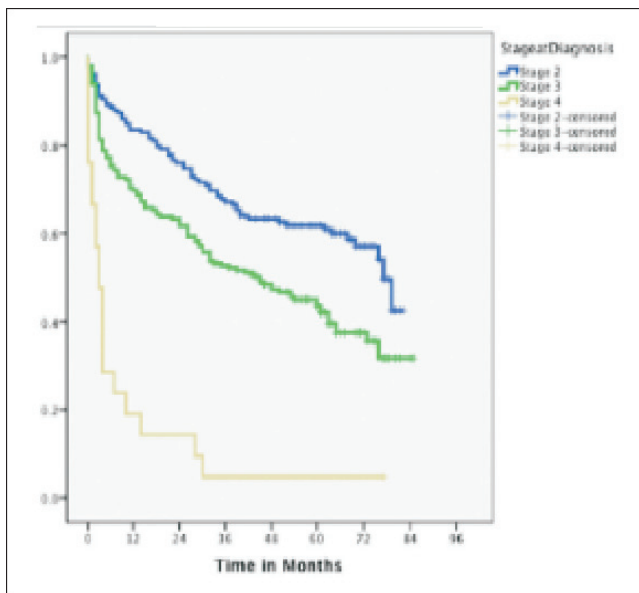
The department of preventive oncology attended to 3788 new cases of suspected gynaecological cancers and Papanicolaou test (Pap smear) was done in 2739 patients. They detected 69 cases of cancers.

Occupational Therapy:

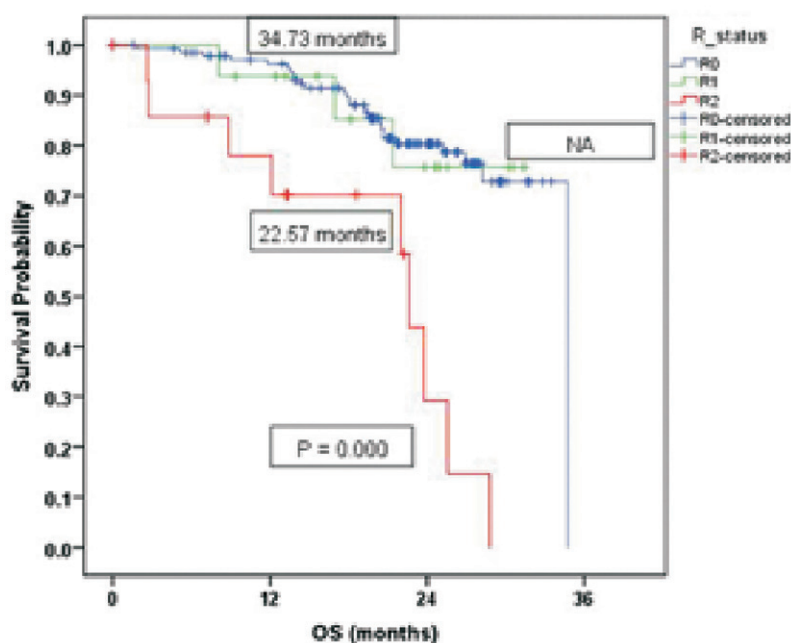
The occupational therapy department performed vaginal dilatation and provided sexual counselling to 670 women.

Outcome Indicators

The audit reports published in 2018 report improvement in outcomes of cervical cancer as compared to 2010 cohort {Chopra S, IJC 2018 (left panel); Mittal P, Chopra S, JGO 2018 (right panel)}.



Overall survival in women with R0, R1, and R2 resection



Research

A total of 35 publications in Pubmed Indexed Journal were made by Gynaecology DMG members in 2018.

Total number of Clinical Trials (N=23)		Completed Trials in 2018 (N=11) (including thesis)		Ongoing Trials(N=35) (including thesis)		Overall patients accrued in 2018
Investigator Initiated Thesis	Sponsored trials	Investigator Initiated /	Sponsored trials	Investigator Initiated /	Sponsored trials	
20	03	11	00	32	03	Approx. 1300

The percentage of patients recruited in trials in 2018 was 33 % (1300 out of 3893 total registered patients).

Head & Neck - DMG



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Dr. Shubhada Kane
Dr. Swapnil Rane

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Dr. Prabha Yadav
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Dr. Nilesh Sable
Dr. Nitin Shetty
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Dr. Shivani Mahajan
Dr. Suyash Kulkarni

Speech Therapy

Mr. Arun Balaji
Mr. Rukmangathan TM

Surgical Oncology

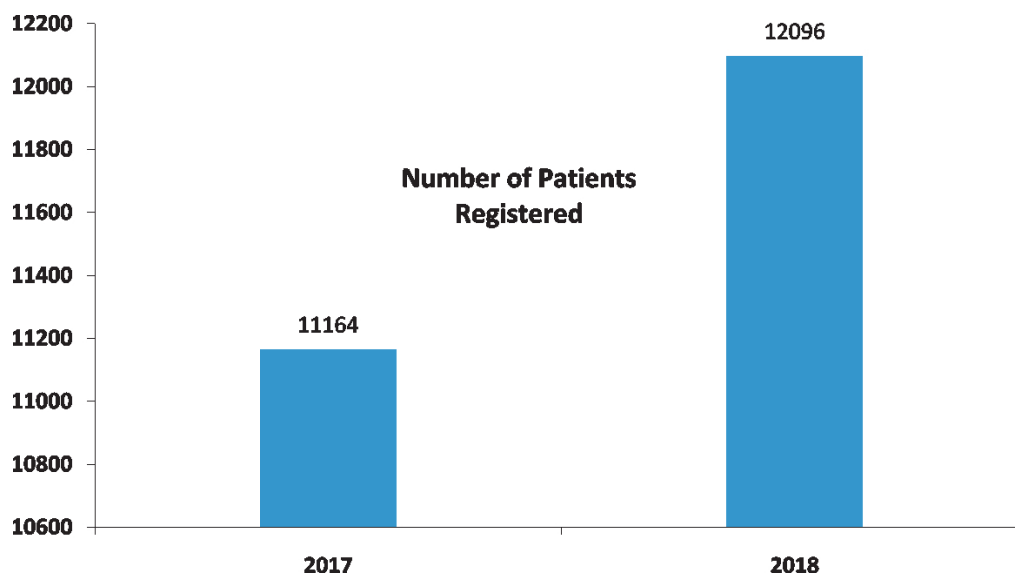
Dr. Anil D'cruz
Dr. Anuja Deshmukh
Dr. Deepa Nair
Dr. Devendra Chaukar
Dr. Gouri Pantvaitya
Dr. Pankaj Chaturvedi
Dr. Poonam Joshi
Dr. Prathamesh Pai
Dr. Richa Mahajan
Dr. Shiva Kumar Thiagarajan
Dr. Sudhir Nair (ACTREC)

The Head & Neck cancers constituted almost 25 % of the annual registrations at TMC. The Head & Neck Disease Management Group (DMG) comprised of major oncology specialties (surgical, radiation and medical oncology), effectively supported by diagnostic other ancillary and rehabilitative services, providing effective evidence based care for HN cancers.

The DMG members were instrumental in promoting a healthy environment through public education and anti-tobacco advocacy.

The management plans were evidence based adhering to local as well as international guidelines. The following sections provide registration details, admissions, surgical procedures and radiation and medical oncology treatment details.

Volume Indicators



Modality	Procedures	No of patients
Surgery	Minor	7139
	Major	2299
Radiotherapy	Radical (Definitive + Adjuvant)	1176
	Palliative	116
Chemotherapy	Neoadjuvant Chemotherapy	765
	Concurrent Chemo radiotherapy	778
	Palliative Systematic Therapy	65
	Palliative systemic therapy: OMCT & Intravenous (First-line, Second Line & Third Line)	659
	Palliative: Counselling for chemotherapy and opted for best supportive care	208
Pathology	Histopathology	14343
	Fine needle Aspiration Cytology	3374
	Exfoliative cytology	426
Radiology	CT Scan	4308
	MRI Scan	148
	Ultrasonography	6062
Dental / Prosthetic	Consultation	13695
	Prosthesis	1265
	Fluoride Gell Application	2965
	Extractions	4441
	Prophylaxis (Total two sitting)	1407
	Implant	04
Speech / Rehabilitation	New Patients	5293
	No of sittings	10982
	Laryngectomy Rehabilitation	575
	Audiometry	3157
	Dysphagia Rehabilitation	7825

OMCT=Oral Metronomic Chemotherapy

Procedures Done under Speech Department	Total
Fiberoptic Endoscopic Evaluation of Swallowing (FEES)	502
Videofluoroscopic Swallowing Evaluation/Modified Barium Swallow	247
Voice Evaluation (acoustic)	220
Videostroboscopy	25

Surgical Data:

	Unit A	Unit B	Unit C	ACTREC	Total
Total cases (Major Operations)	571	546	702	302	2121
Site: Oral	299	293	457	296	1345
Larynx/hypo	46	29	45	0	120
Thyroid	131	109	115	04	359
Salivary gland	35	28	22	02	87
Maxilla	05	09	11	0	25
Skull base	26	46	14	0	86
Misc.	29	32	38	0	99
Reconstructive					
Yes	273	229	322	270	1094
Free flaps	168	128	144	14	454
Pedicled	69	63	127	204	463
Local	36	37	51	52	176
Category of Patients					
Private	242	253	217	16	728
General	329	293	485	286	1393
Morbidity					
Major	21	51	54	29	155
Minor	48	73	138	63	322
Infection	22	54	78	33	187
Mortality	02	02	04	01	0.40 %

Radiation Oncology:

Treatment	No of Patients (%)
Radical: Definitive	470 (40)
Adjuvant	703 (60)
Re Radiotherapy	66 (5)
Brachytherapy	30 (2.5)
Palliative	116 (10)
ACTREC	140

Technique	Conventional	3DCRT	IMRT
TMH	60 %	-	40 %
ACTREC	71 %	-	69 %

Chemotherapy:

Admission for chemotherapy	443
Admission for supportive care	278
Total number	721
Emergency casualty admissions	1836
Day care services (Chemotherapy visits + supportive in a year)	7345

Stridor: In all patients receiving immediate chemotherapy, clinical stridor resolved within 48 hours. The radiological response rate was 62.5 %. The median reduction in size of tumor was 37 %.

Outcome Indicators

Modality	Morbidity / Mortality	No of patients (%)
Surgery at TMH (n = 2121)	Morbidity	22.4 Major-7.3 Minor-15.1
	Mortality	0.4
Radiotherapy (1176)	Completed	87
	Dermatitis (Grade 0-2) (Grade 3)	92 8
	Mucositis (Grade 0-2) (Grade3)	89 11
	NGT placement (%)	37
	Weight loss (Avg in Kg)	2-3 kg
	Hospitalization (%)	4
	Not completed (%)	13
	Mortality (%)	< 1
	Chemotherapy	
NACT (n = 765)	Compliance	97.0 %
	Toxicity	0.6 %
	30 day Mortality	0.13 %
CTRT (n = 778)	Compliance	90.1 %
	Toxicity	7 %
	Mortality	0.38 %
Palliative systemic therapy: Cetuximab n=65	Compliance	75.0 %
Palliative systemic therapy: OMCT & Intravenous (first-line) n = 508	Compliance	90.4 %

Mortality

Palliative systemic therapy: Second line n = 91	Compliance 77.4 %
--	----------------------

NACT = Neoadjuvant Chemotherapy;
CTRT = Chemotherapy+Radiotherapy;
OMCT = Oral Chemotherapy;
NGT = Nasogastric tube

Survival Rates

Surgical Oncology:

- Thyroid 5 years overall survival – 98 %
- Salivary gland neoplasm DFS -73.6 % (30 months median)

Radiation Oncology:

1. Early stage Oral cavity treated with surface mould Brachytherapy: n = 31

- Median FU: 52 months
- 3- & 5- year Local control (LC): 5 yr LRC- skin – 92 %
- 5 yr LRC-intraoral - 76 % (LRC=LocoRegional Control)
- 3 & 5 year DFS: 2 and 5 yr DFS-69 % (DFS=Disease Free Survival)
- 3 & 5 year OS: 2 and 5 year OS - 86 % and 81 % respectively.(OS=Overall Survival)

2. Nasopharynx

Number of patients	185
Year	2005-2014
Median follow-up	26 months (8-44 months)
Overall survival at 3 years	91 %
Local control at 3 years	89 %
Locoregional control at 3 years	84 %
Distant metastasis free survival at 3 years	85 %
Disease free survival at 3 years	71 %

3. Oral cavity: Stage III / IV

5-year controls	Adjuvant RT (n = 600)	Adjuvant CTRT (n = 300)
Locoregionally controlled	64 %	69.3 %
Disease free Survival	54 %	56.7 %
Overall Survival	50 %	51.7 %

Medical Oncology:

Neoadjuvant Chemotherapy (NACT)

Oral Cancers: The 2 year survival in patients receiving NACT in oral cancers is 42 %.

Hypopharynx: The 2 year survival in patients receiving NACT in pharyngeal cancers (laryngopharynx) is 60 %.

Maxilla: The 2 year survival in patients receiving NACT in maxilla is 41 %.

Sinonasal: The 2 year survival in patients receiving NACT in sinonasal tumors is 78.5 %.

First line treatment outcomes:

The median OS in metronomic chemotherapy was 249 days (222.48–275.52 days), in intravenous chemotherapy was 152 days (134.19 – 247.81 days) and in paclitaxel & cetuximab was 314 days (95 % CI 227.6 - 400.4 days). [CI=Confidence Interval]

Second line treatment outcomes:

The median estimated PFS and OS were 110 days (95 % CI 61 - 175 days) and 156 days (95 % CI 126 - 185 days) respectively. [PFS=Progression Free Survival].

Compliance to treatment

Stage of treatment	Adherence at TMH (%)
Pre-treatment	99.3
Definitive treatment	90.9
Adjuvant treatment	89.7

Research

There were a total of **80** publications from the DMG along with **02** book chapter contribution.

	Total Number of Clinical Trials		Completed Trials		Ongoing Trials		Overall Patients Accrued
	Investigator Initiated	Sponsored Initiated	Investigator Initiated	Sponsored Initiated	Investigator Initiated	Sponsored Initiated	
TMH	125	6	91	4	34	2	2307
ACTREC	28	0	7	0	21	0	1239
Total	153	6	98	4	55	2	3546
Grand Total	159		102		57		

TMH : Tata Memorial Hospital

ACTREC : Advanced Centre for Treatment, Research and Education in Cancer.



Neuro-Oncology - DMG

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Secretary:

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Clinical Neurophysiologist

Dr. Velayutham Parthiban

Clinical Psychologist

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Dr. Maya Prasad
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Surgical Oncology

Dr. Aliasgar Moiyadi
Dr. Prakash Shetty

The Neuro-oncology Disease Management Group (DMG) provided comprehensive care to patients with brain and spinal tumors. This included outpatient as well as inpatient services (both elective and emergency care). The entire clinical and support team along with the DMG coordinators and other trial staff ensured smooth coordination between the different clinical specialities and supporting departments. The coordinators liaised with other members of the DMG (pathology, radiology and molecular biology) to streamline the management processes of patients.

A patient information brochure was available and provided to all patients by the Brain Tumor Foundation (BTF) staff. Feedback from the patients and their caregivers was collected during the patient support group meetings.

The DMG was at the forefront of introducing molecular markers of diagnostic, prognostic, predictive, and therapeutic

relevance for testing in clinical practice to enhance quality of patient care. Detailed preoperative imaging was done for majority of preoperative patients (at TMH and ACTREC) to plan surgery optimally as well as create a database. This included routine Magnetic Resonance imaging (MR) sequences as well as special functional MR evaluations. Special surgical planning (navigation) MR sequences were used when necessary. High precision radiotherapy techniques like Stereotactic Radio Surgery (SRS), Intensity Modulated Radiotherapy with image guidance (IG-IMRT) using cutting edge technology was given to patients based on the evidence-based guidelines.

Brain Tumor survivor and Phacomatosis clinics were new additions to the neuro-oncology DMG; both being speciality clinics. The Phacomatosis clinic looked into the various syndromic associations in brain tumour patients. The Brain

Tumor survivor clinic was started in 2018 with the mandate to address various issues related to tumor, therapy or other associated problems in patients who were five or more years post their initial brain tumor diagnosis.

Volume Indicators

The number of new Patient registrations in 2018 was 1732 (New, 1612; for second opinion, 120). Of the new patients, males were 1057 and 555 were females.

The General to Private Patient Ratio was: 69:31

Surgical Data:

Type & Number of Surgeries (TMH + ACTREC)		
Total number	Primary procedures	354
	Additional procedures	28 (7.9 %)
	Re-exploration	19 (5.4 %)
	Total no. of procedures	401
Primary Surgical procedures	Craniotomy (supratentorial)	225 (63.6 %)
	Posterior Fossa	44 (12.4 %)
	Retro-mastoid	11 (3.1 %)
	Trans-sphenoidal	11 (3.1 %)
	Others	35 (9.9 %)
	Shunts	25 (7.1 %)
	Burr hole evacuation	03 (0.8 %)
Nature of Surgery	Elective	308 (87.0 %)
	Emergency	46 (13.0 %)

Intraoperative Neurophysiological Monitoring (IONM) was actively started in 2017. Since then, the surgical staffs were continuously performing IONM procedures in various neurooncology surgical procedures. Intraoperative monitoring was done with the help three IONM machines, of which one machine (NIM 3.0) was dedicated for direct cranial nerves identification; one is for intraoperative identification of speech and language mapping (INOMED) in **awake procedures**. The third machine (NIM-Eclipse) was used for intraoperative localization (mapping) and monitoring of sensory and motor areas during the removal tumors in and around the motor cortex. This machine was also used for mapping the corticospinal tract at the subcortical level with successful outcome. Besides, neurosurgery unit, the monitoring facility was extended to other DMG's as well.

A total of 249 procedures were monitored which included 132 procedures in neurosurgery and 90 for other units.

Radiation Oncology:

Over half the patients registered annually received radiation therapy as part of their treatment. Nearly 60 % were treated with radiation therapy within the institute, but 40 % were referred outside (patient choice, long waiting-times, and logistics) for radiation therapy. Vast majority of them subsequently follow-up with Radiation Oncology services and complete their further adjuvant chemotherapy (if needed) at the institute.

Technique of Radiotherapy (RT)	TMH	ACTREC	Total
Conventional RT	33	04	37
3D-CRT	168	31	199
IMRT/IGRT	172	68	240
Stereotactic Radiosurgery	07	02	09
Total	380	105	485

3D = Three Dimensional Conformal Radiotherapy;
IMRT = Intensity Modulated radiotherapy;
IGRT = Image Guided Radiotherapy.

Chemotherapy in Adult Brain Tumors:

Regimen	Number of patients	Number of cycles
Temozolomide adjuvant	317	2445
Temozolomide salvage	24	87
CCNU/COMBAT/PCV	53	345
Bevacizumab based regimens	30	176
CET / ICE / CTRT	28	78
Packer	01	01
Others	42	113
Protocols provided for outside chemotherapy	27	-
Follow up	-	302
Total	522	3576

CET = Chemo or Endocrine Therapy;
ICE = Fosfamide+Carboplatin+Etoposide combination;
CTRT = Chemoradiotherapy
CCNU / COMBA / PCV are different drug combination regimens.

Inter-institutional collaboration

The Neuro DMG was involved with collaborative projects with the Indian Institute of Technology (IIT-Mumbai) for a project on proteomics as well as with the Department of Remote Sensing and Robotics, Bhabha Atomic Research Centre

(BARC), Mumbai to develop an indigenous robotic stereotactic system. The IIT collaboration led to important leads on the proteomics aspects of brain tumours that were being pursued in future. The robotics project was adopted by the BARC as a departmental project under the “Make in India” programme of the Prime Minister’s Office and was under validation across multiple other centres across the country. A dedicated surgical operating room for validating this technology was set up at Advanced Centre for Treatment, Research and Education in Cancer (ACTREC).

The radiation oncology faculty was involved in various collaborative basic and translational research projects with IIT, Mumbai, BARC, and IIT Jodhpur. The main thrust of these collaborations was to develop novel drugs / drug formulations involving nanotechnology to disrupt the blood brain barrier and blood tumor barrier for the efficient penetration and targeting of the chemotherapeutic drugs for enhancing the efficacy of radiation against these tumors. Moreover, one of the collaborative studies was looking at the important role of inflammatory markers within the tumour and the tumour milieu.

Newer techniques / services by Molecular Pathology department: The highlight of the year had been introduction of gene expression based molecular classification for medulloblastoma and expanded sequencing evaluation for histone (3.1 & 3.3) mutations and Telomerase Reverse

Transcriptase (**TERT**) promoter mutations. These services were offered as routine diagnostic service by the molecular pathology laboratory at affordable cost that were being used for better risk stratification for medulloblastomas, diagnosing diffuse mid-line glioma, K27M as an entity and prognostication for Glioblastoma Multiforme (and also meningioma’s) respectively.

Outcomes

30-day Neurosurgical Morbidity and Mortality (for elective cases):

	Morbidity (Minor)	Morbidity (Major)	Mortality
TMH + ACTREC	47 (13.3 %)	34 (9.6 %)	08 (2.3 %)

Chemotherapy Morbidity and Mortality

Regimen	Toxicity 3 - 4 CTCAE
Adjuvant temozolomide	22 % (70 patients)
CCNU	40.4 % (10 patients)
Bevacizumab	16.7 % (05 patients)

CTCAE = Common Terminology Criteria for Adverse Events

Mortality due to toxicity: Eight (08) patients altogether (< 1 %).

Research

The DMG members publish **25** articles in various journals.

	Investigator initiated	Investigator initiated + Thesis	Retrospective Audit / Survey	Pharma Sponsored trials
Ongoing clinical trials in 2018	18	11	04	00
Completed trials in 2018	07	06	03	00
Ongoing trials before 2018	15	10	03	00
Overall patients accrued in clinical trials in 2018	268 (16.62 %) of 1612 patients			

Pediatric Hematolymphoid - DMG



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The Pediatric Hematolymphoid Disease Management Group (**DMG**) provided comprehensive medical diagnostic, counselling, management, follow-up and palliative services to children below 15 years of age suffering from hematolymphoid malignancies. The DMG had developed a holistic program that extended beyond the needs of the patient and their treatment. In March 2018, the pilot phase of the Indian Childhood Collaborative Leukemia (**ICiCLE**) protocol and prospective enrolment on the multi-center ICiCLE-2014 trial was started - initially for B cell-Acute Lymphoblastic Leukemias (**ALL**), and since Aug 2018, extended to include T

cell-ALL. The DMG focused on refining treatment protocols, academic training and invested in research activities to herald novel therapies for Paediatric cancer patients in India. The major initiative in this direction was the Chimeric Antigen T cells Receptor (**CAR-T**) therapy program as a flagship program for cell-based immunotherapies.

An outreach program called '**My Child Matters**' was initiated under the "Hospital to Home-Away-From-Home Infection Control Outreach Nursing Programme" in October 2018 and was implemented as a robust infection control measure in 11 pediatric housing centres in the city of Mumbai.

Volume Indicators

The number of patients registered annually under the DMG crossed **1000** for the second consecutive year.

Disease Burden in 2018				
	General	Private	Total	%
Acute Lymphoblastic Leukemia ALL	527	76	603	59
Acute Myeloid Leukemia AML	109	18	127	12
Chronic Myeloid Leukemia CML	25	03	28	03
Non Hodgkins Lymphoma NHL	108	25	133	13
Hodgkin's Lymphoma HL	88	11	99	10
Langer Cell Histiocytosis LCH	18	01	19	02
Juvenile Myelo Monocytic Leukemia JMML	12	0	12	01
Myelo Proliferative Disorders MDS	02	0	02	0
Total	889	134	1023	100

There had been a big burden in the inpatient admissions with patients waitlisted for admission. The DMG collaborated with other hospitals in Mumbai for administration of high dose Methotrexate to prevent chemotherapy delays. The high out-patient footfall was a reflection of not only increasing number of patients, but an improved survival adding to increased follow-up visits and, also the increasing focus on relapsed malignancies being taken up for treatment.

Management Details of Various Hematological Cancers											
		Treated at TMH		Treated under TMH guidance		Second opinion		TR&A		Palliative or Expired	
Disease	Total	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
ALL	603	471	78.1	22	3.6	110	18.2	16	3.4	60	12.7
AML	127	92	72.4	06	4.7	24	18.9	05	5.4	24	26.1
CML	28	21	75.0	02	7.1	05	17.9	01	4.8	0	0.0
NHL	133	110	82.7	03	2.3	20	15.0	08	7.3	28	25.5
HL	99	80	80.8	03	3.0	15	15.2	05	6.3	05	6.3
LCH	19	14	73.7	02	10.5	03	15.8	0	0.0	0	0.0
JMML	12	09	75.0	01	8.3	02	16.7	01	11.1	05	55.6
MDS	02	02	100.0	0	0.0	0	0.0	0	0.0	01	50.0
Total	1023	799	73.0	39	3.6	179	16.4	36	4.4	123	15.4

TR&A = Treatment Refusal and Abandonment

Mortality

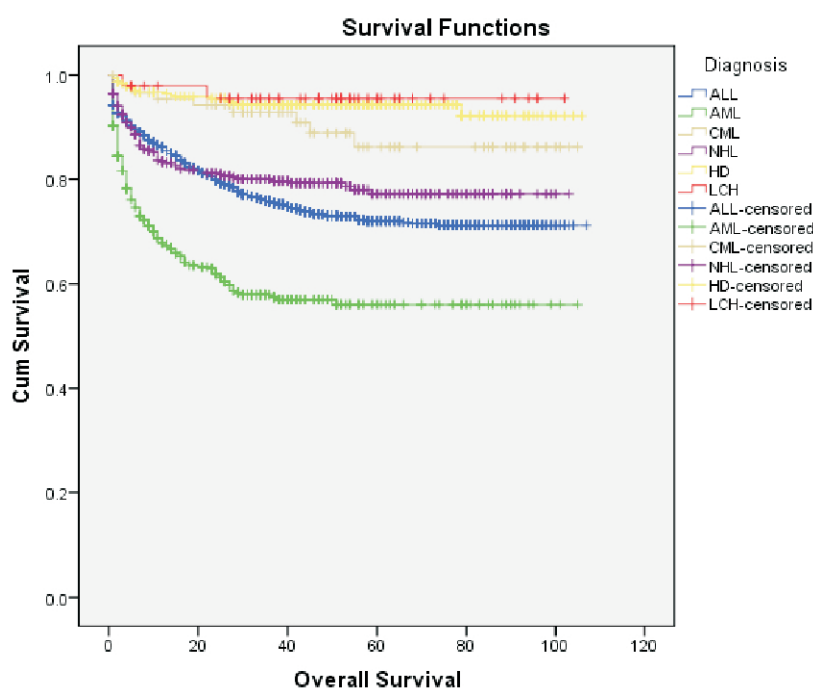
The Mortality figure remained steady around 9 % for the last 3 years and was 9.4 % in 2018. As in previous years, septicemia from Multi-Drug Resistant (**MDR**) gram-negative organisms remained the biggest challenge. In 2018, the DMG systematized their approach to Granulocyte transfusion for

such patients. In year 2018, thirty one (31) patients presented with Epilepsia Partialis Continua (**EPC**) of which, 19 succumbed to intractable seizures with secondary complications. The Herpes Simplex Virus (**HSV**), emerged as the most frequent cause; majority being in complete remission or in maintenance phase.

Mortality in 2018								
Disease	Total Registered	Total Expired	Before Treatment		Within 45 days		After 45 days	
			No.	(%)	No.	(%)	No.	(%)
ALL	603	50	07	1.16	30	4.9	13	2.1
AML	127	16	01	0.78	08	6.29	07	5.5
CML	28	01	0	0.0	0	0	01	3.57
NHL	133	20	02	1.5	0	0	18	13.5
HL	99	05	02	2.02	01	1.01	02	2.02
LCH	19	0	0	0.0	0	0	0	0
JMML	12	04	01	8.33	01	8.33	02	16.6
MDS	02	01	0	0	0	0	01	50
Total	1023	97	13	1.27	40	3.91	44	4.3

Survival Rate

This report depicted the outcomes in the time period prior to and after 2013 with a 5-year follow up until 2018.

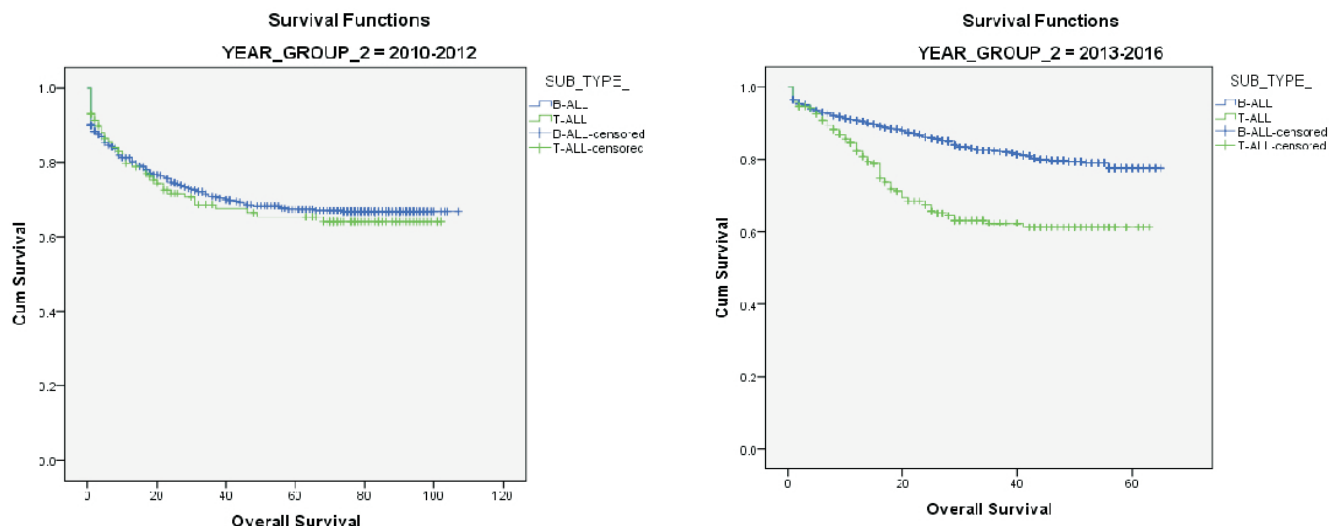


The Outcomes for Patients with all the different diagnoses registered and treated under the DMG between 2010 until 2016.

The graph showed a very encouraging overall survival for this entire period among all the diagnoses dealt by the DMG, though a concern of early mortality remained. These rates were achieved despite significant challenges of presentation with advanced disease, malnutrition and resistant infections seen at the center. Also, relapsed disease had been a lower priority till recently as most patients were unable to secure funding support for second-line therapies that were even

more intensive and the need to be followed by Stem Cell Transplant (SCT). Despite running one of the oldest and among the busiest SCT units in the country, only a small fraction of relapsed patients made it to SCT due to socio-economic constraints and a long waiting period that currently exceeded one year at TMH. In that context, the Overall Survival (OS) figures more broadly reflected the outcome of primary treatment and, to that extent, was very close to that in developed countries.

i) Acute B and T lineage Leukemia

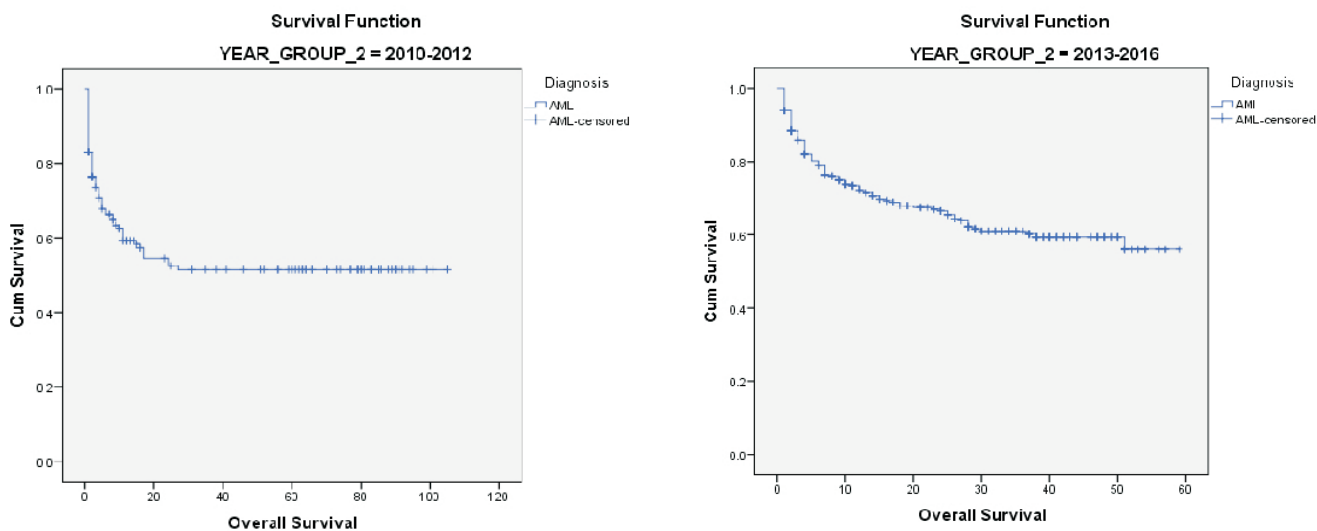


The 5-year OS for B lineage acute leukemia has improved from 67.3 % before 2013 to 77.5 % after 2013.

ii) Outcomes of patients with Acute Myeloid Leukemia (AML):

AML remained a challenging disease within the DMG. Most of these patients eligible for transplant were unable to go for transplant due to the limitations of the transplant facility at TMH. With the use of Oral Metronomic Chemotherapy (OMCT) as maintenance, and as a bridge-to-standard chemotherapy for those with severe co-morbidities at presentation, many patients had good outcomes without transplant.

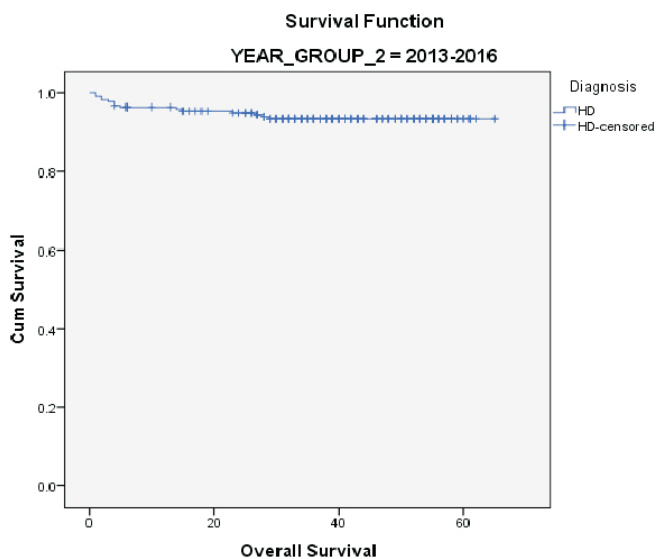
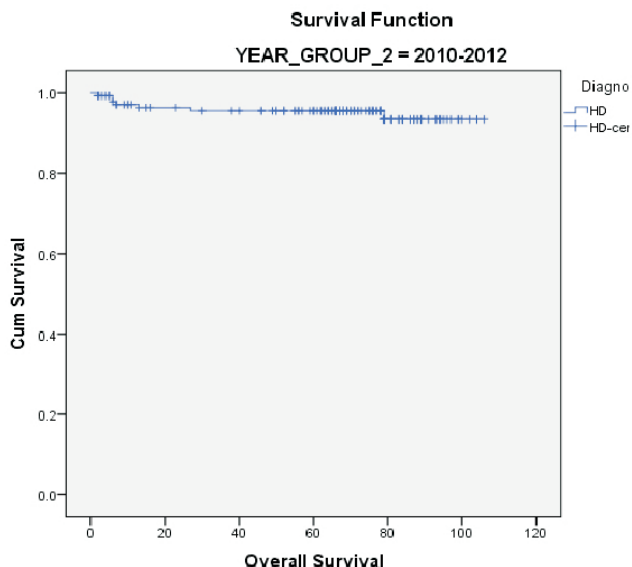
Acute myeloid leukemia



The 5-year overall survival for AML was 51.5 % between 2010 to 2012 was 56 % between 2013 to 2016 showing a steady improvement over the years.

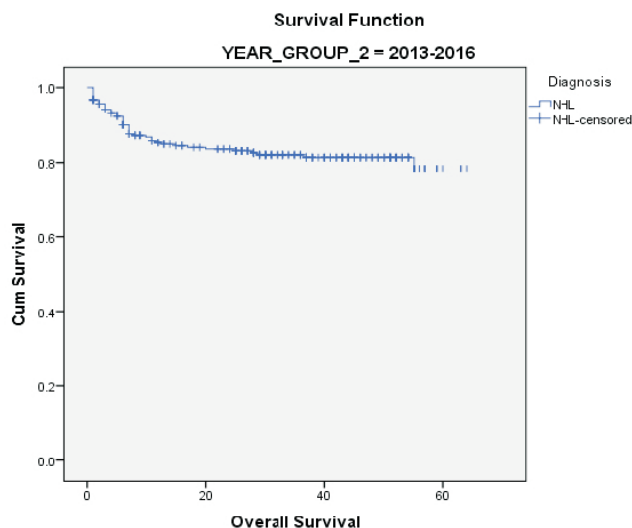
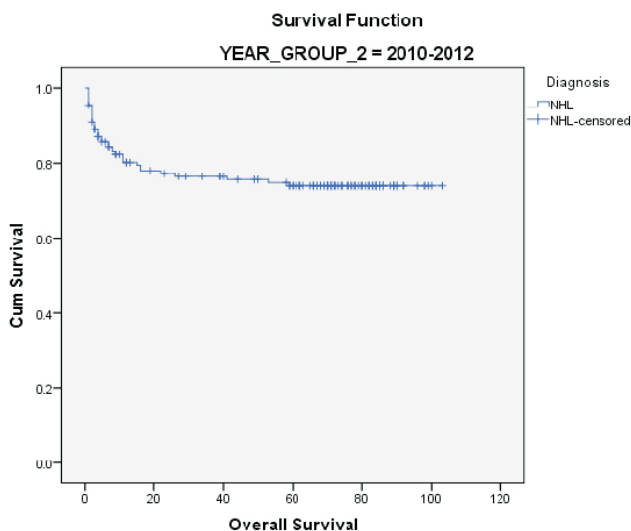
iii) Comparing Overall Survival Rates of Non-Hodgkin Lymphoma (NHL), Hodgkin Lymphoma (HL) and Langerhans Cell Histiocytosis (LCH) between the years 2010 to 2012 and years 2013 to 2016.

Hodgkin's lymphoma



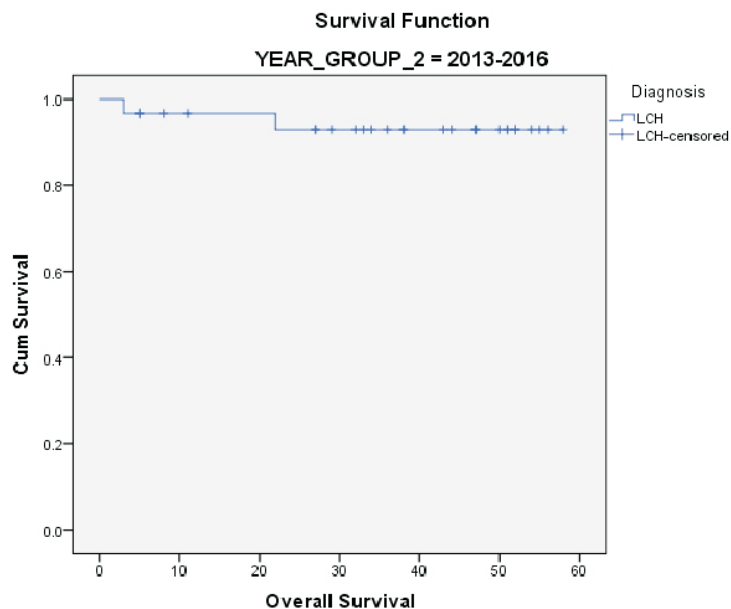
The 5-year overall survival of Hodgkin's lymphoma was 95 % between 2010 to 2012 and was 93.5 % between 2013 to 2016 suggesting a good Overall Survival, at par with the best centers in the world.

Non-Hodgkin's lymphoma



The 5-year overall survival for Non-Hodgkin's lymphoma was 74.9 % between years 2010 to 2012 and 78.3 % between years 2013 to 2016.

Langerhans Cell Histiocytosis



The 5-year overall survival for Langerhans cell histiocytosis was 92.5 % between years 2013 to 2016.

Compliance

- The Patients on treatment were more than 97 % compliant with their treatment due to the social support and patient tracking systems that were in place
- The Completion of entire therapy at expected time for malignancy and stage was 90 %.
- The Treatment Refusal & Abandonment Rate (TR&A) was under 5 % at 4.4 %

Research

Total number of Clinical Trials		Completed Trials		Ongoing Trials		Overall Patients Accrued
Investigator Initiated	Sponsored trials	Investigator Initiated	Sponsored trials	Investigator Initiated	Sponsored trials	
20	02	02	00	13	03	1434



Pediatric Solid Tumor - DMG



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Dr. Vasundhara Smiriti

Surgical Oncology

Dr. Sajid Qureshi

The Pediatric Solid Tumor Disease Management Group (**DMG**) managed children under the age of 15 years who harbored any specific organ or tissue related tumors. The DMG meetings were held regularly with required quorum.

Volume Indicators

Diagnosis	2017	2018
Neuroblastomas	98	106
Renal Tumors	64	69
Germ Cell Tumors	50	43
Liver Tumors	36	36
Retinoblastomas	52	46
Soft Tissue Sarcomas	135	197
Miscellaneous	72	86
No malignancy	33	50
No investigation	36	17
Total	576	650

Surgical Data:

	TMH	ACTREC	Total (2018)
Major	217	14	231
Minor	191	01	192
Pediatric vascular access	58	0	58
Total	466	15	481

Radiation Oncology:

Treatment		No of Patients
Total (External + Brachytherapy)		211 + 10 = 221
Radiotherapy (RT) Intent (External RT)	Radical	161 / 211 (76.32 %)
	Palliative	50 / 211 (26.69 %)
	Ketlar	45 / 211 (24 %)
External Radiotherapy		211 / 221 (95 %)
Brachytherapy		10 / 221 (5 %)
Conventional		95 / 211 (45 %)
3D-CRT/ IMRT		116 / 211 (55 %)
Did not come for RT after Appointment		09 / 220 (4 %)
Did not complete planned RT		02 / 211 (0.01 %)
Referred outside for RT		25

3D-CRT=Three Dimensional Conformal Radiotherapy; **IMRT**=Intensity Modulated Radiotherapy

Morbidity & Mortality Rates

Treatment	Morbidity	Mortality
Major Surgery (n = 231)	30 day – 12.9 % (30 / 231)	0.8 % (02 / 231)
Chemotherapy (n = 571, treated in TMH)	Febrile Neutropenia requiring Inpatient Care 12.6 % (72 / 571)	3.8 % (22 / 571)
Radiotherapy (RT) (n = 210, Completed RT)	Grade 0 54 (25 %) Grade 1 114 (54 %) Grade 2 11 (5 %) Grade 3 02 (1 %) Grade 4 0 (0 %) Not Known 23 (13 %)	0 %

The mortality rate of < 5 % for Chemotherapy and < 1 % for Surgery were acceptable. But the recent increase from 1.2 % in 2017 to 3.8 % in 2018 for chemotherapy and, from 0.4 % in 2017 to 0.8 % in 2018 for surgery required attention and analysis.

Survival Rates

Cancer	Event-Free Survival (EFS) %	Overall Survival (OS) %	Best Published Results %
Wilm's Tumor	84	89	90 (OS)
Germ Cell Tumors (extracranial)	81	93	95 (OS)
Retinoblastoma	79	81	95 (OS)
Soft Tissue Sarcomas (non-rhabdomyosarcoma)	61	77	89 (OS)
Neuroblastoma (Low / Intermediate)	68	75	54 - 100 (4 year EFS)
Neuroblastoma (High risk)	22	40	30-50 (3 year EFS)
Extra-skeletal Ewing's Sarcoma	68	77	69 – 77 and 58 – 67 (EFS and OS)
Hepatoblastoma	70	78	100, 83, 56 and 46 – stage wise (OS)

After Completion of Therapy (ACT) Clinic for long-term survivors of childhood cancers:

	2017	2018
Follow-up	550	1000
New registration	200	450
Total	750	1450

Compliance

The compliance to time lines was calculated from a subset analysis of patients of 2017 who had completed entire treatment protocols for multiple Tumor types:

- Time to first Joint Clinic (DMG): 0 – 4 days
- Date of registration to start of treatment in 07 - 14 days: 85-90 %

- Getting surgery within expected dates from induction chemotherapy: 65-87 %
- Completion of entire therapy at expected time for Tumor and stage: 93-94 %.

The Treatment Refusal & Abandonment (TR&A) Rate in the year 2018 was 4 % (28 out of 650).

Research

There were **20** ongoing Principal Investigator Initiated Clinical trials in the year 2018 that accrued over 1300 patients. The DMG members published **17** articles and **two (2)** books.



Thoracic - DMG

Convener:

Dr. Nilendu Purandare
(Nuclear Medicine &
Molecular Imaging)

Secretary:

Dr. Sabita Jiwnani
(Surgical Oncology)



Anaesthesia, Critical Care & Pain

Dr. Priya Ranganathan
Dr. Swapnil Parab

Medical Oncology

Dr. Amit Joshi
Dr. Kumar Prabhash
Dr. Vanita Noronha
Dr. Vijay Patil

Nuclear Medicine & Molecular Imaging

Dr. V. Rangarajan

Palliative care

Dr. Arunangshu Ghoshal
Dr. Jayita Deodhar

Pathology

Dr. Anuradha Chougule
Dr. Rajeev Kaushal

Physiotherapy

Dr. Anuradha Daptardar
Dr. Vincent P

Pulmonary Medicine

Dr. Maheema Bhaskar
Dr. Pavankumar Biraris
Dr. Sandeep Tandon

Radiation Oncology

Dr. Anil Tibdewal
Dr. JP Agarwal
Dr. Naveen Mummudi

Radiodiagnosis

Dr. Abhishek Mahajan
Dr. Amit Kumar Janu
Dr. Amrita Guha
Dr. Kunal Mistry
Dr. Shweta Wadhwa

Surgical Oncology

Dr. CS Pramesh
Dr. George Karimundackal

The Thoracic Oncology Disease Management Group (DMG) was among the few specialized multidisciplinary groups in the country that treated a wide variety of thoracic neoplasms including the lung, esophageal, chest wall and mediastinum. The DMG services also included involvement of cardiovascular surgeons, endocrine specialists, basic scientists and technology experts. In addition, the DMG had a vibrant teaching/ training program and participated in several relevant research activities.

A unique feature was the specialized “**thoracic anaesthesiology**” team with 3 specialist anesthetists who practiced thoracic anaesthesia exclusively leading to active and increased participation in patient care pre and post operatively, in addition to standardizing and maintaining excellent intra-operative protocols. Active participation from

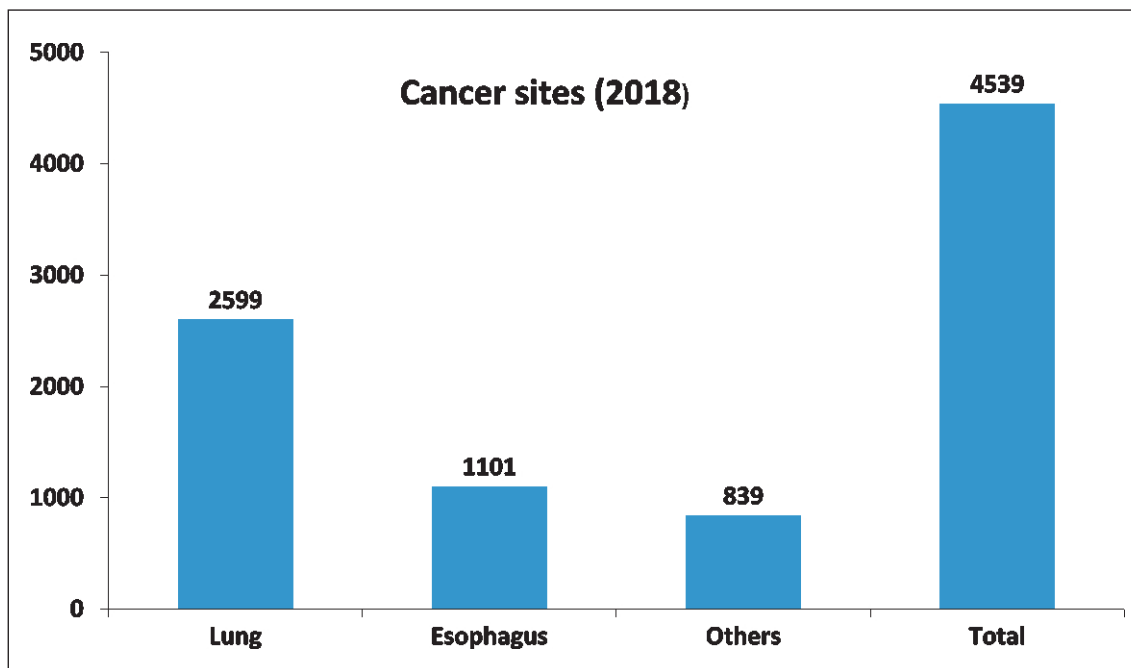
the physiotherapy department on postoperative rounds ensured individualized attention necessary in the intensive rehabilitation after these complex surgeries.

The **50th Esophageal and Lung Cancer Support Group** meeting was held in Dec 2018. The involvement from patients provided a forum for exchange of experiences, discussing their fears, concerns and closer interaction with other patients and their treating physicians. The availability of dedicated counselors for patients with thoracic cancers and the institution of early palliative care continued to improve the overall quality of life for the patients.

The number of active Endo Bronchial Ultra Sonography (EBUS) rose to 108 from 65 in the year 2017. The Rapid On Site Evaluation (ROSE) cytology was unique to the city of Mumbai and reduced the number of mediastinoscopies.

Volume Indicators

The DMG was among the highest volume thoracic centres in the world. A total of **4539** new patients were registered in 2018. Lung cancers formed the majority, 2599 (57.2 %); followed by esophageal cancer 1101 (24.2 %).



Surgical Data with Morbidity & Mortality Rates:

	Esophagus	Lung	Metastat-ectomy	Medistinal mass	Chest wall	Port	Others	Medistin-oscropy
Total number operated	183	132	79	42	41	32	82	80
Mortality	07 (3.8 %)	01 (0.7 %)	0	01	0	-	-	-
Major morbidity	21 (11.4 %)	09 (6.8 %)	03 (3.7 %)	01	03	-	-	-
VATS	42 (31.5 %)	31 (23.5 %)	44 (55.7 %)	12	-	-	-	-
Robotic	15 (11.7 %)	07 (5.3 %)	-	04	-	-	-	-
Open	75 (54.4 %)	72 (54.5 %)	34 (43 %)	26	-	-	-	-
Inoperable	09 (4.9 %)	10 (7.5 %)	05 (6.3 %)	04	-	-	-	-

VATS = Video-Assisted Thoracoscopic Surgery

Minor procedures (including bronchoscopy) = **2311**

Bronchoscopy = **1609**

Radiation Oncology:

All modern techniques of radiation including Image Guided & Intensity Modulated Radiotherapy; 3 Dimensional Conformal Radiotherapy; Stereotactic Body Radiotherapy and, Stereotactic RadioSurgery were available and used regularly to provide superior treatment outcomes.

Lung Cancer: **735** cases of lung cancer received Radiotherapy (**RT**) at TMH, **98** of which were treated with radical intent and **637** patient received RT with Palliative intent.

Esophageal cancer: **150** patients with carcinoma esophagus received RT at TMH, 108 with radical intent and 42 with palliative intent.

Medical Oncology:

New patients treated: Lung – 2090; Esophagus - 910

Chemotherapy toxicity for Esophageal cancers

- **NACT for esophageal Ca:**
 - o Overall, 46 % of patients had > grade 3 toxicity
- **CTRTR esophagus (weekly pacli / carbo with radical XRT):**
 - o 56 % of patients developed grade > 3 acute toxicity
- **Fatal toxicities:** Overall - 9.5 %

Newer initiatives in the DMG

- Endobronchial Ultrasound (**EBUS**) guided trans-bronchial needle aspiration (**TBNA**)
- Pharmacovigilance program for chemotherapy drugs
- Introduced early palliative care for lung cancer patients
- Dedicated counselor for lung cancer patients.

Research

Members from the DMG have published **30** articles in peer reviewed journals in 2018. These articles covered topics not only related to thoracic oncology but also other aspects of oncology like cancer control, biostatistics, diagnostics and others.

Total number of Clinical Trials		Completed Trials		Ongoing Trials		Overall patients accrued
Investigator Initiated	Sponsored trials	Investigator Initiated	Sponsored trials	Investigator Initiated	Sponsored trials	
57	07	01	02	56	05	>3200



Uro-Oncology - DMG



Convener:

Dr. Amit Joshi
(Medical Oncology)

Secretary:

Dr. Vedang Murthy
(Radiation Oncology)

ACTREC Scientists

Dr. Ashok Verma
Dr. Chiplunkar S.
Dr. Kishore Amin

Cytology

Mr. Saleem Pathuthara

Epidemiology

Dr. Rajesh Dixit

Medical oncology

Dr. Kumar Prabhash
Dr. Vanita Noronha

Medical Records

Dr. Bala Ganesh

Nuclear Medicine & Molecular Imaging

Dr. Archi Agarwal
Dr. Venkatesh Rangarajan

Pathology

Dr. Sangeeta Desai
Dr. Santosh Menon

Radiation Oncology

Dr. Rahul Krishnatry

Radiodiagnosis

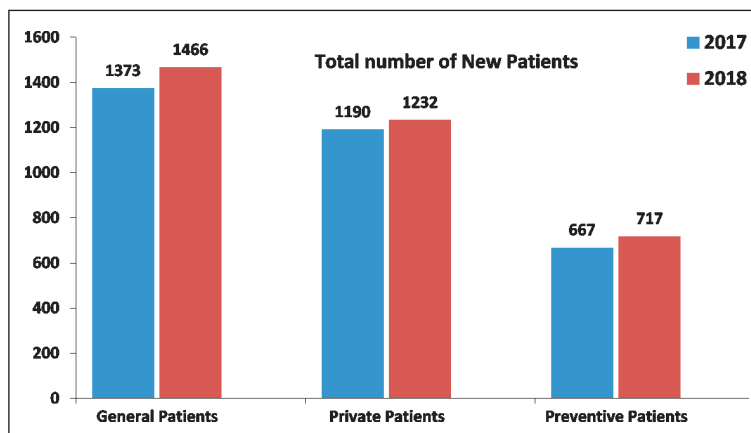
Dr. Aparna Katdare
Dr. Kunal Mistry
Dr. Meenakshi Thakur
Dr. Nilesh Sable
Dr. Palak Popat
Dr. Shweta Wadhwa
Dr. Suyash Kulkarni

Surgical Oncology

Dr. Gagan Prakash
Dr. Ganesh Bakshi
Dr. Mahendra Pal

A total of **3415** new patients with genitourinary tract cancers were seen in the year 2018 and, all the new patients are advised appropriate work-up as per the TMH Evidence Based Medicine guidelines / European Urology 2016 guidelines. There were **18256** Follow-up patients and the General to Private category Ratio was 54:46

Volume Indicators



Surgical Data:

The surgical branch utilized the State-of-the-art procedures like Robotic, Laparoscopic and Endo-Urological techniques. Six hundred seventy seven (677, including 59 at ACTREC) and 3780 minor surgeries were performed.

The focus was on organ preservation and till the end of year 2018, two hundred and seventeen (217) robotic surgeries were performed; sixty nine (69) in the year 2018.

Total number of major surgeries	TMH + ACTREC	618 + 59
Renal Tumors	Open Radical Nephrectomy	33
	Nephron sparing surgery (open)	21
	Nephron sparing surgery (Robotic)	20
	Excision of Renal fossa recurrence	03
	Nephroureterectomy	08
	Cytoreductive Nephrectomy	10
	Laparoscopic radical Nephrectomy Robotic radical Nephrectomy	15 01
Bladder tumors	Radical Cystectomy (open) Robotic Laparoscopic	57 01 02
	Ileal conduit	57
	Neobladder	03
	Partial Cystectomy	02
	TURBT, Clot evacuation	302
	Prostate Cancers	Radical prostatectomy (open) Robotic Assisted Radical Prostatectomy
Channel TURP		01
Scrotal Orchiectomy		36
Penile Cancers	Partial Penectomy	35
	Total Penectomy	11
	Groin Node Dissection	58
Testicular tumors	High inguinal Orchiectomy	43
	RPLND	33
Laparoscopic Urology		27
Robotic Urology		69

TURBT=Transurethral Resection of Bladder Tumor; **TURP**=Transurethral Resection of Prostate; **RPLND**=Retroperitoneal Lymph Node Dissection

Prostatectomy	43
Radical Nephrectomy	01
Nephron Sparing Surgery	20
Partial Cystectomy	02
Radical Cytectomy	01
Groin Node Dissection	01
Nephroureterectomy	01
Total	69

Details of Robotic Surgery

Radiation Oncology:

- Almost 98 % of the radiotherapy patients treated curatively received Image Guided Radiotherapy (IGRT) ensuring optimal quality in radiation delivery
- Stereotactic Body Radiation Therapy (SBRT) was introduced into routine service for prostate cancers that significantly reduced treatment time for patients, machine burden and turnaround time for the department from 5 - 7 weeks to 5 - 10 days
- Bladder Preservation Protocol: Urinary Bladder preservation was implemented into routine practice as standard of care for patients with moderately advanced bladder cancer. The unique and indigenously developed adaptive technique known as 'Plan of the Day' approach was used in bladder preservation radiotherapy
- Penile conservative therapy was offered to patients diagnosed with early stage penile cancer using radical interstitial Brachytherapy.

Type of cancer	Intent of treatment	Number of patients (TMH)	Number of patients (ACTREC)	Total
Renal Cancer	Radical	17	06	23
	Palliative	61	04	65
Urinary Bladder Cancer	Radical	17	26	43
	Palliative	43	02	45
Prostate Cancer	Radical	112	65	177
	Palliative	124	06	130
Penile Cancer	Radical	11	05	16
	Palliative	03	0	03
Testicular cancer	Radical	07	05	12
	Palliative	10	02	12
Others	Radical	01	04	05
	Palliative	09	0	09
Total Radical		165	111	276
Total Palliative		250	14	264
Total		415	125	540

Patients by sub-site and Intent of treatment (TMH + ACTREC)

Medical Oncology:

- Nine hundred sixty (960) new patients were seen by medical Oncologists
- The Medical Oncology services included daycare and indoor chemotherapy sessions. The "State of the Art" Immunotherapy for treating advanced renal and bladder cancer was also offered to patients seeking treatment to our hospital
- The Department had initiated the Young Adults (YA) clinic every Friday for counseling and supporting the urological cancer survivors; primarily the patients of Germ Cell Tumors
- Economical and social support for testicular cancer patients was started with the help of Non Government Organizations and ensured the compliance of treatment for the testicular cancer patients.

30 - Days mortality and Complication Rates

Surgical Oncology Complication rates (As per Clavien Dindo system):

- Grade I 9.75 %
- Grade II 11.90 %
- Grade IIIA 5.74 %
- Grade IIIB 5.78 %
- Grade IVA 1.56 %
- Grade V 0.94 %

Surgical Oncology Mortality rates: 0.44 %

Medical Oncology 30 - Day Morbidity:

Cancer Site	% of patients
Cancer Testis	30.4
Renal Cell Carcinoma	26.4
Prostate cancer	27.1

Medical Oncology 30 - Day Mortality: Testicular cancers = 3 %

Survival Rates

Surgical Oncology:

Organ	Overall Survival		Disease Free Survival	
	Early disease (T1,T2,M0)	Advanced disease (T3,T4,M0)	Early disease	Advanced disease
Cystectomy	77 %	55 %	72 %	46 %
Nephrectomy	90 %	46 %	84 %	55 %
Testicular	93 %	85 %	91 %	82 %

Overall five year survival rates

Radiation Oncology:

Type of cancer	5 year overall survival	
Prostate cancer	High risk	85 %
	Intermediate risk	90 %
Bladder cancer (Chemotherapy + Radiation Therapy)	65 %	
Bladder preservation rate	84 %	

Medical Oncology:

Organ	Median Overall Survival (in months)
Metastatic Penile cancer patients receiving palliative chemotherapy	10.6
Metastatic Renal Cell Cancer patients receiving TKIs in first line	22.6
Metastatic Renal Cell Cancer patients receiving TKIs in Second line	6.2

TKI = Tyrosine Kinase Inhibitors

2 year Overall Survival for: Seminoma: 94.9 %;

Non-Seminal Germ Cell Tumor: 95.4 %

18 month Overall Survival Metastatic Castration Resistant Prostate cancer patients receiving palliative chemotherapy: 57.3 %.

Compliance

The DMG maintained over 95 % compliance with evidence based guidelines with respect to patient treatment. In 5 % of patients pragmatic decisions were taken in the Joint Clinic to

offer best-possible therapy to patients, given various patient-related factors predominantly family - support and finance. The compliance for Radiotherapy was 98 % and all patients for palliative therapy were treated within 4 days.

Research

Total number of Clinical Trials		Completed Trials		Ongoing Trials		Overall patients accrued
Investigator Initiated	Sponsored trials	Investigator Initiated	Sponsored trials	Investigator Initiated	Sponsored trials	
23	04	05	01	18	03	1316



Departments



DEPARTMENTS

Anaesthesiology, Critical Care & Pain

Head, Dr. Jigeeshu Divatia

Dr. Kailash Sharma,
Dean Academics
Dr. Parmanand Jain
Dr. Atul Kulkarni
Dr. Vijaya Patil
Dr. Aparna Chatterjee
Dr. Sheila Myatra
Dr. Madhavi Shetmahajan
Dr. Nayana Amin
Dr. Vandana Agarwal
Dr. Sumitra Bakshi

Dr. Priya Ranganathan
Dr. Reshma Ambulkar
Dr. Madhavi Desai
Dr. Raghu Thota
Dr. Bhakti Trivedi
Dr. Shilpushp Bhosale
Dr. Amol Kothekar
Dr. Malini Joshi
Dr. Jeson Doctor
Dr. Swapnil Parab
Dr. Sohanlal Solanki

Dr. Sudivya Sharma
Dr. Sheetal Gaikwad
Dr. Sukhada Sawarkar
Dr. Debashree Lahiri
Dr. Bindiya Salunkhe
HBCHRC, Visakhapatnam
Dr. Ramkiran S.
HBCH, Varanasi
Dr. Arun Raj Pandey
Dr. Madhup Singh
Dr. Shardendu Singh

The Department of Anaesthesiology, Critical Care and Pain incorporated the Anaesthesia services, the Division of Critical Care and the Division of Pain. The department comprised of 27 permanent staff, 34 senior residents (including 01 fellow) and 66 post-graduate students [including Six (06) DM (Critical Care) candidates].

Service

Besides the services offered to TMH and at ACTREC, the departmental staff provided services to the satellite centres in Visakhapatnam, Sangrur and Varanasi.

In TMH, nineteen thousand and thirteen (**19013**) patients were given anesthesia in the year 2018. Pre-anesthetic evaluation was done on **21636** patients. There were **2250** Intensive Care Unit (ICU) admissions and **9234** patients were admitted in the recovery ward. The Pain section offered treatment to **13324** patients.

Critical care group

The ICU ran a comprehensive programme for prevention of nosocomial infection since 2007. This included surveillance and monitoring of infection control practices in ICU. The recent nosocomial infection rates were as follow: The Central Line Associated Blood Stream Infections (**CLABSI**) rate was 2.92 per 1000 catheter days; the Ventilator Associate Pneumonia (**VAP**) rate was 6.8 per 1000 ventilated days and the Catheter Associated Urinary Tract Infection (**CAUTI**) rate was 1.01 per 1000 urinary catheter days. There was an overall reduction in the nosocomial infection rates, with a significant reduction in CLABSI rates over the last 2 years.

The ICU ran an in-hospital cardiac arrest team since 2002. In 2018 the Return of Spontaneous Circulation (**ROSC**) following Cardio-Pulmonary Resuscitation (**CPR**) was 38 % with a 14 % survival to hospital discharge. More than 80 % of the patients who were discharged had a cerebral performance scale of 1 and 2.

Pain group

The TMH Pain service switched from manual to web based case record forms for both acute and chronic pain. The Acute Pain Service was paperless ward rounds using I-Pad. A quality of life (**QOL**) questionnaire and the Brief Pain Inventory (**BPI**) was mandatorily assessed. Prescription and consumption of opioids increased by 20 % in keeping with improved World Health Organization's ladder adherence. An emergency room intravenous Morphine protocol was implemented and a study analyzed its efficacy. A mean reduction of pain intensity of 75.6 % was noted.

Paediatric anaesthesia group

The morbidity rates for major surgery for neuroblastoma decreased from 50 % to 20 %. They also audited their practice of anaesthesia for bone marrow procedures in children. Only 25 out of 4136 (0.6 %) patients had complications, which was 6 to 8 times less than reported in literature

Thoracic anaesthesia group

The procurement of a disposable paediatric bronchoscope system reduced the waiting time for placement of lung isolation devices with ease of intraoperative monitoring of its position.

Anaesthesia Services, Tata Memorial Hospital		
	January to December 2018	January to December 2017
Elective Major OT cases (OTs# 01 – 12A and HBB OT# 22 & 23, HBB OT # 26 functional since Oct 2018)	7599	7555
Emergency cases	920	839
Minor OT cases	4074	3900
Bone Marrow OT cases (under General Anaesthesia)	2579	2526
Radiotherapy OT cases (under anaesthesia)	1555	1545
Paediatric radiotherapy cases (under anaesthesia)	1343	972
CT scan and Interventional Radiology cases (under anaesthesia)	770	699
GI endoscopy (under anaesthesia)	173	154
Pre-anaesthesia check-up General patients	Total: 13576 11136 (new) + 2440 (follow-up)	Total: 13062 10271 (new) + 2791 (follow-up)
Private patients	Total: 8060 6296 (new) + 1764 (follow-up)	Total: 8476 6390 (new) + 2086 (follow-up)
Critical Care services		
ICU admissions Total	2250 (965 ventilated with 4797 ventilator-days)	2218 (954 ventilated with 3439 ventilator-days)
First Floor ICU	928 (614 ventilated)	879 (610 ventilated)
Surgical ICU	1322 (351 ventilated)	1339 (344 ventilated)
Recovery Room admissions	9234	12626
Total ICU + Recovery Room admissions	11484	14844
Dialysis	490 sessions (179 patients)	345 sessions (121 patients)
Pain Services		
Patients seen by Acute Pain Services	3101	3048
Chronic Pain OPD General patients	Total: 7146 3555 (new) + 3591(follow-up)	Total: 8386 3984 (new) + 4402 (follow-up)
Private patients	Total: 3045 1524 (new) + 1521 (follow-up)	Total: 3815 1797 (new) + 2018 (follow-up)
Interventional procedures for pain	32	49

HBB=Homi Bhabha Building; **OT**=Operation Theatre; **GI**=Gastrointestinal; **ICU**=Intensive Care Unit; **OPD**=Out Patients Department, **CT** = Computed Tomography

Education

In April 2018, the department conducted the annual Anaesthesia Review Course (ARC) for post-graduate students, which was a three-day course attended by more than 300 students. The department organized the “Difficult Airway Conference” in December 2018. The Critical Care division held an annual two-day workshop on the Tutorials in Hemodynamic Monitoring & Therapy in Critical Care (THEMATICC) that was attended by several intensivists from all over India. The Pain division organized an annual two-day conference – “Education in Cancer Pain (ECAP)”. The department also conducted a 1-year ICU technicians’ course, a hospital CPR Course for nurses and for doctors (at both TMH and ACTREC) and an orientation lecture series in pain management for hospital nurses. The Department took the

lead in organizing the 1st National Conference on ‘Onco-anaesthesia & Perioperative Care’ at the Tata Memorial Hospital, Mumbai on the 18th and 19th August 2018 and also unveiled a National Society for Onco-Anaesthesia and Perioperative Care (SOAPC) during the conference. Members of the department were invited as faculty at several national and international conferences in 2018.

Research

The department had more than 50 clinical studies, which were either completed or ongoing in 2018. Project discussion meetings were held at regular intervals where investigators discuss planned projects in the department before submission to the Institutional Review Board. Members of the Department served on the Institutional Ethics Committee and the Data Safety Monitoring Unit.

Dental & Prosthetic Services

Head, **Dr. Kanchan P. Dholam**

Dr. Sandeep V. Gurav

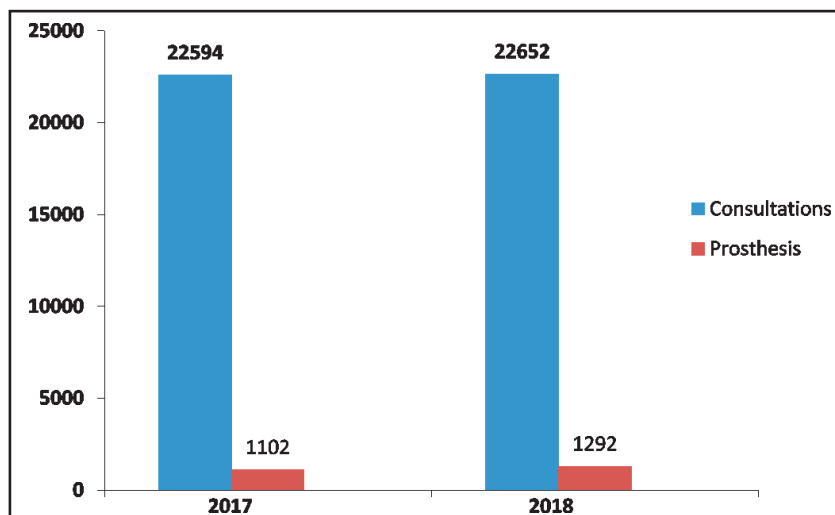
The Dental Department was an integral part of the Head & Neck DMG. Patients undergoing radiotherapy required dental evaluation before and after radiotherapy. The department also catered to the general dental needs of the hospital staff.

Service

In the year 2018, a total of **23944** consultation & procedures were performed in the dental department. Oral prophylaxis services were offered to **1407** patients. Dental prophylaxis

using Fluoride Gel Application was offered to **2965** patients. Tooth extraction was performed on **4441** patients. Prosthetic rehabilitation was offered to **1292** patients that included Maxillary obturators, Guide plan, Tongue prosthesis, Palatal augmentation, Dentures (Complete / partial), Occlusal Guards and Extra-oral prosthesis.

A total **41** patients were provided with Platelet Rich Fibrin (PRF) treatment that was introduced in year 2017 to treat Medicine Related Osteo-Necrosis of Jaw (MRONJ).



Education

A Fellowship training Program in Oral Oncology and Maxillofacial Prosthetics was conducted.

The department organized and conducted training and informal teaching sessions for observers from dental faculty, surgical and radiation oncology in Maxillofacial Prosthetics.

There were annual structured teaching programs and lectures conducted for students of physiotherapy, occupational therapy, speech therapy and nursing.

Research

Research was ongoing to evaluate the most appropriate dental treatment in the management of drug induced osteonecrosis of the mandible.

Digestive Diseases & Clinical Nutrition

Head, Dr. Shaesta Mehta

Dr. Prachi S. Patil
Dr. Ganapathi Kini

The department of Digestive Diseases and Clinical Nutrition (**DDCN**) provided specialized gastroenterology services for the patients and the staff members. The services provided included general gastroenterology including diagnostic and therapeutic endoscopy; evaluation and endoscopic management of premalignant and malignant lesions of the gastrointestinal tract; management of familial digestive cancers and, clinical nutrition including parenteral nutrition therapy.

Service

The department was involved in the work-up and management of patients with Gastrointestinal and Hepato-pancreatic-biliary cancers. In addition, endoscopic, general gastroenterology and clinical nutrition services were provided for all patients, as well as for the hospital staff. In 2018, seven thousand three hundred eighty nine (**7389**) endoscopies were performed, of which, 1774 were therapeutic. The commonly performed therapeutic and advanced diagnostic procedures were Endoscopic Retrograde CholangioPancreatography **ERCP** (n = 184) and, diagnostic & interventional Endoscopic Ultrasonography (**EUS**) {n = 221, including 27 EUS guided Fine Needle Aspiration Cytology (**FNAC**)}. In addition, polypectomies (n = 51), luminal stent placements (n = 23) and endoscopic resection of early GI tumors (n = 04) were also carried out. Endoscopy services were started at the

Advanced Centre for Treatment, Research & Education in Cancer (ACTREC) from 3rd October 2018. Seven (07) Gastrosopies and 11 colonoscopies were performed at ACTREC so far.

The Hepatology clinic was started in 2015 as a twice weekly clinic for specialized hepatology support. The services were offered thrice a week and **1994** patients were evaluated.

The Nutrition clinic evaluated and provided **2262** consultations for nutrition support to cancer patients that included various oral diets, enteral {tube feed- Naso-gastric, Naso-jejunal, Percutaneous Endoscopic Gastrostomy (**PEG**)} as well as Parenteral Nutrition.

Education

A six-month basic endoscopy training program was conducted annually. The DM (Gastroenterology) students from KEM hospital had a 3-month rotation in Digestive oncology. Nutrition and dietetics students from other universities had a clinical rotation to complete their internship and received 6-8 weeks training in oncology related clinical nutrition.

Research

There were a total of eight (08) ongoing projects that included research in endoscopy, phase 2/3 clinical studies and clinical nutrition. Some of these projects received intramural funding.

Digital Library

Head, Mrs. Deepali V Kuberkar

Mr. Jagdish Sharma

The Digital Library continuously catered to the information needs of about 1500 registered clinicians, academicians, researchers, trainees and students. The library enhanced both its physical collection and virtual resources and this was reflected in terms of average users visiting per day; about 48 for using both print and computer cell facility. In order to satisfy the information need of such end users, the library had a collection of about **8280** books, **19586** bound volumes and more than 1000 thesis. While, Springer platform provided access to more than **2300 E-Books**, in addition 5 perpetual access books were added to the collection on Ovid platform. The Library also provided access to arrays of E-Resources viz. Clinical Key, UpToDate, Cumulative Index to Nursing and Allied Health Literature (**CINHAL**) Plus, Tumor, Node & Metastases classification (**TNM**) and British National Formulary (**BNF**). The Library also provided online access to reasonable number of E-Books and journals from some of the publishers like Wolters Kluwer, Springer-Nature, Wiley, ProQuest, Cambridge and others. The Library subscribed to 181 medical and scientific journals of which about 116 were also available in online format. The Digital Library was an active member of the DAE's consortium for Science Direct.

Service

The Digital library enhanced the reprography facility by purchasing RISO copy printer for supporting the services. The library supported articles request through its Inter-Library Loan (**ILL**) activity. About 221 such requests for 638 articles were received and the department met about 94 % of these requests. The library team actively played the role of informationist to not only registered users but also to the visitors. On various occasions, telephonic request and assistance in the effective utilization of library resources was provided. Hence, users were encouraged to become more self-dependent to obtain their desired articles. In addition,

the remote access facility was extended to the registered users for the various resources acquired. The library Web-OPAC facility was available to all the library web page visitors. For registered users, the Federated search facility helped to make a single point search for various E-Resources acquired and were made available on DSpace based Institutional Repository. The library indexed about **463 staff publications** and was in the process of adding educational videos. The library used Koha –ILS (Integrated Library System) for various activities. The system was enabled to send auto-generated email message and reminders for the library items issued to the patrons. Recently, access to more than 80 online journals along with UpToDate, BNF, TNM and CINHAL databases to five centres was initiated.

The Library Commons planning and designing for both the Varanasi sites was proposed and the work was initiated accordingly.

Education

Library orientation was an annual activity for the benefit of newly joined students in various disciplines. Besides hands on instructions to the end users using computer cell facility, the library arranged about six training sessions, tutorials and organized demo for the benefit of end users for Cumulative Index to Nursing and Allied Health Literature-Nursing Reference Centre (**CINHAL-NRC**), UpToDate, British Medical Journal (**BMJ**) Case Reports, Clinical Key for Nursing, and antiplagiarism software; more than 145 bonafide users benefited. The Library also provided assistance for the training session on UpTo Date at the Dr. B. Borooah Cancer Institute in Guwahati.

Research

The Digital library entered into evidence based use module with Springer for online e-books.

Engineering

Chief Engineer - TMC, **Mr. GS Dhanoa**

Mr. RR Rodrigues, TMH
Mr. Sandeep Kalwaghe, TMH
Mr. MK Nate, TMH
Mr. RS Sharma, TMH
Mr. RB Kapse, TMH

Mr. KK Karle, TMH
Mr. BD Patil, TMH
Mr. MSV Rama Sastry, HBCHRC - Visakhapatnam
Mr. Tilak Bhowmik, MPMMCC - Varanasi
Mr. RD Puri, HBCHRC - Mullanpur

The mandate of the Engineering department at Tata Memorial Centre was to maintain and manage all the facilities under its jurisdiction and to ensure the safety of patients and staff. This involved smooth functioning of the hospital infrastructure including but not limited to Mechanical, Electrical & Plumbing (**MEP**) services like Medical Gas Pipe system, Heating, Ventilating & Air Conditioning (**HVAC**), Telephone & Audio Visual (**AV**) system, Public Address System, Fire Alarm System, Closed Circuit Television (**CCTV**), Pneumatic Tube System, Power & Water supply, Elevators & Escalators, etc. The department ensured minimum breakdowns by taking timely action on preventive maintenance & upgrading the MEP utilities as per the needs of the hospital.

In order to ensure prompt maintenance and reducing the lead time, the department adapted the "Computerized Complaint Management System", whereby users logged into the system and complaints were recorded online so that appropriate remedial measures were instituted and dislocation of services kept to the minimum.

Further to conserve electricity, a remarkable cut down in power consumption was achieved by maintaining the power factor, replacing in phase-wise the existing florescent light fittings by Light Emitting Diode (**LED**) lights, modification in the existing HVAC system, replacement of old MEP equipments with newer technology & energy efficient equipments, replacement of Air Conditioning systems in the Intensive Care units (**ICU**), areas of Radiodiagnosis & Radiotherapy, Library etc. in the shut down period without disturbing the day to day activities in the respective department. A total 16 package units were replaced including the entire plant room work within a period of 25 days.

In addition to the above work, the Engineering department had undertaken major renovation work to upgrade the hospital infrastructure to meet current and future needs. Few of the renovation works were the creation of additional Operation Theatres (**OT** No. 26) at Homi Bhabha Building (**HBB**), Day Care facility at Annexe 6th floor., renovation of Pathology laboratories, renovation of Helpline, renovation of nurses quarters & change rooms, renovation of purchase department, turnkey of Digital X-ray & Single Photon Emission Computed Tomography (**SPECT**) machines in main building,

up gradation of telephone exchange, Air Conditioning (**AC**) duct cleaning of OT & ICU, repair & replacement of false ceiling in main building & HBB, etc.

The Engineering department also overlooked the Maintenance, Verifications & Disposal Cell that was headed by Mr. R. R. Rodrigues.

In addition to maintenance works in TMH, the department was actively involved in various upcoming Projects within Maharashtra State and other States like Uttar Pradesh, Assam, Punjab etc.

Mumbai, Maharashtra:

In the plot Number 3/330 (adjacent to Haffkine institute, Parel), approx. 5 acre of land was allotted by the Maharashtra Government for development of a cancer hospital. The development was taken up in a phased manner.

- A new hospital to be constructed at an estimated cost of INR 450 crore. M/s Hosmac India Private Limited issued a Letter of Intent for providing comprehensive architectural services
- Residential Quarters for doctors and Dharamshala for patients was being set up in the Parel plot. About 25 % of the work was done and the structure would be ready by end of 2019 and commissioned by mid 2020.

Navi Mumbai, Maharashtra - The Advanced Centre for Treatment, Research & Education in Cancer (ACTREC) in Kharghar:

- The Construction of the Structure for Hadron Beam Therapy was in progress and was expected to be completed by the end of May 2019
- For the Radiological Research Unit (**RRU**), M/s SAM (I) Pvt. Ltd. Was appointed as the contractor and the construction work started. It was expected to be ready by end of year 2019
- The work for the exclusive block Hematolymphoid Block & the Women & Children cancer wing was underway from December 2017 to be completed by end of 2019.

Mohali, Punjab - the Homi Bhabha Cancer Hospital & Research Centre (HBCHRC) in Mullanpur village of Mohali District:

- The structural work of the main hospital building, the doctors & nurses quarters and the Dharamshala were almost complete and the MEP services work started.

Varanasi, Uttar Pradesh:

- The boundary wall of the Mahamana Pandit Madan Mohan Malaviya Cancer Centre (MPMMCC) was completed
- The structural & brick work of the staff residential quarters at MPMMCC was almost completed
- Excavation work for staff hostel, Dharamshala and car parking started.

Muzaffarpur, Bihar:

- Architect M/s Arch En Design were appointed to provide comprehensive architectural consultancy services for the proposed Homi Bhabha Cancer Hospital & Research Centre in Muzaffarpur, Bihar.
- A memorandum of Understanding between Tata Memorial Centre and Central Public Works Department (CPWD), Patna was signed for the construction of the boundary wall for HBCHRC.

Guwahati, Assam:

- The process for renovation, refurbishing, retrofitting and extension of the existing buildings of the Dr. Bhubaneswar Borooah Cancer Institute (BBCI) started
- Paper work for the demolition of the Academic block of BBCI begun to construct an Ancillary building in its place.

Visakhapatnam, Andhra Pradesh:

- The Radiotherapy Block was almost completed and to be commissioned by mid 2019.



General Medicine

Head, **Dr. Aruna Alahari Dhir**

Dr. Sheela Sawant
Dr. Anuprita Daddi
Dr. PTV Nair, Medical officer

The Department of General Medicine was an important clinical service of the Hospital as a vast number of patients presenting to the Hospital invariably required a medical consult. The department provided both outpatient and inpatient consultation services for management of medical comorbidities of patients undergoing surgery, radiotherapy and chemotherapy. The staff members also provided valuable inputs in the Intensive Care Unit (ICU) management of patients, including bedside portable echocardiography; and in the wards, towards the management of emergencies and medical events in the peri-treatment course.

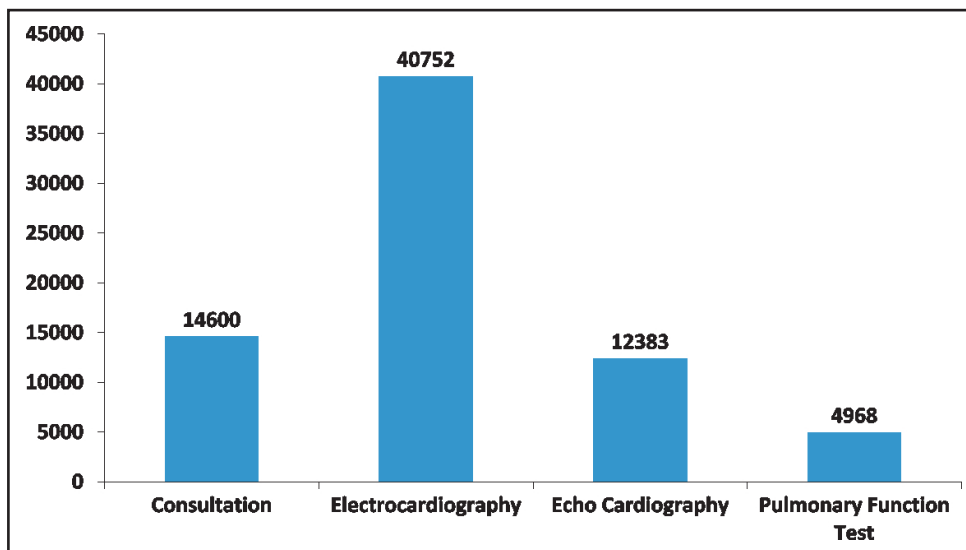
Apart from management of common medical issues like diabetes, hypertension, ischemic heart disease, asthma, Chronic Obstructive Pulmonary Diseases etc, the department was also involved in treatment of some chemotherapy and radiation induced toxicities, management of infections in the immuno-compromised patients especially Human

Immunodeficiency Virus, management of some acute complications in critically ill oncology patients, including infections, pulmonary complications, cardiovascular disease and metabolic disorders.

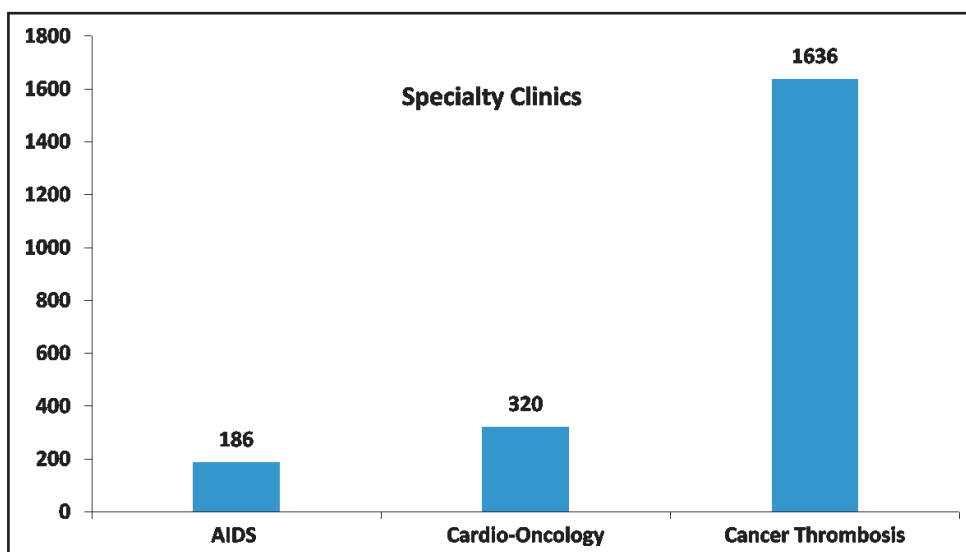
Service

The team comprised of dedicated medical consultants as well as trained technicians and provided the following investigational and clinical services.

Investigational services: 2D and 3D Echocardiography with Color Doppler for evaluation of cardiac structure and function as well as bedside echocardiography in critically ill patients in the Intensive Care Units. The department provided a total of **14600** consultations during the year. It performed **12383** echocardiography tests, **4968** pulmonary function tests and **40752** electrocardiograms during the year. Cardiopulmonary stress test services were also provided.



Workload of the department (2018)



In the year 2018, the waiting period for in-patient echocardiography was reduced to less than 24 hours.

Specialty Clinics:

These included the Acquired Immune Deficiency Syndrome (AIDS) Malignancy, Cancer Thrombosis and Cardio-Oncology clinics. The sick patients who could not attend the clinics were given advice on telephone.

Adjuvant therapies could potentially cause a wide range of acute and late cardiac complications. The focus of the Cardio-Oncology clinic was on prevention, early detection and timely management of cardiovascular complications associated with cancer therapy so that patients could complete optimal treatment for their cancer.

Education

The faculty was involved in training in hospital infection control course and M. Sc nursing students.

Quarterly meeting of the cancer thrombosis working group of the hospital was conducted.

Research

The ongoing projects included the Institutional Review Board approved study on Metabolic Syndrome in childhood cancer survivors; an Audit of cardiotoxicity of Tyrosine Kinase Inhibitors in elderly patients with metastatic renal cell carcinoma and, an Audit of Cardio pulmonary exercise test in lung cancer patients.

Information Technology

Head, Mr. Vivek Narayan Marathe

Mr. Raja Sekhar MSN
Mr. Mahesh Sadashiv Mangrulkar
Mr. Sanjaykumar Sinha
Ms. Charulata Rakesh Nimje

Mr. Pravin Madhukar Kalsekar
Ms. Sandhya Ravindra Joshi
Mr. Manoj Sadashiv Chavan

The Information Technology (IT) Department played a pivotal role in the day to day functioning of Tata Memorial Hospital in all the three major areas viz. Service, Research, Education. The IT department developed a comprehensive integrated Hospital Information System (HIS) to effectively manage clinical, financial and administrative aspects of the hospital. The HIS was user-friendly, easy-to-use & most of the modules were web enabled. New features and functionalities were continuously added to cater for ever changing user requirements. The HIS ran 24 x 7 on IBM power Server with DB2 / 400 Relational Database Management System. It had High Availability & Disaster Recovery features. Patient Electronic Medical Records were available on intranet as well as internet. HIS had Comprehensive coverage of all hospital functions that were integrated with external systems like Picture Archiving and Communication System (PACS), Lab Auto analyzers, Bar Code, Smart Card, Kiosk, Computer-on-Wheels etc. The HIS - enabled modules were implemented in a phased manner that provided greater flexibility to meet the needs, while protecting investment and minimizing the impact of change.

Service

During 2018, many applications were developed that enabled the department to provide better patient services. Software Development, Software Maintenance, Hardware Maintenance, Network monitoring & supervision, User training, various trouble shooting procedures, solving day-to-day user problems, data analysis, conducting meetings with users etc. were the major departmental activities.

The following activities were carried out:

- Patient's and Staff's Electrocardiograph (ECG) on the hospitals Electronic Medical Record (EMR)
- Token System at Disease Management Group (DMG) rooms
- Automated Barcode Label on test tubes at Collection Center
- HL7 Scheduler from Virtual Basic (VB) to NET
- Web System on Sales Counter
- Online Reports for Referral Patients
- Tracking system for Fine Needle Aspiration Cytology

- Integration of Radiation Medical Centre
- Pain Management System
- Day Care Appointment System
- Narcotic consumption
- Patient data transfer to all Institute
- Medical Oncology Information System
- Guest House / Hostel Management System / Venues Module
- Surgical Pathology Module
- Management Information System (MIS) Report
- Patient Follow-up Appointment System
- Patient Prescription
- Assessment & Rating
- Gate Pass System
- Human Resource Development (HRD) & Personnel Management
- Engineering Module
- Material Management System
- Nutrition Module
- Tumor Tissue Repository (TTR)
- Financial Management
- Short Message Service (SMS)
- Website

Education

Training was given to nurses on computer concept, Hospital Information System, Microsoft Office and IT related topics. The laboratory staff was trained to use Diagnostic Information System effectively.

Research

Data Analysis was regularly done for Clinical Information System, Patient Administration, Billing and Receipting System, Radiology Information System, Nuclear Medicine System, Operation Theatre Module, Radiation Oncology Information System etc. that provided data for clinical research.

Medical Graphics

Officer in Charge, **Mr. Nilesh Ganthade**

The department of Medical Graphics comprised of two parts; the Medical Illustration and, the Medical Photography & Videography. The departmental staff worked with medical professionals to document the disease and kept the record of the same.

The department was well equipped with the state-of-the art digital technologies such as full frame DSLR (Digital Single Reflex Camera), 4K medical purpose surgical recording system, live broadcasting over the internet for the distance learning and high-end 2400 DPI (Dots per Inch) film scanner for the digitization of the Magnetic Resonance Imaging and Computed Tomography images.

The medical artist, photographer, videographer and layout artists formed the backbone of the department. The accurate photographic documentation of the disease process gave the medical professionals', a visual clue, measurement and analysis of the disease while planning for treatment. These images were also useful for clinical research and education purposes.

The presence of Digital high bandwidth in the country along with distance learning tools enabled the medical graphics department to do live broadcast of various surgical procedures that educated doctors across the country. This was possible with the help of high-end 4K video cameras that reproduced crisp and clear images in high resolution.

Specialized techniques such as, macro photography of the lesion, thermal imaging, endoscopic cameras etc. were used to record internal organs and infrared photography to record outside visual spectrum .

The Department extended support to the entire hospital during the course of conducting their conferences, workshops etc. from designing to audiovisual support. They also performed photography for the Public Relations (**PR**) office and archived the images.

Work performed in the year 2018

Clinical photography (number of patients)	13125
Scientific Poster Presentation	96
Desk-Top Publishing (DTP)/Artwork of Conference, Posters, Brochures etc.	680
Surgical Operations Recordings, Clinical Procedures	68
Illustration For Clinical papers	52
Public Relations photography / Visitors / Number of non-medical events	27883



Medical Oncology

Head, **Dr. Shripad D. Banavali**

Dr. Sudeep Gupta
Dr. Kumar Prabhash
Dr. Navin Khattry
Dr. Manju Sengar
Dr. Amit Joshi
Dr. Jaya Ghosh
Dr. Tushar Vora
Dr. Vanita Naronha
Dr. Jyoti Bajpai
Dr. Bhausahab Bagal
Dr. Girish Chinnaswamy
Dr. Gaurav Narula (Surg Cdr)
Dr. Maya Prasad
Dr. Hasmukh Jain
Dr. Seema Gulia

Dr. Vikas Ostwal
Dr. Vijay Patil
Dr. Anant Ramaswamy
Dr. Anant Gokaran
Dr. Sachin Punatar
Dr. Avinash Bonda
Dr. Nirmalya Roy Moulik
Dr. Chetan Dhamne (From April 2018)
Dr. Vasudev Bhat (From August 2018)
Dr. Sushmita Rath (From August 2018)
Dr. Siddharth Turkar (From August 2018)
Dr. Lingaraj Nayak (From August 2018)

Molecular Lab

Dr. Anuradha Chougule
Mr. Rajendra Ankam
Ms. Priyanka Bagaytdar

Cancer being considered as a systemic disease, most patients registered at TMH were seen by the department of Medical Oncology that dealt in systemic therapies in the form of chemotherapy, targeted therapies, hormonal therapies and immune therapies (monoclonal antibodies and check-point inhibitors). The department was committed to offer efficient and compassionate care along with providing cutting-edge clinical research to both, adult and pediatric patients with cancer and at the same time, provide outstanding training opportunities to medical students from across the country and other Low and Middle Income Countries (**LMIC**).

Unlike surgery and radiation therapy, which was usually done only once or very rarely twice, cancer patients needing systemic therapy not only get multiple cycles (4 to 6 cycles and up to 3 years of therapy in Acute Lymphoblastic Leukemia) of therapy upfront, but they could also receive multiple (up to 6 or even 8) lines of treatment in presence of resistant / progressive or relapsed disease. Systemic therapies were not only given before local therapies (neo-adjuvant setting); along with surgery / radiation therapy; after local therapies (adjuvant setting) and as maintenance therapies in curative settings, but also as palliative therapies in advanced cancers to improve their quality of life. Considering the limitation of in-patient beds, most of treatment was now executed on outpatient basis in injection room or on Day-Care beds. Additionally, whenever expertise was available, patients were referred back to their place of residence to take their chemotherapy cycles. This component had significantly increased with the opening of newer hospitals under the administration of Tata Memorial Centre at Varanasi, Visakhapatnam and Sangrur.

Service

The department of medical oncology offered its services to patients of TMH and also those at ACTREC in Navi Mumbai. The total work-load on the department can be gauged by the fact that members of the medical oncology department attended to **42315 new patients** in 2018. There were **31218 inpatient** and **247250 day-care** admissions. There were a total of 420349 patient visits in the medical oncology OPDs and **82290 casualty** visits. Over thirty six thousand (**36886**) procedures were performed in the minor operation theatre that included bone marrow aspirations and biopsies; lumbar punctures (including intra-thecal injections) and tappings (pleural, ascitic, etc). All these were executed by only 29 faculty members who also participated in the eleven (11) Disease Management Groups (**DMG**), helped by nearly 74 efficient and hardworking Residents and Fellows. With the development of various immunohistochemistry, flow-cytometric, cytogenetic and molecular tests at TMH, the department offered patients risk stratified and personalized therapies that helped not only to decrease side-effects and costs of treatment, but also helped to improve their outcomes.

The Pediatric Division provided comprehensive medical diagnostic, counselling, management, follow-up and palliative services to children below 15 years of age having cancer. Two thousand thirty four (**2034**) **children less than 15 years of age** were registered at TMH in 2018 and this included 378 children who came for second opinion or special investigations only. The high costs of curative therapies along with the severe socio- economic constraints which majority

of the families have, coupled with the highly curative nature of most pediatric malignancies, the group recognized way back that intervention in these issues helped save lives, and improved outcomes quantitatively and qualitatively. Towards this end, the group developed an extensive support system and raised more than 220 million Indian Rupees to provide financial aid, accommodation, nutrition, continued education, sporting and fun activities, outings and cultural programs to these pediatric cancer patients as part of its service program. All this helped to keep the Treatment Refusal & Abandonment rate below 5 % (4.4 %) and at the same time improved the overall 5-year survival to above 70 % in children below the age of 15 years.

The Bone Marrow Transplant (**BMT**) unit continued to be one of the very few BMT units in the country that specialized in difficult to do unrelated & haploidentical transplants.

Education

TMC was the topmost institution in the country involved in the training of manpower in the field of oncology and this also included the field of Medical Oncology. At any given time, there were nearly 100 students being trained in medical oncology at TMH which included 69 DM (Med-Onc), 10 DM (Ped-onc), 5 Fellows in Hem-Onc / BMT / Molecular Oncology, 10 Ph.D students and many observers / fellows from across the country and also from African and South Asian Association for Regional Cooperation (**SAARC**) countries.

The department members were appointed on various DM examination & Ph.D committees of Institutions across the country. The Faculty members were also invited to Institutions / Meetings / Conferences across the country for disseminating knowledge through invited talks as well as panel discussions. The department consultants were on

various committees like Indian Council of Medical Research (**ICMR**) to formulate treatment guidelines for the country.

Research

Research was one of the important pillars of the vision of TMC. The departmental members were Principal Investigators of 40 new projects approved by one of the 3 TMC Internal Review Boards in the year 2018, and at the same time were co-investigators of many more. They were part of 144 pub-med indexed publications in 2018. The department members were also Principal Investigators of one practice changing paper in the field of Head & Neck cancer and cervical cancer that was presented in international meetings and later published in prestigious journals. Most of the departmental members were on the Editorial Boards of most cancer related journals published from the country. Senior departmental members were also representatives on various prestigious scientific national committees like Indian Council of Medical Research (**ICMR**), Drug Controller General of India (**DCGI**), National Cancer Control Programme (**NCCP**), Department of Biotechnology (**DBT**) and the Department of Science & Technology (**DST**).

The department had its own state - of - the - art molecular laboratory that was involved in service, research and training activities. The laboratory developed new molecular and genomic tests, initially on research basis and once standardized and proven useful, were offered on service basis, not only to patients registered at TMC, but also to patients across the country at very affordable cost. The departmental members helped establish and were also part of the Clinical Scientific Laboratory at ACTREC. The laboratory standardized the Next Generation Sequencing (**NGS**) in solid tumors and was issuing reports for the same.



Medical Oncology Molecular Laboratory

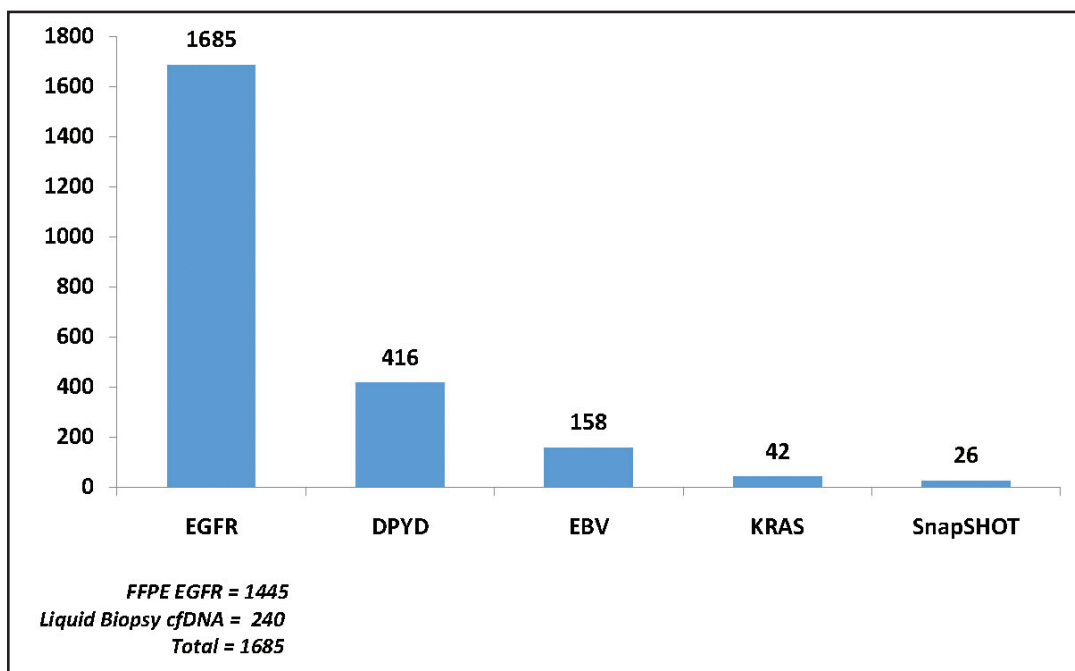
Head, Dr. SD Banavali

Dr. Kumar Prabhash, Supervisor
Dr. Anuradha Choughule, Lab In-charge

The Department of Medical Oncology- Molecular Laboratory, a state - of - the - art molecular laboratory, was started in 2005 and was the first diagnostic lab in Tata Memorial Hospital (TMH) to perform molecular studies, to begin with Reverse Transcription Polymerase Chain Reaction (RT-PCR) and later Real-time Quantitative Polymerase Chain Reaction (RQ-PCR). The lab developed new molecular and genomic tests, initially on research basis and once standardized and proven useful, these tests were later offered on service basis not only to patients registered at TMH, but also to patients across the country at very affordable cost. The laboratory focused 70 % on diagnostic work and 30 % on research work. From the initial work in haematological malignancies, the laboratory shifted to working with solid tumours, especially lung cancer, as per the mandate given by the hospital. Again, the laboratory was the first to offer cost-effective Sequencing and Next Generation Sequencing (NGS) tests. Recently, the laboratory has started offering liquid biopsies. The departmental members also helped establish and were part of the Clinical Scientific Laboratory at the Advanced Centre for Treatment, Research & Education in Cancer (ACTREC).

Service

Under the service facility, the laboratory provided single gene Epidermal Growth Factor Receptor (EGFR) and RAS (family of RAt Sarcoma virus oncogenes that makes proteins involved in cell signalling pathways that control cell growth and cell death) mutation analysis with the homebrew TaqMan primer probe based on real time PCR that was a very cost-effective test. The Human Epidermal Growth Factor 2 (HER2), the Mesenchymal-Epithelial Transition (MET) Exon 14 skipping by Sanger sequencing, the DihydroPyrimidine Dehydrogenase (DPD) gene mutation analysis for 5' Fluorouracil (FU) toxicity by Sanger sequencing, the Epstein Barr Virus (EBV) detection and absolute quantification by Real time PCR in cancer of the Nasopharynx were some of the other diagnostic tests offered. The laboratory participated in the College of American Pathologists Proficiency testing by using the in-house TaqMan primer probes for EGFR and Kirsten RAS (KRAS, of RAS family).



EGFR=Epidermal Growth Factor Receptor; DPYD=Dihydropyrimidine dehydrogenase; SnapSHOT=a Clinical Laboratory Improvement Amendments (CLIA) approved assay, validated in lung cancer, that uses Single Nucleotide Polymorphism (SNP) genotyping in degraded DNA from FFPE tissue to identify multiple described mutations across many cancer genes; EBV= Epstein Barr Virus; cfDNA= Cell-free DeoxyriboNucleic Acid; FFPE= Formalin-Fixed Paraffin-Embedded; KRAS= Kirsten RAS (family of RAt Sarcoma virus oncogenes)

Incorporation of NEW TESTs based on NGS platform: A multigene AmpliSeq 52 gene Focus panel on Formalin-Fixed Paraffin-Embedded (**FFPE**) samples were standardized, optimized and validated on Next Generation Sequencing (MiSeq NGS). The genes incorporated were based on available targeted therapies, prognostic and predictive markers for different cancers. This test was now available as a diagnostic test. The Cell-free DeoxyriboNucleic Acid (**CfDNA**) for single gene EGFR testing was already a routine diagnostic test done on Real Time PCR. Understanding the increasing importance of liquid biopsy, the laboratory standardized, optimized and validated 4 gene Custom Panel for the cfDNA samples and incorporated it as diagnostic NGS test.

Education

Since 2016, the department conducted quarterly Preceptorship Program for EGFR mutation analysis in Non-Small Cell Lung Cancer (**NSCLC**). From 2017 onwards, a one-year training program in molecular oncology that involved intense training was conducted for various PCR techniques like Sanger sequencing, Real time PCR, and Next Generation Sequencing and includes data analysis and interpretation. Regular classes for DM and MD students that educated doctors in this field were ongoing.

Research

The Lab was involved in various Institutional Review Board (**IRB**) approved projects that included:

1. Beta Adrenergic receptor analysis in Sarcomas
2. Wingless-related integration site (**Wnt**) signaling pathway in Metronomic therapy
3. Genomic profiling in Thyroid carcinoma
4. Study to evaluate the prevalence of EGFR mutation status in Small cell lung cancer in India
5. Establishing cfDNA as diagnostic and monitoring tool in NSCLC
6. Lung cancer resistance project: The aim was to identify novel genomic alterations conferring resistance towards EGFR-Tyrosine Kinase Inhibitors (**TKIs**) in lung adenocarcinoma patients positive for *EGFR* mutations.
7. Mass Array genotyping on lung squamous and small cell lung cancer samples: The aim was to describe the landscape of actionable alterations in lung squamous and small cell lung cancer patients of Indian origin. Here, a total of 54 mutations were profiled.
8. Prospective observational cohort study of advanced Gall bladder cancer patients to study the impact of clinical and molecular characteristic and outcome.



Medical Physics

Head, **Dr. R. A. Kinhikar**

Dr. D. D. Deshpande
Mr. Rituraj Upreti
Mr. Yogesh Ghadi
Mr. Shrikant Kale
Mr. Ritesh Mhatre
Mrs. Uditia Upreti
Mrs. Dheera A.

Mr. Libin Scaria
Mrs. Priyadarshini Sahoo
Mr. Avdhoot Sutar

ACTREC

Dr. S. V. Jamema
Mrs. Ph. Reena Devi
Mr. Kishor Joshi

The Department of Medical Physics had a strength of 22 Medical Physicists between TMH and ACTREC (including 07 on contract) and other technical staff. There were 12 Medical Physics interns as well in TMH and ACTREC. Calibration, Quality Assurance, maintenance of imaging machines (simulator / CT Simulator), teletherapy & brachytherapy machines, treatment planning & dosimetry for treatment of radiotherapy patients, procurements of radioactive sources,

looking after the radiation safety & protection of the staff/ patients/public were some of the important functions carried out by the department.

Service

The department was actively involved in dosimetry, data acquisition of various Linear Accelerators, Telecobalt &

Brachytherapy machines. Planning & execution of sophisticated techniques like 3D Conformal treatment with Multi-Leaf Collimator (**MLC**), Stereotactic Body Radiotherapy (**SBRT**), Intensity Modulated Radiotherapy (**IMRT**), Volumetric Modulated Arc Therapy (**VMAT**), Image Guided Radiotherapy (**IGRT**) treatments were some of the advanced & skilled jobs carried out by department staff. The department kept abreast with the international standards of dosimetry by participating in International Atomic Energy Agency (**IAEA**) /World Health Organization (**WHO**) / Bhabha Atomic Research Centre (**BARC**) dose inter-comparison and many other clinical trial protocols like Radiation Therapy Oncology Group (**RTOG**) / European Society for Radiotherapy & Oncology (**ESTRO**) etc.

The Department of Medical Physics worked in close association with department of Radiation Oncology for radiotherapy of cancer patients. There were a total of 06 Linear Accelerators, 02 Tomotherapy machines, 05 Telecobalt machines for RT treatment and 02 simulators (conventional and CT simulator) for treatment and planning of teletherapy. Brachytherapy patients were treated with Ir-192 HDR after-loading machine.

Calibrations, Quality Assurance, maintenance of these teletherapy and brachytherapy machines, treatment planning & dosimetry, procurements of radioactive sources, looking after the radiation safety & radiation protection of the staff/patients/public were some of the important functions carried out by the department.

The department was equipped with many sophisticated equipment like treatment planning systems TPS (Eclipse, Oncentra, i-Plan), dosimeters & calibration instruments (DOSE1, Unidos, 3-D Water Phantom (Blue Phantom, 3-D scanner), Advance patient specific Dosimetry System (Octavius, MatriXX Evolution), TLD reader (Rexon), Film Dosimetry System (Omnipro), Gafchromic Film dosimetry system etc.

The department also advised other departments like Diagnostic Radiology, Transfusion Medicine, Tissue Bank, Bio-imaging and in ACTREC for their requirements of radiation

protection, Quality Assurance (**QA**), source procurement & disposal as per Atomic Energy Regulatory Board (**AERB**) guidelines. The departmental staffs were actively involved in Radiation safety, planning of RT rooms, equipment specifications etc for new centres at Varanasi, Visakhapatnam & Mullanpur.

Education

The first candidate has successfully completed Ph. D in Medical physics under the Homi Bhabha National Institute (**HBNI**). The staff members were constantly updating their knowledge through publications and attending National and International conferences. They also educated and trained physicists, doctors, nurses, technologists & many visiting national and from International Atomic Energy Agency (**IAEA**) trainees in radiation physics. The department conducted a 2-year Advanced Diploma of Radiotherapy Technologist's that was recognized by Maharashtra State Board of Technical Education (**MSBTE**).

Research

There were many research projects initiated by the department alone and with the department of Radiation Oncology. Projects on Flattening Filter Free (**FFF**) beam dosimetry and Adaptive therapy were been accepted by the TMH ethics committee. One international project on small field dosimetry was awarded by IAEA.

Future Plans

The construction and site preparation for Proton facility at ACTREC was ongoing and was soon to be commissioned.

The department planned to finalize the treatment planning system for the Bhabhaton with MLC, indigenous brachytherapy machine Kirknidon.

The department was prepared to set up Radiotherapy machines at the present and soon to be commissioned new satellite cancer centres across India.



Microbiology

Head, Dr. Rohini S. Kelkar

Dr. Sanjay K. Biswas
Dr. Vivek G. Bhat

The department of Microbiology provided rapid and accurate diagnosis of infectious diseases. The State - of - the - art molecular diagnostic methods were now a routine for quicker diagnosis of bacterial, fungal and viral infections.

Infections with multidrug resistant organisms were a global menace. They were of importance in patients with haemato-lymphoid malignancies and solid tumors. The department focused on activities to identify and control these infections. The department was currently engaged in setting up tests using molecular epidemiology.

The diagnosis of tuberculosis in cancer was a challenge. Multidrug resistant and non-tuberculous mycobacterial infections were on the rise. The introduction of molecular tests markedly improved the diagnostic yield and the detection of drug resistance.

A diagnostic virology department to support the diagnostic needs of patients with haemato-lymphoid malignancies and bone marrow transplantation was being planned.

The department offered support for environmental surveillance of the operating rooms, water quality testing, hospital waste management and the prevention and control of healthcare associated infections.

Clinical rounds in the critical areas and wards to monitor hospital associated infections and bedside support for management of infectious complications were a routine.

The department continued to be accredited by the National Accreditation Board for Laboratories for the second decade

Service

The total numbers of samples processed were **223062**.

The number of tests performed by the department showed an overall increase of 9.3 % in one calendar year.

The workload in individual sections showed a rising trend namely, increase of 7.6 % in Bacteriology, 11.3 % in Serology, 19.9 % in Mycology, 9.2 % in Clinical Microbiology and 6 % in Molecular Microbiology.

Education

The ongoing educational programs included the Certificate Course in Hospital Infection Control (since past 15 years), training technologists in laboratory biosafety and Infection Control for nurses and dialysis technicians.

Research

Focus during the year was on the validation of an in-house anti-fungal susceptibility testing by micro-broth dilution method and rapid tools for the early diagnosis of sepsis in critically ill patients. In vitro studies on characterization of drug resistant pathogens like *Klebsiella pneumonia* and *Escherichia coli* were ongoing.



Nuclear Medicine & Molecular Imaging

Head, Dr. Venkatesh Rangarajan

Dr. Nilendu C. Purandare
Dr. Sneha Shah
Dr. Archi Agrawal
Dr. Ameya Puranik

The department performed the largest number of Positron Emission Tomography - Computed Tomography (**PET/CT**) scans in India and south East Asia. The department provided its service through three (03) state of art PET/CT scanners and one (01) Single Photon Emission Computed Tomography/CT (**SPECT/CT**) scanner. The hospital Radiopharmacy supplied 99mTechnetium and 68Gallium Radiopharmaceuticals and, 18Fluorine based PET radiopharmaceuticals were supplied to the department by the Board of Radiation & Isotope Technology (**BRIT**) Medical Cyclotron facility. A five (05) bed Radioisotope therapy Isolation ward was operational, as was the state of the art Hospital Radiopharmacy for the formulation of therapeutic radiopharmaceuticals.

Service

The department performed **16681 PET/CT** scans using various radiopharmaceuticals. It performed **4925 SPECT** and general nuclear medicine studies. Forty three (43) Therapeutic procedures were performed for thyroid, Neuroendocrinal and liver cancers.

The department also managed the PET/CT scanner at ACTREC on time share basis and performed 1650 PET/CT scans there. It also provided the regulatory and service support for the facility at ACTREC.

Education

The department conducted MD in Nuclear Medicine for six students and Post Graduate Diploma in Fusion Image techniques for ten (10) students. It offered apprenticeship and observership programme for various trainees.

The departmental staff authored one book and three chapters on nuclear and molecular imaging.

Research

The department participated in the research programme on the use of Gallium 68 Labeled Prostate Specific Membrane Antigen in the diagnosis and follow-up of Prostate Cancer.

The department undertook the project of Radioimmuno-diagnosis and Therapy in collaboration with Bhabha Atomic Research Centre. The international project BIONICS, with Netherlands-Matretich University, Centre for Development of Advanced Computing (**CDAC**) and Philips, under the Government of India's Indo Dutch collaboration was successfully underway.



Nursing

Superintendent, **Ms. Swapna Joshi**
Principal, **Ms. Anita D'Souza**

Ms. Carmine Lasarado,
Deputy Nursing Superintendent

Ms. Manisha Pawar,
Vice Principal

Ms. Pathepa Jagdish,
Associate Professor

Assistant Nursing Superintendents

Ms. Manorama Anilkumar
Ms. Sindhu Nair
Ms. Shweta Ghag
Ms. Chhaya Dhanve
Ms. Reena Nair
Ms. Bharati Veer

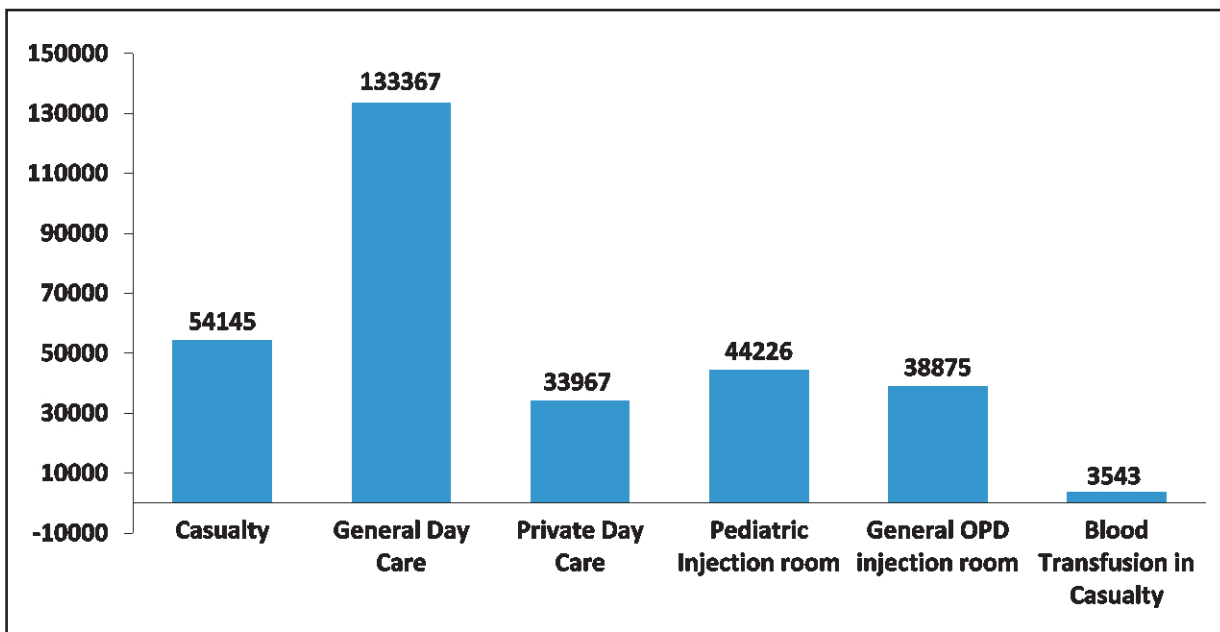
The department of Nursing was involved in advancing patient care and services across the hospital. Working towards the goal of patient centered care, the Nursing Department was actively involved in quality improvement initiatives focusing on measuring and improving patient outcomes.

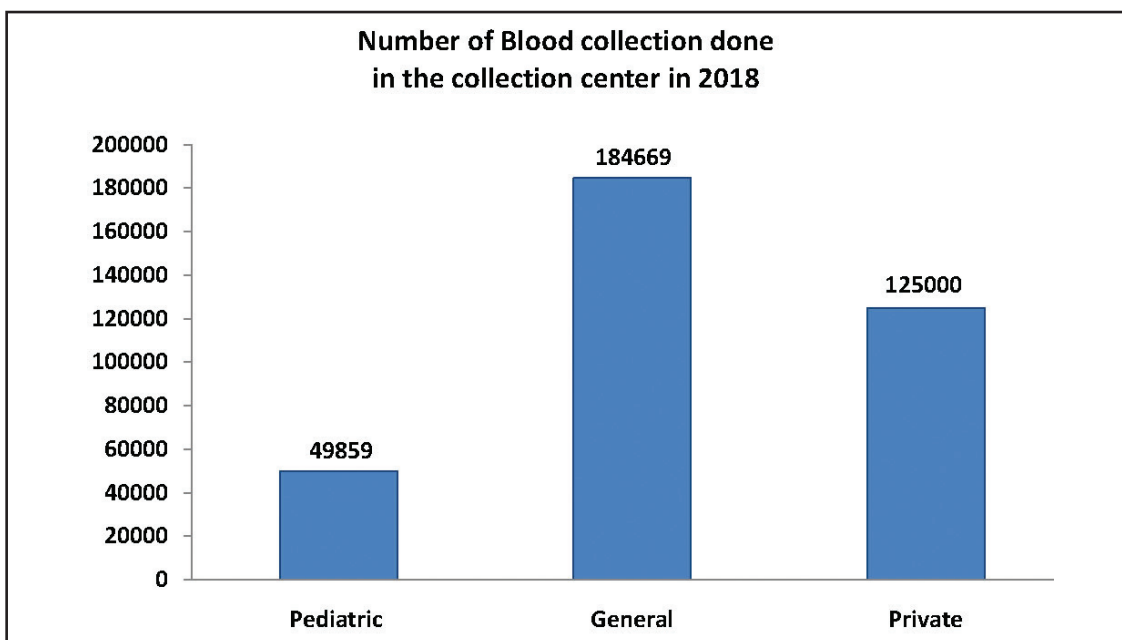
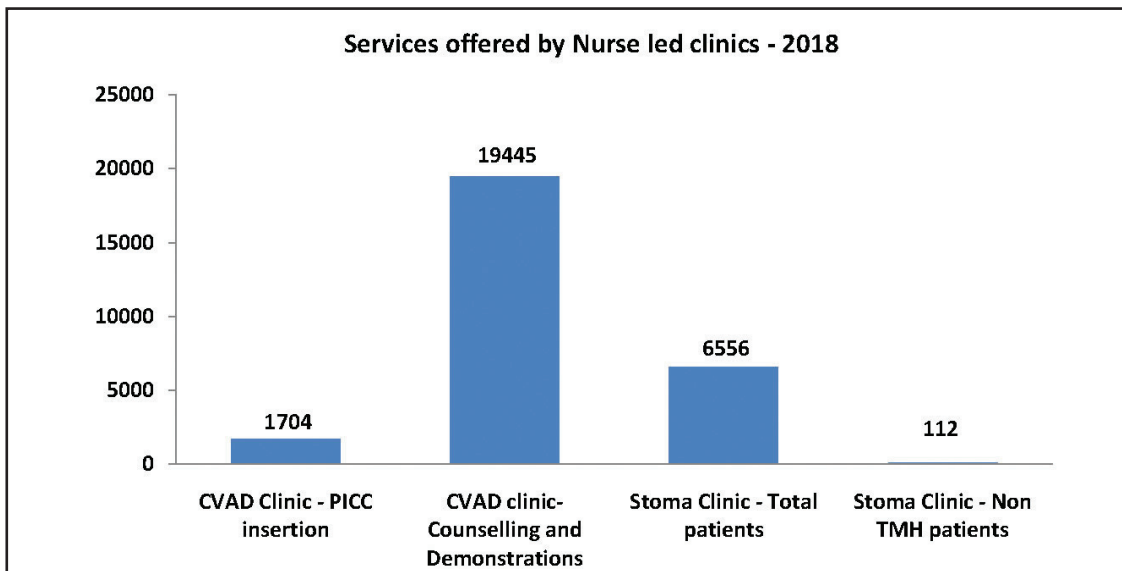
Service

Two hundred and thirty eight (238) nurses had degree in oncology nursing with 34 nurses trained in certificate course in Central Vascular Access Devices (CVAD), 09 nurses trained in enterostomal therapist and 12 nurses trained in certificate course in Hospital Infection Control; thereby making them the link nurses in the ward to monitor the infection control practices. The nurses in TMH were trained in Basic Life Support (BLS) that equipped them to start the resuscitation efforts

prior to the arrival of rapid response team. The introduction of Pediatric Emergency Warning Score resulted in better management of pediatric patients in the wards. With the challenges faced by the patients to receive blood transfusion at night the nursing services in casualty was extended. Interventional Radiology (IR) services were strengthened by making provisions for transportation of samples to laboratory.

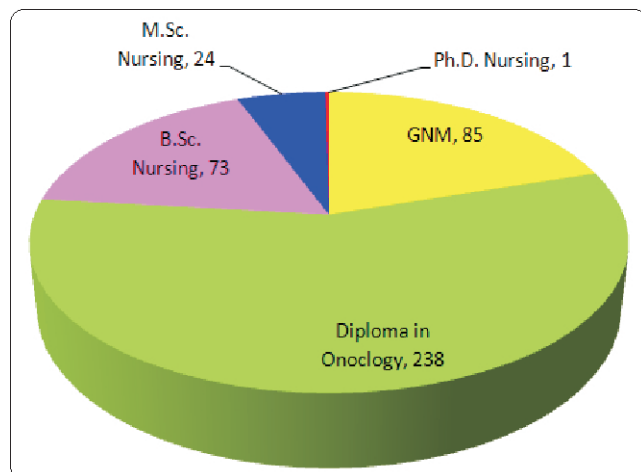
Various incidences leading to loss of skin integrity was reported which led the nursing staff to the use of skin barrier films in operation theatre by the Operation Theatre (OT) nurses on the pressure points. This initiative showed promising output by reduction in numbers of pressure ulcers. Successful transition of supply of packed sterilized trays from the central sterile supplies department had been started.





Eduation

Conferences and workshops on Communication, Stress management, Pediatric Oncology Nursing, airway



management, safe infusion practices and infection control practices were conducted in TMH for the nursing staff.

Vice Principal Ms. Manisha Pawar was awarded Phd from Maharashtra University of Human Sciences (**MUHS**). Under the student exchange programme funded by the National Cancer Grid (**NCG**) and TMH, Principal of College of Nursing, Ms. Anita D'Souza visited National Cancer Center in Singapore with 05 students. They also got an opportunity to attend the 4th Regional Oncology Nursing Conference on "Connecting the dots – Oncology Nursing across the Care Continuum".

Research

Audits on nursing quality indicators were conducted across the hospital which included pressure ulcer, medication safety and patient safety.

Occupational Therapy

Officer in Charge, **Dr. Manjusha Vagal**

Dr. Rebecca Marri
Dr. Shruti Velaskar
Dr. Jagmohan Lal Meena

The Occupational Therapy department enabled individuals to achieve personal productivity, wellbeing and quality of life through assessment, goal setting, interventions and participation in personally meaningful occupations while also addressing their physical, social, emotional and spiritual needs. Occupational Therapy services were provided to a wide range of age groups across a variety of care settings including hospital, home, inpatient palliative care units and community based rehab services.

Service

The Occupational therapy services were provided on Out- and In- Patient basis to the patients at TMH. In the year 2018, the department attended to **13748** patients (10174 Out- & 3244 In- Patients) with (**5346** new and **8402** follow up patients).

In addition to regular rehabilitation, the department fabricated 08 low temperature thermoplastic splints, provided 17 Orthosis (outsourced), 280 Taylors braces (outsourced) and 11 Temporary above knee & below knee prosthesis to TMH patient.

The extension of this department was the “Rehabilitation and Research Centre” (RRC) at Dr. Ernest Borges Memorial Home (EBMH), Bandra that manufactured and supplied 1520 Jaw stretcher keys, 159 Upper limb Lymphedema kits and 76 Lower limb lymphedema kits to TMH dispensary. Two hundred thirty three (233) Orthoses and 42 Prostheses were prepared. A total of 196 patients and 646 follow-up visits were recorded for Occupational Therapy services at RRC, EBMH, Bandra in the year 2018.

Education

Occupational Therapy Interns from Sion Hospital, Maharashtra University of Health Sciences were getting regularly trained in Oncological rehabilitation on their rotational posting at TMH. The students received education on principles of Oncology practice and rehabilitation through special lectures taken for them by various departments at TMH.

The department conducted, 6th Educational Program in honour of late Mrs. A. P. Tole on 14th and 15th December 2018. Total five scientific sessions were held, viz., inter institute case presentations, poster competition on Gynaecological Cancer and special lecture series, presentation of case series in Oncology and CME on Gynaecological Cancer. Five (05) prestigious institutions of Mumbai participated in the event.

Throughout the year the department was involved in education of observers from various faculties like Occupational Therapy, Palliative Medicine, Dental, Physiotherapy and Nursing.

Research

The department initiated a study, “A questionnaire based survey, to assess the awareness amongst health care professionals (Onco-surgeons, Medical Oncologists, Radiation Oncologists, Occupational Therapists and Physiotherapists) about breast cancer related lymphedema.

The department initiated an innovative project in collaboration with Indian Cancer Society, on the fabrication of vaginal dilators with measures for objective assessment of vaginal patency and visual feedback for patients for better compliance.

Palliative Medicine

Officer in Charge, **Dr. Jayita Deodhar**

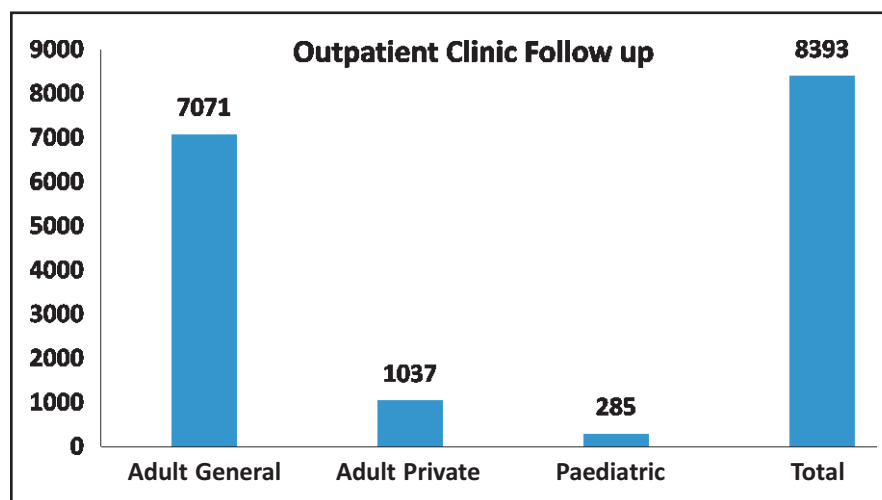
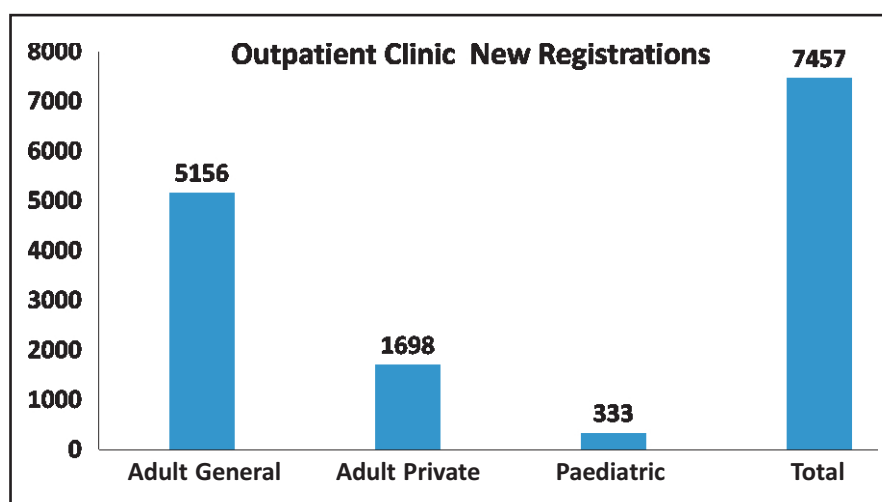
Dr. Mary Ann Muckaden
Dr. Anuja Damani
Dr. Arunanghsu Goshal

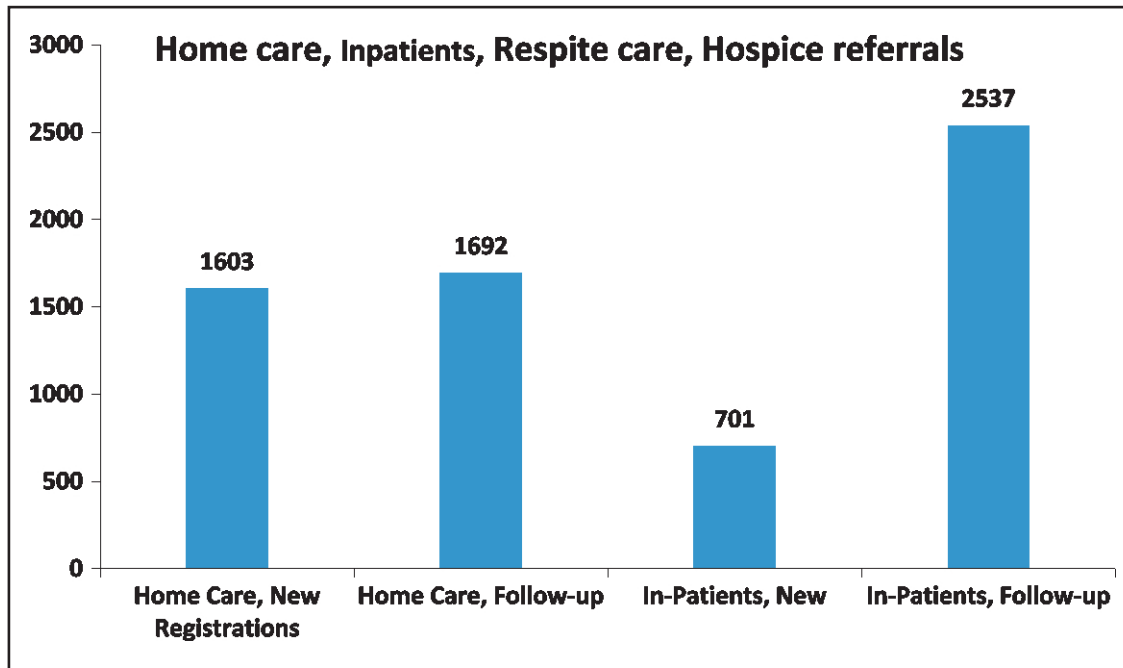
The department of Palliative Medicine broadened the scope of home based palliative care by the addition of home care team that operated from ACTREC campus. It catered to palliative care patients of Thane and Panvel area. There was augmentation of the home care model team to collaborate with local general practitioners in northern suburbs of Mumbai from Dahisar to Virar. An Innovative home care model was set in process that was Nurse coordinated and

facilitated by local general practitioners in routine / out of hours care that catered to 215 additional patient assessments.

Service

The department saw a total of **7457** new registrations, had **8393** follow-up patients and, home care was offered to **3295** patients.





There were a total of **3238** ward consultations and **573** respite palliative care admissions. The Hospice referrals numbered 193.

Education

Many educational programs were conducted for training in palliative care and special courses were organized, specific to palliative care in children. Training programs were organized for social workers and volunteers.

Research

There were 13 Investigator Initiated Trials, 03 Thesis studies, and 02 Audits.

There were 16 Peer reviewed national and international publications by the departmental medical staff.

The departmental staff contributed to three (03) book chapters.



Pathology

Head, **Dr. Sangeeta B. Desai**

Dr. Sumeet Gujral
Dr. Tanuja Shet
Dr. Mukta Ramadwar
Dr. Kedar Deodhar
Dr. Bharat Rekhi
Dr. Munita Bal
Dr. Santosh Menon
Dr. Rajiv Kumar
Dr. Neha Mittal
Dr. Ayushi Sahay
Dr. Poonam Panjwani
Dr. Uma Sakhadeo
Dr. Trupti Pai

Dr. Subhash Yadav
Dr. Katha Rabade
Dr. Aekta Shah
ACTREC Staff
Dr. Asawari Patil, Officer in Charge
Dr. E. Sridhar
Dr. Swapnil Rane
Dr. P.G. Subramanian, Officer in Charge, Hematology
Dr. Nitin Inamdar, Officer in Charge, Biochemistry,
Mrs. U.A. Joshi, Officer in Charge,
Anatomic Pathology Laboratory
Mrs. Manisha Kulkarni, Officer in Charge,
Pathology Academic Program

Service

The department of pathology provided wide range of diagnostic services viz. Surgical pathology, Fine needle aspiration cytology, Exfoliative cytology, Molecular testing, Biochemistry, and Hematopathology to all in-house patients and the expertise was extended to cancer patients throughout the Indian subcontinent. It maintained a National Tumor Tissue Repository to facilitate translational research.

The department offered diagnostic services to **64869** histopathology cases in the year 2018 that included small biopsies, big specimens and referral material. Overall there was a rise in total number of TMH cases approximately by 4.1%. The total number of frozen section cases reported was 5513 and frozen sections performed 9762. Total number of immunostained slides was **145737**; increase of 19.2% as compared to that in 2017.

Synoptic reporting formats were introduced in routine service since April 2018. The synoptic reporting system design, development and deployment of Phase I was completed and the deployment of Phase II was in advanced stage.

Quality initiatives:

- External Quality Assurance Services (EQAS) program in Histopathology was continued in the year 2018 with 97 participants across India
- The Immunohistochemistry section successfully participated in the proficiency testing program for Immunohistochemistry by the College of American Pathologists (CAP).

Education

For the first time in India, DM Oncopathology course in TMC under the Homi Bhabha National Institute was introduced by the department and three students enrolled for the same on August 1st 2018.

The department generated a system wise catalogued teaching sets as learning modules comprising of 9155 glass slides, 1425 gross specimens (Mounted and unmounted), Lectures in digital format and the 344 books in Departmental Library have facilitated students/trainee learning immensely. These were invaluable for students, trainees and observers from the Indian subcontinent.

Research

The department published and contributed a total of 51 original articles/case reports in the peer reviewed indexed medical journals during the year.

Several research projects related to Digital Pathology, Machine learning based image analysis and applications of artificial intelligence in oncopathology were initiated.

The newer projects included Deep learning based image analysis to predict molecular mutations and response to therapy in lung cancer; Revisiting grading of squamous cancer using computational methods; Bayesian methods of automated interpretation of immunohistochemistry results and, Deep learning based image analysis to predict mutations in thyroid carcinoma.

The total number of Observers / Trainees / Post Graduate students who visited the Department of Pathology in the year 2018:

TMC HBNI Path	Path PG students From other institutions	TMC HBNI-PG Non Path Students	Observers	Oncopathology Trainees	UICC* fellow	Trainee Technicians	Total
12	63	11	45	04	01	11	135

* UICC = Union for International Cancer Control

HBNI = Homi Bhabha National Institute; PG = Post Graduate; TMC = Tata Memorial Centre; Path = Pathology

Clinical Biochemistry

Head, Dr. Sangeeta Desai

Dr. Bharat Rekhi, Administrative Head

Dr. Nitin A Inamdar, Office in Charge

Dr. Kinjalka Ghosh, Academics in Charge

Dr. Geeta Rathnakumar, Laboratory Manager

Dr. Meera Ghadge

Dr. Pranab Sadhukahan

Mr. Tanaji Matle

Ms. Kavita Shinde

The department of Clinical Biochemistry provided routine analysis relying heavily on random access automated analyzers with multiple methodologies like, photometry, turbidimetry, Chemiluminescent Microparticle Immuno Assay (CMIA), Rate Nephelometry and gel electrophoresis. Along with a number of manual assays and urinalysis, certain Vitamin assays, selected enzyme activity assays, tumor markers, glycosylated haemoglobin, Immunoglobulins, serum protein electrophoresis, Immunofixation, Vanillyl Mandelic Acid (VMA) and 5- Hydroxyindole Acetic Acid (SHIAA) were also performed.

Service

The major core laboratory had an extensive chemistry test menu of approximately 135 different assays available on major sample types (serum/plasma, urine, Cerebrospinal Fluid (CSF) and body fluids).

The department was designed to perform the maximum number of tests with minimum specimen volume and, the chemistry analyzers could perform 52 chemistry assays on 1/3 ml of blood with the throughput of 2900 tests per hour.

The department offered **3529915** biochemical test service to 432933 patients and, **234087** Tumor marker tests and electrophoresis services to 102009 patients in 2018.

The samples reached the department through Pneumatic chute and were processed through Diagnostic Information System (DIS). All the equipments were interfaced bi-directionally, which facilitated report generation and reduced manual errors. The reports were directly transferred from instrument to the DIS and thus reduced the turnaround time.

The new tests introduced included: Testosterone, estradiol, FSH and Troponin I.

The key to successful processing for the large daily volume of samples was high throughput analyzers allowing uninterrupted delivery of vital patient services. To ensure the highest standard of work, the department participated in Internal Quality assurance and External Quality assurance schemes. The department continued to be accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL).

The laboratory had Beckman Coulter chemistry analyzers (AU 680, AU 5811: 2units), Beckman coulter Immage 800, Abbott Architect i2000 (2 units) Immunoassay analyzer, Osmometer, Minicap gel Electrophoresis analyzers and Hydrasys analyzer.

The department provided 24 x 7 operational support by offering comprehensive biochemical services and strived to maintain the highest standard of laboratory practices and provide timely and reliable reports.

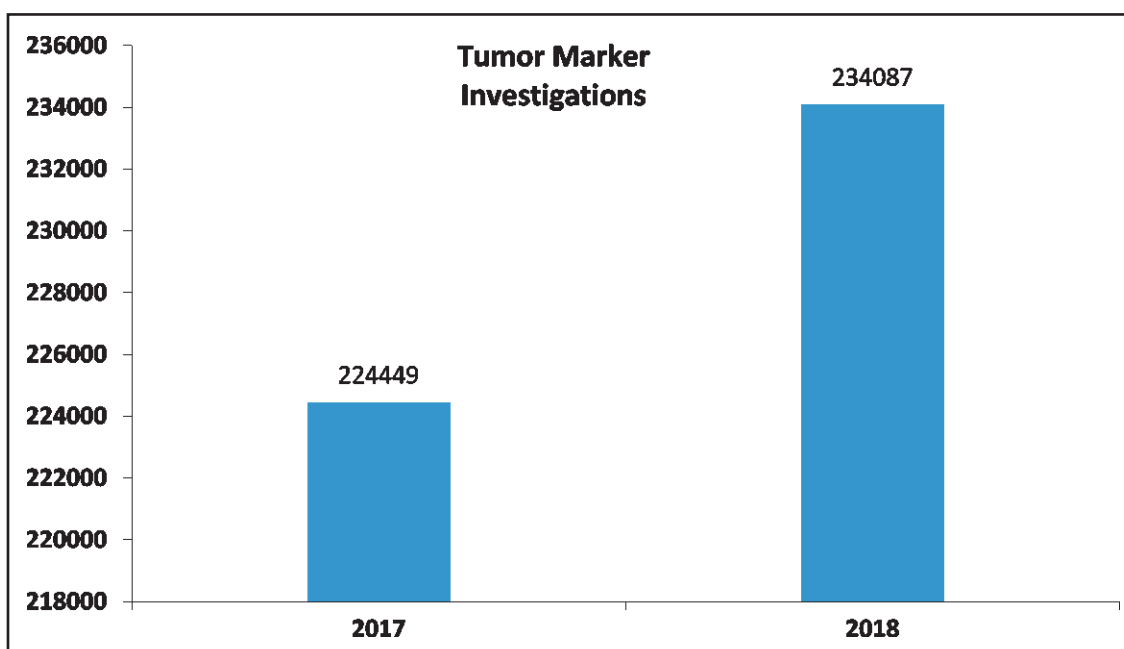
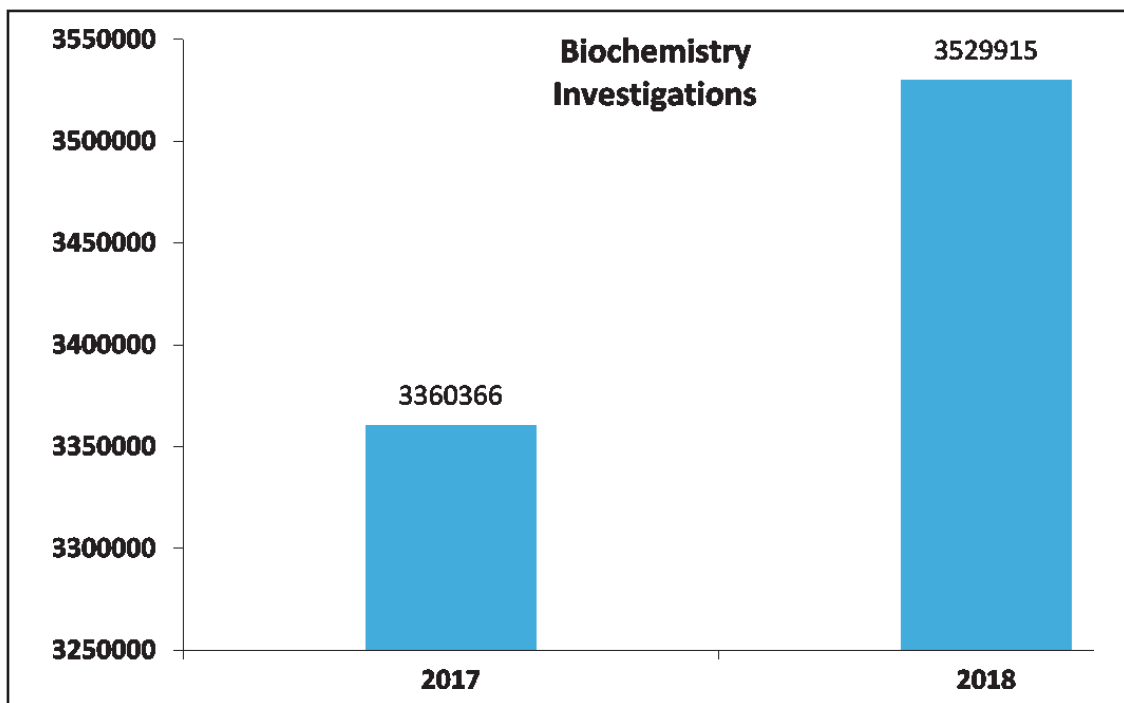
The optimization of specimen - handling protocols minimized the turnaround times for critical service areas of the hospital. The turnaround time for pediatric patients was less than 30 minutes.

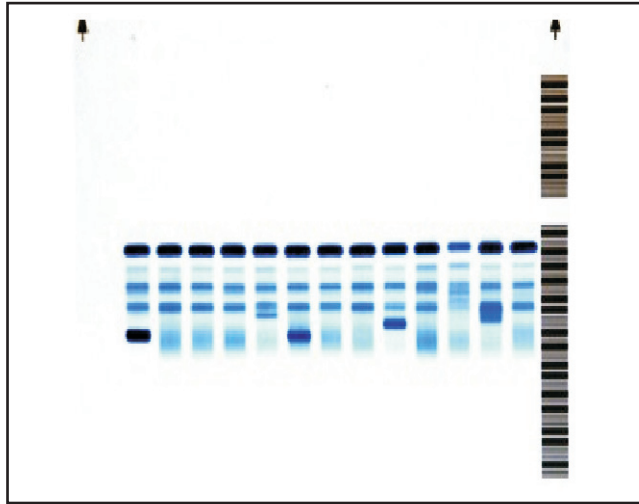
The integration of patient services with high quality analyzers permitted a full array of laboratory testing for both research and routine clinical chemistry.

The tumor marker assays and serum protein Electrophoresis formed an important part of the department and attained the status as national reference center for Tumor marker and

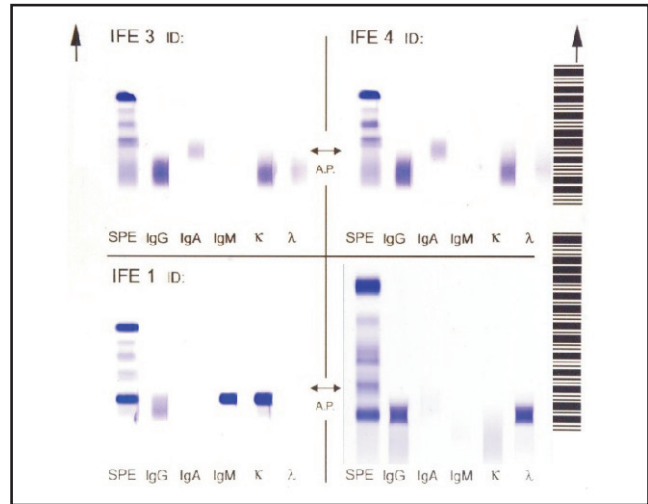
serum protein Electrophoresis and Immunofixation for Multiple Myeloma patients. The laboratory performed all tests required for Multiple Myeloma patients for diagnosis, monitoring and evaluation of Bone marrow Transplant patients according to International Myeloma Foundation like SPE, IFE, IgA, IgG, IgM quantitation, BJP, β 2microglobulin and free Kappa and free Lambda quantitation.

The Electrophoresis, Immunofixation, Immunoglobulin and free light chains Kappa and Lambda estimation were routinely performed for many institutions other than TMH.





Serum Protein Electrophoresis (SPE)



Immunofixation (IFE)

Education

The Advanced Clinical Biochemistry training course was conducted twice a year; a 06 months course with 6 months internship.

The post graduate (MD) pathology students were trained for Biochemistry and exams conducted by the department.

The staff members attended training courses, conferences and seminars on a regular basis. In-house proficiency test was taken for all the staff.

The department conducted two national levels Continuing Medical Education (**CMEs**) courses and one hands-on workshop in Clinical Biochemistry in 2018.

Research

The department focused on diagnosis and the prognostic factors in patients of Multiple Myeloma. There was also an ongoing study on the biochemical parameters in Neuroblastoma.

The department participated in external quality control program conducted by Bi-Rad for Clinical Biochemistry, urine chemistry, glycosylated haemoglobin, therapeutic drug monitoring and immunoassay with a very good accuracy score.



Cytopathology

Head, **Dr. Sangeeta B. Desai**
Pathologist - In - Charge, **Dr. Kedar Deodhar**

Mr. Saleem Pathuthara,
Laboratory Manager

The department of Cytopathology offered (3-tier) cancer screening and diagnostic services with minimal turnaround time (TAT) of 24-72 hour for cytology samples as routine services. It also offered special services, such as Endobronchial Ultrasound guided Fine Needle Aspiration Cytology (EBUS-FNAC), Endo Ultrasonography guided Fine Needle Aspiration Cytology (EUS-FNAC), On-site adequacy testing of Fine Needle Aspiration Cytology (FNAC) samples, and to improve sample adequacy and Immunocytochemistry (ICC) to enhance diagnostic accuracy and offer rapid diagnosis.

Liquid Based Cytology (LBC) service was launched in the year 2017 as an additional test modality to conventional cytology to improve the diagnostic yield. Intensive Care Units (ICUs) and other critical samples were reported within 4 hours.

Synoptic formats were implemented that ensured uniform and unambiguous reporting. The department was accredited for diagnostic services by the International Academy of Cytology (IAC) and National Accreditation Board for Testing & Calibration Laboratories (NABL) and also for training and examination by IAC. The department was the National level External Quality Assurance Scheme (EQAS) cytopathology service provider for various laboratories in India.

Service

The workload of the Department comprised **23078** samples (**92312** smears) as compared to **22207** samples (100828 smears) in the year 2017. The samples consisted of **4110** exfoliative gynaecological, **11623** exfoliative non-

gynecological and **7345** fine needle aspiration cytology samples, with **8.5 %** decrease in the overall workload. Immunocytochemistry service (with **20** validated immunomarkers) was provided to challenging cases. EQAS Diagnostic Cytopathology service with two cycles of the Proficiency Test series showed **11.5 %** increase of participants (from 260 - 290) compared to that in the previous year.

Education

Staff members attended various training courses, conferences and underwent regular technical and diagnostic proficiency tests in-house and run by Indian Academy of Cytologists (IAC).

The department imparted training in cytopathology for MD Pathology Postgraduates and for Post MD Pathology and Cytotechnician observers. Four students underwent the Advanced Cytopathology Technicians Training Course conducted by the Department. An interesting cytology case was uploaded on the TMC website in a quiz format every month. Staff regularly participated in departmental academic & DMG meetings, CMEs, Conferences and Workshops held in and outside TMH.

Research

Regular follow-up and clinical audit of all reported cytology samples was carried out to evaluate the performance characteristics. The reasons for diagnostic pitfalls, inadequacy rate, etc. were monitored and appropriate corrective and preventive measures taken.



Molecular Pathology

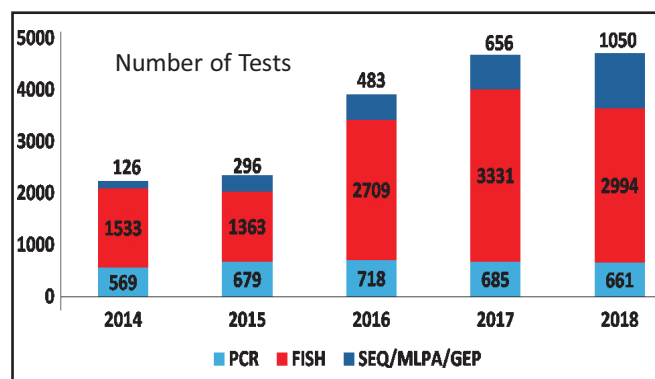
Head, **Dr. Sangeeta Desai**
Officer in Charge, **Dr. Sridhar Epari**

Dr. Omshree Shetty
Dr. Mandar Ankolkar

At the Molecular Pathology facility, various molecular techniques were being used for the diagnosis, prognostication and prediction of solid tumors. Keeping in tune with current trends in the field of molecular diagnostics, the laboratory continued to strive towards its goals to introduce newer assays for routine patient care. Clinically relevant 2 new molecular diagnostic assays were introduced in the year 2018 using diverse testing platforms. The Next Generation Sequencing (NGS) Platform was acquired and solid tumor panel comprising of 52 genes {Somatic mutations Single-Nucleotide Variant (SNVs) and Fusions} and Thyroid panel (BRAF, RAS, TERT) were introduced.

Service

The Molecular Pathology Laboratory offered clinically relevant, targeted therapy based molecular diagnostic assays as per the National and International Guidelines using Polymerase Chain Reaction (PCR), Fluorescence in situ Hybridization (FISH), Sanger sequencing, Multiplex Ligation-dependent Probe Amplification (MLPA), Gene expression analysis and Next Generation Sequencing based tests. A total of **4705 requisitions** were received in the year 2018. There was a 10-fold increase in requisitions for Sequencing, MLPA and Gene Expression Profiling (GEP) over the last five years and 60% increase compared to that in the year 2017; whereas marginal decrease in FISH requisition was noted from 3331 last years to 2994 (~10% reduction) essentially for ALK FISH due to introduction of Immunohistochemistry (IHC) for the same.



SEQ = Sequencing.

All the molecular diagnostic tests were performed as per the National Accreditation Board for Testing and Calibration Laboratories (NABL) norms. The laboratory also participates in the College of American Pathologists (CAP) Proficiency Testing program. Trend analysis for the routine diagnostic tests was performed on monthly basis.

Education

Molecular Pathology Laboratory conducted a week long "Hands on training course" in Molecular Diagnostics in September 2018.

Under the Molecular Pathology Academic program, one-year fellowship was offered to postdoctoral candidates. Intense training was provided in various techniques viz. PCR, FISH, Primer designing, Gene sequencing, Data Analysis, and interpretation. Pathology residents were posted every month on rotation basis for training in routine molecular pathology. Weekly Continuing Medical Education (CMEs) programs were conducted.

Research

Nine (09) Principal Investigator initiated projects were ongoing in the laboratory with the dedicated project staff working on them.

Gene expression profiling and Taqman Low Density Arrays (TLDA) were performed to explore the Nuclear Factor Kappa-light-chain-enhancer of activated B cells (NFkB), phosphoinositide 3-kinases (PI3K) pathways in Lymphoma. The laboratory developed a buffer for extraction of DeoxyriboNucleic Acid (DNA) from Formalin-Fixed Paraffin-embedded (FFPE) tissue thus helping in extraction DNA from old blocks for tests like MLPA and sequencing and thereby reducing the number of uninterpretable cases due to suboptimal quality of amplifiable DNA.

The medical and scientific staff of Molecular Pathology published 12 articles in peer reviewed journals and participated in six (06) international conferences during the year.

Physiotherapy

Officer in charge, **Dr. Anuradha Abhijeet Daptardar**

Dr. Vincent Singh Paramanandam
Dr. Ajeeta Mohan Kulkarni
Dr. Manali Viraj Kamat
Dr. Sarika Gautam Mahajan

Physiotherapy Department interacted with various DMGs and ensured optimum rehabilitation for better outcomes and increased patient satisfaction, through individualized therapeutic exercise program. This included in patients care and out patients services.

Service

Since March 2018, the Physiotherapy Department extended its OPD timings from 8.00 am to 7.00 pm in order to benefit larger volumes of patients. As a result, **21898** patients were offered Physiotherapy services in the year 2018. The Physiotherapy services included Pulmonary Rehabilitation, Post-operative group therapy program for breast cancer patients, Lymphedema management, Rehabilitation of Shoulder and Neck Dysfunction, Management of Trismus, Respiratory care, Mobilization, Ambulation, Pain relief and Management of Cancer Related Fatigue.

Education

Orientation program and training was imparted round the year to the students from various Physiotherapy colleges and observers from other institutions.

Training was also provided to the Kevat students.

Research

The ongoing research projects were in evaluating the effect of physiotherapy group therapy in pulmonary rehabilitation and the role of acupuncture as a modality for treating chemotherapy-induced neuropathy in breast cancer patients. A randomized controlled trial evaluating the role of exercise in women undergoing treatment for breast cancer was ongoing.



Psychiatry

Officer in Charge, **Dr. Jayita Deodhar**

Clinical Psychologists

Mrs. Savita S. Goswami
Ms. Lekhika N. Sonkusare

The multidisciplinary mental health professional Psychiatric Unit provided a specialized psycho-oncology service by conducting psychological assessment of cancer patients of all age groups, in ward and outpatient settings. The service also conducted neurocognitive testing, both for clinical

purposes and as part of research projects. Psychological support was provided to staffs who accessed the departmental services or were referred by the hospital Staff Clinic. A liaison input was provided in specialized clinics like Survivors Clinic (**After Completion of Therapy**) and Palliative

Care. Individual and group psychotherapeutic sessions were also conducted. The Psychiatric Unit involved the patient and their caregivers by arranging psychoeducational and support activities for them and their survivors.

Service

A total number of **3722** patients were seen in 2018, including **2182** new referrals and **1540** reviews.

Analysis of departmental records revealed that most common psychosocial interventions used were stress reduction exercise (in 79 % patients), as single or in combination with cognitive-behavioral (71 %) and problem solving approaches (38 %).

As per a continuing audit, improvement was seen on review in all patients with psycho-oncological interventions, as assessed by Clinical Global Impression-Improvement scale.

Education

On the occasion of World mental Day on 10th October 2018, well known theatre artist Ms. Renuka Shahane was invited as guest of honor for a panel discussion on Parenting. The departmental staffs were invited as experts on an All India Radio program on psycho-oncology and palliative care awareness.

The department conducted 09 training programs and had 07 observers.

Research

There were 05 Principal Investigator (PI) initiated clinical trials and 08 as Co PI and one (01) Audit.

The departmental staff published 06 articles in national and international; journals along with oral presentations in National (05) and International conferences (03).



Pulmonary Medicine

Head, **Dr. Sandeep Tandon**

Dr. Maheema Bhaskar
Dr. Pavankumar Biraris

The Pulmonary Medical Unit assessed patients referred for respiratory evaluation and saw a progressively rising trend of consultations over the past decade since its inception.

The addition of two part time Chest Physicians and two Senior Registrars were instrumental in augmenting service delivery as well as introduction of newer services and academics.

Service

The number of patient consultations jumped from 6600 in 2017 to **8300** in 2018. The team members formed an integral part of the newly introduced service i.e. the Endobronchial Ultrasonography (EBUS) guided Fine Needle Aspiration Cytology (FNAC) for mediastinal staging of lung cancer as well as diagnostic mediastinal nodal sampling in conjunction with Thoracic Surgery, Interventional Radiology, Thoracic Anaesthesia and Cytopathology Services since April 2017; and, more than 150 procedures were successfully performed since then with excellent results. The team members also

started doing adult and paediatric diagnostic bronchoscopies and diagnostic Bronchoalveolar lavages, in immune-suppressed lung infections and Transbronchial Lung Biopsies to complement the Thoracic Surgery services. The department planned to introduce newer services like Diagnostic Medical Thoracoscopy for undiagnosed pleural effusions and talc pleurodesis, as short procedures under sedation in Minor operating theatres, as well as bronchoscopic cryo-lung biopsies for diffuse lung diseases under general anesthesia.

Education

After the extensive groundwork in 2017 and 2018, the two year HBNI Fellowship in Pulmonary Oncology would be initiated from 2019, the aims of which were to generate and fulfill the growing unmet need and demand across the country for Chest Physicians well trained in Pulmonary Oncology, to work as a part of a Multi-Disciplinary Lung

Cancer Team, as well as towards diagnosis and management of pulmonary complications arising as a result of all cancers and cancer therapy. To further intra and inter Institutional academic exchange, the Pulmonary Medical Unit initiated the weekly teaching Chest Radiology Meetings with Radiology and Thoracic Surgery with external invited experts as well as the monthly teaching Chest-Pathology-Radiology Meetings with the Thoracic DMG Pathologists and invited Respiratory Pathology experts from Cardiovascular & Thoracic Centre of KEM Hospital, Mumbai. These meetings would go a long way in furthering academic exchanges and

knowledge especially between Oncology and Non Oncology setups and patient subtypes.

Research

The team collaborated with intra DMG and across DMGs towards various collaborative projects and publications as well as initiated collaboration with the Clinical Pharmacology team of Tata Memorial Centre and Bhabha Atomic Research Centre towards low cost high impact product developmental initiatives.

Radiation Oncology

Head, **Dr. Jai Prakash Agarwal**

Dr. Rajiv Sarin
Dr. Siddhartha Laskar
Dr. Sarbani Ghosh Laskar
Dr. Tejpal Gupta
Dr. Umesh Mahantshetty
Dr. Ashwini Budrukkar

Dr. Reena Engineer
Dr. Vedang Murthy
Dr. Supriya Jayant Sastri
Dr. Jayant Goda Sastri
Dr. Tabassum Wadasadawala
Dr. Nehal Khanna

Dr. Rahul Krishnatry
Dr. Shirley Lewis
Dr. Naveen Mummudi
Dr. Lavanya Naidu
Dr. Rima Pathak
Dr. Monali Swain
Dr. Anil Tibdewal

Department of Radiation oncology strived to offer optimised and efficient treatment through well trained and motivated personnel. The Tata Memorial Hospital and the Advanced Centre for Treatment, Research and Education in Cancer (ACTREC) had a total of 19 Radiation Oncologists, 24 Senior Registrars, 08 research fellows, 48 Post-graduate students (Junior Registrars), 13 Medical Physicists, 39 Technologists, a Medical Social Worker, 04 Trained Nurses, 02 Secretaries and other staff supporting the departments of Radiation Oncology and Medical Physics. The department had a 30 bedded inpatient ward in Parel and 5 beds in ACTREC facility.

Service

In the year 2018, **8154** patients underwent radiation treatment at the Tata Memorial Centre. Dedicated measures were being taken to improve patient throughput by extending the departmental working hours. In 2018, there was an increase in number of patients offered specialised treatments and 40 % of patients were treated using advanced technologies.

1. EXTERNAL BEAM THERAPY		Total No. external radiotherapy	
Total new patients treated	8154	Private patients	2223
Total No. of patients treated	7839	General patients	5616
Total No. referred outside	6742	Private : General ratio	1:2.5

Machines			
Telecobalt		Linear Accelerator (LA)	
Theratron 780	553	Tomotherapy (TMH)	229
Theratron 780C	385	True Beam (TMH)	790
Elite - 80	694	LA - Clinac 6EX	927
Equinox - 80	789	LA - Clinac Trilogy	765
Bhabhatron - II	305	LA - NovalisTx	799
		LA - Unique	872
		Tomotherapy (ACTREC)	279
		True Beam (ACTREC)	484
2. BRACHYTHERAPY			
Brachytherapy (No. of Patients) TMH + ACTREC	(715 + 196)	No. of Brachytherapy fractions	4009 (3110+699)
I. HDR-Intracavitary Applications		II. HDR-Interstitial	
ICA Selectron	959	Iridium Implants (Nylon tube)	914
ICA Vienna / Veneziaapplicators	176	Template MUPIT	222
CVS Selectron	61	TemplateSyed-Neblett Prostate	75
Houdek	09	Template TMH	0
CVS / SIVA	299	Gynec (IC+IS)	328
ACTREC (ICA+CVS+Vienna+Selectron)	527	Template Anal Canal	0
Endobiliary	0	ACTREC (Interstitial)	170
Intraluminal (ILRT)	45	III. HDR Surface Applicator	
		Surface Moulds	112
3. Treatment Planning Computers			
Simulator & Mould Room			
CT-Simulator 4D (Lightspeed) CT Simulator (ACTREC)	5839 1118	Oncentra / Plato (Nucleotron)	2588
CT-Simulator without V Sim	0	Eclipse (Varian)	4637
Conventional Simulator Imagin	659	I Brain Lab	13
Tissue Compensators	461	Tomoplan	508
Surface Mould	0	C – Arm	372
Wax Bolus	343		
Conformal Block	0		
Electron	0		

The infrastructure available at Tata Memorial Hospital for external beam therapy included six Linear Accelerators (LA) with multiple photon electron energies and four **Telecobalt Units** along with **2 High Dose Rate Brachytherapy units**. In addition there was one indigenous **Conventional Simulator** (Imagin), and a **Mould Room**. The state-of-the-art radiation therapy **CT - Simulator (Light Speed)** was capable of image

acquisition for **4D treatment planning & Gated Radiotherapy** along with advanced linear accelerators with facilities for Image Guided Radiation Therapy (IGRT). The **CT Simulator** (Somatom-Emotion) was decommissioned in 2018 and a new CT simulator will be installed in near future. Also, **PET-CT** (Advantage-Sim) and **MRI Based Treatment Planning** for newer radiation techniques were networked to the

Radiodiagnosis and Bio-Imaging departments. At ACTREC, there was one linear accelerator (**Truebeam**), Tomotherapy HiArt IGRT Linear Accelerator, the indigenous **Bhabhatron II Cobalt Unit**, and an **Brachytherapy Unit** with HDR Brachytherapy facilities.

The current facilities offered modern state-of-the-art treatments like 3-D Conformal Radiotherapy (**3-D CRT**), Intensity Modulated Radiotherapy & RadioSurgery (**IMRT & IMRS**), Stereotactic Body Radiotherapy / Radiosurgery (**SBRT/SRS**) and IGRT and Volumetric Arc Therapy (**VMAT**) apart from conventional radiotherapy. The SBRT facilities were expanded for virtual visual biofeedback to execute extracranial stereotaxy with higher level of precision. Also Tata Memorial Centre was chosen as an international site for showcasing high precision Liver Stereotaxy by International Atomic Energy Agency. The facilities were accredited for participation in multi-institutional international trials. The external radiation facilities were accredited by National Research Group / Radiotherapy Oncology Group (**NRG/RTOG**), National Cancer Institute, International Atomic Energy Agency and Image guided Intensity Modulated External beam radiochemotherapy and MRI based adaptive Brachytherapy in locally advanced Cervical cancer (**EMBRACE**) study group for Advanced Technologies. The radiotherapy facilities at ACTREC were also used for treatments like Total Body Irradiation (**TBI**), for Bone Marrow Transplant (**BMT**) and Total Lymphoid Irradiation (**TLI**).

Brachytherapy formed an integral part of many treatment protocols in the department. Annually, patients have been offered brachytherapy. New Brachytherapy applicators were added in TMH and ACTREC (Venezia and Vienna Applicator) which facilitated image based brachytherapy in patients with more advanced gynecological tumours. With increasing institutional and international data on safety of single application and 2 fractions treatment, the throughput of the department increased wherein more treatment deliveries could be done with lesser number of gynecological implant procedures (a technique well established for other tumour sites).

In-patient care of patients on Radiation Therapy was facilitated in the special Radiation Oncology ward. There were 30 dedicated beds for radiotherapy (including 9 beds for patients undergoing brachytherapy). One senior resident & 3-4 junior residents were posted full time for manage in-patients and medical emergencies. These residents also oversaw patient treatment delivery in the radiotherapy treatment areas.

With the Aria Networking System it was possible to transfer data digitally from CT Scan / MRI / PET scan and Treatment Planning System to the Linear Accelerators. This ensured accurate and quick data transfer for conformal radiotherapy, SRT/SRS and IMRT/IMRS with complete verification and accuracy. The Radiation Oncology Information System (**ROIS**)

was a web based application and was seamlessly integrated at TMH and ACTREC in 2018.

The TMC Radiation Oncology Incident Program (**TRIP**), a voluntary online error reporting system initiated in late 2017 with the vision for improvement in the workflow and patient safety was further strengthened last year. Detailed workflow SOPs prepared for all sites in 2017 were revised as per changing needs, workflows and errors reported in the department. Special initiatives were taken to improve the education and implementation of SOPs and safe practices. Synchronization of machine parameters of telcobalt with conventional simulators and modern treatment planning system were carried out, which decreased the transcriptional errors by > 97 %. Most of the recorded errors were near misses, where incidents reported were of low severity (grade 1 - 2).

Education

The department had a structured comprehensive training program for students pursuing MD in Radiation Oncology under the Homi Bhabha National Institute. The 2 year "Fellowship in Image Guided Radiation Therapy" continued as was the formal "Training Course for Radiation Therapy Technologists" recognized by the Maharashtra State Board for Technical Education (**MSBTE**). As an initiative towards dissemination of knowledge & hands-on training on various aspects of radiation therapy (advanced techniques like IMRT/IGRT, Brachytherapy, Quality assurance etc), the department organized a "Radiation Oncology Practicum" once yearly. The theme in 2018 was "Implementation of Image Guided Radiotherapy". The department had 34 national, 17 international observers and 04 visitors.

Research

The faculty in the department was actively involved in institutional / multi-institutional national & international research protocols. As part of the research initiatives, faculty members had initiated a number of research projects as principal / co-investigators that were approved by the Institutional Review Board (**IRB**). The faculty members from the department have been involved as Principal Investigators in 168 and 29 (Industry & Sponsored) projects approved by the IRB. Majority of the projects have been investigator initiated projects and have intramural or extramural funding. The Clinical Biology Laboratory aimed to develop newer formulations of radiation modifiers - both radiation sensitizers and radiation protectors, besides repositioning of existing drugs as radiation sensitizers. The laboratory was also involved in testing nanoformulation and was part of a US-India consortium on repositioning of drugs for radiation modification. The laboratory was also involved in the translational aspects of clinical trials.

There were 105 publications in 2018 of which 82 were original research articles in international peer reviewed journals. There were 02 publications in JAMA Oncology and Journal of Clinical Oncology. The department and institution also received approval as an international site for NRG / RTOG

multicentric international trials. In addition to investigator initiated trials, the department was accredited as an international site for International Atomic Energy Association (IAEA), Cervix Cancer Research Network (CCRN), EMBRACE, European Society for Radiotherapy & Oncology (ESTRO) research studies.

Radiodiagnosis

Head, **Dr. MH Thakur** (till May 2018)
Dr. Suyash S. Kulkarni (from June 2018)

Dr. NS Shetty
 Dr. Abhishek Mahajan
 Dr. Nilesh P. Sable
 Dr. Palak Popat
 Dr. Ashita Rastogi (till June 2018)
 Dr. Kunal B. Gala
 Dr. Akshay Baheti

Dr. Amrita Guha
 Dr. Suman Kumar Ankathi
 Dr. Arpita Sahu
 Dr. Amitkumar Choudhari
 Dr. Aparna Katdare
 Dr. Vasudhara Smriti
 Dr. Sweta Wadhwa

Dr. Ankita Ahuja
 Dr. Kunal Mistry
ACTREC
 Dr. SA Kembhavi, Officer in Charge
 Dr. Amit Janu
 Dr. Raghunath Nagvekar
Honorary Consultant
 Dr. S M Desai

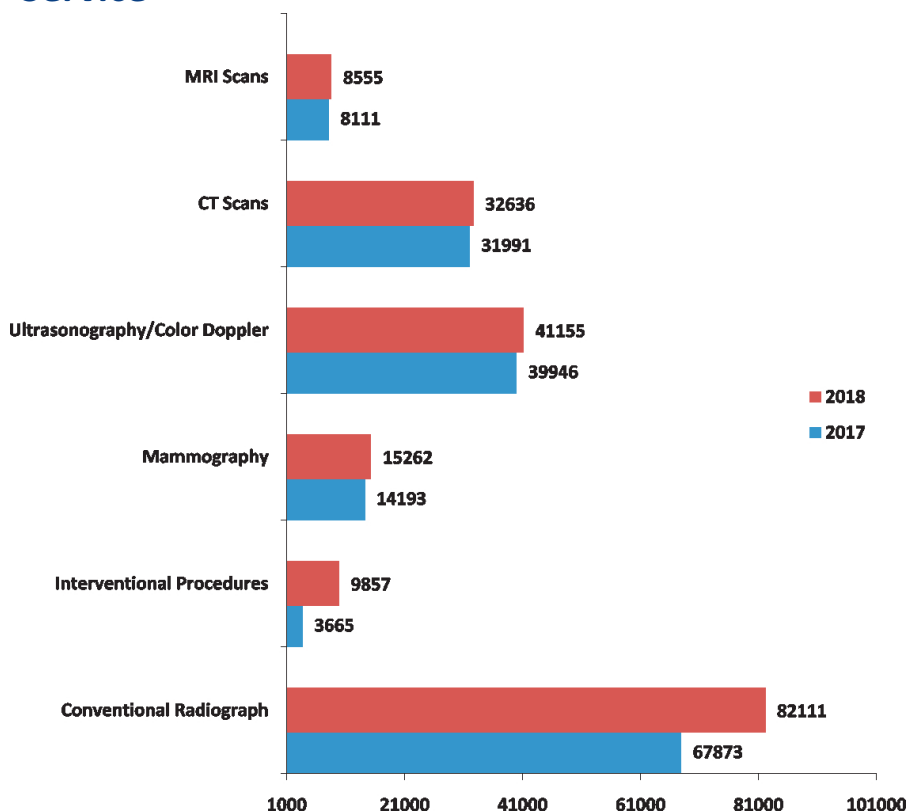
The departmental workflow was based on Disease Management Groups (DMGs), with each radiologist assigned to a few DMGs. The department transitioned into DMG-wise reporting in 2018, with each faculty reporting scans pertaining only to their DMG. Cancer-specific templates and synoptic reporting were introduced as well for each DMG. This led to improved quality of reports that were tailored to address specific DMG queries.

Dedicated emergency radiology services and facilities were initiated to streamline emergency scans and improve turnaround times.

Radiation safety initiatives were started along the Atomic Energy Regulatory Board (AERB) and International Atomic Energy Agency (IAEA) guidelines to improve the radiation safety culture of the department.

The interventional radiology services were expanded to include micro-wave ablation and Irreversible Electroporation (IRE), second in the country that offered these services.

Service



Education

The department was one of India's largest academic radiology department with 17 MD Radiology residents and 2 DM Interventional Radiology residents who joined annually. The department also had one Fellow each in Oncoimaging and Breast Imaging annually. Besides clinical and academic excellence, the residents also received mentoring and support to submit abstracts and attend major national and international conferences. Over 15 abstracts were accepted at the European Congress of Radiology (ECR) and five at the Radiology Society of North America (RSNA) annual meeting.

Research

All faculties actively engaged in over 50 Institutional Review Board approved research projects as principal or co-investigators, including multiple projects on Artificial Intelligence (AI) and with many publications in indexed medical journals.

The faculty collaborated with both National (Indian Institute of Technology (IIT), Mumbai; Shri Guru Gobind Singhji Institute of Engineering & Technology, Nanded; Institute for Plasma Research, Gandhinagar) and International (National Cancer Institute, US; Martino Centre for Biomedical Imaging at Massachusetts General Hospital, Boston, USA) partners for AI start-ups, radiation dose reduction, radiomics etc.



Speech & Swallowing Therapy

Officer in Charge, Arun Balaji KD

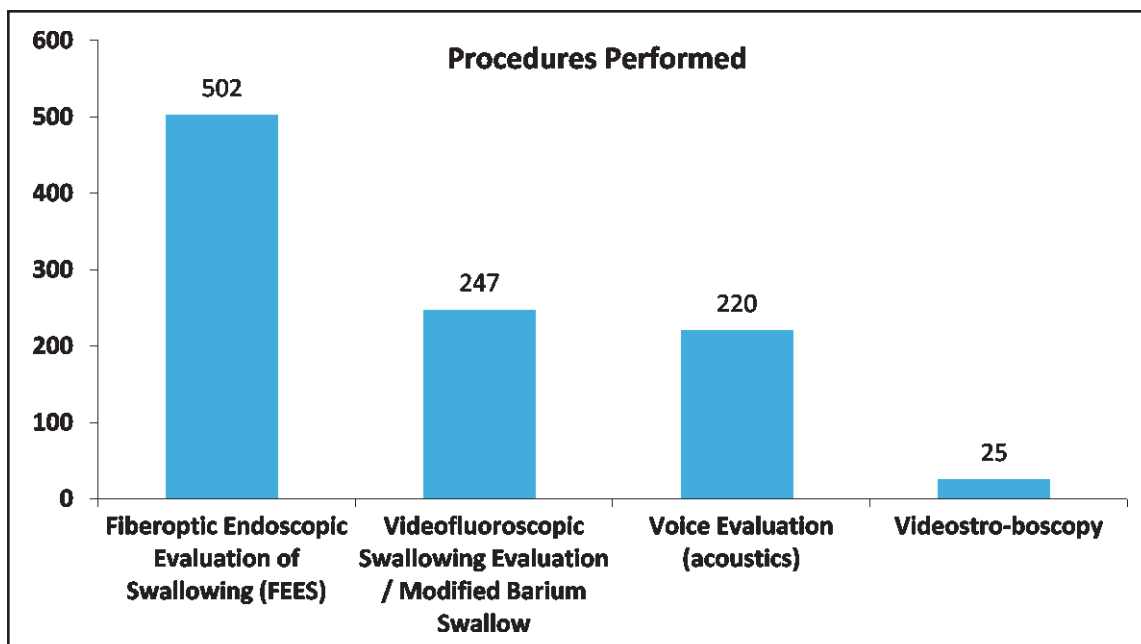
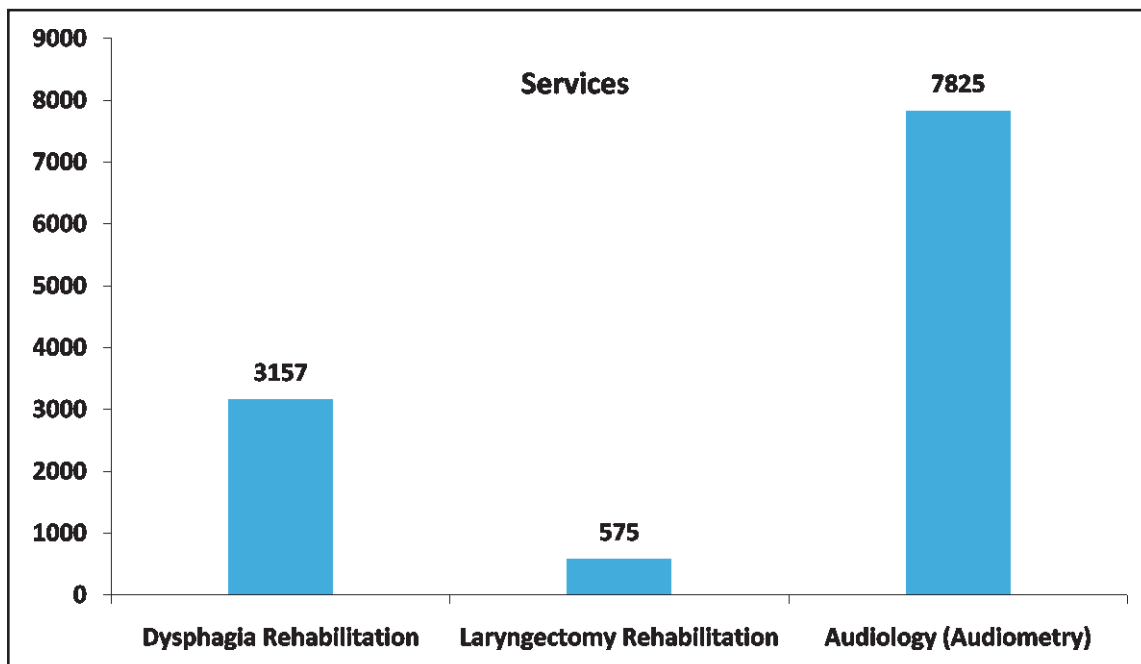
Mr. Rukmangathan TM,
(from December 2018)

The Speech and Swallowing Therapy services offered comprehensive / advanced speech, voice, swallowing and basic audiology rehabilitation for patients with Head and Neck Cancer (HNC) and as well other cancer sites too. The initiation of advanced services from 2017 led to the strength and expansion of speech and swallowing therapy services cater to the needs of patients.

Clinical swallow evaluation, Instrumental swallow evaluation such as Fiberoptic Endoscopic Evaluation of Swallowing (FEES) and Videofluoroscopic Swallowing Evaluation / Modified Barium Swallow (MBS) procedures were streamlined by appointment systems. Videofluoroscopic Swallowing Evaluation / MBS procedures were jointly performed with interventional radiology on Saturdays regularly. The (Chemo) Radiotherapy swallowing clinic was successfully executed weekly four days a week and regular functional follow ups were being carried out regularly. The Inpatient services were also performed regularly.

Service

The department catered to a total **10892** patients in the year 2018 with 5293 new cases. Total Laryngectomy rehabilitation was provided very effectively for patients with Tracheoesophageal Voice (TEP) and with Electrolarynx. The department provided 23 electrolarynx in 2018 and patients benefitted very well. Clinician reported speech and swallowing outcome measurement ratings were effectively used and documented in the Electronic Medical Record (EMR). Weekly laryngectomy clinic initiated in 2018 and joint clinic were carried out along with Head & Neck Surgeon in challenging patients to improve voice and swallowing outcomes in Total Laryngectomy. Laryngectomee Volunteer Support Services was initiated in December 2018 with a focus of training esophageal speech.



Education

In 2018, along with the patient services, the department also focused on development of human resources. The department successfully initiated the “TMC Fellowship in Speech and Swallowing Therapy in Dept. of Head Neck Oncology” – first of its kind in India.

Nine (09) National Speech Therapists and two (02) International Speech Therapists visited the department in 2018 for observership training. Internship students from Nair Hospital, Mumbai visited for learning speech and swallowing rehabilitation.



Surgical Oncology

Head, Dr. Ajay Puri

Dr. Indraneel Mittra,
Professor Emeritus
Dr. RA Badwe,
Director TMC
Dr. AK Dcruz (till Nov. 2018),
Dr. C S Pramesh (from Dec. 2018);
Director TMH
Dr. RA Kerkar
Dr. Prabha Yadav
Dr. Amita Maheshwari
Dr. Devendra Chaukar
Dr. Pankaj Chaturvedi
Dr. Prathamesh Pai
Dr. Vani Parmar

Dr. SV Shrikhande
Dr. Sajid Qureshi
Dr. Aliasgar Moiyadi
Dr. Vinay Kant Shankhdhar
Dr. Gouri Pantvaitya
Dr. Ganesh Bakshi
Dr. George Karimundackal
Dr. Anuja Deshmukh
Dr. Deepa Nair
Dr. Sudhir Nair
Dr. Nita Nair
Dr. Ashish Gulia
Dr. Mahesh Goel
Dr. Prakash Shetty

Dr. Dushyant Jaiswal
Dr. Shylasree TS
Dr. Sabita Jiwnani
Dr. Avanish Saklani
Dr. Gagan Prakash
Dr. Ashwin L. deSouza
Dr. Shalaka Joshi
Dr. Shivakumar Thiagarajan
Dr. Prakash Nayak
Dr. Vikram Chaudhari
Dr. Manish Bhandare
Dr. Shraddha Patkar
Dr. Mahendra Pal
Dr. Purvi Thakkar
Dr. Garvit Chitkara

The department offered state of the art surgical care that included complex and challenging vascular reconstructions and multiple organ resections, skull base procedures, limb salvage surgeries, minimal access and robotic surgeries. A large volume of micro vascular reconstructions was regularly done. The department recently completed 1000 robotic surgeries. The department acquired the **Brainlab** navigation system with intraoperative navigable ultrasound and Intra-operative Examination Monitor for Awake Surgery (**IEMAS**). This enabled the neurosurgical unit to offer more optimal resections. The navigation unit was also utilized by the orthopedic services to undertake complex and precise pelvic bone resections. The department continued to actively support the units based at Sangrur, Visakhapatnam and Varanasi that are expanding their scope of activity.

Number of Surgery			
	Major	Minor	Total
TMH	8519	17552	26071
ACTREC			1528

Education

The department had 69 M.Ch students, 23 Post M.Ch. candidates, 15 HBNI fellows besides training multiple national and international visitors. Besides the annual "Oncosurg" conference that offered delegates the opportunity to view live surgeries and interact with renowned faculty, the department members conducted and participated in many specialty meetings within TMH, nationally and on international platforms.

Research

The department had to its credit many investigator-initiated and sponsored research studies as well as research collaborations with reputed Indian institutes like Indian Institute of Technology (IIT), Bhabha Atomic Research Centre (BARC), Dept of Remote Sensing & Robotics and multiple international institutes. Staff members continued to contribute chapters to various oncology books and had numerous publications in national and international peer reviewed journals.

Tissue Bank

Consultant, **Dr. Astrid Lobo Gajiwala**

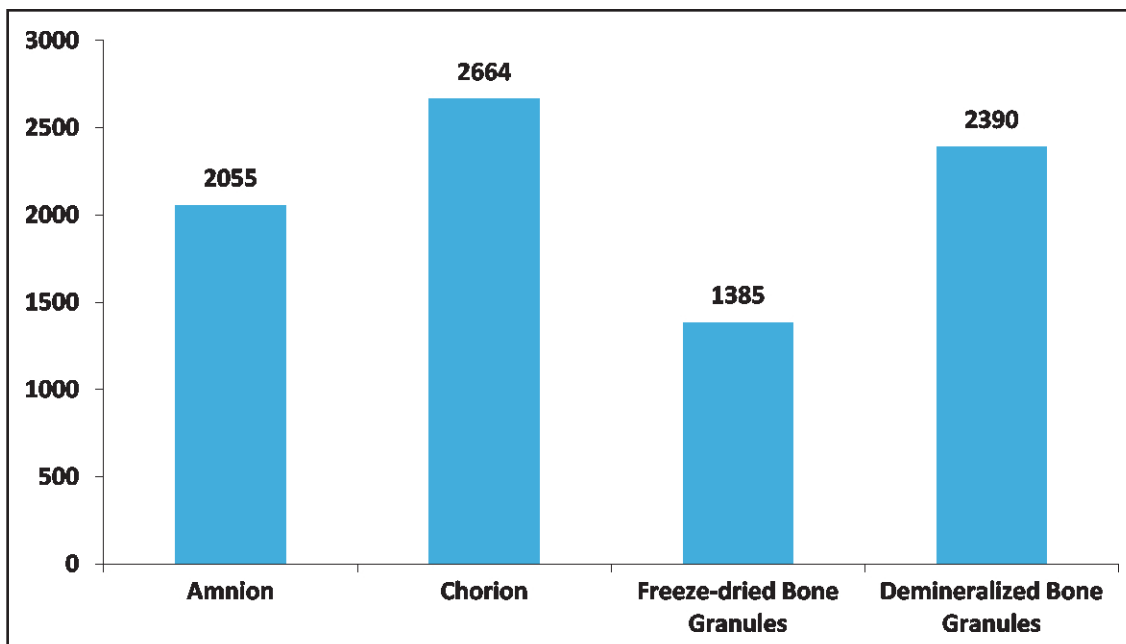
Ms. Urmila Samant,
Ms. Cynthia D’Lima

The Tissue Bank recycled and reused the routinely discarded surgical residues such as femoral heads and tibial slices obtained during hip and knee replacement surgeries, and amniotic membrane that was expelled during deliveries. The donor’s medical history was reviewed and serological tests were performed to screen for the presence of transmissible disease. Tissues from suitable donors was cleaned, processed, cut into different shapes and sizes and terminally sterilized by gamma radiation to produce allografts and dressings. The bone allografts were used in reconstructing skeletal deformities subsequent to disease, trauma or ablative surgery for cancer, while the amnion was used as temporary wound dressings in the management of burns, ulcers, bed sores and skin reactions following radiotherapy or drug use, or in orbital and ocular surface reconstruction and vaginoplasties. The chorion was used as a barrier membrane in guided oral tissue regeneration. Since these products were unique and cost effective, they were much sought after, and the Tissue Bank therefore extended its services to patients across the country.

Service

The total number of tissue donors was **3260** and the total number of grafts produced in **2018** was **9577**. The total number of grafts issued during the year was **10,163**. These were used in patients in **284** hospitals and nursing homes in Mumbai and **266** hospitals from other States in India. During the year, **199**TMH patients benefited from the grafts produced in the Tissue Bank. At TMH, **75** bone allografts were used in reconstruction following tumor excision and dental procedures in **42** patients. Also, **995** amnion dressings were used in **157** patients in the management of moist skin desquamation (ulceration) subsequent to radiotherapy, bed sores, and as a surgical wound cover and a barrier membrane in dental procedures. In ACTREC, **95** amnion dressings were used in the management of moist skin desquamation (ulceration) subsequent to radiotherapy for **17** patients.

The out of TMH users of Tissue Bank included the Government & Municipal hospitals in Mumbai (20), private hospitals & nursing homes in Mumbai (264) and hospitals outside Mumbai (266).



Number and Type of Allograft Produced

The departmental staff was also involved in assisting in the development of new tissue banks and, raising public and professional awareness of tissue donation and transplantation.

Education

During the year, 75 students and medical professionals were shown around the TMH Tissue Bank and given a lecture on the regulatory requirements of tissue banking as well as the donation, processing and clinical use of human allograft. This included 25 Doctors, 43 Nursing Students and 07 technicians and Transplant coordinator.

Hands-on training in basic tissue processing procedures was provided for the staff of the institutions who were interested to start a Tissue Bank (Life Cell International Pvt. Ltd. and Justice KS Hegde Charitable Hospital).

Research

The research was focused on the use of Freeze Dried Bone Allograft with Platelet Rich Fibrin and Demineralized Freeze-Dried Bone Allograft (**DFDBA**) with Platelet Rich Fibrin for mandibular defects.

Another project was on the "Clinical Use of Irradiated Amnion Dressings in the Management of Moist Desquamation Following Radiotherapy in Cancer Patients," in collaboration with the Radiation Oncology department of TMH.



Transfusion Medicine

Head, **Dr. S.B. Rajadhyaksha**

Dr. P.D. Desai
Dr. Meenakshi Singh

The department of Transfusion Medicine provided high quality, specialized blood components to oncology patients and maintained excellent standards of service. It had state-of-the-art technology and its services were availed by various institutions in the city.

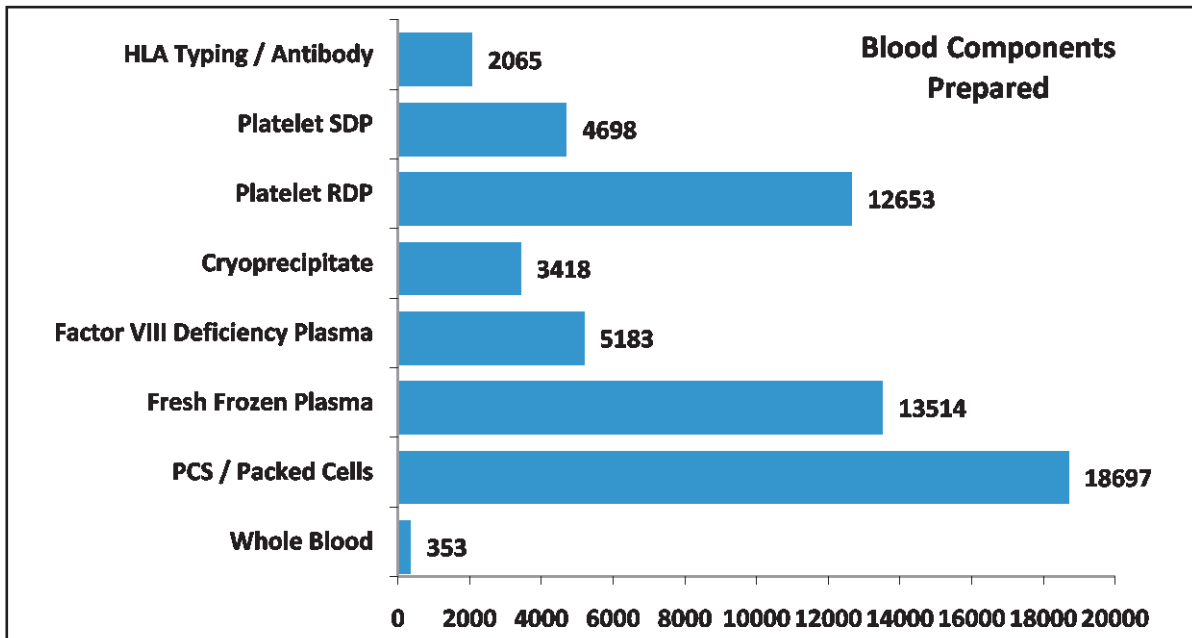
Service

With emphasis on safe and quality of blood, **178 outdoor voluntary blood donation** camps were conducted in the year 2018 that yielded **14931 units** compared to 13951 in year 2017. **Thirteen (13) platelet donor** registration camps were conducted in the year 2018. Forty one thousand four hundred thirty seven (**41437**) **components** were made available to patients. Granulocyte harvests that were utilized for therapy in neutropenic patients doubled from 21 to 44.

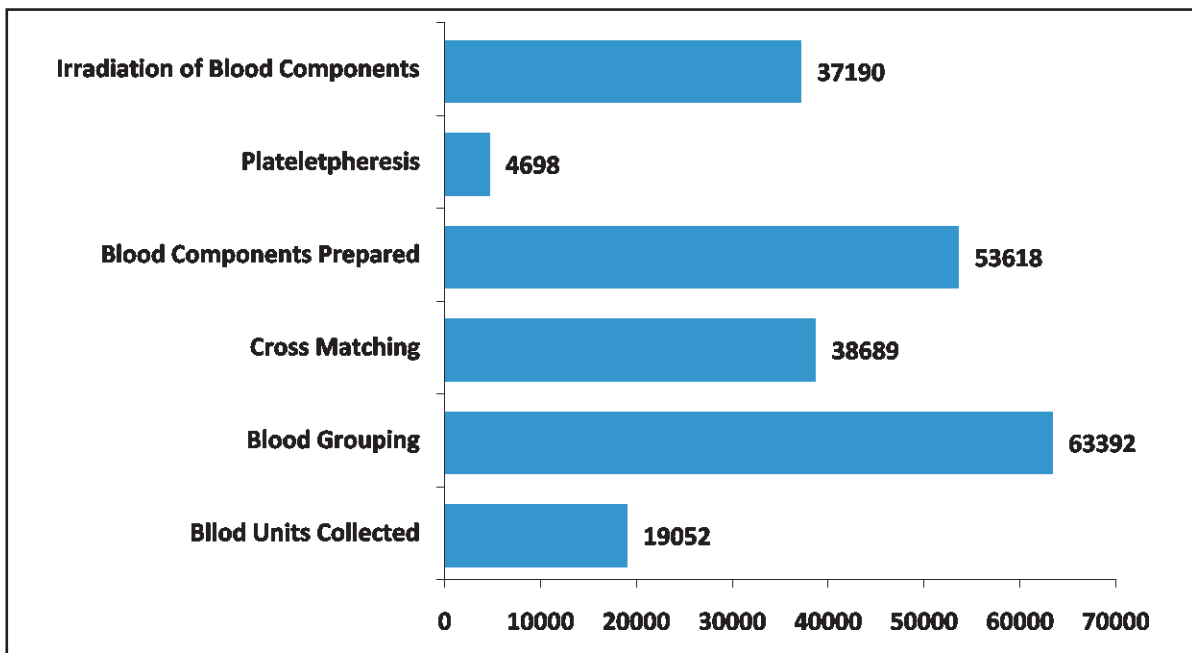
A total of **4698 Single Donor Platelet** were made available for transfusions by 3893 Plateletpheresis procedures. There was also increased number of blood grouping and crossmatching tests and specialized procedures like irradiation (63379, 38689 & 37190 respectively).

The HLA laboratory was involved with transplant diagnostics and provided both, low resolution Single Specific Primer-Polymerase Chain Reaction (**SSP-PCR**) & Sequence-Specific Oligonucleotide probes (**PCR-SSO**) and, high resolution Sequence Based Typing (**SBT**). Advanced techniques like Panel-Reactive Antibody (**PRA**) & Donor Specific Antibody (**DSA**) tests that facilitate improved outcomes in Stem Cell transplant patients were also available.

The latest technology of Next-Generation Sequencing (**NGS**) was considered for high throughput and high resolution Human Leukocyte Antigen (**HLA**) alleles.



PCS=Postoperative Cell Salvage; RDP=Random Donor Platelet; SDP=Single Donor Platelet; HLA=Human Leukocyte Antigen



Details of Blood Processed

Education

The department conducted regular training for Medical Officers and Blood Bank technologists. There was also a hands-on immunohematology Wet Workshop for technologists.

Research

Research focused on various aspects of Transfusion Medicine and Transplant immunology including studies on massive transfusion practices, red cell utilization, granulocyte transfusions, non-HLA genes and epitomes in presence of anti-HLA antibodies in mismatched / haploidentical Hematopoietic Stem Cell Transplantation (HSCT).



Education



Academia

Director Academics, TMC

Dr. Kailash Sharma (till June 2018)
Dr. Shripad D. Banavali (from July 2018)

Dean Academics, TMC

Dr. Kailash Sharma (from July 2018)

Prof. S.D. Banavali was appointed as Director of Academics of Tata Memorial Centre (TMC) after the superannuation of Dr. Kailash Sharma in June 2018. This centre was affiliated to the Homi Bhabha National Institute (HBNI) – Mumbai, a Deemed University under the Department of Atomic Energy (DAE), Government of India and imparted Post Graduate (PG) training in oncology and other broad specialties. All these courses were recognized by the Medical Council of India (MCI), New Delhi.

Tata Memorial Centre comprised of the Tata Memorial Hospital (TMH), the Advanced Centre for Treatment, Research and Education in Cancer (ACTREC), the Centre for Cancer Epidemiology (CCE) and the other satellite cancer centres opened across India (Homi Bhabha Cancer Hospitals and Dr. B. Borooah Cancer Institute).

TMC continued to provide the highest standard of patient care through its services and research; and boosted capacity by imparting knowledge through various educational activities.

Academic Activities

Tata Memorial Center, a training center in cancer Education and Research was recognized by several National and International organizations, including the World Health

Organization (WHO), the International Atomic Energy Agency (IAEA) and the International Network of Cancer Treatment and Research (INCTR). The institute offered education through various academic activities like Post Graduate (PG) courses, and training through short term observership and various training programs. About 180 Post graduate medical students were registered in 2018 for PG courses in various disciplines.

Tata Memorial Centre in collaboration with Kings College, London organized “A summer school in Oncology - 2018” training program for two weeks for the Under Graduate and Post Graduate medical students. One hundred forty six (146) students selected from Government Medical colleges participated from all over India. After successful completion of this program five (05) participants were given chance for internship at King College London for one month.

Six months training program at Tata Memorial Centre

The primary aim was to train various specialists on sponsorship basis in oncology and other supportive branches. Approximately 20 oncology trainees were trained at TMC for 06 months (twice in a year). Additionally, 26 trainee technology students were training at TMC for 06 months (twice in a year).



Tata Memorial Hospital



ACTREC

Observership program at Tata Memorial Centre

Approximately 529 specialists from all over India, including dental surgeons visited Tata Memorial Centre as observers in the year 2018.

Overseas trainees and observers at Tata Memorial Centre

In the year 2018, sixty six (66) overseas specialists visited Tata Memorial Centre as observers for a period of between 01 to 06 months and came from the following countries.

Bangladesh	Canada	Germany
Korea	Myanmar	Nepal
Oman	South Africa	USA

Countries of Foreign Observers

Tata Memorial Centre took the initiative in training of African and sub-Saharan country doctors & nurses under the Indo-African Forum Summit III, in the field of Oncology for period ranging between 01 to 06 months. This program would continue for 3 more years at TMC.

Collaborative Exchange Program

There was collaborative students exchange program with Seth G.S. Medical College & KEM Hospital, Children Wadia Hospital and Lokmanya Tilak Municipal General Hospital in Mumbai.

Academic Activities

Being a teaching and research institute, regular teaching programs and Continuing Medical Education (CME) activities were held by various departments and the Disease Management Groups (DMG). Conferences and seminars discussed the latest advances in cancer management. There were workshops that show-cased the special techniques in cancer treatment perfected by the institutional staff members. Foreign renowned dignitaries were invited to discuss unique issues faced by the Indian populations afflicted with cancer and, the uniqueness of some cancers in different parts of the country due to local cultural and geographic variations.

Meetings and discussions were held to figure out ways and means to treat cancer patients in the remote areas where transport, communication and accessibility were a challenge.

The institutional staff members published four books and contributed 56 chapters in medical text-books along with, more than 300 international and around 150 national publications in journals of repute.

Around one hundred conferences, seminars, workshops etc. were conducted annually.

Conferences, Continuing Medical Education (CME), Seminars, Training Programs, Updates & Workshops

Event	Date	Organized By
	January	
ONCORECON 2018	5th - 7th	Plastic & Reconstructive Surgery
Manuscript Writing Workshop	6th	Clinical Research Secretariat
3-Days Workshop on Tobacco Control & Cessation in Preventive Oncology	10th - 12th	Preventive Oncology
Workshop on Basic Ultrasound and Echocardiography in Critical Care	14th	Anesthesiology
Nuclear Medicine & PET/CT Update in Neuro-Imaging	17th & 18th	Nuclear Medicine & Molecular Imaging
CR UK meeting	18th	Surgical Oncology
2nd National Conference and Workshop, Managing Quality in Clinical Laboratories	20th & 21st	TMC
IRB Program Demo	24th	Research Administration
Masterclass in Neurosurgical Oncology – Maximizing Resections, Minimizing morbidity	26th - 28th	Neuro-Oncology DMG
Clinical Research methodology Workshop	28th	Anesthesiology
	February	
Training for ANM & ASHA / PHW	2nd - 7th	Preventive Oncology
Training Program for Gunwati Kapoor Foundation	8th	Palliative Medicine
Pearls, Perils & Pitfalls in Cytopathology	10th & 11th	Cytopathology
3 - Day Certificate course in Preventive Oncology	14th - 16th	Preventive Oncology
Nuclear Medicine-NeuroImaging CME	17th & 18th	Nuclear Medicine & Molecular Imaging
Childrens Palliative Care Training	19th & 20th	Palliative Medicine
Pre - EBM CME Recent advances in Head and Neck Pathology	22nd	Pathology
XVI Annual Conference on EBM of Cancers in India (Head and Neck Cancers, Cancer Immunotherapy, Pediatric Solid Tumours)	23rd - 25th	TMC
ASCO Video Conference in Training Exam	27th - 28th	Medical Oncology
KEVAT- A Patient Navigation Program	28th	TMC

Event	Date	Organized By
	March	
6 - Day residential workshop on Clinical Research Protocol Development (CReDO)	4th - 9th	Clinical Research Secretariat
Head & Neck Symposium	6th	Head & Neck DMG
Hospital Infection Control Training Program	12th - 14th	Microbiology
3 - Day Workshop on Health Education & promotion for Paramedical personnel	14th - 16th	Preventive Oncology
Press Conference	16th	Preventive Oncology
Students Conference	17th	Physiotherapy
IACA - 6 weeks Training Course	19th - 23rd	Palliative Medicine
OICON	20th - 22nd	Radiodiagnosis
3rd Lung MCMC (Multidisciplinary Cancer Management Course)	24th & 25th	Thoracic DMG
Anaesthesia Review Course'18	30th - 1st	Anesthesiology
	April	
Head & Neck Rehabilitation: Speech and Swallowing Certificate Course (Langmore FEES & Laryngectomy Rehabilitation Course)	4th - 7th	Head & Neck DMG
Teaching Pathology conference	13th	Pathology
Speech & Swallowing Therapy Conference	20th - 22nd	Head & Neck DMG
Breast Cancer Academy 2018	28th	Breast DMG
	May	
8th National Cancer Grid meeting	5th & 6th	TMC
4th Summer School Programme in oncology	7th - 18th	TMC
North-East CME-cum-Workshop on Practical Aspects of Radiation Oncology and Medical Physics	11th & 12th	Radiation Oncology
Brain storming Session for Research Projects	12th	Research Administration
3 - Day Workshop on Tobacco Control & Cessation in Preventive Oncology	23rd - 25th	Preventive Oncology
	June	
1st Head & Neck Surgery Workshop	7th & 8th	Head & Neck DMG
Seminar Meeting	19th	Radiodiagnosis
	July	
8th Basic Hematopathology Course	6th & 7th	Hematopathology
Cancer & Biochemistry	8th	Clinical Biochemistry
3 - Day Certificate Course in Preventive Oncology.	11th - 13th	Preventive Oncology
Education in Cancer & Acute Pain ECAP-2018 (USG in Regional Anesthesia)	14th	Anesthesiology
3 - Day Workshop on Health Education and Promotion for Paramedical Personnel in Preventive Oncology	24th - 26th	Preventive Oncology
Mastercourse on Oral Cancer Management	27th - 29th	Head & Neck DMG

Event	Date	Organized By
	August	
Breast Workshop	3rd	Breast DMG
Breast Workshop	5th	Breast DMG
Training Program	6th - 7th	Personnel Department
Breast Workshop	10th	Breast DMG
8th Annual Conference of Indian Brachytherapy Society IBSCON - 2018	10th - 12th	Radiation Oncology
Breast Workshop	12th	Breast DMG
Certificate Course in Lymphedema Management	13th - 17th	Physiotherapy
1st National Conference on "OncoAnesthesia & Perioperative Care" (SOAPC)	17th - 19th	Anesthesiology
PreConference Workshop	24th	Nuclear Medicine & Molecular Imaging
3rd National Thyroid meeting of the Indian Society of Thyroid Surgeons	24th & 25th	Head & Neck DMG
Training Program	27th & 28th	Personnel Department
	September	
In-Service Education for Nurses	6th	Nursing
Induction Lecture for Security Guards	10th	Security
XVI Annual TMH Radiotherapy Practicum "Image Guided Radiotherapy - A Radiation Therapist Perspective"	15th & 16th	Radiation Oncology
TMH Radiotherapy Practicum 2018	17th & 18th	Radiation Oncology
Affordable & High quality standard of care for Breast cancer patients	18th	Breast DMG
In-Service Education for Nurses	20th	Nursing
Training course in Molecular Diagnostics	24th - 28th	Molecular Pathology
In-Service Education for Nurses	27th	Nursing
Workshop on Family Systems and Psychosocial Palliation	28th	Palliative Medicine
	October	
Indian National Training program for Pediatric Oncology Nurses	1st - 5th	Nursing
CME Testicular Cancers an Update	6th	Uro-Oncology DMG
IACA - 6 weeks training course	10th - 12th	Palliative Medicine
Training program for Upgradation of knowledge & skills of 'D' level employees	24th - 25th	Personnel Department
7th International Oncoplastic Breast Surgery Symposium (IOPBS) in conjunction with the 16th Women's Cancer Initiative-Tata Memorial Hospital(WCI-TMH)	26th - 28th	Breast DMG
Cancer Awareness, Blood donation, Canthon Run	28th	TMH

Event	Date	Organized By
	November	
PreConference Workshop	2nd	Transfusion Medicine
14th Annual Surgical Oncology Workshop	2nd - 4th	Surgical Oncology
RSO Workshop	12th & 13th	Nuclear Medicine & Molecular Imaging
Good Clinical Practice course (Basic & Advanced Courses)	17th	Clinical Research Secretariat
Recent Advances in Cancer Biology : A biochemical perspective Workshop & CME	17th & 18th	Clinical Biochemistry
Immuno-Histotech 2018	23rd - 25th	Pathology
Seminar Praspoid Metastases	28th	Radiation Oncology
"The Difficult Airway" (TMC-DAC 2018)	30th - 2nd	Anesthesiology
	December	
Workshop on Airway management Hemodynamic Monitoring	5th	Nursing
Workshop on Health Education & Promotion for Paramedical Personnel	5th - 7th	Preventive Oncology
Senior Surgical Pathologists meet	13 th	Pathology
6th Educational Program in honor of late Dr. Aruna P. Tole	14th & 15th	Occupational Therapy
5th Laser Course in Head & Neck Oncology with Narrow Band Imaging	14th & 15th	Head & Neck DMG
8th CME for Medical Laboratory Technologists	14th & 15th	Clinical Biochemistry





Certificate Courses

Sr. No.	Name of Training Program	Duration	Commencement	No. of Seats
1	Certificate course in Hospital Infection Control	6 weeks	January / February	15
2	Certificate course in Preventive Oncology	3 days	Jan / Apr / July / Oct	05
3	Cyto Pathology Technicians Training Course	1 year	January & July	06
4	Advanced Hematology Training course	1 year	January & July	03
5	Advanced Clinical Biochemistry Technologist Training course	1 year	January & July	05
6	Advanced CT Scan Training Course	1 year	March & September	03
7	Advanced Interventional Radiology Training Course	1 year	March & September	03
8	Advanced Mammography Imaging Training Course	1 year	March & September	03
9	Advanced MRI Imaging Training Course	1 year	March & September	03
10	Onco-Occupational Therapy Training Course	1 year	March & September	04
11	Molecular Biology Training Programme	1 year	September	02
12	Onco Physiotherapy Training Programme	1 year	September	05
13	Advanced Training Course for Technicians In Flow Cytometry	1 year	January & July	03
14	Advanced Molecular Haematology Training Course	1 year	January & July	03
15	Basic CME Programme in Palliative care for Nurses	3 days	February	30
16	PB Desai / UICC Fellowship	8 weeks	March / April	04
17	Certified Training in Oncology for Doctors	6 months	March & September	20
18	National Training Program in Palliative Care for Doctors & Nurses	2 months	June / November	20 + 20
19	Post Basic Diploma in Oncology Nursing 11 months + 1 year bond for non sponsored Candidates		June	30
20	Training Program in Palliative Care for Social Workers, Volunteers & Councillors	8/10 days	July / August	30 + 30
21	Certificate course for Medical Secretary	1 year	September	20
22	Library Trainees	1 year	October	02
23	Cert. Course in Intensive Care Nursing	18 months	October	30
24	Cert. Course in Enterostomal Therapy	3 months	December	08
25	Cert. Course for Central Venous Access Devices (CVAD)	1 month	December / January	10
26	Certificate Course in Biorepository Science	1 year	January	01
27	TMC Fellowship Speech & Swallowing Thrapy	1 year	March	03
28	Apprentiship Training, Board Of Apprenticeship Training (BOAT)	1 year	-	12
29	Oncology Training (Defence)	24 / 36 months		
30	Six weeks cert. Course in Palliative Care for Doctors & Nurses	6 weeks	November / March	10
31	Six months Cert. Course in Palliative Care Nursing	6 months	March / September	04
32	One Week certificate course in Care and Maintance of Long Term Central Venous Access Devices.	1 week	May	03
		Total number of Students		350

CME=Continuing Medical Education; UICC=Union for International Cancer Control



Degree Courses

Sr. No.	Name of the Course		Approved By	Designation	Admitted 2018-19 JR I / SR I	Recognised University	Post Graduates (PG) passed out
1	M.Ch.(Surgical Oncology)	3 Year Course - Superspeciality Course (Post MD)	Medical Council of India (MCI)	SR	16	HBNI	15
2	M.Ch.(Gynecological Oncology)				02		02
3	M.Ch (Plastic Surgery)				02		02
4	M.Ch. (Head & Neck Oncology)				04		04
5	D.M.(Medical Oncology)	3 Year Course - Superspeciality Course (Post MD)		SR	15		15
6	D.M. (Critical Care)				02		02
7	D.M. (Paediatric Oncology)				03		02
8	D.M. (Gastroenterology)				02		02
9	D.M. (Interventional Radiology)				02		0
10	D.M. (Onco-pathology)				03		0
11	MD (Pathology)	3 Year Course - Board speciality Course (MD) Homi Bhabha National university (HBNI) Approved		JR	12		12
12	MD (Anesthesiology)				20		19
13	MD (Radio-diagnosis)				17		10
14	MD (Radiotherapy)				16		14
15	MD (Microbiology)				0		02
16	MD (Immuno Hematology & Blood Transfusion)				03		01
17	MD (Nuclear Medicine)				06		04
18	MD (Palliative Medicine)				03		02
19	Advance Diploma in Radiotherapy Technology (ADRT)	Technologist Trainee	MSBTE / DTE Approved (Government of Maharashtra)	Trainee	10	MSTBE	09
20	Advance Diploma in Medical Imaging Technology (ADMIT)	MSBTE-DTE Approved		Trainee	18		08
21	Post Graduatue Diploma in Fusion Imaging Technology	01 Year and One Year Internship	HBNI University	Trainee	10	HBNI	11
22	M.Sc Clinical Research	02 Years Course and one Year Internship (Bond)		PG Student	10		10
23	M.Sc Nursing	02 Years Course		PG Student	10		05
24	Ph.D.(Health Sciences)	05 Years Course		JRF /SRF	08		02
Total					194		153

MSBTE = Maharashtra State Board of Technical Education; **DTE** = Directorate of Technical Education

JR = Junior Residents; **SR** = Senior Residents; **JRF** = Junior research Fellows; **SRF** = Senior Research Fellows

Institutional Research



RESEARCH

Clinical Research Secretariat & Department of Atomic Energy Clinical Trials Centre

Officers in Charge

Dr. Maju Sengar

(till June 2018),

Dr. Aliasgar Moiyadi

(from July 2018)

The Clinical Research Secretariat (CRS) along with Department of Atomic Energy Clinical Trials Centre (DAE-CTC) played a key role in facilitating research in field of oncology at Tata Memorial Centre since its inception. The mandate of CRS included promoting clinical research, training and education of researchers and trial-coordinators for scientific and ethical conduct of clinical trials and propagation of practice of evidence based medicine across the country.

In year 2018, the following activities were conducted in each of the above mentioned domains.

1. Promoting Clinical Research

A. Expansion of Infrastructure:

- i) CRS Hub at Homi Bhabha Block (HBB): In addition to CRS HUB situated at Main Building, additional work space was provided for researchers and support staff in the expanded CRS area in the HBB. This included a hub with 8 dedicated and fully equipped work stations (desktop computers with internet connections and one network printer). A small consent room was planned in CRS HBB area. Space for 2 statisticians was provided for the benefit of the clinical trial support staff in the Main Building. Space was also provided for the National Cancer Grid (NCG) support staff, at the CRS Hub in the Main Building
- ii) Central Pharmacy: For storage of all trial related drugs at required temperature in compliance with Schedule Y (Investigator Product Management) and the International Conference on Harmonisation-Good Clinical Practice {(ICH-GCP) (Food and Drug Administration guideline)} (E6) with

controlled access. In addition, for storage of trial medicines under strict temperature control, a walk-in cooler along with automated alarm system for temperature deviations was installed.

A dedicated Research Pharmacist was also appointed

- iii) Filing Storage space: The two Filing storage spaces stored all the clinical trial records in compliance with ICH-GCP. Both the dedicated storage spaces with controlled access to authorized trial personnel were in place
- IV) Monitoring Room: A dedicated well-equipped trial monitoring room was also available in the CRS. This facilitated the monitoring plan layout by the sponsors and investigators of a clinical trial as well as conduct of monitoring visits
- V) A dedicated consent room was planned in the CRS to facilitate consenting.

B. Statistical support for the Clinical Trials

The statisticians at CRS provided expert help to clinical researchers in designing of trial, sample size calculation, randomization list generation and analysis. CRS also provided statistical analysis software (SPSS version 20.0+) to all investigators.

In 2018, statistical support was provided to 125 clinical trials and projects in the following areas:

Analysis - 139

Randomization list generated - 22

Randomization Assistance - 03

Sample size - 17

Design - 30

In addition, the CRS supported the process of central randomization on an ongoing basis for 10 trials.

Additionally, CRS coordinated and provided services of senior statisticians on-site to expedite and resolve statistical queries and address the needs of researchers on a timely basis.

C. Financial support for the clinical trials

A total of 18 Intramural trials (ongoing and new) were supported through the DAE-CTC and a total of INR 1, 44, 96, 302/- was provided as financial grant.

D. Translation facilities for consent forms (local / vernacular languages) for clinical trials

A dedicated Translator supported the constantly increasing translation work burden. The Translator provided expert help to clinical researchers in Informed consent translation and back translation in both Marathi and Hindi language. A total of 102 clinical trial consent forms were translated in Hindi and Marathi languages. Translation services also helped in proof reading and error corrections for 03 clinical trial consents.

E. Publications of results of clinical research supported by DAE-CTC

A total of 25 Publications were made with the result of Clinical research supported by DAE-CTC.

F. Network and Database Administrator

The CRS Server facility was once again initiated for all the Disease Management Groups (DMGs) and they were provided a dedicated storage space to store all the relevant documents that were routinely stored by the administrator as a backup. Moreover, CRS installed SQL server database and Visual studio 2017 software for developing Electronic data capture systems.

CRS also initiated the development of a centralized Clinical Trial Database Management System (CTMS).

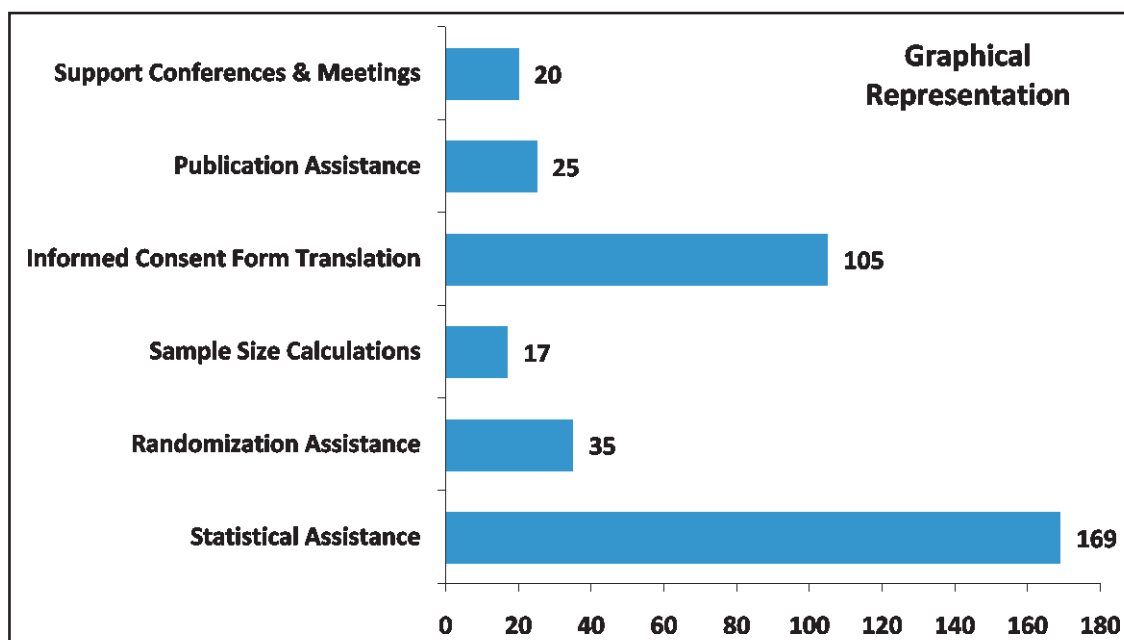
G. Support to Conferences and Meetings

A total 20 conferences and meetings were supported for the year 2018. In addition, CRS provided logistical and advisory inputs to many other meetings and events.

H. Standard Operating Procedure

CRS was involved in conducting numerous trials including Investigator initiated, pharma sponsored, collaborative studies (International and National) and the thesis of postgraduate students.

A detailed Standard Operating Procedure (SOP) for conducting research at TMC was designed. The SOP's were designed to have uniform standard, quality assurance and quality control for conducting clinical Studies / Research at TMC.



The key elements of the SOP included: Assessing Protocol Feasibility, Clinical Trial Agreement with sponsors or Contract Research Organization (**CRO**), Interaction with Institutional Ethics Committees (**IECs**), Study/Research team responsibilities, Communication with sponsor or CRO, Site initiation, Activation, Conduct and close out, Reviewing and obtaining Informed consent form, Recruiting study subjects, Source documentation, Managing investigational product, Archival of essential documents, Safety reporting, Managing biological samples, Reimbursement policies, Study team training and study handover, Transfer of patients between TMH and ACTREC etc.

The SOP's were designed to assure execution of research in accordance with Institutional guidelines, updated applicable national guidelines and regulations {e.g. Schedule Y, Indian Good Clinical Practice (**GCP**), Indian Council of Medical Research (**ICMR**) guidelines, International Council for Harmonisation GCP (**ICH-GCP**)}.

SOP training and education was offered to the research team of TMC. It was mandatory that every research staff should be trained and must be aware of the TMC SOP before conducting research.

CRS also developed SOPs for statistical support and central pharmacy services. This would help streamline these services.

2. Training and Education of researchers:

- A. Good Clinical Practice (**GCP**) Workshop was organized to train TMC Staff on ICH-GCP principles on 17th November 2018. The Advanced GCP

course module was attended by 60 participants and the Basic GCP course was attended by 70 delegates.

- B. M.Sc Clinical Research: CRS was actively involved in M.Sc Clinical Research course. At present there were 19 students in first and second year of their courses with 10 students doing Internship training in various Disease Management Groups after successfully completing their M. Sc.

The following support was also provided:

- Coordinating entrance exam and interview
- Coordinating lectures and study material
- Managing lectures, invigilating exams
- Managing mini library and arranging for the study books
- Rotations through various external postings for comprehensive training
- Maintaining leave records and attendance.

Evidence Based Management (**EBM**) meeting **2018**: The important aim of CRS / DAE-CTC was to propagate and promote practice of evidence based medicine especially in cancer. In this regard Evidence Based Management meetings were started about a decade and half ago.

The philosophy behind the meeting was to identify and answer focused questions relevant to oncology practice in India. National faculties and International faculty members were invited every year, and who were experts in their field of oncology. The deliberations typically go on for 2-3 days and included talks on a particular topic in context with the Indian scenario.

The 16th EBM focused on 3 modules viz. a) Head and Neck Cancers, b) Cancer Immunotherapy, c) Paediatric Solid Tumours that were simultaneously organized from 23rd to 25th February 2018.



Data Safety Monitoring Unit

Secretary, Dr. Gouri Pantvaidya

The Data Safety Monitoring Unit (**DSMU**), a subcommittee of the Institutional Ethics Committee (**IEC**) I & II at Tata Memorial Centre was responsible for monitoring patient safety during the course of the study in a manner that ensured the scientific and ethical integrity of the study.

The mandate of the Committee was to:

- Assess and evaluate Serious Adverse Event reports (**SAEs**) on all trials being conducted at the TMH
- Monitor the overall progress of institutional clinical trials and to ensure adherence to clinical trial and procedural requirements

- Ensure that the safety of participants, validity of data and projected accrual goals were maintained
- Provide regular reports to the Institutional Ethics Committee (**IEC**).

The DSMU members met on the second Monday of every month at 8.00 am in the Institutional Ethics Committee meeting room.

The composition of the DSMU for the year 2018-2020:

Composition of DSMU w.e.f. April 2018

Sr. No.	Names	Gender	Expertise
1.	Dr. Gouri Pantvaidya, Secretary, DSMU	Female	Surgical Oncologist
2.	Dr. Priya Ranganathan, Jt. Secretary, DSMU	Female	Anesthetist
3.	Dr. Anuja Deshmukh Member	Female	Surgical Oncologist
4.	Dr. Sabita Jiwnani Member	Female	Surgical Oncologist
5.	Dr. Ashwin Desouza Member	Male	Surgical Oncologist
6.	Dr. Rajiv Kaushal Member	Male	Pathologist
7.	Dr. Archi Agrawal Member	Female	Radiologist
8.	Dr. Swapnil Parab Member	Male	Anesthetist
9.	Dr. Maya Prasad Member	Female	Medical Oncologist
10.	Dr. Rahul Krishnatry Member	Male	Radiation Oncologist
11.	Dr. Anant Ramaswamy Member	Male	Medical Oncologist

Sr. No.	Names	Gender	Expertise
12.	Dr. Hasmukh Jain Member	Male	Medical Oncologist
13.	Dr. Sharmila Pimple Member	Female	Preventive Oncologist
14.	Dr. Anuprita Daddi Member	Female	Physician
15.	Dr. Ashish Gulia Member	Male	Surgical Oncologist
16.	Dr. Akshay Baheti Member	Male	Radiologist
17.	Dr. K. Manjunath. N Member	Male	Pharmacologist
18.	Dr. Jeson Doctor Member	Male	Anesthetist
19.	Dr. Tushar Vora Member	Male	Medical Oncologist
20.	Dr. Nehal Khanna Member	Female	Radiation Oncologist

The committee conducted 12 meetings from Jan - Dec 2018. Besides the scheduled monthly meetings and review of SAEs reported on all the studies, the SAEs on regulatory trials were evaluated continuously (to meet the 30-day timeline) on email by a group of 5 members consisting of the secretary of the respective committee (IEC 1 & 2), the two lead discussants assigned to each project and the secretary and Jt-secretary of the DSMU.

The four principle functions of the committee included:

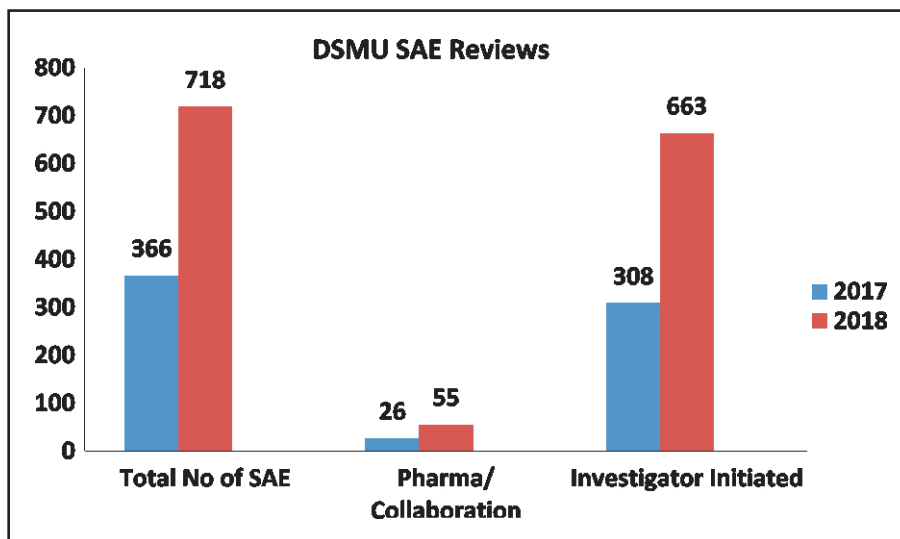
1. Review of Serious Adverse Event Reports
2. Monitoring of institutional (investigator initiated) trials and for cause monitoring of other trials as requested by the IECs.

3. Review of annual Continuing Review Application / Annual Status Reports
4. Review of Site monitoring report.

The primary **responsibility of the DSMU was to review** and address SAE events involving all trials.

Every month, the committee received an average of **70** SAE reports on trials being conducted at the TMC (Investigator initiated and sponsored studies). A total of **718** SAE reports on **51** clinical trials were received and reviewed by the DSMU from Jan - Dec 2018.

In addition, the DSMU also received **497** off - site safety reports on multicentre trials ongoing at Tata Memorial Hospital in 2018.

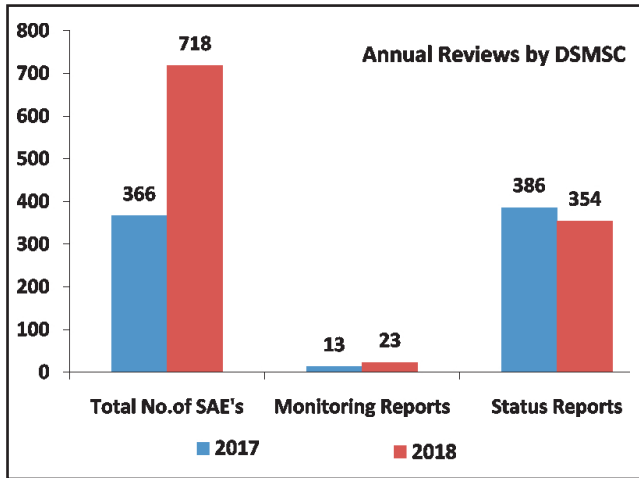


Continuing Review Application	354
Trials monitored	23

Review by DSMU

A detailed review of the Continuing Review Application was done by DSMU Member Secretary. The comments from the DSMU were forwarded to the IEC.

A total of 354 status reports were received and reviewed by the DSMU in 2018. The DSMU monitored 23 studies in the year 2018.



Activities

- Revision of the Continuing review form, SAE Reporting form and the Monitoring form so as to include extensive details with respect to different aspects of the trial
- Streamlining the process of study monitoring
- Training of DMG coordinators and M.Sc interns in the process of study monitoring
- Developing system for online submission of Continuing Review Application (CRA) and SAE reporting forms
- Setting up the system of “no payment” policy for patients on trial to avoid problems with reimbursement.

Future Plans

- To streamline reimbursement process for trial patients.

Institutional Ethics Committees (IEC – I & II)

Member Secretary (IEC - I), **Dr. Umesh Mahantshetty**

Member Secretary (IEC - II), **Dr. Girish Chinnaswamy**

The Institutional Ethics Committees-I & II (IECs) was constituted by the Director, Tata Memorial Centre (TMC) under authority vested by the Governing Council of the TMC.

Term: 02 years (April 2018 - March 2020).

Terms of reference included:

- Ensuring the highest scientific and ethical standards of research at TMC
- Reviewing and approving proposals for clinical, basic or translational research projects (Intra and Extra mural) for scientific and ethical content
- Improving the ethical standards and issuing guidelines on ethical dilemmas related to patient care services
- To function as a forum to advise the administration in case of any ethical issues that may arise from patients, families or public
- Endeavor to be a national standard of reference
- To issue and periodically, update and revise Standard Operating Procedures (SOPs) and guidelines for effective functioning of IECs as and when necessary
- Continuing the education in clinical research bioethics by holding seminars, workshops and interactive discussions for all categories of staff members including nursing and paramedical staff
- To initiate and commission research studies on ethical aspects of practice in TMC.

The IEC functioned as per the Standard Operating Procedures (SOPs) based on the Indian Council of Medical Research (ICMR) guidelines (2017), Schedule Y (Drugs and Cosmetics Act, 1940 and Rules, 1945 as amended up to the 31st December 2016), World Health Organization (WHO) Standards and Operational Guidance for Ethics Review of Health-Related Research with Human Participants 2011, and International Conference on Harmonisation Good Clinical Practice (ICH-GCP) 1996 (amended up to November 2016).

The members for the year April 2018 - March 2020:

Institutional Ethics Committee - I (IEC – I)

Sr. No.	Names	Position	Affiliation	Gender	Expertise
1.	Dr. S.K. Shrivastava	Chairperson	Director, Radiation Oncology, Apollo Hospital	Male	Radiation Oncologist
2.	Dr. Nithya Gogtay	Co-Chairperson	Professor, Dept of Clinical Pharmacology, KEM Hospital	Female	Basic Medical Scientist (Clinical Pharmacologist)
3.	Dr. Umesh Mahantshetty	Member Secretary	Professor, Dept. of Radiation Oncology, TMH	Male	Radiation Oncologist
4.	Mr. K.V. Ganpathy	Member	CEO, Jeet Association for Support to Cancer Patients (JASCAP)	Male	Lay Person

Sr. No.	Names	Position	Affiliation	Gender	Expertise
5	Dr. Mrunal Marathe	Member	Freelance Counselor and Trainer associated with NGO-St.Jude's-Childcare Centre and Adoption Group, Asha Sadan Orphanage	Female	Social scientist
6.	Ms. Tanu Mehta	Member	Legal Counsel and Mediator, High Court, Mumbai	Female	Legal expert
7.	Dr. Sanjeev Waghmare	Member	Scientific Officer, Advanced Centre for Treatment, Research and Education in Cancer (ACTREC)	Male	Basic Scientist
8.	Dr. Rajiv Sarin	Member	Professor, Dept. of Radiation Oncology & PI & OIC, Cancer Genetics Unit, TMH	Male	Radiation Oncologist
9.	Dr. Gouri Pantvaidya	Member & Secretary, Data Safety Monitoring Unit (DSMU)	Professor, Dept. of Surgical Oncology, TMH	Female	Surgeon
10.	Dr. Sheila Myatra	Member	Professor, Dept. of Anesthesiology, Critical Care and Pain, TMH	Female	Anesthetist
11.	Dr. Sudhir Nair	Member	Associate Professor, Dept. of Surgical Oncology, Tata Memorial Centre	Male	Surgeon
12.	Dr. Amit Joshi	Member	Professor, Dept. of Medical Oncology, TMH.	Male	Medical Oncologist
13.	Dr. Santosh Menon	Member	Professor, Dept. of Pathology, TMH	Male	Basic Medical Scientist (Pathologist)
14.	Dr. Sneha Shah	Member	Professor, Nuclear Medicine, Bio-imaging Unit, TMH	Female	Nuclear Medicine Physician
15	Dr. Palak Papat	Member	Assistant Professor, Dept. of Radiodiagnosis, TMH	Female	Radiologist

Institutional Ethics Committee - II (IEC – II)

Sr. No.	Names	Position	Affiliation	Gender	Expertise
1.	Dr. Sudeep Shah	Chairperson	Consultant in Gastroenterology Surgery, Hinduja Hospital	Male	Surgeon
2.	Dr. Arun Bhatt	Co- Chairperson	Consultant – Clinical Research and Development	Male	Clinician
3.	Dr. Girish Chinnaswamy	Member Secretary	Professor, Dept. of Medical Oncology, TMH	Male	Medical Oncologist (Paediatrician)
4.	Dr. Yashashri Shetty	Member	Associate Professor, Department of Pharmacology & Therapeutics, Seth GS Medical College & KEM Hospital	Female	Clinical Pharmacologist

Sr. No.	Names	Position	Affiliation	Gender	Expertise
5.	Mrs. Manisha Naikdala	Member	Member of Ethics Committees at Hinduja Hospital (IEC-1), IITB, Global Hospital, Nair Hospital and IIT-B Alternate Member (Layperson) with ISBEC (InterSystems Biomedical Ethics Committee) and KEM Hospital	Female	Lay Person
6.	Dr. Bindulakshmi P.	Member	Associate Professor, Advanced Centre for Women's Studies, School of Development Studies, Tata Institute of Social Sciences	Female	Social scientist
7.	Ms. Tanisha Doshi	Member	Associate, Hariani & Co, Mumbai	Female	Legal expert
8.	Dr. Neelam Shirsat	Member	Scientific Officer, ACTREC	Female	Basic Scientist
9.	Dr. Ashwini Budrukkar	Member	Professor, Dept. of Radiation Oncology, TMH	Female	Radiation Oncologist
10.	Dr. Priya Ranganathan	Member & Jt. Secretary Data Safety Monitoring Unit (DSMU)	Professor, Dept. of Anaesthesia, TMH	Female	Anesthetist
11.	Dr. Nita Nair	Member	Associate Professor, Dept. of Surgery, TMH	Female	Surgeon
12.	Dr. Suyash Kulkarni	Member	Professor & Head, Division of Interventional Radiology, TMH	Male	Interventional Radiologist
13.	Dr. Vikas Ostwal	Member	Associate Professor, Dept. of Medical Oncology, TMH	Male	Medical Oncologist
14.	Dr. Mukta Ramadwar	Member	Professor, Dept. of Pathology, TMH	Female	Basic Medical Scientist (Pathologist)
15.	Dr. Nilendu Purandare	Member	Professor, Dept. of Nuclear Medicine	Male	Radiologist

Staff

Sr. No	Name & Designation
1.	Mrs. Abhidnya V. Desai, IRB Administrator
2.	Mrs. Uthara H. Iyer, IRB Administrator
3.	Mr. Sandeep Kalsekar, Software Programmer
4.	Mr. Ramchandra Patil, Sr. Assistant
5.	Mrs. Megha Chalke, Private Secretary
6.	Mrs. Sapana Rane, DSMU Co-ordinator

The types of projects reviewed by the IEC:

- Investigator initiated projects or trials, soliciting funding from national funding agencies
- Investigator initiated projects or trials, soliciting funding from international funding agencies
- Investigator initiated projects without specific funding
- Multicentric academic trials with national collaborators
- Multicentric academic trials with international collaborators
- Pharmaceutical / Industry sponsored trials
- Intramural projects: Funding was provided for institutional projects (TMH & ACTREC) after a process of review and competitive scoring by the IEC
- Thesis of the students appearing for M.S., MD & Ph.D courses.

Registrations

Tata Memorial Centre - IECs were registered with Drug Controller General of India (DCGI) in 2013.

- IEC - I: ECR / 170 / Inst / MH / 2013 / RR-16
- IEC - II: ECR / 414 / Inst / MH / 2013 / RR-16

Institution had a Federal Wide Assurance (FWA) with the Department of Health and Human Services (DHHS) through the Office for Human Research Protections (OHRP). The assurance number was FWA00006143. This was periodically renewed as required.

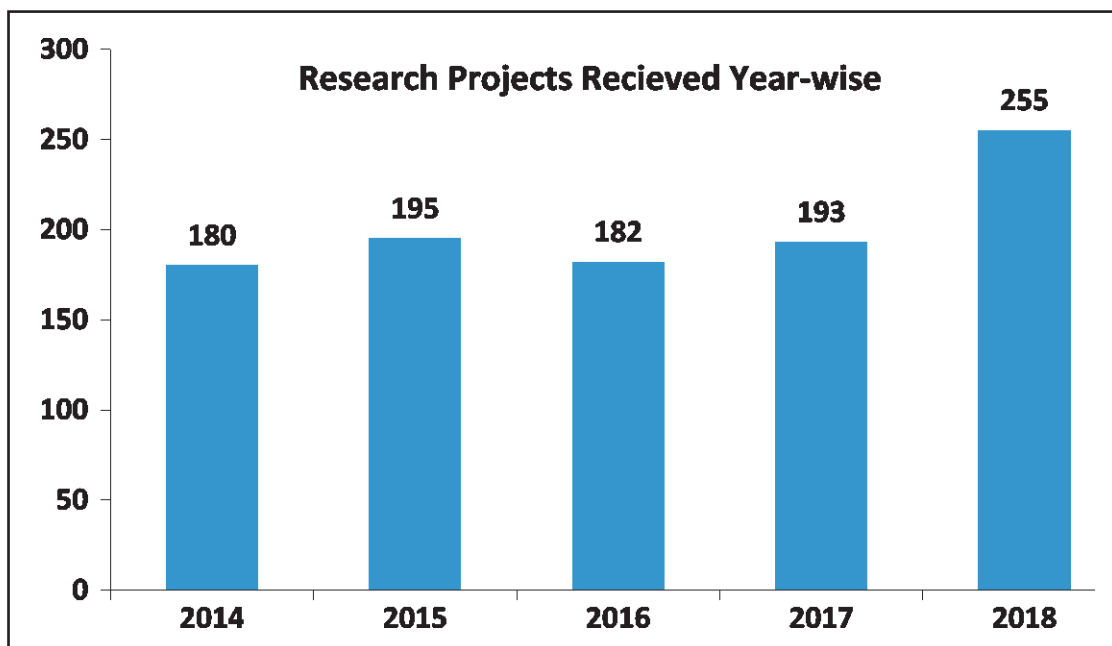
IECs were also registered with Office for Human Research Protections (OHRP) and have IORG Nos. IRB00003414, IRB00007802 for IEC-I & IEC-II respectively. This too was periodically renewed as required.

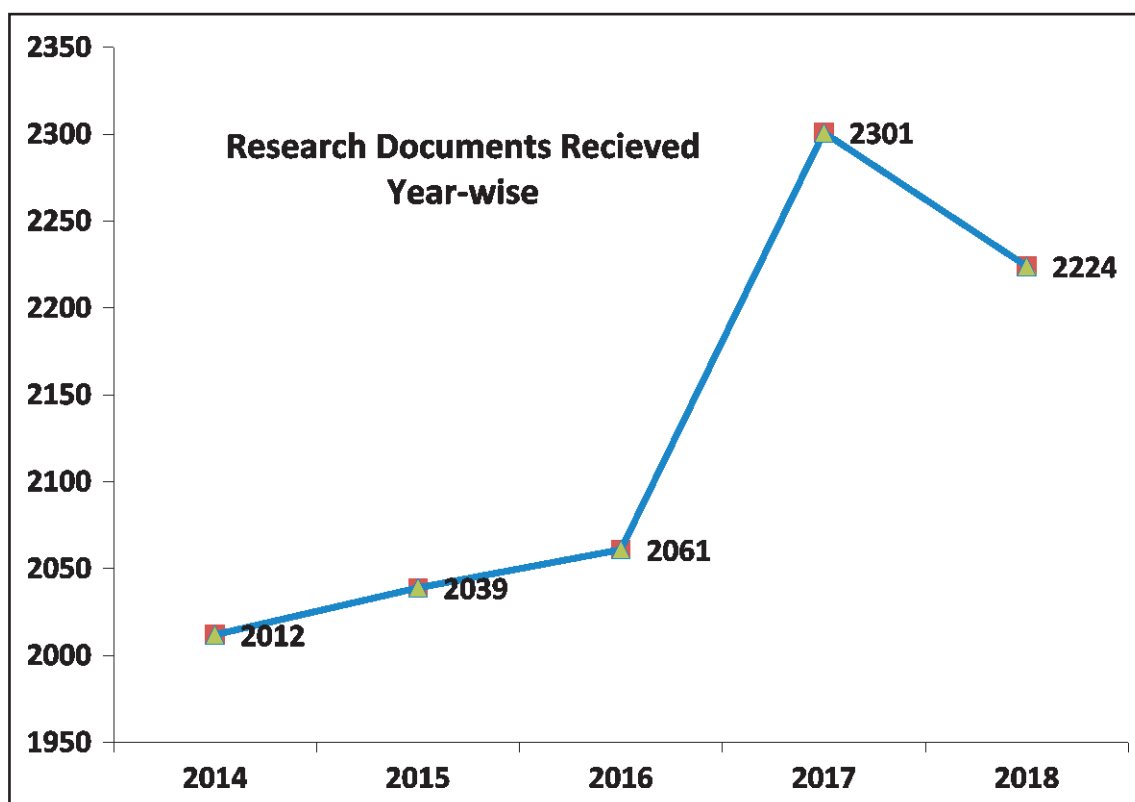
Accreditations

- National Accreditation Board for Hospitals and Healthcare Providers (NABH), recognition received on 11th December 2017 valid thru 10th December 2020
- Association for the Accreditation of Human Research Protection Programs (AAHRPP) - first in 2014 & reaccreditation in 2017 valid thru 2022
- World Health Organization (WHO) / The Strategic Initiative for Developing Capacity in Ethical Review (SIDCER) in 2009, 2012, 2016.

IEC Performance in 2018

The IEC received 255 projects in 2018 out of which 240 were reviewed by the IEC and 15 projects were awaiting review.





No. of Meetings Conducted

Types of Review	Committees		
	IEC I	IEC II	Total
Full Board	12	12	24
Expedited	06	01	07

Research Projects	IEC-I	IEC-II	Total
Received before 2018 and approved in 2018	28	34	62
Received & Approved in 2018	94	81	175
Total Projects Approved in 2018	122	115	237

Types of Review of projects

Types of Review	Committees		
	IEC - I	IEC - II	Total
Full Board	84	107	191
Expedited	11	06	17
Exemption	27	02	29
Total	122	115	237

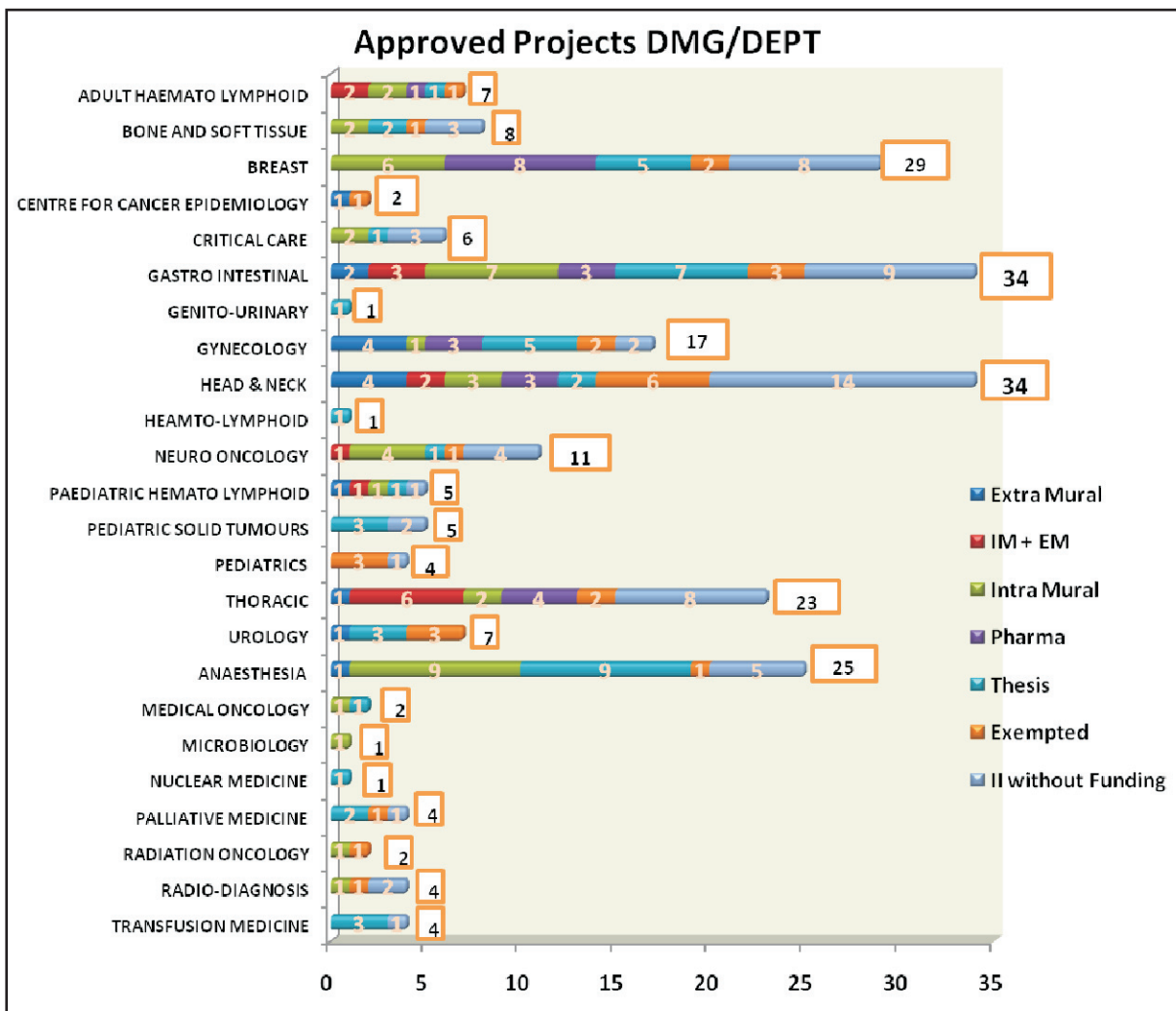
Full Board - The turnaround time from date of submission to final decision (including response time of PIs to IEC queries) was **12 weeks**.

Expedited - The turnaround time from date of submission to final decision (including response time of Principal Investigators (PIs) to IEC queries) was **7 weeks**.

Financial Support

Source of Funding	No of projects (IEC-I)	No of projects (IEC-II)
Extra Mural	07	08
Pharma	08	14
IM + EM	11	04
Intra Mural	12	31
No funding	84	58
Total	122	115

Type of studies	No of projects (IEC-I)	No of projects (IEC-II)
Investigator Initiated	77	54
Investigator Initiated + Thesis	13	16
Thesis	24	32
Pharma	08	13
Total	122	115



Successful completion of projects in 2018: 99

Closure reports	No. of projects
Closed By IEC	09
Discontinue	02
Terminated	08
Withdrawn By PI	02

IEC Software

IEC developed a web portal for online submission of new research proposals.

Education / Trainings

- Role / responsibilities of Ethics Committee
- Updates on Schedule Y & Indian Council of Medical Research (ICMR) Guidelines (2017)
- Risk Benefit assessment.

Future steps

- To develop GCP training modules for TMC staff
- To complete online submission processes for all TMC research projects
- To conduct IEC meetings in a paperless environment.

Research Projects Approved by IEC I & II

Principal Investigator (PI)	Project Title
Mrs. Achrekar, Meera	A study of assessment of sexual functioning of patients with colorectal cancers and their spouses at Tata Memorial center.
Dr. Agarwal, Jai Prakash	Prognostic Value of Total Lesion Glycolysis in Early Non Small Cell Lung Cancer
	Set-Up Margin Validation, Analyzing Dynamic Changes in Tumor Volume and Patterns of Failure in Radiotherapy for Lung Cancer
	Quantitative Computed Tomography Image Texture Analysis in Thymic Tumours
	Evaluation of solitary pulmonary nodule with Texture Analysis
	Prediction of Survival Outcomes of Non-Small Cell Lung Cancer treated with Radical intent by Texture Analysis of Cone Beam Computed Tomography.
Dr. Agarwal, Vandana	Postoperative Pulmonary Complications: Incidence and risk factors in patients undergoing major abdominal cancer surgery.
Dr. Agrawal, Archi	Use of PET-CT with Gallium-68 labelled prostate Specific Membrane Antigen in the Diagnosis and Follow-up of patients with Prostate Cancer
	To evaluate the role of 18F FDG PET/CT in urinary bladder carcinoma.
	To evaluate the role of FDG PET imaging for prediction of viable disease in residual masses in seminoma post chemotherapy.
Dr. Ambulkar, Reshma	A prospective randomised controlled study to compare CMAC video laryngoscope and macintosh laryngoscope in nasotracheal intubations by novices
	An ultrasonographic analysis of gastric volume in patients posted for elective gastrointestinal surgeries.
Dr. Amin, Nayana	A Prospective pilot study on perioperative fluid therapy in paediatric patients and its relationship with glucose homeostasis and ketosis.
Dr. Badwe, Rajendra	Comparative Evaluation of Cancer Awareness Among Project Participants and Similar General Female population in Mumbai, India.
Dr. Baheti, Akshay	Utility of MRI in detecting peritoneal metastases in gastric cancer patients with negative CECT abdomen
	Utility of MRI in evaluation of pancreatic cancer for predicting and assessing response to neoadjuvant chemotherapy: A prospective observational study
	Authorship survey amongst TMH faculty
	Effect of intravenous iodinated contrast media on renal function in adults with estimated glomerular filtration rate <45 mL/min/1.73m ² : A randomized controlled non-inferiority trial
	CT Reconstruction using Prior Scans for Radiation Reduction.
Dr. Bajpai, Jyoti	Protocol No. - CLEE011A2404 : An open-label, multicenter, Phase IIIb study to assess the safety and efficacy of ribociclib (LEE011) in combination with letrozole for the treatment of men and pre/postmenopausal women with hormone receptor-positive (HR+) HER2-negative (HER2-) advanced breast cancer (aBC) with no prior hormonal therapy for advanced disease-COMPLEEMENT-1
	"Epidemiological aspects, pattern of care and outcome in malignant melanoma patients from a tertiary care cancer center in India"
	Acupuncture as a modality of treatment for Chemotherapy-Induced Peripheral Neuropathy in Breast Cancer-A Phase 3 Randomized Controlled Trial (ABC-CIPN).
	Feasibility of Eribulin for the Treatment of Pre-Treated Metastatic Breast Cancer from a tertiary care cancer center in India

Principal Investigator (PI)	Project Title
	A Double Blind Randomized Controlled Trial of Renal Protective Effects of Normal Saline Plus Placebo Versus Normal Saline Plus Mannitol Prior to Cisplatin Containing Chemotherapy Regimens in Osteosarcoma and other Solid Tumors.
	Retrospective study of demographics, pattern of care and outcome of TNBC patients from a tertiary care cancer centre In India.
Dr. Bakshi, Ganesh	Prostate cancer demographics and outcome data from 2013 at a tertiary cancer hospital in India
Dr. Bakshi, Sumitra	Role of video based learning on competency level of direct laryngoscopic skills of novice anesthesiologists - a randomized clinical trial
	A prospective randomised trial to assess the effect of cleaning of blood stained epidural site on incidence of bacterial colonization of epidural catheter.
Dr. Bal, Munita	Pancreatic neuroendocrine neoplasms: a comparison of The WHO 2010 and 2017 grading systems.
Dr. Banavali, Shripad	Advancing Cancer-care through CANScript™ Enabled Personalized Treatment (ACCEPT): A non-randomized, investigator initiated, observational trial to measure predictive power of CANScript™ for chemotherapeutics and targeted therapy in patients with newly diagnosed, locally advanced head & neck cancer and refractory / relapsed triple negative breast cancer
	Holistic Support Coupled with Prospective Tracking Significantly Reduces Abandonment in Childhood Cancers: A Report from India
	Maintenance Metronomic Therapy (MMT) in Newly Diagnosed, Non-Metastatic Triple Negative Breast Cancer (TNBC) Patients after Completion of Standard Therapy: A Retrospective Analysis from a Tertiary Care Center in India
	A phase-3 randomized control trial comparing hydroxyurea and L-asparaginase for cytoreduction in pediatric AML patients presenting with hyperleukocytosis.
Mrs. Bandekar, Archana	A study to assess the effect of a structured teaching programme (STP) on knowledge of cervical cancer patients planned for brachytherapy at a tertiary cancer care hospital(Tata Memorial Hospital).
Dr. Bhandare, Manish	Radical Gastrectomy for Gastric Cancer at Tata Memorial Hospital.
Dr. Bhat, Vivek	Comparison of Disc Diffusion and Gradient Diffusion Methods With Standard Reference Broth Dilution Method For Colistin Susceptibility Testing In Gram Negative Bacilli.
Dr. Budrukhar, Ashwini	Feasibility Of Magnetic Resonance Image Based Target Delineation In Radical High Dose Rate Interstitial Brachytherapy For Early Oral Cavity Cancers: A Pilot Study.
Dr. Budukh, Atul	A mixed methods study on cancer registration in India.
Dr. Chatterjee, Aparna	Comparison of three difficult intubation predictors in obese individuals in Indian population
	Efficacy Of Analgesia In The First 48 Hrs Following Thoracic Surgery
	Audit of pain score during post operative period in pacu [Recovery Room].
Dr. Chaturvedi, Pankaj	Predictors of extracapsular spread and its impact on survival in clinically node-negative early oral cancers
	Impact of age on elderly patients with oral cancer
	Outcome of Patients following NACT given for Unresectable Cervical Nodes in HNSCC
	Role of frozen section and optimum margin in patients with oral cancer
	Impact of Second primary and recurrent tumors on oral cavity cancers and its comparison with treatment naive cancers
	Incidence, predictors and impact of involved bony margins in surgically treated T4 stage cancers of the oral cavity.

Principal Investigator (PI)	Project Title
Dr. Chinnaswamy, Girish	Evaluation of prescription pattern of drugs in paediatric cancer patients in a tertiary care hospital: An observational study
	A Phase 2 randomized controlled trial to evaluate the role of modified C.O.M.B.A.T maintenance regimen in children with high risk medulloblastoma
	Precision medicine and Malnutrition- A Model based approach to dose chemotherapy in pediatric patients with malnutrition.
Dr. Chopra, Supriya	Locally Advanced Cervical Cancer: An audit of 5-year outcomes
	Temporal course of late radiation toxicity and impact of intervention in patients undergoing radiation for cervical cancer.
Mrs. D Souza, Anita	A retrospective study to assess the incidence of Chemotherapy induced Peripheral Neuropathy and prescription patterns, in patients who have received Oxaliplatin containing chemotherapy for GI cancer at Tata Memorial Hospital
	A study to assess the functional outcome and quality of life after sphincter preserving surgery in low rectal cancer patients at Tata Memorial Hospital, Mumbai.
Dr. Deodhar, Jayita	Prevalence of and factors associated with anxiety disorders in advanced cancer patients referred for palliative care.
Dr. Deodhar, Kedar	Histopathology reports of carcinoma cervix and carcinoma endometrium: Assessment of different histology parameters including lymph node yield in surgically resected specimens, operated at TMH and ACTREC (from January 2013- March 2018).
Dr. Desai, Madhavi	Prospective audit of incidence of emergence delirium in children undergoing day care procedures.
Dr. Desai, Priti	Evaluation of clinical practices of Red Blood Cell Transfusions in a Tertiary Care Oncology Centre - An Audit
	Use of Granulocyte Transfusions in Hemato-oncology patients with febrile neutropenia.
Dr. Desai, Subhash	Audit on retrospective evaluation of the computed tomography guided biopsy of vertebral lesions.
Dr. Deshmukh, Anuja	Surgical outcomes of thyroid cancer patients in a tertiary cancer centre in India
Dr. Dholam, Kanchan	Variation in the number and type of items raised on a single sheet paper version of the Patient Concerns Inventory- Head and Neck across different economies
	Assessment of dental implant stability following oral rehabilitation of head and neck cancer patients.
Dr. Dikshit, Rajesh	Lifestyle and genetic risk factors for gallbladder cancer: Multicentre case-control study.
Dr. Divatia, Jigeeshu	Study to assess the role of virtual endoscopy in difficult airway assessment and management in patients with obstructive lesions of the airway: a retrospective cohort study.
Dr. Doctor, Jeson	Ultrasound-guided assessment of gastric residual volume in patients undergoing elective surgery.
Dr. Engineer, Reena	Stereotactic body radiotherapy in Pancreatic Cancer- A clinical audit
	Retrospective audit of wait and watch approach in rectal cancers receiving chemoradiotherapy
	Role of conformal radiotherapy for isolated local or regional recurrences in upper gastrointestinal malignancies following definitive treatment.
Dr. Epari, Sridhar	Medulloblastoma- molecular groups: clinicopathological correlation.
Dr. Ghosh, Jaya	Retrospective evaluation of progression free survival in patients of advanced epithelial ovarian cancer who did not undergo interval debulking surgery after first line neoadjuvant chemotherapy in tertiary care centre.

Principal Investigator (PI)	Project Title
Dr. Ghosh-Laskar, Sarbani	Protocol No. - TPC-CLT-002 : A Multi-Centre, Randomized, Double Blind, Parallel-Group, Comparative Clinical Trial to evaluate the Safety and Clinical Equivalence of Generic Clotrimazole Troche/Lozenges USP, 10mg (Unique Pharmaceutical Laboratories, India) to Clotrimazole Troche/Lozenges ® 10mg (Roxane Laboratories Inc., USA) in subjects with Oropharyngeal Candidiasis
	Pilot testing ICMR THSTI forms for use by Ethics Committees
	Multi-Institutional Oral Cavity Collaborative (MOCCC).
Dr. Goda, Jayant	A dosimetric and clinical study of DIBH in Mediastinal Lymphomas: An exploratory observational study.
Dr. Goel, Mahesh	Demographic profile of hepatocellular carcinoma in three tertiary care referral centres
	Establishment of national gall bladder cancer registry.
Dr. Gulia, Ashish	A Double Blinded Phase III Randomized Placebo Controlled Trial to Evaluate the Efficacy of Tranexamic Acid to Reduce Operative Blood Loss in Bone Tumor Patients
	Oncologic outcomes and prognostic factors following surgical treatment of extremity and pelvis chondrosarcomas.
Dr. Gulia, Seema	Protocol No. - I3Y-MC-JPCF : A Randomized, Open-Label, Phase 3 Study of Abemaciclib Combined with Standard Adjuvant Endocrine Therapy versus Standard Adjuvant Endocrine Therapy Alone in Patients with High Risk, Node Positive, Early Stage, Hormone Receptor Positive, Human Epidermal Receptor 2 Negative, Breast Cancer (MonarchE)
	Activity of Trastuzumab Emtansine (TDM1) in metastatic Her 2 positive breast cancer.
Dr. Gupta, Sudeep	Protocol No. - MO39196 : A Phase III, Multicentre, randomised, double-blind, placebo controlled study of Atezolizumab (anti-PD-L1 antibody) in combination with paclitaxel compared with placebo in combination with paclitaxel for patients with previously untreated, inoperable locally advanced or metastatic Triple Negative Breast Cancer
	Protocol No. - 471-13 : A Prospective, Adaptive, Randomized, Open-Label, Multicenter Clinical Trial to assess the Efficacy and Safety of Fixed Dose Combination of Capecitabine & Cyclophosphamide in Patients of Metastatic Breast Cancer with failure of Anthracycline and/or Taxane Chemotherapy
	Protocol No. - 2017-VBP-926 : A multi-center, randomized, double-blind, vehicle-controlled, phase-2 trial to evaluate the efficacy and safety of two concentrations of topical povidone-iodine nail solution (VBP-926) for the treatment of chemotherapy-associated paronychia in cancer patients.
	Protocol No. - 1000-16 : An Open Label, Single Arm, Multicentric, Phase IV study to evaluate the safety and efficacy of Bevacizumab of Intas Pharmaceuticals Limited in approved indications
	Protocol No. - D0818R00001 : A Non-interventional, multicentre study to assess prevalence of BRCA1 and BRCA2 mutation among ovarian, primary peritoneal and fallopian tube cancer patients in India (BRCA study)
	Protocol No. - EIL-E7389-CT01-012 : Post Marketing Trial (Phase IV) on the Safety, Tolerability And Efficacy of Eribulin Mesylate in Treating Patients with Locally Advanced or Metastatic Breast Cancer
	A multicentric open label phase II safety and efficacy study of ormeloxifene in tamoxifen resistant metastatic/recurrent breast cancer patients.
	A global, multicenter, three arms, open-label randomized study to evaluate the efficacy and safety of Nanosomal Docetaxel Lipid Suspension compared to Taxotere® (Docetaxel Injection Concentrate) in triple-negative breast cancer patients with locally advanced or metastatic breast cancer after failure to prior chemotherapy

Principal Investigator (PI)	Project Title
	Protocol No. - D0816C00016 : An Open Label, Single Arm, Multicentre Study to Assess the Clinical Efficacy and Safety of Lynparza (Olaparib) Tablets Maintenance Monotherapy in Platinum Sensitive Relapsed Ovarian Cancer Patients who are in Complete or Partial Response Following Platinum based Chemotherapy (L-MOCA).
Dr. Gupta, Tejpal	Retrospective Audit Of Chordomas Involving The Skull-Base And Cervical Spine (ReChord Study)
	Demographic Profile, Clinicopathological Spectrum, And Treatment Outcomes Of Primary Central Nervous System Tumors: Retrospective Audit From An Academic Neuro Oncology Unit
	Hypoxia Imaging and Tissue Correlates in Head & Neck Squamous Cell Carcinoma (HoTCORE study)
	Experiences of the Indian Parents and Caregivers about Caring for a Child with Medulloblastoma: An Interpretative Phenomenological Analysis
	Biomarker-based optimization of adjuvant therapy in glioblastoma
	Inflammatory Indices in Diffuse Glioma (InDiGo): A Prospective Observational Study.
Dr. Jain, Hasmukh	A prospective observational study to evaluate the clinical utility of staged Bronchoalveolar fluid (BAL) analysis in adolescent and adult leukemia and lymphoma patients with febrile neutropenia and lung infiltrates.
Dr. Jain, Parmanand	An Observational Study for assessing the Effectiveness of IV Morphine Titration Pain Protocol in control of Cancer Pain in Emergency Department
	Post Operative Pain Management Following Minimally Invasive Abdominal Cancer Surgeries-An Audit.
Dr. Jiwnani, Sabita	Treatment and outcomes of esophageal cancer patients treated at Tata Memorial Centre.
Dr. Joshi, Amit	A randomized trial to compare gefitinib plus chemotherapy vs chemotherapy alone in EGFR positive and T790M mutation negative advanced Non-small cell lung cancer patients after progression on first line gefitinib
	Kidney cancer demographics and outcome data from 2013 at a tertiary cancer hospital in India
	A Randomized Study of the Safety and Efficacy of BIO-11006 in the Treatment of Advanced Non-Small Cell Lung Cancer in Patients who Are not Candidates for Curative Surgery and/or Radiation and who Are Receiving Pemetrexed and Carboplatin.
Dr. Joshi, Malini	Effect Of Frailty On Post operative Outcomes In Major Abdominal Surgeries In A Tertiary Cancer Institute
	A Prospective PeriOperative Audit of Outcomes after Endoscopic Procedures to drain Pancreatobiliary Obstruction in a Tertiary Cancer institute.
Dr. Joshi, Shalaka	CONcurrent versus SEquential Chemo-Endocrine therapy in ER positive and HER2 negative non-metastatic breast cancer (CONSEQUENCE).
Mrs. Kamat, Manali	Effect of pulmonary rehabilitation group therapy on perioperative complications in resectable lung cancer- a retrospective study.
Dr. Kembhavi, Seema	Retrospective descriptive study of image defined risk factors of abdominal neuroblastoma and the post chemotherapy response
	Retrospective descriptive study of image defined risk factors of extra-abdominal neuroblastoma and the post chemotherapy response
	Retrospective audit to evaluate the correlation between breast density and body mass index.

Principal Investigator (PI)	Project Title
	Imaging audit in neurological complications of acute childhood leukemias.
	Retrospective study of mammography features of triple negative breast cancers
	Retrospective study of mammography features of hormone positive breast cancers.
Dr. Khanna, Nehal	Evaluation of outcome of patients diagnosed with Desmoplastic small round cell tumor (DSRCT).
Dr. Khattry, Navin	Five year activity and outcome data from Adult Hematolymphoid Disease Management Group of Tata Memorial Centre
Dr. Kothekar, Amol	Effect of Short End Expiratory Hold on Echocardiography Acoustic Window Optimization and cardio-respiratory pathophysiology in patients on mechanical ventilation.
Dr. Kulkarni, Atul	A retrospective study to evaluate the outcomes of cancer patients admitted to the Intensive Care Unit in a tertiary cancer centre requiring Renal Replacement Therapy
	Indian Intensive Care Case Mix and Practice Patterns Study II (INDICAPS II)
	Evaluation and validation of the scoring systems; PRISM IV, PIM 3 in critically ill paediatric oncology patients.
Dr. Kumar, Rajiv	Programmed Death Ligand 1 (Pd-L1) Expression In Treatment Naïve Lung Adenocarcinoma Patients: An Experience From Tertiary Cancer Care Center
	Introduction of a novel, cost effective, multigene panel for nslc patients - a pilot project
	Performance Assessment of Various Digital Pathology Whole Slide Imaging Systems(WSIs).
Dr. Laskar, Siddhartha	Total Lymphoid Irradiation as Salvage Therapy in Refractory/Relapsed Lymphoma
	An Audit of Radiation Therapy in Wilm's Tumor.
Dr. Mahajan, Abhishek	Additional use of Extrinsic Warmer for intravenous CT Contrast media and its impact on incidence of Contrast Extravasations and Allergic like Reactions: an observational case control study
	Role of Chest Computed Tomography As Screening Tool For Distant Metastases Work-Up In Advanced Head And Neck Cancers
	CT emphysema score as a prognostic indicator in advanced NSCLC treated with chemotherapy
	Preoperative patterns of mandibular involvement as prognostic marker for outcomes in gingivo-buccal squamous cell carcinomas
	Exploring the implication of modified ALI (mALI) on outcomes in patients with advanced NSCLC patients
	Deep Learning neural network based radiogenomics in predicting clinicopathological outcomes in non-small cell lung cancer.
Dr. Mahantshetty, Umesh	A cross-sectional feasibility study of a telephonic questionnaire by research nurses for follow-up of locally advanced cervical cancer patients with complete response to treatment
	Correlation of hematological parameters with clinical outcomes in cervical cancer patients treated with radical radio (chemo) therapy - analysis from a prospective cohort database.
Dr. Maheshwari, Amita	A phase II trial to study efficacy, toxicity and immunomodulatory effect of Carctol-S in high grade serous epithelial ovarian cancer at first serological relapse
	Outcomes of advanced epithelial ovarian cancer treated with neoadjuvant chemotherapy
	Abdominal Tuberculosis masquerading ovarian malignancy - A Retrospective Review

Principal Investigator (PI)	Project Title
	Assessing Trop2 expression and its correlation with the anti-Trop2 immune status in ovarian cancer patients.
Dr. Menon, Santosh	Study of hormonal receptors in low grade endometrial stromal sarcoma and correlation with clinical parameters.
Mrs. Methry, Rashmi	A Study to assess the effect of Structured Teaching Programme on knowledge of patients with Acute Myeloid Leukemia on Chemotherapy schedule, Side effects and its Management at a Tertiary cancer center.
Dr. Mhatre, Sharayu	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 Genome-Wide Association Study to Identify Role of Genetic Susceptibility in Buccal Mucosa Cancer.
Dr. Mitra, Indraneel	A study to assess the efficacy of Resveratrol-Copper (R-Cu) in ameliorating toxicity in patients receiving palliative chemotherapy for advanced stage IV inoperable gastric cancers.
Dr. Moiyadi, Aliasgar	Audit of Intraoperative Neuromonitoring cases performed at TMH - A Retrospective Study.
Dr. Muckaden, Mary	Assessment of the sexual difficulties experienced by women diagnosed with advanced cervical cancer, post radiation therapy, who visit palliative medicine OPD in a tertiary cancer centre Provision of Palliative Care in India: A Gap Analysis Survey Validation of Hindi and Marathi versions of 'Pediatric Quality of Life Inventory TM (PedsQL TM) Cancer Module 3.0' for the pediatric oncology patients in a tertiary cancer center Prospective validation of Palliative Prognostic Index (PPI) in advanced cancer patients in a tertiary cancer hospital - a pilot observational study.
Dr. Mummudi, Naveen	Multidisciplinary Management of Primary Lung Cancer: Experience from a tertiary care oncology centre.
Dr. Murthy, Vedang	A study of Inguinal nodal distribution in Penile Cancer for developing radiotherapy contouring guidelines.
Dr. Myatra, Sheila	A Randomised Controlled Trial To Compare Thrive Versus Nodasat Techniques Of Oxygenation To Prolong Safe Apnoea Time During Microlaryngoscopy In Head And Neck Cancer Patients Augmented Renal Clearance (ARC) in patients undergoing cancer surgery and its impact on pharmacokinetics of administered antibiotics High-flow oxygen through nasal cannula in acute hypoxemic respiratory failure International observational study To Understand the impact and BEst practices of airway management of critically ill patients (INTUBE Study) Prevalence, causes, management, and outcomes of sepsis in Asia's intensive care units Development and Validation of an Electronic Surveillance System for Surgical Site Infections Developing During Hospital Stay and After Discharge: A Multi-Centric Study.
Dr. Nair, Deepa	Outcomes of surgically treated oral cancer patients at a tertiary cancer center in India Validation of the Beta Defensin Index (BDI) as a Biomarker for Oral Cancer - India.
Dr. Nair, Nita	A randomized controlled trial to evaluate the safety of breast conserving surgery post neo-adjuvant therapy locally advanced breast cancer Prospective study to identify biomarkers of chemoresistance to neoadjuvant chemotherapy and discover targetable pathways in triple-negative breast cancer

Principal Investigator (PI)	Project Title
	Breast cancer in India - An audit from a tertiary cancer center with outcome analysis
	Correlation of predictive accuracy of PREDICT Version 2.0, (PREDICT V2.0) on a retrospective cohort of Indian women with operable breast cancer (OBC).
Dr. Narula, Gaurav	Clinicoepidemiological profiles, clinical practices, and the impact of holistic care interventions on outcomes of pediatric hematolymphoid malignancies - A 6 year audit of the pediatric hematolymphoid disease management group at Tata Memorial Hospital.
Dr. Noronha, Vanita	A randomized study to compare gefitinib with bevacizumab vs gefitinib in EGFR mutation positive Non-small cell lung cancer in palliative setting.
	Carboplatin/paclitaxel versus cisplatin/5-fluorouracil definitive chemoradiotherapy for locoregionally advanced unresectable esophageal and gastroesophageal junction cancer.
Dr. Ostwal, Vikas	A prospective Proof of concept dose de-escalation open label clinical study to evaluate the safety and efficacy of Sorafenib with Metformin and Atorvastatin in advanced Hepatocellular carcinoma (SMASH)
	Protocol No. - D419CC00002 : A Randomized, Open-label, Multi-center Phase III Study of Durvalumab and Tremelimumab as First-line Treatment in Patients with Unresectable Hepatocellular Carcinoma (HIMALAYA)
	Prevalence of MMR status in gallbladder cancer (GBC) treated with palliative intent and its correlation with response to chemotherapy and survival
	Protocol No. - 19214 : A phase IV study to investigate the safety and efficacy of regorafenib in Indian patients with metastatic colorectal cancer (mCRC)
	Retrospective study evaluating outcomes with multimodality management of periampullary adenocarcinomas
	A randomized, open label, parallel-group, phase 3 study to investigate the efficacy and tolerability of palonosetron, dexamethasone, aprepitant plus Olanzapine versus palonosetron, dexamethasone and aprepitant alone in patients receiving high moderately emetogenic chemotherapeutic (MEC) regimens (OMEC study).
Dr. Pai, Prathamesh	To analyse the post treatment outcome of Buccal mucosa and lower alveolus complex cancer.
Dr. Pantvaiddya, Gouri	Total laryngectomy: surgical morbidity and outcomes- a case series.
Dr. Parab, Swapnil	A survey on practice of thoracic anesthesia among indian anesthesiologists.
Dr. Patil, Asawari	Clinico-pathological Study of Odontogenic Tumors.
Dr. Patil, Prachi	Prevalence and predictors of malnutrition and its impact on quality of life and prognosis in patients with hepato-biliary tumors - a prospective study
	Prevalence and predictors of malnutrition and its impact on quality of life and prognosis in patients with pancreatic tumours - a prospective study
	Survey of clinical practice amongst medical oncologists regarding Hepatitis B screening in patients with cancer
	A randomized phase 2/3 trial of Rosuvastatin with neo-adjuvant chemo-radiation in patients with rectal cancer.
Dr. Patil, Vijay	Phase 2 going to phase 3 randomized study for evaluation of docetaxel and triple metronomic as second line therapy in head and neck cancer.
Dr. Patil, Vijaya	Utility of Surgical Apgar score in Predicting Post-Operative Complications after Whipple Procedure in Pancreatic Cancer Patients
	Volume change following Valsalva- a valuable tool for diagnosis of jugular thrombosis
	Post-operative cognitive dysfunction in patients after major oncosurgery :a prospective clinical study.

Principal Investigator (PI)	Project Title
Dr. Patkar, Shraddha	Radiological diagnosis alone risks overtreatment of benign disease in gallbladder cancer: A word of caution in an era of radical surgery
	Management of Retroperitoneal tumors and outcomes- experience from a tertiary care center.
Dr. Pimple, Sharmila	Phase I- Device Development : Development of portable transvaginal digital colposcope.
	Phase II- Development and Non-Inferiority Evaluation of a portable transvaginal digital colposcope with smartphone interface for single visit cervix cancer screening in low resource setting
	Protocol No. - SII-qHPV/IN-02 : A Phase-II/III, Partially Double-blind, Randomized, Active-controlled, Multicentric Study to Assess the Immunogenicity and Safety of SIIPL's qHPV Vaccine Administered Intramuscularly in Healthy Volunteers According to a Two-dose Schedule to Cohort 1 (Girls and Boys Aged 9-14 years) and a Three-dose Schedule to Cohort 2 (Women and Men Aged 15-26 years) as Compared to Merck's HPV6/11/16/18 vaccine (Gardasil®).
Dr. Popat, Palak	Retrospective study of mammography features of her2 positive breast cancers.
Dr. Prabhash, Kumar	A Randomized study comparing Weekly Paclitaxel plus Best Supportive Care to Best Supportive Care Alone in Patients with small cell lung cancer relapsed on two or more lines of chemotherapy (rel. small cell)
	Protocol No. - CA-170-201 : A Phase 2, Open-Label Randomized Trial Evaluating the Efficacy and Safety of Two Dosages of Once Daily Oral CA-170 in Patients with Selected Relapsed Advanced Tumors (ASIAD)
	Protocol No. - LRP/LNP3794/2016/006 : A Phase II/III Pivotal, Open-label, Randomized, 3-Arm Study to Assess the Efficacy of LNP3794 Monotherapy or in Combination with Docetaxel, Compared with Docetaxel Alone, in Patients with RAS Mutation-Positive Locally Advanced and Metastatic Non-Small Cell Lung Cancer
	Protocol No. - WO40242 : A Phase III, Multicenter, Randomized, Double-Blind, Placebo-Controlled Study Of Atezolizumab (Anti"Pd-L1 Antibody) As Adjuvant Therapy After Definitive Local Therapy In Patients With High-Risk Locally Advanced Squamous Cell Carcinoma Of The Head And Neck
	Docetaxel or Cisplatin radiosensitizer in Head and Neck cancer patients for curative or adjuvant chemoradiation
	Protocol No. - D5161R00003 : An observational, multicentre, Prospective study to evaluate concordance of detecting EGFR mutation by circulating tumour free DNA versus tissues biopsy in NSCLC (CONCORDANCE).
Dr. Prakash, Gagan	Bladder cancer demographics and outcome data from 2013 at a tertiary cancer hospital.
Dr. Prasad, Maya	Clinical Course, Pathological Spectrum and Outcomes in Paediatric Rare Tumors in India: A Prospective Observational Study
	Dietary Intake, Sarcopenic Obesity, and Other Treatment-Related Outcomes in Indian Children with Acute Lymphoblastic Leukemia: A Pilot Study.
Dr. Purandare, Nilendu	Role of FDG PET/CT in predicting malignant change in benign chondroid tumors
	Incidence of extrathoracic metastases in head-neck squamous cell carcinoma at initial staging: Role of whole body FDG PET/CT.
Dr. Puranik, Ameya	Lung Shunt Fraction on 99m-Tc-Macro-Aggregated Albumin scintigraphy: is it predictor of survival in patients with Hepatocellular carcinoma and liver-dominant metastatic cancer undergoing Trans-arterial Radio-embolisation using Y90 labeled spheres?
	Utility of 18F-fluoroethyl-tyrosine PET/CT imaging for diagnosing high grade gliomas
	Correlation of metabolic parameters on FDG PET/CT (TLG, MTV, T/W ratio) with molecular markers and overall survival in patients with high grade gliomas

Principal Investigator (PI)	Project Title
	Prognostic significance of 18F-FDG PET/CT imaging in Langerhans cell histiocytosis
	A Pilot study to evaluate tracer uptake characteristics in high grade neoplastic brain lesions on Ga-68 PSMA PET/CT imaging/
Dr. Puri, Ajay	A Retrospective Audit of Radiated Autogenous Tumor Bone - A Reconstruction Option for Primary Diaphyseal Bone Tumors/
Dr. Qureshi, Sajid	A Cross-Sectional Study of the distribution of Paediatric Solid Tumours at an Indian Tertiary Cancer Centre
Dr. Rajadhyaksha, Sunil	An Audit of management of massive blood transfusion and its outcome in surgical patients of a tertiary care oncology hospital
	A Retrospective Audit of Acute Normovolemic Hemodilution Procedures conducted in a tertiary care oncology centre/
Dr. Ramadwar, Mukta	RAS and BRAF status in patients with colorectal cancer
Dr. Rane, Swapnil	Revisiting grading of squamous carcinoma using computational methods/
Dr. Rangarajan, Venkatesh	Pilot study to evaluate the biodistribution & dosimetry of 177Lu - Trastuzumab in HER2 receptor positive metastatic breast carcinoma and its toxicity & efficacy profile
	To evaluate the role of 68Ga PSMA PET/CT in assessment of response to treatment in patients with carcinoma prostate
	Role of F18 FDG PET/CT and Ga68 DOTA PET/CT In the detection of Recurrence in patients with Medullary Thyroid Carcinoma and Raised Serum Calcitonin levels.
Dr. Rekhi, Bharat	Analysis of Bone and Soft Tissue Sarcoma registered during the year 2012, at Tata Memorial Hospital with Clinical Outcomes.
Dr. S.R., Priya	Does clearance of positive margins provide similar local control to initially negative margins in oral cavity- A meta - analysis.
Dr. Sable, Nilesh	A retrospective study on the accuracy of pre-operative computed tomography in the diagnosis of the site and etiology of intestinal obstruction.
Dr. Saklani, Avanish	Complete pathologic response rectal cancers EYSAC.1 Study (CORSiCA).
Dr. Sengar, Manju	A Phase III, International, Randomized, Controlled Study of Rigosertib versus Physician's Choice of Treatment in Patients with Myelodysplastic Syndrome after Failure of a Hypomethylating Agent.
Dr. Shah, Sneha	Retrospective analysis of FDG PET/CT in prognostication of locally advanced breast cancer.
Dr. Shanmugham, Pramesh	Esophagectomy Complications Platform and Quality Measures: What is the Contemporary Incidence of Complications at High Volume Esophagectomy Centers?
	Influence of Nutrition and SarcoPenia on Esophageal Cancer outcomes (INSPECT Study).
Dr. Sharma, Kailash	A Prospective observational study of Baska mask for airway management during General Anaesthesia.
Dr. Shet, Tanuja	Is extranodal Rosai Dorfman a different disease ?- Exploring BRAF , KRAS and MAP2K1 mutations in defining extranodal Rosai Dorfman disease
	Shelterin protein by Immunohistochemistry in Classical Hodgkin's Lymphoma.
Dr. Shetmahajan, Madhavi	Comparison of vocal cord mobility assessment using percutaneous ultrasonography and laryngeal fibrescopy in patients undergoing esophagectomy and mediastinoscopy.
Dr. Shrikhande, Shailesh	Re-operative Pancreaticoduodenectomy - Challenges & Outcomes
	An integrated network analysis to identify genomic alteration profiles of human pancreatic cancer.
Dr. Tembhare, Prashant	Evaluating the clinical utility of new immunophenotypic markers in the determination of minimal residual disease in childhood acute myeloid leukemia.

Principal Investigator (PI)	Project Title
Dr. Thakur, Meenakshi	Retrospective analysis of diagnostic outcome of incidentally detected FDG-avid breast lesions in PET scan done for non-breast pathologies.
Dr. Thiagarajan, Shiva Kumar	Effect of Pre Operative Distress Levels on Post Surgical Wound Healing in Head Neck Squamous Cell Carcinoma Patients
	Surgical morbidities and outcomes of major salivary gland neoplasm treated at a tertiary cancer centre
Ms. Vagal, Manjusha	A questionnaire based survey to assess the awareness amongst health care professionals (Onco-surgeons, Medical Oncologists, Radiation Oncologists, Occupational Therapists and Physiotherapists) about breast cancer related lymphedema.
Dr. Vasudevan Nair, Sudhir	Phase IIb/III, Placebo-controlled, double-blind randomized clinical trial, using Curcumin and Metformin in patients with previous history of head and neck squamous cell carcinoma, in an attempt to lower the incidence of second primary tumor
	Soft tissue deposits in Oral Cancer
	A prospective evaluation of a point of care saliva-based detection test based on soluble CD44 (OncAlert) for the presence of disease in a previously untreated oral cavity and oropharynx squamous cell carcinoma
	Predictors of contralateral regional node metastasis and utility of contralateral neck dissection in recurrent oral cavity cancers.
Dr. Vora, Tushar	Global Retinoblastoma Presentation 2017.
Dr. Wadasadawala, Tabassum	Clinical Outcome of elderly patients with breast cancer: a retrospective study (COME study)
	A Pilot Study of CONcurrent ChEmotherapy and RadioTherapy in Adjuvant Treatment of Breast Cancer (CONCERT).



TMC Research Administrative Council

Administrator, **Ms. Rohini Hawaldar**

The TMC Research Administrative Council (**TRAC**) was constituted in the year 2008. TRAC had a broad mandate to maintain and improve in all aspects basic, translational and clinical research in TMC.

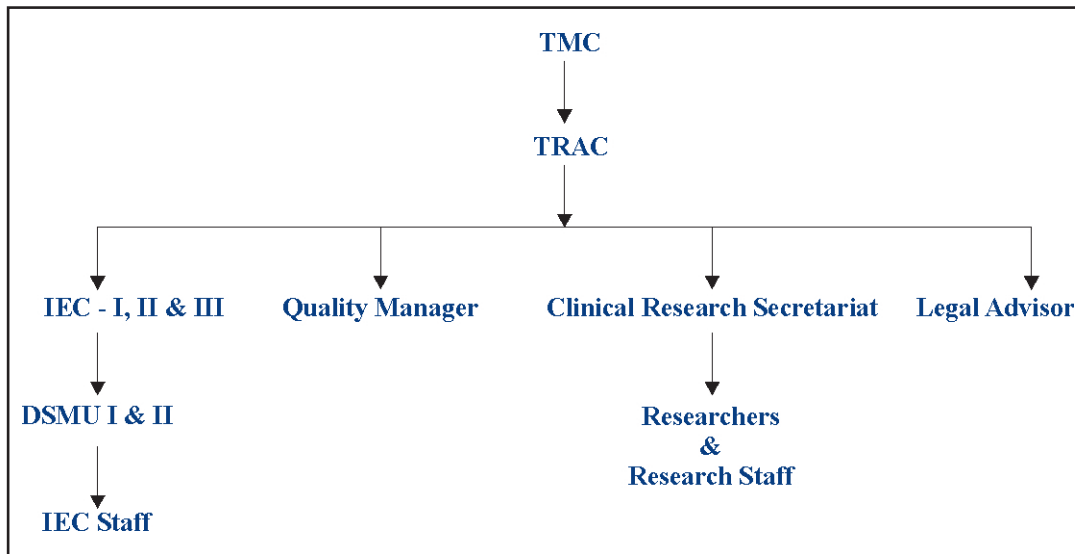
The focus was in the specifics of the following areas:

- Established Human Research Protection Program and its implementation
- Set directions, priorities and thrust areas for research as per institute's mandate
- Suggest and review proposals for collaborations between TMC, with other Indian or International

Institutions, Groups, Individuals or industry. When required, suggest the names of possible Principal and Co-Investigators within TMC for this collaboration

- Review pre-proposals for sponsored research and suggest the names of possible Principal and Co-investigators within TMC
- Review the expenditure and income incurred on hospital services, laboratory and administrative functions for investigator initiated and sponsored research conducted in TMC.

Human Resource Protection program (HRPP) Organization Chart



IEC = Institutional Ethics Committee

Meetings

Meetings were held to discuss the issues faced by the IECs regarding implementation of the Indian Medical Council of Research (ICMR) guidelines issued in October 2017 and calling expert reviewer for the research projects that were beyond the subjects of competence of IEC, funding policies etc.

Achievements

- IRB Portal - WEB based application for submission of research projects and other correspondence with IEC was released. This was highly appreciated by investigators and trail coordinators.

Activities

- Implementation of systematic and comprehensive Human Research Protection Program that affords protection for all research participants. Individuals within the Organization follow the policies and procedures of the Human Research Protection Program with the Association for the Accreditation of Human Protection Programs (AAHRPP)

- Quality Improvement plans – Audits of functioning of IEC-I,II, III and research projects at regular intervals
- Financial support was granted for 48 research projects in year 2018
- Timely assistance extended to accounts department on queries for non functional research accounts.

Publications

Twenty five (25) publications in peer review journals of the research studies were supported through institutional grants.

Future Goals

- The quality control programs for research projects
- To monitor the progress of research studies supported by institutional funds
- To develop online education model for researchers and staff.

The Management



MANAGEMENT

General Administration

Chief Administrative Officer (CAO), TMC, **Mr. AN Sathe**

Wg. Cdr. (Retd) Anand K. Tiwari,
Senior Administrative Officer (SAO)

The General Administration was responsible for the overall management and the safety & security of all the buildings and assets of all units of TMC across the country. They supervised the recruitment of manpower, replenishment of materials, procurement of Capital Equipment and the Budgeting. The administration maintained the highest standards in terms of equipment and facilities that ensured that the best services were offered to cancer patients. The general administration oversaw the expansion of Tata Memorial Hospital on the 5-acre plot in the campus of Haffkine Institute, Parel and the various cancer centres across the country under TMC.

A major work of the General Administration was to liaise with the statutory bodies, Central / State Government authorities' viz. the Urban Development Department (**UDD**), the Central Public Works Department (**CPWD**), the Public Works

Department (**PWD**), the Municipal Corporation of Greater Mumbai (**MCGM**), the Mumbai Collectorate, the State Department of Revenue and other local and national statutory bodies for various permissions, Licenses extensions and sanctions etc.

The General administration was responsible for the management of, and the allocation of, the various staff residential accommodation in the city of Mumbai.

Information was provided to **140 requests** received under Right to Information (**RTI**) Act 2005. The First Appellate authority received 24 appeals that were resolved in stipulated period.

A total of 499 employees were added to the Contributory Health Service Scheme (**CHSS**) and deleted 227 beneficiaries. The total beneficiaries of TMH were 5883; and, for the 2076 claims received, INR 34, 51, 515/- was sanctioned under CHSS.



Accounts

Joint Controller (Finance & Accounts), TMC, **Mr. Suryakant Mohapatra**

The Accounts department was responsible for patient billing, receipting and settling the accounts of different categories of patients i.e. smart card, cash paying, trust and company referred. The department was also responsible for budgeting, utilization of the plan and non-plan grants, submission of various reports to DAE regarding utilization of funds and the status of planned projects.

The fund management of all the new and upcoming TMC units was looked into by the Accounts department. The Financial Management Systems (FMS) was implemented in HBCH, Sangrur; HBCHRC, Visakhapatnam; and, at HBCH, Varanasi.

During the financial year 2018 - 19, Non plan Grant (Recurring Grant) of INR 325.68 crore was received; the plan grants sanctioned was INR 375.70 crore and the targets proposed were met.

The Smart Card services implemented across the hospital for all categories of patients resulted in the ease of transacting services in the institution. **Till end of year 2018, more than two lakh active Smart Card users carried out over 13 lakh transactions, to the tune of almost INR 300 crore.**

For patients' convenience and ease, the online top-up of the smart card facility continued and the kiosks helped generation of bills and statements, thereby avoiding running

around and waiting in long queues. Similar system was in place at HBCH, Varanasi and was to be implemented in MPMMCC, Varanasi.

In keeping with Digital India ideology and ease of transactions, the systems of payments through Point of Sale (**POS**), Real-Time Gross Settlement (**RTGS**) / National Electronic Funds Transfer (**NEFT**) / Payment Gateways / Cheques continued.



Food Services

Deputy Admin. Officer, **Mr. RA Patil**

The core belief of Food Service department of the hospital was that hard work, dedication and passion towards serving the patients and staff with gastronomic delights was the foremost priority.

Being a cancer hospital, the dietary requirements varied from patient to patient and, the department ensured that the dietary requirement of every patient was met by planning the menu keeping in mind its nutritional value and also the taste, so that the food was palatable to the patients.

The team members considered not only their duty but also felt a great sense of satisfaction to see satiated faces of patients, doctors, nurses etc. who were availing of the food services. The food quality and nutrition was never an option; it was considered to be mandatory, and accordingly, the menu

was planned with different recipes that excited the taste buds and kept the diners craving for more.

The greatest strength of the department was its core team that comprised of 03 Head cooks, 11 Cooks and 37 ward boys. The cafeteria team consisted of 02 Head butler, 04 Butlers & 12 ward boys, along with 03 supervisors, 01 Technical staff and 02 attendants. The staff members took pride in catering to around **1800 persons four times a day** covering around 7000 servings (TMH Staff and patients from 16 different wards). The department also catered to all attendees of approximately 200 National and International conferences in the year 2018.

The department ensured that the entire running operation of the kitchen and cafeteria was within the allotted yearly budget.



House Keeping

Officer in Charge, **Mrs. Rajlaxmi K. Naik**

The Tata Memorial Centre (TMC) was India's premiere hospital providing healthcare to cancer patients. The role of TMC's Housekeeping Department (**HKD**) was critical in providing a peaceful, infection free and pleasant atmosphere for the patients during their stressful period of in the hospital.

The HKD ensured Cleanliness and Hygiene using latest equipment, materials and techniques. The department also carried out Pest control with proper scheduling and planning, relocation of equipment and furniture in a systematic and timely manner, Façade cleaning, Flower arrangements, Garden maintenance, Green Waste Recycling (organic manure plant), coordinating complaints of electrical, civil, linen & laundry with their respective departments,

implementing allocation of Doctor's Quarters, Foyer & Stage arrangement, Academic Department – Examinations etc.

The HKD achieved this mammoth task by meticulously planning & scheduling their activities, training their in-house staff and, by motivating and mentoring them to improve their performance to enhance their productivity that ensured thorough & timely completion of tasks.

The HKD at TMH was regularly appreciated for their quick response, dependability and efficiency.

The efforts of HKD were praised during the conceptions of the hospitals Annual Evidence Based Medicine Conference and the Academic Convocations.

Human Resource Development (HRD)

HRD Officer, **Mr. Benny George**

Mr. PK Sukumaran, HR & Administration Co-ordinator

The goal of Human Resource Development Department (HRD) ensured optimum utilization of manpower by deploying the right person for the right place. Recruitment

actions for various posts, after following all procedures, had been taken for the 230 personnel appointed in the year 2018.

Category	Projects			
	TMH*	Visakhapatnam	Punjab	Varanasi
Group 'A'	18	06	03	29
Group 'B'	11	06	01	99
Group 'C'	42	-	02	13

*Tata Memorial Hospital, Mumbai

Handicapped Personnel Employed (15):

Category	Group 'A'	Group 'B'	Group 'C'
Group 'A'	02	-	-
Group 'B'	03	01	-
Group 'C'	04	02	03
Total	09	03	03

Reserved Category Employment Details:

Category	Group 'A'	Group 'B'	Group 'C'
Schedule Castes (SC)	22	137	406
Schedule Tribes (ST)	01	21	17
Other Backward Classes (OBC)	25	229	186
Total	48	387	609

The SC / ST / OBC officers were included in selection committee for the various interviews that were conducted; Mr. Harshad C. Waghmare, Purchase Officer for SC/ ST/ Physically challenged and Mr. A. N. Sathe, Chief Administrative Officer for OBC, were the liaising officers.

The department promoted 123 employees. Sixty Three (63) employees ceased from service in 2018, of which, 37 superannuated and 10 retired voluntarily. All the SC / ST employees were interviewed for the merit based review promotion and were promoted with relaxed norms. The HRD facilitated recruitment of trainees for various short term and long term training programmes. There were 26 advanced specialized skilled courses for doctors, nurses and technicians. From across the country, 230 trainees benefited during the year.

The skills of in-house employees were developed through various training programmes and workshops and, many were deputed for training programmes conducted by Advanced Training Institutes (ATI) of the Department of Atomic Energy (DAE); the Institute of Secretariat Training and Management (ISTM), New Delhi; the Financial Management Research & Resource Society (FMRRS), Mumbai and the Entrepreneurship Development Institute of India.

Personnel

Senior Personnel Officer, **Mr. Rajendra P. Jaiswar**

Personnel Department organized training programme for labor staff through central Board for Worker's Education, Ministry of Labour and Employment, Govt. of India. About **300** labor staffs were benefitted during the year. The centre had the backing of **839** number of labor staffs governed under Brihanmumbai Municipal Corporation (BMC) and Central Government (CG) who played an important role in the areas of Cleanliness, Transport of Specimens, documents etc., that were important support functions in delivery of patient care. During the year, department conducted staff promotional activities and promoted **74** labor staff (BMC & CG). During the year **22** BMC employees switched over to CG rules. Promotion policy for CG employee was prepared and implemented. During the year, **13** labor staff superannuated/ voluntarily retired.

All the labor staffs were trained on behavioral aspects, communication, family budget, dignity of labor, absenteeism etc. Weekly meetings were conducted with recognized union to resolve the common issues for smooth functioning of the hospital work including patient care. Allocation of man power to different wards, departments and sections was fulfilled to maintain a high standard of cleanliness and hygiene. Submission of identity card form for labor staff as well as pensioner and festival advance form, Annual Budget, Passport form, service certificate to retirees and Pension form were made available through online process. The Time Keeper Office functioned 24 x 7 to facilitate deployment of labor staff to various departments in the hospital. Computerized leave application, leave crediting and leave record maintenance system was successfully made operative.

The pension related documents and calculation date could be easily extracted without referring personal file of the pensioner. This reduced the time required needed do this activity manually.

Bank / court recovery / Pensioners forms related work of the labor staff was also done through Personal Information

System (**PIS**) transaction. Preparation of service book for CG Employees was under process.

The Personnel Department in coordination with the selection committee nominated labor staff with good work record for "Best Worker Award" and they were felicitated at Annual Hospital Day Function.



Public Relations

Sr. PRO (TMC) and Officer in Charge of Corporate Social Responsibility,
Mr. S.H. Jafri

The Public Relations (**PR**) office played an important role in maintaining a positive image of the organization. The PR officers were proactive with the various Publics of the institution. The department followed the simple principle of compiling data by active research, evaluation & analyses of the problems / data, and planned with the management to implement such programs keeping in consideration the resources available. Prompt feedback was accumulated that analyzed the success of these programs and, to make them better.

The various Publics that were given priority included:

Media (Press Conferences)

The PR office maintained transparent environment with the media and, with regular personal contact, led to hospital friendly media with positive achievements of the institution being widely publicized. Press conferences were held during the graduation ceremony, on International Women's Day and for the Bhoomi Poojan of InfoSys Asha Niwas at the Advanced Centre for Treatment, Research & Education in Cancer (ACTREC) at Kharghar in Navi Mumbai.

Staff Welfare Program

The PR office organized welfare activities for the hospital staff members that maintained healthy relationships among them. The various programs included organization of the annual Hospital Day function, the Best Workers Award, refreshers training courses, sports activities, trekking for staff children and other cultural programs.

Patients / Relatives

The PR Dept in co-ordination with various Non Government Organizations (**NGOs**) organized outings, cultural programmes, yoga sessions, movie shows etc. for the patients regularly. These activities provided a welcome relief to the patients from their pain and tensions and, the patients and their relatives looked forward to such programmes.

The festival of Diwali was celebrated with cancer patients and their relatives by the PR office every year. The PR office arranged entertainment programs that included orchestra, magic shows, Puppet shows etc. and distributed gift hampers. Small fireworks were also arranged and snacks were provided.

As a part of patient welfare activities, the PR office arranged a trip to Goa for children with cancer every year. The Goa Excursion Tour brought children together to share their experiences with each other about various aspects of treatment, accommodation, financial help & moral support.

Non Government Organizations (NGOs) & Volunteers

About 30 NGOs and more than 150 volunteers including individuals were streamlined & monitored and used for the benefit of the institution. The volunteers were of tremendous help to patients, relatives as well to the hospital staff by facilitating the cumbersome process at the Out-Patients section, the Disease Management Group clinics and at the blood collection area. The **Helpline** functioned under the PR with the view to co-ordinate and streamline the activities of various NGO'S and individual volunteers to offer maximum

help to the patients in the form of financial help, accommodation, counseling and guidance, ration distribution, educational support, rehabilitation program, assistance in organizing Diwali and various entertainment programs as well as distribution of various items like food, clothes, toys etc received as donations.

International Patients Relations

The PR office replied to the mails received from International patients for Medical visa, consultation appointments and, if visa was required, the visa letter was sent to the patient. The PR also advised, counselled and guided them for local accommodation, currency exchange etc. A total 996 Foreign National patients were registered in Tata Memorial Hospital in the year 2018.

Conferences / Meetings / Seminars

The PR office interacted with different departments during conferences, meetings, seminars etc. that ensured smooth functioning of all ancillary services including the floral arrangements, the kit bags, medals, transport, dignitary welcome, banners, posters, badges, etc.

Welcoming Visiting Dignitaries

The personal visits by the distinguished visitors left them with a lasting memory of the image of the institution. Proper care was taken to inform the visitors about the working of the institution during their visit.

Hindi Cell

The PR Office worked towards the effective implementation of the Official Language (Hindi) policy of Department of Official Language in the Organization. These activities included organization of various competitions for the staff to celebrate 'Hindi Fortnight'; Kavi Sammedan for patients; translation of all documents including signs & rubber stamps; selection of Hindi books for the library; arrange Hindi Classes for the staff of the Hospital; providing training to the staff on using Unicode Hindi Typing tool on computer etc.

Publication

The PR office prepared the Patient hand book, News dispatch in English, Spandan in Hindi & Marathi, and the telephone directory and compiled a Cancer Glossary of around 8000 words (English to Hindi).

Life Insurance of India (LIC) Death Claims

All LIC Policy death claims were being processed by the PR department so that the relatives do not face any hardship for claiming their insurance. One hundred and sixty (160) death claims were been processed in the year 2018.

Corporate Social Responsibility (CSR) Donations

With inputs from the management, the PR department helped procure various medical equipments from companies through their respective CSR funding. Some companies funded patient treatment as well as in refurbishing and renovations of certain essential areas in the hospital.

Purchase

Purchase Officer, **Mr. H.C. Waghmare**

The Purchase Department was involved in the procurement of various consumables, capital equipment, minor equipment, spare parts, local purchases etc. The Primary aim of the purchase department was to provide efficient and exceptional service to the entire Centre by way of arranging materials and services of requisite quality and, by minimizing the lead time.

During the calendar year 2018, the Purchase Department procured:

- Capital Equipment's, Spares and Consumables for the entire Centre worth **INR 148 Crore through Import Cell**

- Consumables, Spares and Local Equipment's for the Centre worth **INR 28 Crore through Non Rate Contract channel** and,
- Reagents, Consumables and other essential services for the Centre worth **INR 54 crore through Rate Contract Cell.**

The total materials procured and services arranged worth **INR 230 crore** in the calendar year 2018.

Security

Chief Security Officer (TMC), **Mr. Johnson Lukose**

The security department shouldered the core responsibilities i.e. regulating the movement of people, material, vehicles etc. in order that ensured safety & security of the Institutions property. The department also carried out other varied responsibilities like fire fighting, scrutinizing the documents of foreign nationals and their attendants before registration & admission, liaised with local police & Civic officials. The security audit of TMH was carried out by the officials of Security and Protection Branch of Mumbai Police. The security measures recommended by them were looked into. The Republic Day and Independence Day celebrations were organized by the security department. The Vigilance

Awareness Week – 2018 was observed from 29.10.2018 to 03.11.2018. Shri. Subodh Kumar Jaiswal, IPS, Commissioner of Police, Mumbai, delivered a lecture on the theme i.e. “Eradicate corruption – Build a new India” that was attended by TMH staff. During the programme, the pledge in Hindi and English was administered by Dr. Sanjeev Sood, Director (Projects) - TMC and Dr. CS Pramesh, Director-TMH respectively. Posters for spreading the awareness were printed and displayed prominently at the venue as well as in OPD areas. Adequate arrangements in coordination with Police and other related agencies were made during all visits of renowned dignitaries and important personalities.

Stores

Stores Officer, **Mr. Arun L. Kuvalekar**

The main function of the centralized stores was to stock and support day to day requirement to the various wards / Out Patients Department / Laboratory / Departments as and when required.

The Stores received all stock and non-stock consumable and capital equipments except drugs and surgical goods. The Stores took maximum efforts and innovative ways to save papers to promote Go Green scheme.

Stores was **holding 319 stock items** during 2018-2019 with **inventory value of INR 44,92,958/-** as on 31st March 2018. There was no discrepancy in ledger and physical stock items during annual stock taking.

The Stores also received capital items including donation or free of cost or under project as per requirement of various department and maintained assets inventory records. This helped the Maintenance, Verification & Disposal Cell and the Biomedical Department to check Warranty, Annual Maintenance Contract and Comprehensive Maintenance Contract details to do real time maintenance of asset.

The Stores also conducted physical verification and tagging of asset routinely; tagging of asset, painting of asset number and computerized entry of these assets was completed till December 2018.

Medical Administration

Medical Superintendent, **Dr. Mrs. Sarita V. Khobrekar**

Assistant Medical Superintendents

Dr. Vinit Samant
Dr. Ms. Sumedha Patankar
Dr. Sandeep Sawakare

The Medical Administration was led by the Medical Superintendent (MS) Dr. Sarita V. Khobrekar and her team of Assistant Superintendents (AMS). They were the link between the patients and the hospital staff and, addressed medical as well as administrative issues between them. The departments of biomedical engineering, the registration office, the sterile supplies, stores and pharmacy, Quality control, social workers, hospital staff clinic etc, reported directly to the MS office. They ensured that all process were in place for smooth interaction between the patients and medical staff and, between the medical staff and the management. The team also ensured the implementation of various quality improvement processes. Issues related to patient safety were addressed by them and the medical administration also addressed patient grievances. The

medical administration was involved with the patients right from the time of registration till their discharge. The onus of running the out patients department was on them. They had to address the needs of the increasing number of patient registrations every year. In 2018, the patient registrations grew by 3 %. They also looked into the increased waiting period for various investigations and devised algorithms that reduced patient waiting periods. Overcrowding was another issue that they had to address, and for which, they reshuffled non essential patient services to different locations. To initiate the process towards National Accreditation Board for Hospitals & Healthcare Providers (NABH) Accreditation, a team of doctors, nurses, administrative and technical staff were provided the Internal Counselors training for NABH Accreditation with a view to improve quality and consistency of patient care at the hospital.

Biomedical Engineering

In Charge, **Mr. Milind H. Raut**

The core responsibilities of the Department of Biomedical Engineering (**DoBE**) included upkeep of all hospital biomedical equipments for all critical, diagnostic and therapeutic areas. This involved preventive maintenance, breakdown, maintenance, new purchase and condemnations. The department had a staff of 05 engineers, 02 support staff and 03 admin. staff.

The DoBE extensively concentrated on in-house repairs of medical equipments. In the year 2018, a total 112 work orders were issued for repairs. A total 210 of Annual Maintenance Contracts (**AMC**) / Comprehensive Maintenance Contracts

(**CMC**) work orders were issued out of which 140 were renewal and 70 were for new. The department also supported these activities at the other centres in Visakhapatnam, Sangrur and Varanasi. The calibration of all laboratory equipments was also a prime responsibilities of DoBE in the view of National Accreditation Board for Testing and Calibration Laboratories (**NABL**) accreditation.

For the 180-bed Homi Bhabha Cancer Hospital in Varanasi, the list of medical equipments was derived in consultation with the respective users. Active support was given by DoBE during installations and executions till commissioning.

Central Registration Office

Officer in Charge:

Mrs. RM Chahabria (till September 2018)
Mr. Sreenivas Sunkarapalli (from October 2018)

The Central Registration Office (CRO) for the General and Private Out-Patients Department (OPD) was managed by Mrs. RM. Chhabria and Mr. Sreenivas Sunkarapalli respectively. To facilitate the process of registration and to conduct other activities related to patient management immediately before and after OPD consultation such as requisitioning of services, billing, issuing medical certificates, railway concessions etc., there was had a team of **134** staff members.

The CRO was the first point of contact for those who wished to avail the hospital services. The front office staffs were deputed for OPD support activities such as Registration, Billing, Enquiry, Appointments and Certificate issuing counters.

While general OPD registered **30454** new cases, the private OPD saw cumulatively (including new registrations and second opinion) around **36795** new cases. With a view to decongest the OPD areas, few infrastructural and process changes were made in the OPDs.

Statistical Data

Patient Registration	General	Private	Total
New Files	30454	15213	45667
Referral (RF) Cards	-	21582	21582
Total Registrations	30454	36795	67249

	General	Private	Total
Number of Railway Concession Issued	142510	73081	215591

New Initiatives

- Centralised billing and appointment (for CT & MRI scans/OPD) counter were made functional from 07.00 am in order to cater to patients coming for morning Sample Collection
- Electronic Calling and Token system was introduced initially for Ground floor Disease Management Groups (Urology/Gynecology/Bone & Soft Tissue/Thoracic) & in the Main Building Ground Floor for Paediatric Haematology
- Billing of all OPD related services was relocated at a centralized location for patient's convenience and better access
- Appointment & Token Calling System introduced in two (02) DMGs gave patients the clarity about expected waiting time and current status of queue in the OPD
- The earliest available dates for CT, MRI and PET Scans were displayed prominently for easy reference.

Central Sterile Services Department

In Charge (Supportive), **Mr. Rajeev G. Sawant**

The Central Sterile Services Department (CSSD) was the life line of the hospital that received, processed, packed, sterilized, stored, distributed and controlled supplies of sterile materials to all the departments including wards, Out Patients Department (OPD) and Operation Theatres (OT).

The department's aim was to provide efficient, economic and uniform sterile supply for the care and treatment of patients.

Its major responsibilities included processing and sterilization of surgical instruments, Trays and Sets, Dressing Material,

Rubber Goods, linen etc. by means of state-of-the-art equipment such as Washer Disinfector, Ultrasonic cleaner, Dryer, EO (Ethylene Oxide) Sterilizer, Pre-Vacuum Sterilizers, Gas-Plasma sterilizer.

The staff members ensured that the devices were properly handled, processed, stored and calibrated to minimize the risk of contamination at the point of care.

Mechanical, chemical and biological Indicators were used for monitoring quality.

The CSSD department followed unidirectional flow concept at TMH i.e. departments facilitate one-way flow of items between soiled and clean work areas and sterile storage. Walls and other barriers separated the functional areas of the CSSD for decontamination, preparation and packaging, sterilization and sterile storage.

The department provided uninterrupted service for patient care needs with twenty loads of steam sterilizer, 30 cubic feet materials, one load of 05 cubic feet of gas sterilizer per day and 6 - 8 loads of 05 cubic feet of plasma sterilizer per day. It was planned to install one washer disinfector for thorough cleaning of robotic instruments, one thirty liters and one sixty liters ultrasonic cleaner, to cope with the increasing load and to provide more efficient sterilization services to the hospital.



Medical Social Services

Acting Officer in Charge, **Mr. Chandu Parab**

Mrs. Parishi Majmudar
Mrs. Sunita Jadhav

Mr. Kishor Howale
Mrs. Sarika Parab

Mr. Jaykumar Mane
Mrs. Melba Koli
Mrs. Prajakta Mhapparle

Globally psychosocial concerns in Cancer Care continuum was gaining equal importance with clinical care. Dispelling myths and stigma by way of psycho education was an urgent intervention. The national network in cancer care has to be strengthened in order to bring about attitudinal change in cancer care outlook.

The multi professional team approach helped in meeting multiple challenges in cancer care from hope to diverse cultures, linguistic concerns, and huge numbers of national and international patients. The Medical Social Worker (**MSW**) of the department with 08 trained Post Graduate Social Workers formed a vital segment in the team that catered to these concerns adopting appropriate management of resource mobilization, planning, coordination, networking, and advocacy for patient needs of emotional support, counselling, finance, food, accommodation, apt referrals and rehabilitation.

Service

The MSW supported patients through ongoing need based assessment and tools and, offered non – judgemental and non - biased intervention in patient care.

The department guided **38,000** old and new patients in 2018 in their treatment journey; 23000 patients were offered counselling while considering them for change in category, medical concession and social support needs. **Concession worth INR 1, 06, 53, 657 was extended on drugs to 10017 patients.**

Low cost / free accommodation at Borges Home, a TMC undertaking and other multiple places around the hospital was offered to 3879 patients.

Financial burden in cancer treatment impacted patient and their families. The MSW networked to advocate and educate stakeholders, philanthropic institutions, individuals and groups to donate generously thereby building a bond of trust and faith in the donor friendly system.

A sum of INR 24 crore was generated through external support and disbursed to deserving patients supporting their treatment.

In house support was provided to patients through seed and supplementary funds to tide over financial crisis in treatment at initial diagnostic phase or mid treatment crisis when hospitalised. Nine Hundred & Four (904) patients benefitted from in house support to the tune of INR 90, 40, 000/-.

A total number of 34 home visits were also made to improve treatment compliance of Radiotherapy patients.

Education

Senior MSW's were invited as faculty experts by College of Social Work Nirmala Niketan, Tata Institute of Social Sciences (**TISS**), and Shreemati Nathibai Damodar Thackersey (**SNDT**) University to orient and teach students on psychosocial dimensions of oncology care.

Non-Government Organizations (**NGO**) invited MSW's to impart practice based skills and empower volunteers to offer

seamless care and service and, to shape activities of their esteem organizations.

MSW offered their expertise to corporate houses and Corporate Social Responsibility (CSR) teams who seek help in shaping activities to offer meaningful contributions in cancer care and associated social realities in health care service delivery partners. Various induction programs were conducted for Tata Trust that trained newly inducted executives who would be working at grass root and middle management teams in cancer care across the country; the goal being uniform sustainable care operations at all centres in the country.

The department contributed in supervision and guidance of **Kevat** students and also as a field work agency of senior social work students placed with MSW for integration of theory and practice skills in hospital settings.

Educational and Cultural Programs organised by MSW for patients in collaboration with other NGO's included:

- Education support for cancer survivors and patients at Taj Mahal Hotel, Mumbai
- Celebration of International Women's Day for female cancer patients
- Cultural celebrations (Diwali and Christmas) for patients and survivors.

Pharmacy / Dispensary

In Charge, Asst. Medical Superintendent, **Dr. Sumedha Patankar**

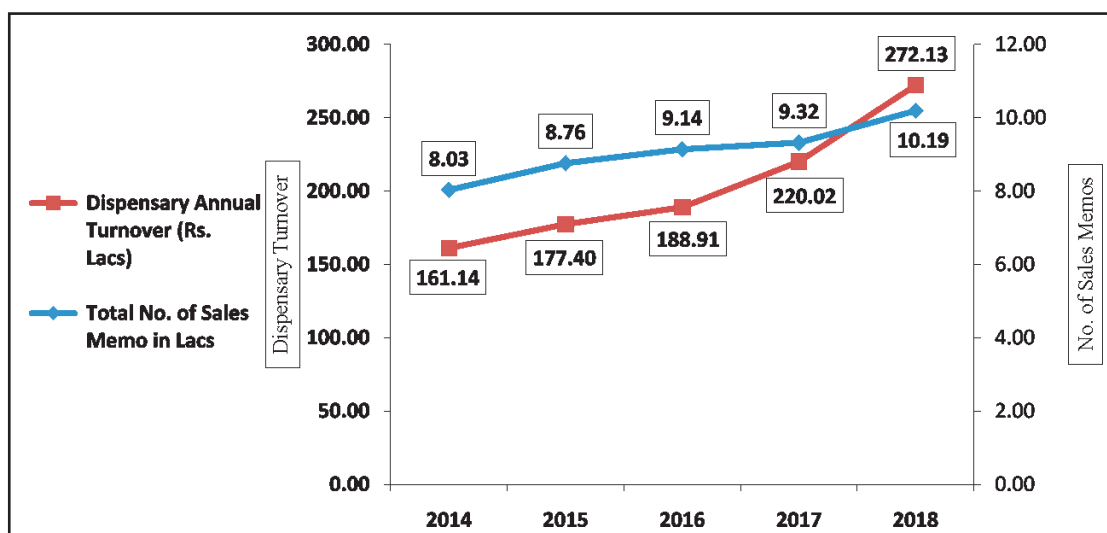
The Dispensary team consisted of 17 permanent pharmacists and 33 contract pharmacists. The department functioned 24 x 7 and catered to prescriptions for both in-patients and out-patients. The average daily transactions in the year 2018 were around **2800 per day** and the annual turnover was over **INR 270 crore**. The three pharmacy outlets together executed **1019424 sales transactions** during the year. In addition to providing medicines at highly discounted rates there were medicine concessions offered to more than 10000 patients valued at INR 1.06 crore.

The Drug and Surgical items were directly procured from the manufacturer at a discount ranging from 10% to 90% on the

Maximum Retail Price (MRP) value. The average discount availed on total purchases i.e. Drugs & Surgical for the year 2018 was at **an average of 54% on MRP**.

The Dispensary Procurement Cell was guiding the purchase process in the new upcoming units of Tata Memorial Centre viz: Varanasi, Sangrur, Visakhapatnam etc.

To ensure continuing education & training for pharmacists, the department had arranged training modules on Inventory Management & Soft skills - Communication skills as a part of Pharmacy-Continuing Education (PACE).



Dispensary Turnover / Sales (Year On Year) Increase

Quality Management

Quality Manager, Ms. Chitra V Hingnekar

The Laboratory quality management team continued to work towards maintaining the required standards, regulatory norms and accreditation status through their oversight activities, periodic reviews and regular audits to ensure the continual quality care and safety in the year 2018.

The TMH hospital committees met regularly for implementing team based patient safety practices, processes and improvements.

Service

The Clinical Department Heads / Officers in Charge facilitated obtaining the grant in National Accreditation Board for Testing & Calibration Laboratories (NABL) Accreditation through Desktop surveillance for their services in March 2018.

Internal audits were held at pre-defined intervals for all the eight accredited clinical laboratories including sample collection areas of the hospital by the NABL trained TMC consultants and scientific officers. This exercise helped in identifying opportunities for improvements and compliance to quality system management and standards.

To bring in the uniformity in the laboratory reporting system the reports of referral cases too were made on-line from December 2018.

Among the TMH multidisciplinary hospital committees, the Hospital Infection Control Committee met quarterly, Safety and Cardio Pulmonary Resuscitation committees met biannually in the year 2018.

The **safety committee reviewed 135** (98 clinical and 37 facility related) incidents reported from January to August 2018 and initiated appropriate corrective and preventive measures. Standardization of incident report and sensitization on the reporting system to the staff enhanced the reporting of incidents by 15% by Doctors and other staff as compared to 7% in the previous year. Nursing staff continued to be the maximum contributors in reporting the incidents.

The initiative of hospital round began with private ward of the main building in October 2018.

The multidisciplinary team represented by nursing, general and medical administration brought to the fore many observations that were resolved in coordination with the user and concerned departments.

Education

Keeping in accordance with International Organization for Standardization (ISO) 15189:2012 standards and relevant NABL requirements, regular training and orientation sessions were conducted for the existing and new staff. The topics covered were, Universal safety precautions, Infection control & Safe Practices (twice), Information Technology & Diagnostic Information System / Hospital Information System training (twice), Fire Safety Training (thrice), orientation on Pre-analytical aspects, Sample collection & transportation requisites of Clinical Biochemistry, Hematopathology, Cytopathology, Cancer Cytogenetics and Histopathology-Operation Theatre related issues (thrice) conducted by the laboratory representatives and the Nursing staff. The orientation sessions on Quality Management (four times), accreditation & Desktop surveillance (thrice) and Data Quality Management activities (four times) were also conducted. Overall 325 attendees from both laboratories and nursing staff were benefitted from the above 21 sessions that were held in the year 2018.

Second National Conference & Workshop on “Managing Quality in Clinical Laboratories” was organized by the Quality Manager and Clinical Laboratories on 20th to 21st January, 2018 at TMH. A total of 214 participants, including Medical Doctors (76), Scientific and Non-Medical Personnel (138) attended. The conference received a positive feedback for all the sessions with request for more such conferences.



Staff Clinic

Staff Physician, **Dr. Sandeep Tandon**

Dr. Pankaj Rajput
Dr. Shabina Ansari

Service

The Staff Clinic provided health care to **2361** TMH staff including 1501 super staff, 860 labour staff (including their dependents) for their day to day ailments. In 2018, the Staff Clinic had approximately **30931** consultations, **547** pre-employment examinations, **181** Hepatitis B vaccinations and **101** Needle stick injuries.

New initiatives:

Since 2017, the Staff Clinic provided TMH staff access to their investigation reports online through the Employee Portal as well as incorporating scanned Electrocardiographs. Efforts were ongoing to cut down local purchases by making optimal medications available in TMH dispensary. As a newer initiative, the clinic had incorporated a trial version of an Online Local Purchase Prescription Module so as to have documentation and records pertaining to local purchase prescriptions issued from Staff clinic. The pharmacy was informed to have a similar module for faster procurement, aid auditing and keep the hospital paperless. Online medical certificate issuance had been initiated by Staff Clinic linking

it to Human Resource Development department, Time Office and Personnel Departments, thus saving paper and ensuring well maintained online records.

Education

Though the Staff Clinic OPD was perpetually packed with around 120 to 150 staff patients daily, every possible opportunity was used to educate the staff about their illnesses and positive health by encouraging and conducting health checkups for early detection of modifiable and treatable risk factors for lifestyle diseases like hypertension, diabetes and dyslipidemias. The staffs were educated about the importance of Hepatitis B vaccination and ensured completion of vaccination.

Research

There was ongoing work on computerising health related data of TMH staff to identify staff with increased risk of various lifestyle diseases as well as various practice and policy related audits.



**Advanced Centre for
Treatment, Research &
Education in Cancer
(ACTREC)**



Overview of ACTREC

The **Advanced Centre for Treatment, Research and Education in Cancer (ACTREC)** - the R&D wing of the Tata Memorial Centre, is located in Kharghar, Navi Mumbai. ACTREC comprises of the Clinical Research Centre and a 120 - bedded Hospital that endeavour towards the treatment of cancer patients as well as clinical and translational research, and the Cancer Research Institute that addresses questions in basic and applied research on cancer. The clinicians, clinician scientists and basic scientists of the Centre are engaged in a large number of clinical trials and audits, as well as institutional, intramural and extramural projects that involve basic, applied, translational and clinical research and aim at a better understanding of cancer; the long term goal of most of these projects is early diagnosis and improved survival of cancer patients. While some of the studies are stand alone, the vast majority are collaborative projects involving close interaction between scientists and/or clinicians within and outside the Centre; some are multicentre international projects. The trials too involve collaborations between the Centre and industry particularly the Pharma sector. Funding support for most projects come from either the Centre itself or from governmental funding agencies.

During the year 2018, a total of 222 projects were on-going at the Centre and 195 of these projects received financial support of Rs. 8.68 Crore from governmental agencies such as DBT, DST, ICMR, and others. In addition, 8 new extramurally funded projects were sanctioned Rs.7.66 Crore for a three year period by these funding agencies for which Rs. 1.5 Crore has been received for the calendar year. Research carried out by faculty of the Centre resulted in 144 total publications in 2018, of which 120 were in reputed international journals, 19 in widely circulated Indian journals, 5 were book chapters and 1 research led to a US patent. During 2018, 52 regular staff members were appointed at the Centre in the medical, scientific, technical, nursing and administrative cadres.

The **Clinical Research Centre (CRC)** and **Hospital** continue to be at the forefront of new developments at ACTREC. Currently CRC has a total of 120 beds including 88 ward beds, 10 ICU and Recovery beds, 6 bone marrow transplant beds and 16 Day care beds. The hospital renovated and made functional 3 Operation theatres with state of the art technology as part of Phase I of OT/ ICU complex renovation. Each of these theatres take up approximately 50 major cancer surgeries/ month for regions including Breast, Head & neck region, Gastro intestinal and Urogenital. The new Patient

waiting area with a seating capacity for 100 patients was made functional. This project designed with patient requirement in mind has helped in creating an optimal waiting facility and made waiting for consultation/Day care/diagnostic report convenient as well as decongested the OPD area of the hospital. A total of 7154 cases were registered in the year 2018, of which 1219 new cases were registered directly at ACTREC and rest were transferred from TMH. The total numbers of admissions were 4771 with 23315 inpatient days. The Day care ward has taken about 100 patients per day during 2018 for chemotherapy, hydration and transfusion.

The department of **Medical Oncology** started its services in ACTREC in 2006. The Solid tumor unit routinely administers chemotherapy in neoadjuvant, adjuvant and palliative setting for solid tumors as well as concomitant chemotherapy with radiotherapy for head-neck and cervical cancers. The Bone Marrow Transplant unit performs autologous/ allogeneic transplants with 10% overall transplant related mortality (2% in autologous, 18% in allogeneic). Adult patients with hematolymphoid neoplasms not undergoing transplant are also being treated in ACTREC. Department of **Radiation Oncology** at ACTREC fulfills the Centre's mandate of high-quality service, education, and research (clinical and translational) in collaboration with colleagues from TMH and scientists from Cancer Research Institute (CRI). The group generates high-quality evidence for the use of advanced radiotherapy technology (IMRT, IGRT, SBRT) in cancers of various sites including brain, head-neck, breast, cervix, genito-urinary tract and hematolymphoid malignancies. The department of **Surgical Oncology** runs five regular operating theatres five days a week and two operating theatres during Saturdays, provides in-patient care, and conducts regular out-patient clinics for newly registered as well as pre- and postoperative care and follow-up clinics for a wide range of cancer patients. Breast surgical services are well established at ACTREC with OPDs five days a week. The neurosurgical services offer intra-operative neurophysiologic monitoring, image guided surgeries, as well as brain mapping and monitoring facilities. Minimally invasive laparoscopic GI surgeries as well as more complex surgeries like excentration are also performed. The department of **Anesthesia, Critical Care and Pain** provides Anesthesia services for the five OTs, Interventional Radiology, MRI, Radiotherapy OT and the Pre anesthesia check-up clinic, administers Critical Care services for the 7-bedded ICU plus a 3-bedded PACU with a CPR team, and also renders Acute Pain services.

The department of **Radiodiagnosis** is well-equipped and provides the following diagnostic imaging services at ACTREC: computed radiography, ultrasonography, color Doppler, computed tomography (CT), magnetic resonance imaging (MRI), mammography and interventional radiology (IR). CT services are shared between PET-CT, RT and diagnostic department. Besides routine MRI, perfusion imaging, diffusion weighted imaging, MR angiography, diffusion tensor imaging and functional MR imaging are also being carried out. IR procedures are increasingly being carried out at the ACTREC Interventional Radiology Suite. The department of **Transfusion Medicine** consistently attempts to provide sheltered and satisfactory supply of blood segments round the clock to meet the specialized hemotherapy need of patients admitted at ACTREC - especially for the BMT, hematolymphoid, pediatric oncology, and surgical oncology units. It also caters to the blood component requirements of patients admitted in other hospitals in Navi Mumbai. The **Nursing Department** provides comprehensive and excellent nursing care for individuals of all ages diagnosed with cancer, assisting in the recovery to optimal health and good quality of life. The objectives are implementation of patient safety goals, continuing education, and research. New initiatives during 2018 included capturing of Surgical Site Infection rates (SSI), patient satisfaction with nursing care and initiation of Catheter Associated Urinary Tract Infection (CAUTI) bundle. The department of **Cancer Cytogenetics** at ACTREC provides diagnostic services (conventional karyotyping and fluorescence *in situ* hybridization) for hematolymphoid malignancies to in-house patients and outside referrals, thus contributing to diagnostic and prognostic evaluation of patients *vis a vis* treatment. The **Pathology Laboratory** at ACTREC 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 well-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 NABL accredited **Composite Laboratory**, provides 24 hours' services to the hospital and consists of three sections: sample collection area, haematology, and biochemistry (routine biochemistry and immunoassay). The **Hematopathology Laboratory** provides services for the diagnosis of hematological malignancies, monitoring of patients while on therapy for all malignancies and preoperative & postoperative hematological workup of surgical patients. The laboratory executes Minimal Residual Disease testing and post treatment monitoring of patients of Chronic Myeloid Leukemia, B cell Acute Lymphoblastic leukemia in children, T cell Acute Lymphoblastic Leukemia,

Acute Myeloid leukemia and Multiple Myeloma. NGS facilities for diagnostics and research have been initiated this year. The **Microbiology Laboratory** provides patient services for processing and reporting of bacteriology, serology, mycobacteriology, 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 carried out by the Laboratory. The **Clinical Pharmacology** group at ACTREC focuses on improving treatment outcomes through the optimization of drug dosages based on pharmacokinetic (PK) and pharmacodynamics (PD) modeling. The group has developed extensive capabilities in therapeutic drug monitoring (TDM), a method of individualized treatment based on drug levels and exposure. In addition, the group provides critical support and expertise necessary to effectively conduct early-phase clinical trials in oncology. The **Hypoxia and Clinical Genomics** group endeavors to understand the role of hypoxia in cancer metastasis & cancer spread, clonal evolution of a tumor leading to therapy resistance, and developing novel assays to monitor tumor burden and response to therapy. The eventual goal of this group is to translate preclinical findings in the laboratory into relevant interventions that address clinical problems. This laboratory is 'nodal' for the Multiomics Hormone Resistance study in breast cancer initiative under the aegis of the Virtual National Cancer Institute (VNCI) endeavor by the Department of Biotechnology, Govt. of India. The **Chromatin Biology** group examines the biology of cell-free DNA and chromatin fragments which can freely enter into healthy cells, integrate into their genomes, and trigger DNA damage, apoptosis and inflammation. These findings have wide implications since DNA damage and inflammation are integral to age-related disorders such as cancer, heart attack, stroke and Alzheimer's disease. The **Radiobiology** group focuses on radiation biology and cancer chemotherapy, and aims to develop newer formulations of radiation modifiers (both radiation sensitizers and protectors), besides repositioning existing drugs as radiation sensitizers.

In the **Cancer Research Institute**, research projects encompassing basic and applied research on cancer are being conducted by the following thematic groups - Cancer Cell Biology; Cancer Genetics, Epigenetics and Genomics; Cell and Molecular Imaging; Hemato-Oncology; Protein Biochemistry, Biophysics and Structural Biology; Stem Cell Biology and Cell Signaling; and Tumor Immunology.

In the **Cancer Cell Biology** group, Dr. Teni's team focuses on gaining insights into the molecular basis of oral and cervical tumorigenesis. On-going studies aim to identify the p53 mutant interactome associated with its gain of function activity in oral cancer cells. Determination of the molecular mechanisms driving radioresistance is being done by validating proteins (TCTP and Moesin) that are associated with radioresistance in the established radioresistant oral

cancer cell lines. Studies to establish HPV positive and HPV negative cervical cancer chemo-radiotherapy resistant cell lines have been initiated to decipher the role of HPV16/18 and the underlying molecular mechanisms in therapy resistance. Other studies include elucidating the non-canonical roles of Mcl-1 in DNA damage response and autophagy; assessing the interaction of CLU with DNA repair proteins in the nucleolus, in response to DNA damage; understanding the regulation of Activin A in oral cancer cells by p63 and its role in oral cancer cell migration. Dr. Dalal's team examines the regulation of cellular pathways by 14-3-3 proteins, and how loss of desmosome function leads to neoplastic progression. Recent work has identified additional mechanisms underlying desmosome biosynthesis and the highly regulated process of desmosome formation, as well as mechanisms by which 14-3-3 ligand complexes form and dissociate, thus regulating centrosome duplication. Increased levels of the secreted protein LCN2 - that confer radio/chemo resistance to cells both *in vitro* and *in vivo* - may serve as a potential target for therapeutic intervention in multiple tumor types. Dr. Warawdekar focuses on the assessment of circulating tumor cells (CTCs) as a tool to track minimal residual disease in solid tumors, in a bid to evaluate the efficacy of therapy and disease prognosis. She has established a protocol for the isolation and enumeration of CTCs from the peripheral blood of breast cancer patients, and has validated the method used for CTC evaluation. Isolation, *in vitro* culture and molecular characterization of CTCs from patients with advanced breast cancer with its correlation to primary tissue biopsy are being examined. The use of circulating biomarkers like miRNAs to gauge improved disease free survival in breast cancer patients' consequent to pre-surgery single depot injection of hydroxyprogesterone is in process.

In the **Cancer Genetics, Epigenetics and Genomics** group, Dr Shirsat's team identified MiR-204 as a valuable marker for risk stratification with a therapeutic potential in the treatment of medulloblastoma, a malignant brain tumor in children. MiR-204 expression levels identify a subset of non-WNT, non-SHH medulloblastomas having high incidence of metastasis and poor overall survival. This finding was validated in an independent western cohort of 760 medulloblastomas. A serum microRNA signature was identified as a biomarker that distinguishes metastatic disease from the localized prostate cancer with an accuracy of 93% as determined using a machine learning algorithm. This microRNA signature can be used as a biomarker for diagnosis and monitoring of patients with prostate cancer. Dr. Mahimkar's team studies genomic alterations at the level of copy number across the genome, and identifying genes/gene clusters underlying the altered genomic loci in tobacco-related oral squamous cell carcinoma (OSCC). Signatures associated with the progression of pre-invasive lesions to invasive OSCC, and candidate driver alterations unique to

primary tumors with lymph node metastasis and related to patient survival have been identified. The chemopreventive efficacy of polymeric black tea polyphenols in inhibiting carcinogen-induced lung adenomas in A/J mice is being tested. His team has for the first time demonstrated that administration of PBPs in drinking water throughout the carcinogen treatment period significantly decreases the multiplicity of surface tumors and microscopic lung lesions, including adenomas. Dr. Gupta's team has shown that changes in H2A isoforms and H3 variants, their site-specific post-translational modification, and deposition machineries of histones affect the process of tumorigenesis and resistance mechanisms. The critical role played by mitogen and stress activated kinase 1, protein phosphatase 1, histone deacetylase and acetylase in the regulation of cell cycle dependent H3 serine 10 phosphorylation as well as that played by acetylation in the DNA damage response in human cell lines and gastric cancer tissues have also been identified. In view of the translational perspective, his team has developed a liquid biopsy based 'real time' monitoring method for epigenetic modifiers and sub-grouping of the patients for treatment with specific inhibitors. The identification of "histone-signature" will help in better understanding of cancer and will lead towards better usage of "epigenetic" agents for diagnosis and therapeutic purposes in disease management. Dr. Amit Dutt's team 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. Dr. Sarin's team aims to understand the molecular basis of inherited and somatic cancers, and develop translational algorithms through molecular biology and functional genomics. These questions are being addressed with the help of a large cohort of families with inherited cancer syndromes, a BRCA-GEL case control study, a TMC International sarcoma kindred case control study, and an International Cancer Genome Consortium project covering gingivo-buccal squamous cell carcinoma patients.

The **Cell and Molecular Imaging** group comprises of three teams. Dr. De's team uses molecular imaging for real-time visualization and quantitative measurement of cellular physiological processes. The group aims to develop and apply molecular imaging methodologies to test experimental therapeutics *in vivo*, with the aim of bench to bedside transition of concept therapeutics for breast and oral cancers common to India. The mandate of this group is translating diverse experimental therapeutics developed through

research. Dr. Bhattacharyya's team focuses on intracellular vesicular trafficking, organelle biogenesis and dynamics, since alterations in organelle size and shape are a hallmark of cancer cells. Using basic cell biological approach and advanced microscopic techniques, the mechanisms governing the size control mechanism of Golgi, nucleus and nucleolus are being examined. Yeast, cell lines and cultured neurons are being used as model systems. The group also aims to develop novel tools and forms for different types of microscopy and study the biogenesis of exosomes, a class of nano-sized extracellular vesicles implicated in cancer metastasis. 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. Other research areas include the synthesis, optical and photothermal characterization of metallic nanoparticles for biomedical applications, exploring ¹H NMR, Raman and infrared spectroscopy for oral cancer diagnosis using saliva, and experimental carcinogenesis in animal models.

The main focus of the **Hemato-Oncology** group is chronic and acute myeloid leukemias (CML/ AML). The CML studies are being carried out by Dr. Govekar's team. Inhibition of tyrosine kinase activity of the transforming fusion gene BCR/ ABL effectively controls CML in ~90% patients in the initial chronic phase. However, patients resistant to tyrosine kinase inhibitors (TKI) progress to the terminal blast crisis. About 80% patients in blast crisis do not respond to TKI therapy. In a bid to identify molecular alterations underlying TKI resistance, proteomic and genomic analyses of cell lines representing blast crisis of CML, that are either sensitive or resistant to TKIs, has been done. Alterations in pathways in resistant cells are now being examined for their potential as therapeutic targets. Dr. Hasan's projects aim to study the molecular and functional aspects of novel agents in Acute Myeloid Leukemia (AML) and hereditary breast cancer without BRCA1/2 mutations. His lab also examines the effects of small molecule inhibitors on primary patient-derived AML blasts, and the anti-tumor activity in patient-derived AML xenograft models. The functional consequences of pathogenic missense mutations are also being studied in hereditary, triple negative breast cancer using genome editing tools (CRISPR-Cas9).

Within the **Protein Biochemistry, Biophysics and Structural Biology** group, Dr. Venkatraman's team works towards building protein interaction networks using PSMD9 and PSMD10/Gankyrin as central nodes, and identifying vulnerable nodes/ edges such as the Gankyrin-CLIC1 interaction that can be manipulated in cancer. Major advances have been made with information from patient data derived PSMD9 sub network in characterizing EGF stimulated EMT markers in PSMD9 CRISPR knock out MCF7 breast cancer

cells. Directed evolution has resulted in the identification of a super binding short dipeptide motif that can interfere with PSMD9 interaction with hnRNPA1 which is crucial in the search for peptide mimetics and inhibitors of NFκB signalling. Studies to expand the network of PSMD9 PSMD10 to include regulation of mitochondrial biogenesis, ribosome assembly and protein translation and also to extend out interest in protein interactions to understand the molecular details of 14-3-3 binding to client proteins and short peptides are ongoing. Dr. Varma's team has expressed and purified different functional domains of BRCA/2, and also crystallized it with its cellular partners and small molecule inhibitors. The pathogenicity of mutations in BRCA gene discovered in Indian and Russian families have been characterized. Also, a set of proteomics based predictive and prognostic biomarkers are being explored in head-neck squamous cell carcinomas treated with radiotherapy. Dr. Bose's group examines macromolecules involved in the apoptotic pathway, and their implications in normal cellular functions and pathogenesis. Under examination are 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. The group has now embarked on application-based translation research that includes enzymes involved in metabolic reprogramming and their role in altering cancer signaling pathways. Within the **Stem Cell Biology and Cell Signalling** group, Dr. Waghmare's team aims to delineate molecular and cellular mechanisms controlling adult stem cell and cancer stem-like cell regulation in human epithelial cancers. Developmental signaling pathways such as Wnt/Notch/Sonic-hedgehog regulate stem cell renewal and differentiation. The group is investigating these aspects using mouse skin model and human epithelial cancers such as head-neck cancer as experimental models. Recently, the group has developed primary head and neck oral cancer cell lines from advanced stage treatment naive patients from an Indian cohort providing a valuable resource to understand the molecular mechanism that would be useful in cancer therapeutics. Dr. Shilpee Dutt's team aims to understand the molecular mechanisms that govern radiation/ chemo resistance in cancer using glioblastoma and leukemia as model systems. *In vitro* cellular models from primary patient samples and *in vivo* pre-clinical orthotopic mouse models have been developed that allow for systematic identification of signals and pathways relevant to resistance, which could provide critical information for use in therapeutic intervention. Recent research findings of Dr Ray's team have revealed an intricate association of autophagy with the initiation and maintenance of chemoresistance and IGF1R signalling and identified unique secretory molecules critical for adherence and migration of chemoresistant cancer cells using a co-culture system. A beneficial role of metformin to impede platinum-resistance by lowering cancer stem cell population, possibly mediated by up-regulation of Taurine

has been observed. An intriguing association was noticed between IGF1R and hCtr1 (platinum influx protein) in metastatic tissues of a small cohort of high grade serous ovarian carcinoma (HGSOC) patients with their clinical outcome. Dr. Chiplunkar's team in the **Tumour Immunology** group focuses on investigating immune dysfunctions in patients, understanding the crosstalk of immune cells, mesenchymal stem cells and suppressor cells in the tumor microenvironment and development of immunotherapeutic strategies using gamma delta T cells ($\gamma\delta$ T cells). The mechanism regulating tumor of gdT cells directed cytotoxicity under hypoxia and energy metabolism, the spectrum of exhaustion markers expressed by T cells and functional role of gdT cells in colorectal cancer are being examined. Cross-talk between mesenchymal stem cells (MSC) from oral/pancreatic tumors and acute myeloid leukemia (AML) to understand immune evasion and chemoresistance in these malignancies are being studied.

Many components of homologous-recombination mediated DNA repair, such as BRCA2 and RAD51, are involved in response to replication-stress, but their functions are mechanistically different in both the pathways. The **Wellcome DBT IA Intermediate Fellow** Dr. Mehrotra has been investigating the role of the novel cancer associated gene - BRCA2 and CDKN1A Interacting Protein (BCCIP), in the prevention of replication stress using mammalian cell cultures and *Drosophila melanogaster* as model systems. This knowledge will be etiologically important for BCCIP deficient cancers. With this study important insights regarding the role of replication stress in tumorigenesis and resistance to radiation therapy will be provided.

Academics

ACTREC continued its emphasis and focus on its academic programs, prime amongst which is the doctoral program. In August 2018, the Centre accepted a new batch of 17 students

for Ph.D. (Life Sciences) affiliated to the Homi Bhabha National Institute – a deemed university recognized by the University Grants Commission. In all, 105 graduate students at different stages of their doctoral research were working at the Centre during January and December 2018. Under the short term and summer training program, the Centre accepted a total of 234 trainees this year - 39 for dissertation and 107 for experience/ 5 on collaborative projects, 45 were observers, 34 were summer trainees and 4 were research associates. The trainees worked under the close supervision of senior or mid-level scientists, clinicians and other officers. In the Advanced Training Course in Medical Laboratory Technology (AMLT) conducted by the Centre's diagnostic labs, 4 students were accepted in the new batch of 2018.

In 2018, the Centre organized 21 local/ national/ international conferences, symposia, workshops, training programs, etc., beginning with the CNE Workshops on 'Essentials of cardiopulmonary resuscitation' and 'Medication safety' in January and in October the UK-India Cancer Bioinformatics Workshop on 'Next- Generation Sequencing Data Analysis'. In December the centre conducted the ACTREC Open Day held annually, where close to 500 students and 35 faculty members from science degree colleges of Mumbai and Navi Mumbai visited and participated in the program, and lab-walk tour organized. Another student –centric event managed in December 2018 by the graduate student fraternity of the centre, is the annually held National Research Scholars Meet [NRSM] in Life Sciences, with enthusiastic participation of students and young researchers from across the country. During the course of the year, the Centre hosted 16 national/ international experts who delivered research seminars on a variety of topics in the life sciences and cancer. The Centre accepted six educational visits, organized four cancer awareness programs and a number of cancer patient support and entertainment programs during the year.



ACTREC Annual Events

Science & Society Oration 2018



Mrs. Arati Gokhale, Central Coordinator, Zonal Transplant Coordination Centre, KEM Hospital, Pune was invited to deliver the Science & Society Oration 2018 at ACTREC on 12th April 2018. Dr. Shubhada Chiplunkar, Director, ACTREC, delivered the welcome address. In her oration entitled, "Organ Donation – Gift of Life, Mrs. Gokhale spoke on this important but sensitive topic with enthusiasm and ease and briefly described her journey and the challenges she had faced about creating awareness and counselling families who

had lost a relative, to opt for organ donation. With support from ZTCC she could initiate a systematic plan for this noble cause, by recognizing the need for an organ allocation system and worked on creating a consolidated waiting list of patients with organ failure. To promote this cause, ZTCC-Pune initiated organising several awareness campaigns for the general public and training programs for the medical fraternity and transplant coordinators in collaboration with the Indian Medical Association, Indian Society of Critical Care Medicine, National Organ and Tissue Transplant Organisation, and MOHAN Foundation. She touched upon her role as a central coordinator, responsibility towards fair and equitable distribution of organs, organising 'green corridors' to facilitate speedy transport of organs, coordinating with various stakeholders (transplant coordinators, doctors from various hospitals with different super specialities), and completing this task in a limited timeframe. From the oration it was evident that she would have inspired several young students of MSW towards a career as transplant coordinator. An interactive discussion session followed after the talk. In the felicitation ceremony the Oration Plaque was presented to Mrs. Arati Gokhale by the Director, ACTREC.

ACTREC Annual Day 2018

The much awaited ACTREC Annual Day 2018 celebrations took place on 13th April 2018 with full fervor at Vishnudas Bhave Auditorium in Vashi, Navi Mumbai. Employees and their family members, contract and project staff, students and trainees, as well as patients attended the event with enthusiasm. At the start of the event, Dr. Shubhada Chiplunkar, Director, ACTREC, extended a warm welcome to all the members of the audience, and appreciated the efforts taken by the organizing team for their hard work and meticulously planned program. She also touched upon and highlighted some of the major achievements and activities of the Centre. The cultural program began with a captivating

array of group songs, dances, and entertaining and topical themed skits, in which the Centre's employees and students gave exquisite performances displaying their talents. This was followed by a session where employees who had completed 30 years of service were felicitated in recognition of their loyal service to the organisation. Later there was a variety entertainment program by a professional orchestra 'Kalakar' led by the renowned artist Mr. Sudhir Sinha and his talented team; this program replete with enthralling songs of his orchestra was appreciated by everyone. Finally, at the end of the evening the employees partook of a delectable dinner and bid adieu to their colleagues, completely refreshed.

ACTREC Annual Day 2018



International Yoga Day



International Yoga Day was celebrated at ACTREC on 21st June 2018. Yoga a national human welfare activity has been initiated in ACTREC for patients and staff members since the past two years. Both practitioners and non-practitioners of yoga performed the asanas and felt greatly motivated by this session.

Consequent to the MOU signed between ACTREC and Kaivalyadhama Ashram, Lonavla, certified yoga trainers/instructors visit ACTREC thrice a week to conduct yoga sessions for patients. These yoga sessions follow the tradition of Ashtanga yoga and Kaivalyadhama through a 1 hr 45 min protocol designed by senior yoga therapist Ms. Lee Majewski. It involves *Chalana Kriyas* (loosening practices), *Asanas* (postures), *Pranayama* (breathing practices), *Kirtan Kriya* (Mantra chanting with finger movements - *Mudra*) and *Yoga Nidra* (deep relaxation and meditation). 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.

The patients eager to follow yoga are requested to obtain consent from their treating Doctor and allowed to participate in the yoga sessions. However, patients who are not permitted are made to relax on a chair and observe the others practicing yoga. These sessions have been able to initiate over 1000 individuals to this effective practice of yoga during the last two years. Many have understood the benefits of practicing yoga and are very positive about this activity.

Sports Events

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



From 29th - 31st October 2018, the selection trials of Table Tennis were successfully conducted at ACTREC for the XXXIV DAE Annual Sports and Cultural Events 2018.

ACTREC – The winner of the Football Match- 2018, TMH Vs ACTREC



Cancer Awareness Programs 2018

Cancer is one of the leading causes of death in our country. It is commonly known now, that cancer can be prevented by modifying lifestyle or minimizing exposure to risk factors. Most cancers can be treated when detected in the early stages. The Tata Memorial Centre lays a lot of emphasis on prevention of cancer. Keeping this in mind, ACTREC had started its Cancer Awareness Program in 2012 under the leadership of Dr. Meera Achrekar, Assistant Nursing Superintendent, ACTREC. Through CAP, the Centre has been reaching out to the masses when requests are received from multi-national and government organizations, housing societies, schools and colleges to disseminate basic information and knowledge about the disease cancer. Generally a team comprising of a lead clinician to deliver the talk on cancer, a scientist, Dr. Achrekar with a small team of

nurses has been delegated for this responsibility. Over the past years, a series of talks have been delivered on cancer prevention and early detection of breast, cervical, oral and inherited cancers. A large number of people have benefited from these CAP events held locally in Mumbai and Navi Mumbai. Some of the sessions focus on breast self examination and clinical breast examination by an accompanying medical team. Referral notes to the Preventive Oncology department of the Tata Memorial Hospital are provided to beneficiaries if they seek cancer screening due to a family history or if a suspicious lump is detected during clinical breast examination.

During the year 2018, ACTREC's CAP reached out to 393 beneficiaries, through four lecture series conducted in response to requests from various organizations.

Date	Requesting organization; site of CAP	Beneficiaries
January 2018	HP Gas Agency, Pune	64
March 2018	Morgan Stanley, Goregaon, Mumbai	215
October 2018	Gold crest International	65
November 2018	BPCL Petrol Pump, Kharghar	48

General Seminars

During 2018, a few beneficial and informative seminars on topics of general interest to all the ACTREC employees were organized by General Administration. The details are given below:

2 February	MRI Safety Training to non-MRI Staff (Wardboy, Housekeeping Contract Staff) Dr. Seema Kembhavi, Professor & Radiologist 'F' ACTREC
8 February	Demonstration organized by Central Bank of India Mr. Umeshkumar Mote, Senior Administrative Officer, ACTREC
13-16 February	Meeting of Hadron Project Mr. P. Baburaj, OIC, Engineering Department, ACTREC
21 February	Arranging the Psychiatrist Lecture from experts – Dr. Rahul Bhatambre and Dr. Swapnil Bhopi, J. J. Hospital, Byculla, Mumbai Mr. S. G. Dakave, Chairman, TMC Workers Union, ACTREC
24 March	Conducting a series of lectures by faculty of TMH/ACTREC for the "Diploma in Radiological Physics (DipRP) course Dr. Tejpal Gupta, Professor and OIC, Radiation Oncology, ACTREC

AUGMENTATION OF RESOURCES



Patient Waiting Area –Inauguration in February 2018

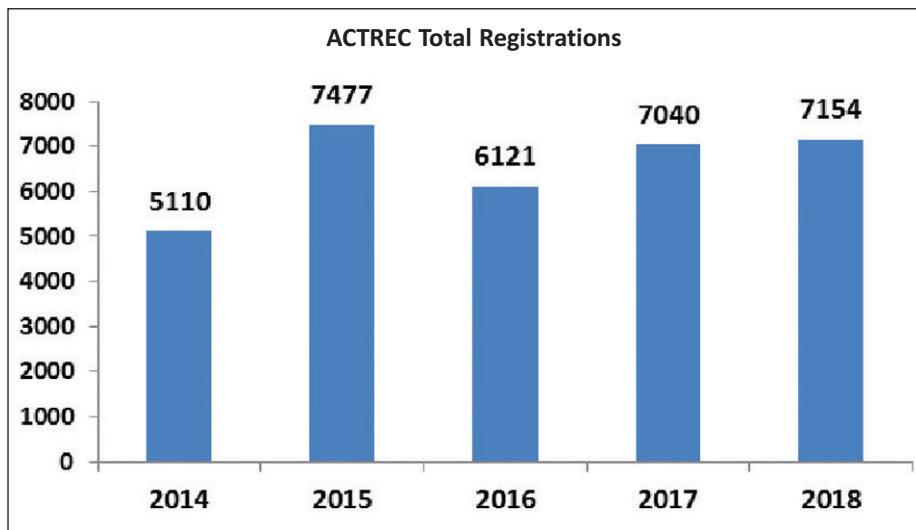
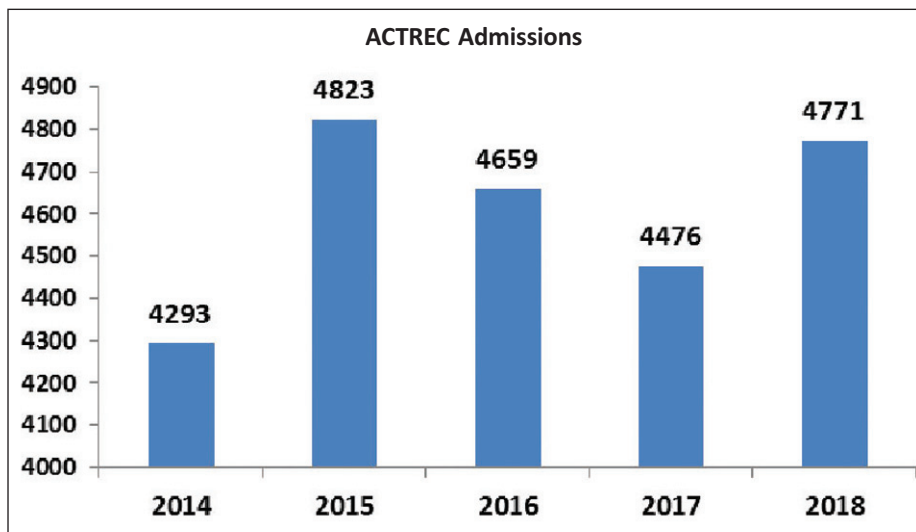
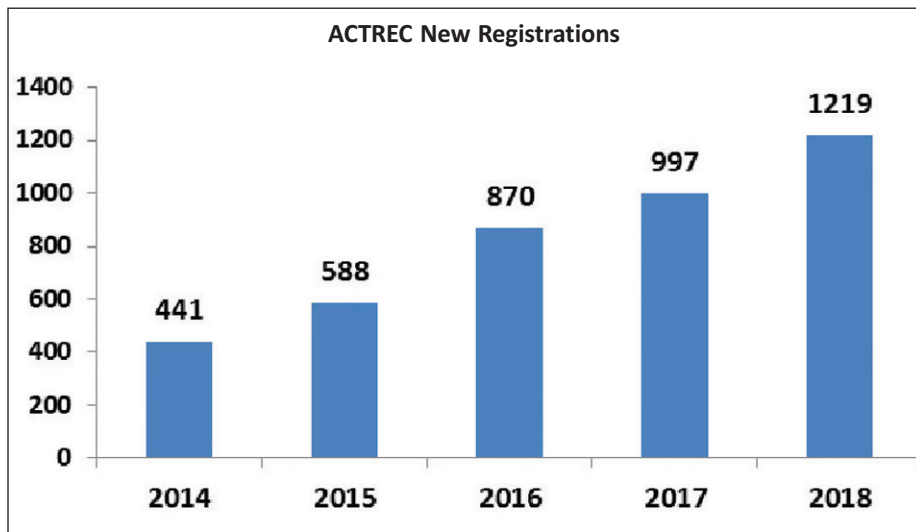


Operation Theatre 2 - Commissioned in January 2018



Operation Theatre 3 - Commissioned in January 2018

TRENDS – ACTREC



Performance Statistics - ACTREC

	2017	2018
Patient Chart Files- General (ACTREC Reg + Transfers from TMH)	5762	5697
Patient Chart Files- Private (ACTREC Reg + Transfers from TMH)	1359	1458
Patient Chart Files- Total (A)	7121	7155
Referrals for Investigations/Second Opinion (B)	795	643
Preventive Oncology (C)	SNA	SNA
Total Registrations (A+B+C)	7916	7798
INPATIENT SERVICES		
ADMISSIONS		
No. of Admissions	4476	4771
Average Length of stay (Days)	4.91	4.98
Bed Occupancy %	68	81.6
SURGICAL ONCOLOGY		
Major OT Procedures	1645	1528
Minor OT Procedures	1611	1522
MEDICAL ONCOLOGY		
Day Care		
Day Care- General	16966	20181
Day Care- Private	3295	3501
Bone Marrow Transplants at ACTREC	55	62
DIGESTIVE DISEASES AND CLINICAL NUTRITION		
Endoscopies [To be included in Min.O.T]	SNA	12
Nutrition Clinic	SNA	SNA
No. of ICU Admissions	186	289
Patients in Recovery Ward	1396	1533
Pain Clinic	176	141
RADIATION ONCOLOGY		
External Beam Therapy (LA + Cobalt + Tomo)	944	1094
Brachytherapy	415	409
Treatment Planning / Beam Modification	1737	1803
Special Radiotherapy Techniques (IGRT, IMRT, SRS, SRT, TSET etc.)	451	547
IMAGING SERVICES		
Radiology		
Conventional Radiography	2449	2789
Ultrasonography / Color Doppler	1373	1600
Mammography	792	1381
C.T. Scan (Diagnostic + RT Planning)	3659	4244
M.R.I Scan	3389	3396
Interventional Radiology	2023	1964

	2017	2018
NUCLEAR MEDICINE		
PET-CT	1398	1748
SPECT-CT	SNA	SNA
C.T. Scan	SNA	SNA
GENERAL MEDICINE		
ECG	2318	2955
Echo Cardiography	1188	1823
Pulmonary Function Tests	SNA	SNA
LABORATORY DIAGNOSTICS		
Pathology (Histopathology + IHC + Frozen Section)	8669	9329
Haemato Pathology	48462	54697
Biochemistry	49113	56340
Cytopathology	404	356
Molecular Pathology	SNA	SNA
Microbiology	10852	14064
FLOW CYTOMETRY AND MOLECULAR HEMATOPATHOLOGY		
Bone Marrow Aspiration Morphology	7591	7811
Flow Cytometric Immunophenotyping	6777	7706
Molecular Hematopathology	8217	8263
TRANSFUSION MEDICINE		
Blood and Platelet Units Collected (Blood donation + Apheresis)	3097	3623
Blood Components Issued	3855	4670
CYTOGENETICS	11809	12058
OTHER CLINICAL SERVICES		
Stoma care	SNA	SNA
Occupational Therapy	SNA	SNA
Physiotherapy	7620	6855
Speech Therapy	SNA	SNA
Psychiatry and Clinical Psychology	SNA	SNA
DENTAL SERVICES		
Prosthetics Services	SNA	SNA
General Dentistry	2219	2562
TISSUE BANK		
Allografts Produced	SNA	SNA
PALLIATIVE MEDICINE		
No. of Patients	SNA	SNA
Home Care Visits	SNA	SNA

	2017	2018
MEDICAL SOCIAL WORK		
Guidance	3393	3450
Counselling	2819	3364
EDUCATION		
Residents & Others	27	50
Fellows	3	13
Medical Observers	0	0
Nursing Trainees	1	0
Paramedical Students	0	0
MLT* Trainees	2	4
Medical Physicist Trainees	2	4
RESEARCH PROFILE		
Extramural Projects	110	107
Institutional (Intramural / No Funding Required)	107	91
Intramural + Extramural Projects	3	5
P.G. Thesis (Dissertation)	7	2
PUBLICATIONS		
International	135	120
National	26	19
Book Chapters	8	5
Conferences / Workshops / Seminars	41	41
SNA = Service Not Available		
DNA = Data Not Available		
Note: Pathology Included: IHC, Frozen & Main lab		
	2017	2018
Patient Chart Files- General (TMH New Transfer)	4881	4588
Patient Chart Files- Private (TMH New Transfer)	1243	1348
Patient Chart Files- General (ACTREC New Registrations)	881	1110
Patient Chart Files- Private (ACTREC New Registrations)	116	109

*MLT = Medical Laboratory Trainees

CLINICAL RESEARCH CENTRE

Dr. Shubhada Chiplunkar (Director, ACTREC) (January –November, 2018)

Dr. H. K. V. Narayan (Dy. Director, ACTREC)

Dr. Sudeep Gupta (Dy. Director, CRC-ACTREC) (Director, ACTREC- December 2018)

Dr. Naveen Khattry (Dy. Director, CRC-ACTREC- December 2018)

Anesthesiology, Critical Care & Pain

Dr. Reshma Ambulkar (*OIC*)

Dr. Bhakti Trivedi

Dr. Amol Kothekar

Dr. Malini Joshi

Dr. Raghu Thota

Cancer Cytogenetics

Dr. Dhanlaxmi Shetty

Ms. Hemani Jain

Cancer Genetics

Dr. Rajiv Sarin

Chromatin Biology

Dr. Indraneel Mittra (*Dr. Ernest Borges Chair*)

Dr. Ranjan Basak

Dr. Kavita Pal

Clinical Pharmacology

Dr. Vikram Gota

Dr. Manjunath Nookala

Clinical Research Secretariat, ACTREC

Dr. Vikram Gota

Mrs. Sadhana Kannan

General Medicine

Dr. Prafulla Parikh

Hematopathology

Dr. Subramanian Ganeshan (*OIC*)

Dr. Nikhil Patkar (*Clinician Scientist*)

Dr. Prashant Tembhare (*Clinician Scientist*)

Dr. Ashok Kumar

Mr. Y. Badrinath

Dr. Shruti Chaudhary

Mrs. Swapnali K. Joshi

Hypoxia & Clinical Genomics

Dr. Sudeep Gupta

Medical Administration

Dr. Prashant Bhat (Medical Suptdt)

Mrs. Chital Naresh

Medical Physics

Dr. Jamema SV

Ms. Reena Phurailatpam

Medical Oncology

Dr. Sudeep Gupta

Dr. Navin Khattry (*OIC*)

Dr. Manju Sengar

Dr. Amit Joshi

Dr. Jaya Ghosh

Dr. Tushar Vora

Dr. Hasmukh Jain

Microbiology & Composite Lab

Dr. Vivek Bhat (*OIC*)

Dr. Preeti Chavan (*OIC*)

Nursing

Dr. Meera Achrekar (Asst. Nursing Suptdt)

Pathology

Dr. Asawari Patil (*OIC*)

Dr. Epari Sridhar

Dr. Swapnil Rane

Radiation Oncology

Dr. Tejpal Gupta (*OIC*)

Dr. Vedang Murthy

Dr. Supriya Sastri

Dr. Jayant Sastri Goda (Clinician Scientist)

Dr. Tabassum Wadasadawala

Radiodiagnosis

Dr. Seema Kembhavi

Dr. Amit Kumar Janu

Surgical Oncology

Dr. Vani Parmar

Dr. MS Qureshi

Dr. Aliasgar Moiyadi (*OIC*)(Jan-Sept 2018)

Dr. Vinaykant Shankhdhar

Dr. Sudhir Nair (Clinician Scientist) (*OIC*, October 2018-)

Dr. Deepa Nair

Dr. Prakash Shetty

Dr. Parthiban Velayutham

Transfusion Medicine

Dr. Shashank Ojha (*OIC*)

Dr. Minal Poojary

Mrs. Manda Kamble

OIC = Officer-in-Charge

Anesthesiology, Critical Care and Pain Department

Officer-in-Charge

Dr. Reshma Ambulkar

Anesthesiologists:

Dr. Raghu Thota, Dr. Bhakti Trivedi, Dr. Malini Joshi

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). Ten senior residents are posted at ACTREC, and full time consultants and residents from TMH support this department.

Service

The service component of the department in 2018 provided its value towards Anesthesia for up to 5 OTs towards Interventional Radiology, MRI, Radiotherapy operation theatre and the Pre anesthesia check-up clinic. The department also administers Critical Care for a 7-bedded ICU plus a 3-bedded PACU with a CPR team and renders Acute Pain services. During 2018, the department provided Anesthesia services for 1528 major OT procedures, 279 procedures in the Radiotherapy OT, 409 MRI, 232 Interventional Radiology procedures and 1605 new + follow-up Pre Anesthesia check-ups; Critical care services for 1635 Recovery room admissions, 174 ICU admissions (45 of which were ventilated) and 13 ICU admissions for procedures; as well as 226 Acute Pain Services. All OTs were non-operational from 28th Oct to 18th November 2018, and 16th to 25th December 2018.

Research

Faculty members were engaged in over 50 clinical studies (completed/ on-going) during 2018. These include a prospective study to compare CMAC video laryngoscope with Macintosh laryngoscope for nasotracheal intubations by novices, a study to evaluate the use of surveillance venous ultrasonography to detect incidence of deep venous thrombosis in perioperative period in cancer patients undergoing neurosurgery and an ultrasonographic analysis of gastric volume in patients posted for elective gastrointestinal surgeries (PI, Dr. Ambulkar); a prospective

observational study of prevalence of ipsilateral shoulder pain in patients after thoracic surgeries and assessment of quality of life in patients with chronic pain using brief pain inventory (PI, Dr. Thota); study to determine whether pulse pressure variation correlates with Doppler evaluation of brachial artery velocity time integral and carotid velocity time integral in predicting fluid responsiveness in patients undergoing major surgeries under general anesthesia with controlled mechanical ventilation, study the effect of frailty on postoperative outcomes in major abdominal surgeries in a tertiary cancer institute and, a prospective perioperative audit of outcomes after endoscopic procedures to drain pancreatobiliary obstruction in a tertiary cancer institute (PI, Dr. Joshi). Members of the Department serve on the Institutional Ethics Committee and the Data and Safety Monitoring Sub-committee.

Education

The Anesthesia division of the department conducted a 3-day annual Anesthesia Review Course (ARC) for post-graduate students, which attracts over 300 students every year. They also organized the 'Difficult airway Conference' in December 2018. The Critical Care division of the department conducted an annual 2-day workshop on Hemodynamic monitoring (THEMATICC) that drew intensivists from all over the country. The Pain division held an annual 2-day conference on 'Education in Cancer Pain (ECAP)'. A 1-year ICU technicians' course, a hospital CPR course for nurses and doctors, and an orientation lecture series in Pain Management for hospital nurses were also conducted. The Department took the lead in organizing the 1st National Conference on 'Onco-anaesthesia & Perioperative Care' at the Tata Memorial Hospital in August 2018 and during the conference unveiled a National Society for Onco-Anaesthesia and Perioperative Care (SOAPC). In 2018, members of the department participated in several national/ international conferences.

Cancer Cytogenetics Department

Officer-in-Charge

Dr. Dhanlaxmi Shetty

Scientific Officer

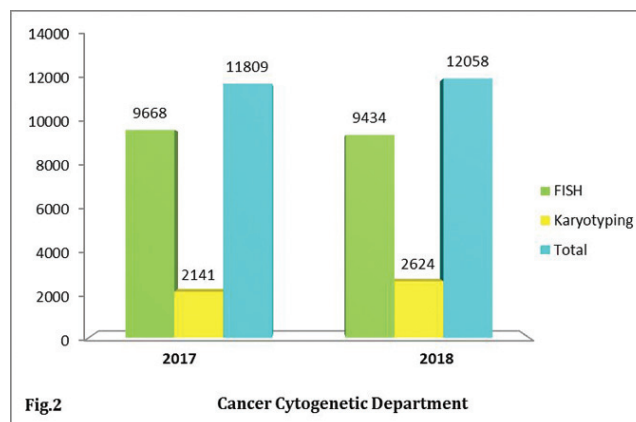
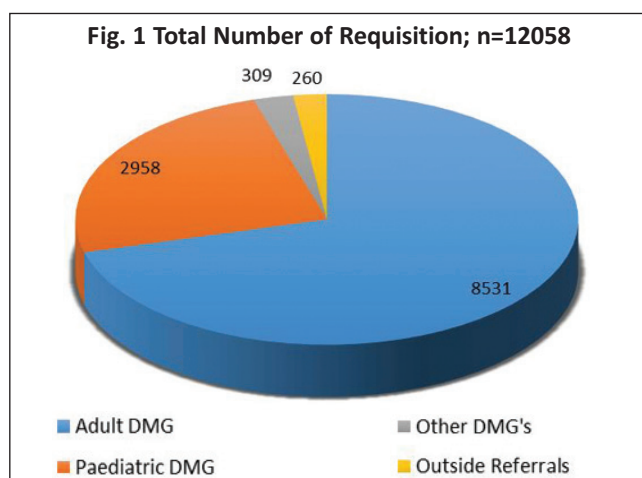
Ms. Hemani Jain

Overview

Cancer Cytogenetics Department at ACTREC is a well-equipped service laboratory for diagnosis, prognosis and risk stratification of hematological malignancies. The department provides services (Conventional Karyotyping (CK) and Fluorescence In-situ hybridization (FISH) studies) to in-house patients and outside referrals for all hemato-lymphoid malignancies. The department is NABL (National Accreditation Board for Laboratories) accredited and participates in External Quality Assessment program (EQAS) with College of American Pathologist (CAP).

Service

During 2018, the department received 12,058 requisitions (FISH-9434 and CK-2624 tests) (Fig.1 & 2). We performed CK in AML, MDS, CML patients and ploidy analysis (chromosome counting) in ALL patients. FISH for recurrent abnormalities was performed for baseline and follow-up AML, ALL, CML, Lymphoma, CLL and MM patients. Post-transplant sex-mismatch was evaluated by chimerism studies (XX/XY). Karyotyping was performed on various cell lines. The laboratory has introduced two new tests viz. ZBTB16-RARA: t (11; 17) in APL cases and RBM15/MKL1: t (1; 22) in Acute Megakaryoblastic Leukemia.



Research

The department is actively involved in studying the role of cytogenetic abnormalities as a prognostic marker in B-CLL based on pathogenesis and clinical course. It has been a part of the ICICLE project (Collaborative, multi-centric, national trial for newly diagnosed patients with acute lymphoblastic leukemia) since 2014 and phase II study for evaluating efficacy of Bortezomib and Rituximab in newly diagnosed adolescent and adult CD20 positive Philadelphia (Ph) negative Precursor B-cell acute lymphoblastic leukemia.

Education

Laboratory staff presented 5 oral presentations in 2 national conferences and one staff member was trained in ISO15189:2012 Quality Management System & Internal Audit Training Course. The OIC attended a short course in Classical and Molecular Cytogenetics organized by European Cytogeneticists Association at France and was an invited speaker at seven national conferences and CME. The staff participated in internal audit conducted in August. An Advanced Cancer Cytogenetic training course of six months with an additional six months internship was offered to six M.Sc. students wherein, intense training was provided in FISH and Karyotyping techniques. Cytogenetics and general laboratory culture orientation was provided to 17 consultants/ registrars from Medical Oncology. Two international observers were trained in Cytogenetics for a period of 3 months. Thirty nine delegates from all over India participated in a two day lecture series cum workshop on 'Applications of Cytogenetic Techniques in Diagnostics' organized by the department in June 2018. Eminent faculty were invited to deliver talks in their specialized field and the delegates were given "Hands - on" training in laboratory techniques.

Chromatin Biology Group

**Dr Ernest Borges Chair in Translational Research
& Professor Emeritus Dept. of Surgical Oncology**
PI: Prof. Indraneel Mitra

Scientific Officers:

Dr. Ranjan Basak,
Dr. Raguram GV,
Dr. Kavita Pal

Overview

This group focuses on the study of the biology of cell-free chromatin (cfCh) that is released from dying cells. They were the first to demonstrate that fragmented cfCh are biologically active molecules and can freely enter into healthy cells, integrate into their genomes, and trigger DNA damage, apoptotic and inflammatory responses. These findings have wide implications since DNA damage and inflammation are integral to ageing and a variety of devastating age-related disorders such as cardiovascular disease, stroke, Alzheimer's disease and cancer as well as acute conditions such as severe infection, sepsis and trauma.

Research

During 2018, the group further substantiated its earlier seminal finding that cfCh that emanate from the billions of cells that die in the body every day are biologically active molecules with wide implications in health and disease. The group has made the following novel observations in the year 2018: (a) radiation-induced bystander effect (RIBE) is caused by cfCh released from irradiated dying cells leading to DNA damage, apoptosis and inflammation in local and distant bystander cells *in vitro* and *in vivo*. RIBE could be prevented by concurrent treatment with cfCh inactivating agents namely

anti-histone antibody complexed nanoparticles, DNase 1 and a novel DNA degrading agent Resveratrol-Copper; (b) endotoxin sepsis in mice is induced by cfCh released from dying cells and can be prevented by concurrent treatment with the above cfCh inactivating agents; (c) lung metastasis induced by MDA-MB-231 breast cancer cells and A375 human melanoma cells are induced by cfCh that are released from the injected cells that die at target sites to transform resident lung epithelial cells which masquerade as metastasis.

Clinical translation of basic research:

- 1) Grade 3 / 4 mucositis following high dose chemotherapy and BMT in patients with multiple myeloma can be prevented by concurrent treatment with Resveratrol-Copper;
- 2) in locally advanced oral cancer, all known hallmarks of cancer, including immune check-point protein PD-1 and PDL-1, can be significantly down-regulated by concurrent treatment with Resveratrol-Copper for a period of 2 weeks

Education

During 2018, as a part of the Centre's training program, Prof. Mitra accepted two trainees for their Master's dissertation projects.



Clinical Pharmacology Group

Officer-in-Charge

Dr. Vikram Gota

Scientific Officer:

Dr. Manjunath Nookala

Overview

The clinical research efforts of this group are aimed at improving treatment outcomes through the optimization of drug dosages based on pharmacokinetic (PK) and pharmacodynamics (PD) modeling. The group has developed extensive capabilities in therapeutic drug monitoring (TDM), a method of individualized treatment based on drug levels and exposure. In addition, the group provides critical support and expertise necessary to effectively conduct early-phase clinical trials in oncology.

Service

The laboratory offers TDM services for voriconazole, posaconazole, mycophenolate mofetil and L-asparaginase. Approximately 2700 plasma samples including 1950 samples of voriconazole and 700 samples of posaconazole were reported in 2018.. Recently permission was obtained from the TMC Governing Council to expand TDM services to 11 drugs, which will commence in 2019.

Research

The OIC and staff successfully faced an US FDA inspection in 2018, for a Bioequivalence study undertaken in 2016. The group undertakes pharmaceutical company-sponsored phase I clinical trials, one of which was successfully completed in 2018, while another is ongoing. The data from the completed phase I trial was successfully submitted to the DCGI to obtain permission for a phase 2 clinical trial by the sponsor. The group was involved in end-to-end clinical operations ranging from designing the study to preparation of final study report.

In addition, a single-center bioequivalence study of PEG-asparaginase manufactured by an Indian biotech company was completed successfully and the results will be submitted to the DCGI in early 2019.

Translational research is another thrust area of interest to this group. Collaboration with BARC has paved the way for phase 1 clinical trial of chlorophyllin in healthy volunteers in addition to a US patent. Other ongoing projects include preclinical studies of Withaferin-A and Resveratrol-copper for prophylaxis of graft versus host disease (GVHD) using an in-house developed animal model, randomized phase 3 clinical trial of curcumin for the prevention of mucositis in BMT, and dose optimization of anti-cancer drugs in malnourished pediatric patients guided by pharmacokinetics and metabolomics. The laboratory is provisionally approved as the Centre for Advanced Research and Excellence (CARE) by ICMR. The multi-crore grant entails capacity building in the country for PK-PD modeling, TDM and make-in-India novel formulations for use in childhood cancers.

Education

In 2016 the laboratory started a fellowship in oncotherapeutics which met with great success. Two oncotherapeutics fellows from this laboratory got excellent placements in India and abroad. In 2018, one research fellow from this laboratory underwent training in mass-spectrometry for the analysis of tobacco metabolites in urine at the University of Minnesota. Dr. Gota is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute, and two students - (Ms. Divya Gohil and Ms. Megha Garg) are presently working on their doctoral thesis.



Composite Laboratory

Officer-in-Charge

Dr. Preeti Chavan

Overview

The Composite Laboratory is NABL accredited, provides 24 hours' services to the hospital and 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. In 2018, the laboratory has been carrying out one IEC approved project and five audits. One research paper was published from this laboratory in 2018. Also, the laboratory conducts a one year advanced training course in Medical Laboratory Technology since November 2015.

Service

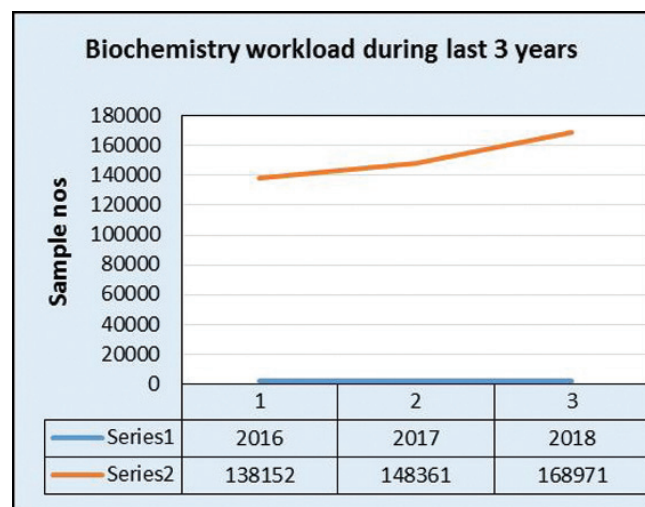
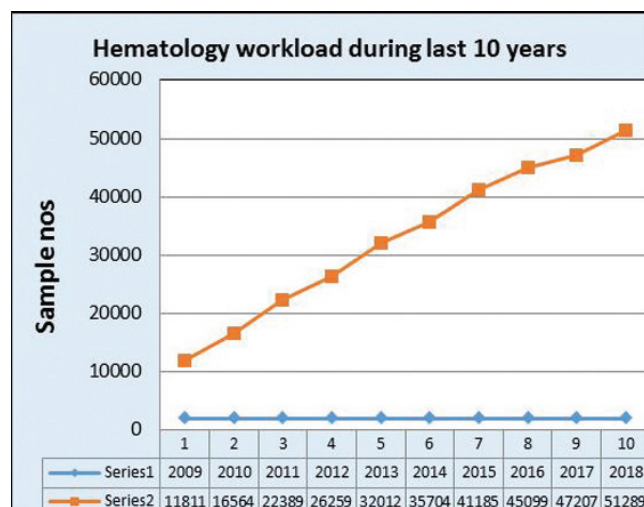
The Composite Laboratory provides the following patient-related hospital services at ACTREC: routine hematology (CBC, coagulation and peripheral blood smear examination) and biochemistry (LFT, RFT, electrolytes, cardiac enzymes, osmolality, immunoglobulins, ferritin, tumor markers; assays for vitamin B12, D and folate; thyroid function tests, drug assays for cyclosporine, tacrolimus and methotrexate; immunoassay for TFT). Glycosylated Hb (HbA1c) analysis was initiated in 2018 in this laboratory. During the year in 2018, the laboratory performed 168971 tests for routine biochemistry, 10587 immunoassays, 51289 tests for hematology and around 35000 patient blood collections in the sample collection area.

Research

An IEC-approved study on-going in this laboratory is, "Determination of select biochemical reference intervals in Indian voluntary blood donors" (PI, Dr Chavan). Besides, the laboratory is involved in four audits; the first audit is an experience with laboratory accreditation and improvement, the second is an audit prospectively conducted to determine the common causes of sample rejections and monitors the effects of corrective action in an effort to reduce human pre-analytical errors and ensure safer patient care, a third audit compares and correlates blood levels of vitamin B12 and folate, and the fourth audit aims to compare Blood Glycosylated Haemoglobin (HbA1C) levels in cancer patients by two different analyzers having same principle and methodology. The laboratory also undertook a survey of patient perception on blood sample collection facility in 2018.

Education

Training sessions on sample collection and interpretation of laboratory values were conducted for ACTREC nurses. The laboratory accepted three trainees this year- one for Master's dissertation project and two for DMLT internship. Besides these, four students were selected for the advanced training course in Medical Laboratory Technology.



Hematopathology Laboratory

Officer-in-Charge

Dr. P.G. Subramanian

Haematopathologist:

Dr. Sumeet Gujral (deputed from TMH)

Clinician Scientists:

Dr. Nikhil Patkar, Dr. Prashant Tembhare

Scientific Officers:

Dr. Ashok Kumar, Mr Y. Badrinath, Dr. Shruti Choudhary

Overview

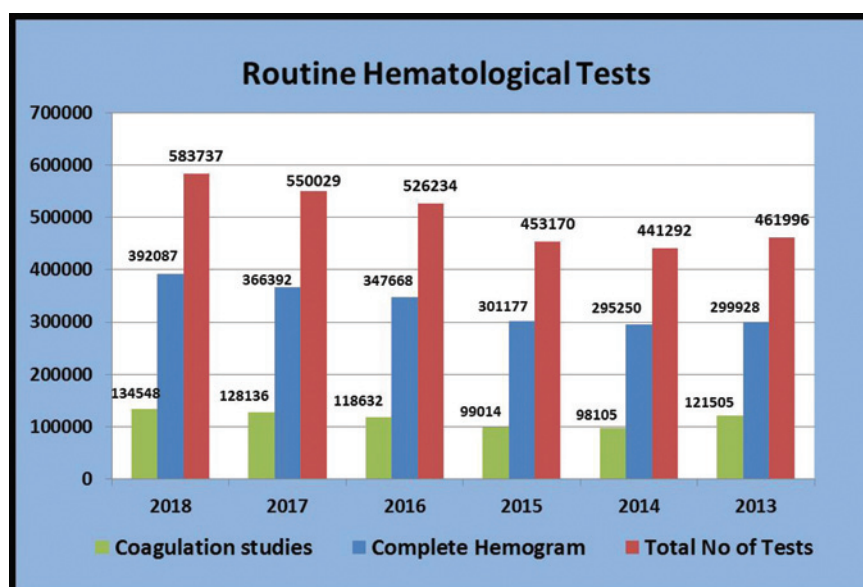
Hematopathology Laboratory is a service laboratory for the diagnosis of hematological malignancies, monitoring of patients while on therapy for all malignancies and preoperative & postoperative hematological workup of surgical patients. The laboratory does Minimal Residual Disease testing and post treatment monitoring of patients of Chronic Myeloid Leukemia, B cell Acute Lymphoblastic leukemia in children, T cell Acute Lymphoblastic Leukemia, Acute Myeloid leukemia and Multiple Myeloma. The laboratory has started NGS facilities for diagnostic and research use this year.

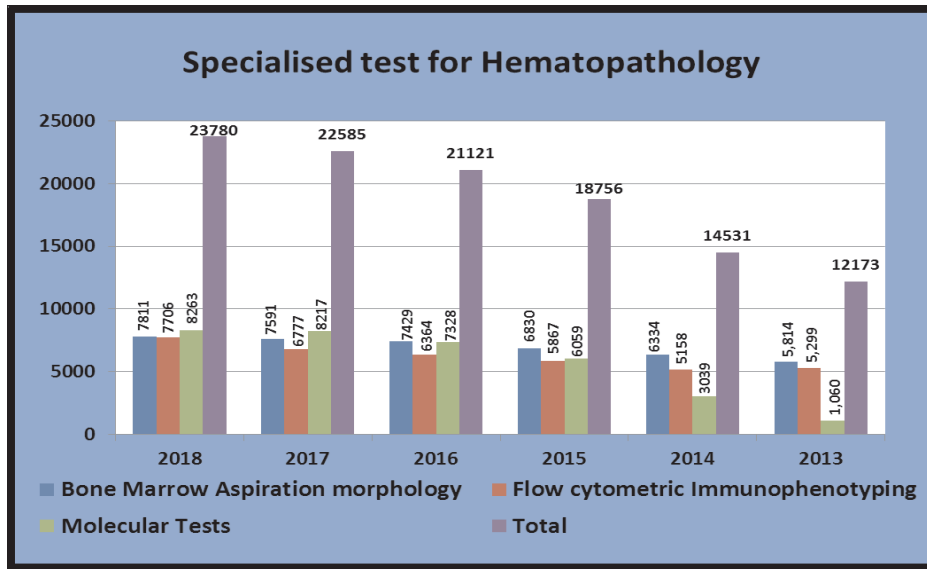
Service

During 2018, this laboratory performed a total of 23780 specialized tests for hemato-oncology, which included 7811 bone marrow aspirate morphology, 7706 flow cytometric immunophenotyping, and 8263 molecular tests. Lab services include detection of MRD for acute leukemia and multiple myeloma up to a sensitivity of detecting 1 cell in 100,000 cells and involvement of hematolymphoid malignancies in

cerebrospinal fluid and other rare sites. The laboratory does post-allogeneic stem cell transplant monitoring for chimerism, and molecular testing for diagnosis, subtyping and monitoring of hematolymphoid malignancies. In 2018, this laboratory provided molecular diagnostics service to a total of 8263 patients - these encompassed RQ-PCR for BCR-ABL (4466), BCR-ABL transcript identification (418), ABL kinase domain mutation studies (382), RQ-PCR for PML RARA (501), acute leukemia transcript identification (17), AML gene mutation identification (239), gene mutation detection for JAK2, CALR and MPL (166), CLL IGVH mutation detection (21), IGH or TCR gene for clonality/ CLL gene mutation/ B-RAF V600E/ MYD88 L265P detection/ K RAS and N RAS mutation detection (52), and chimerism testing by STR markers for bone marrow transplantation (1493), Next Gen Sequencing Assay (508). The lab serves as a referral lab for hematolymphoid malignancies from all over India, and is probably the largest hemato-oncology molecular diagnostics lab in terms of workload in the country.

The following are the total number of tests done in this laboratory in the year 2018.





Research

Faculty members are engaged in several research projects involving Comprehensive profiling of Gene mutations in Acute Myeloid leukemia and their influence in outcome, the search for newer markers for use in Minimal residual disease (MRD) and its value in Clinical management in Indian context. The faculty is also engaged in establishing Immune reconstitution in Allogenic stem cell transplantation, Lineage Specific Chimerism for post Allogenic Transplant monitoring, value of circulating plasma cells and serum miRNA levels for therapeutic response evaluation in newly diagnosed multiple myeloma and examining MRD in the context of NGS for nucleophosmin gene as well as flow cytometric immunophenotyping for pediatric round cell tumors.

Education

The laboratory conducts specialized courses for pathologists and technicians, a 2-year post MD Hematopathology Fellowship program, and a 6-month Advanced Training Program in Oncology for pathologists. Advanced Training Courses in Hematology, Flow Cytometry and Molecular Hematology are also conducted for technologists. In addition, the lab shares its knowledge and expertise with the medical community of the country. In 2018, 50 pathologists from various parts of the country came as observers for training in morphology, cytochemistry and flow cytometry. In 2018, five CMEs and Workshops in Hematopathology and Cytometry were conducted by the lab in ACTREC and TMH. Dr. Sumeet Gujral is a recognized guide for Ph.D. in Health Sciences under the Homi Bhabha National Institute and presently two students (Mr. Rohan Kodgule and Ms Harshini Sriram) are pursuing their doctoral studies.



Hypoxia and Clinical Genomics Group

Clinician Scientists:

Dr. Sudeep Gupta, Dr. Rajendra Badwe,
Dr. Kumar Prabhash, Dr. Nita Nair, Dr. Shalaka Joshi,
Dr. Anuradha Choughule

Overview

The primary focus of this group is to understand the role of hypoxia in cancer metastasis & cancer spread, clonal evolution of a tumor leading to therapy resistance, and developing novel assays to monitor tumor burden and response to therapy. This laboratory uses a bedside-to-bench-to-bedside approach wherein, research questions formulated from clinical observations are addressed in the laboratory settings using pre-clinical assays. A variety of model systems including in-vitro cell-based assays, in-vivo animal studies and 3D organoid cultures to address these research questions are being used. The eventual goal of this group is to translate preclinical findings in the laboratory into relevant interventions that address clinical problems. This laboratory is 'nodal' for the Multiomics Hormone Resistance study in breast cancer initiative under the aegis of the Virtual National Cancer Institute (VNCI) endeavor by the Department of Biotechnology, Govt. of India.

Research

The laboratory is engaged in four research studies with translational relevance; exploring the role of peri-operative hypoxia in breast cancer biology wherein the role of surgery-induced hypoxia during surgical resection of primary breast cancer is being studied. Patients at different times during surgical intervention were biopsied and samples were subjected to whole transcriptome analysis. Pathways related to stress, stemness, metastasis, invasion, wound healing, inflammation and immune responses that are deregulated due to surgical intervention have been identified. Another study funded by DST, Government of India, proposes longitudinally sampling of triple negative breast cancer

(TNBC) patients through the course of their disease to identify clonal mutations that are recurrent across different clinical phases of the disease, and may be involved in metastasis and/or resistance to therapy. TNBC being a very aggressive subtype very often is irresponsive to treatment and has a higher propensity to metastasize to other organs. Thus, identifying mechanisms of this disease spread, as well as structure of clonal mutations might enable pre-clinical laboratory investigations for different therapeutic interventions in this aggressive breast cancer subtype. A third study with intramural funding aims to use liquid biopsy using cell free DNA (cfDNA) to monitor response to neo-adjuvant chemotherapy (NACT) in breast cancer patients. The study will co-relate ctDNA biomarkers with the observed tumor burden during NACT and explore the possibility of finding surrogate markers of response to NACT in breast cancer patients. A fourth study, a VNCI flagship study funded by DBT, Government of India, is a multi-institutional collaboration and aims to identify mechanisms of resistance to endocrine hormone therapy in breast cancer patients. This study will use a holistic approach through multi-omics assays to identify primary mechanisms of resistance to endocrine hormone therapy which to date remain elusive.

Education

Dr. Sudeep Gupta is a recognized guide for Ph.D. in Health Sciences under the Homi Bhabha National Institute and three graduate students— Mr. Rohan Chaubal, Mr. Nilesh Gardi and Mr. Jinesh Maniar, are working towards their doctoral degree. Dr. Gupta also accepted two trainees during 2018 for research experience. Staff and members of this group participated as instructors in national/ international Workshops in 2018.

Medical Administration

Medical Superintendent:
Dr. Prashant Bhat

Quality Manager:
Ms. Chital Naresh

Overview

Medical Administration manages the outpatient, inpatient, diagnostic, clinical and support services including the patient hostel 'Vasundhara'. The department supports in house general medicine for the management of medical comorbidities and super-specialty consultation through honorary specialists. Allied clinical services which include dietetic and patient nutrition, physiotherapy and medical social work and support services associated with patient care are coordinated from the MS office. The department oversees the ACTREC pharmacy and takes part in the material management of drugs and surgical as well as procurement of capital equipment for CRC. Department has facilitated MJPJAY scheme at ACTREC which has benefited the economically deprived patients for cancer treatment. The CSR support for various infrastructure development, equipment donation and monetary donation to various patient welfare funds were liaised and coordinated from this office.

Service

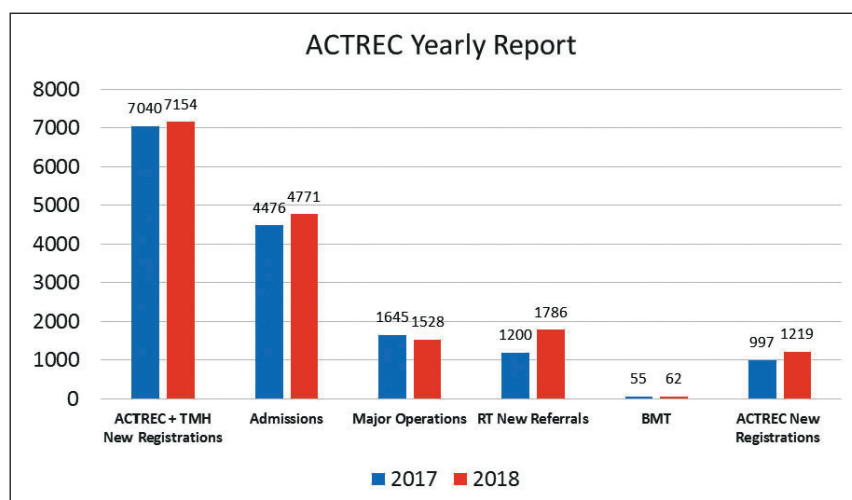
- A total of 7155 cases (7040 in 2017) have been registered during the year 2018. Among which 1219 new cases (997 in 2017) were registered directly at ACTREC. During the year the total registration and direct ACTREC registration have shown an increase of 15%. We have also registered 643 Referral Cards for specialty investigations/ opinion.
- The OPD at ACTREC has shown significant increase with average no. of out-patients per day at 417 (354 in 2017).

To cater to this need a new patient waiting area which can seat 120 patients with amenities has been constructed with help of CSR initiative from Morgan Stanley and was inaugurated on 3rd February 2018.

- The OT – ICU renovation accomplished from a generous grant under CSR by Morgan Stanley was completed in December 2018. The renovation project has created an additional operation theatre (increased from 4 to 5 OT's) and increase in ICU beds from 7 to 13. Major upgrades were given to the infrastructure including dedicated AHU for air conditioning with hepafilter and laminar flow, dedicated patient hold area, patient counseling room, improved facilities and contemporary finishing. New equipment including OT lights, OT tables, pendant and electrocautery were installed.
- Currently CRC has total of 120 beds with 13 ICU and Recovery beds, 5 Operation theatres, 6 Bone marrow transplant (BMT) beds and 16 Day care beds.

Education

The MS - Dr. Prashant Bhat, is a visiting faculty for the EPGDHA hospital management program of the Tata Institute of Social Sciences, Mumbai, and supervised the internship of MHA students in 2018. The MS and his staff on behalf of NABH (National Accreditation Board for Hospitals & Health care Organizations) have actively participated as NABH assessors for assessments of several prominent hospitals in the country. The MS as well as members of the department participated in national/ international conferences and presented their work.



General Medicine

Officer-in-Charge:

Dr. Prafulla Parikh

Patients undergoing cancer treatment at ACTREC also have co-morbidities and medical complications during course of their treatment including pre-operative and post-operative setting. The General Medicine department at ACTREC provides consultation for OPD & IPD patients in order to manage common medical ailments like diabetes,

hypertension, heart diseases, respiratory, neurological diseases etc. The department has witnessed a progressively increasing trend of patient reference since its inception in 2011. During 2018 the department has provided a total of 2578 consultations and performed 1823 echocardiography for emergency and ICU patients.



Nutrition and Dietetics

Dietician:

Ms. Arundhati Lahiri

Qualified and trained dietician of the department provides nutritional intervention to admitted and outdoor patients undergoing surgery, chemotherapy and radiation therapy. The dietician conducts nutritional screening and assessment of referred new patients within 24 hrs. of admission and plans medical nutrition therapy for patients referred by various disease management groups. Planning of medical nutrition therapy is based on nutritional requirements and clinical profiles. Dietician monitors diet compliance and re planning of therapeutic diet is done when required. Dietician also

monitors food service management of hospital kitchen and assesses hygiene, food handling and quality of food served to the patients. In year 2018, 1677 patients were nutritionally screened and assessed on admission. 717 admitted patients and 2065 outdoor patients were provided with nutritional intervention. Department has also conducted nutritional education programs on “Diabetes and Obesity management” and “Food safety and hygiene” for the patients and their care givers in the hospital premises.

CSSD – Central Sterile Supply Department

In-Charge:

Mr. Sachin Walawalkar

CSSD at ACTREC prepares, sterilizes and provides sterile instrument trays, sterile packs and consumables following stringent processes and quality control. The department is equipped with GMP steam sterilizers, ETO and Plasma sterilizer and support equipment and has trained technical staff to carry out the processes, ensure timely availability of

sterile supplies to the Centre. Increase in the number of laparoscopic procedures, Intervention Radiology procedures and Minor procedures were new challenges to the department during the year and the department has ensured uninterrupted and timely supply of sterile materials as per requirement.



Physiotherapy

Physiotherapist:

Dr. Mohua Chatterjee

ACTREC physiotherapy department provided service required by the admitted patients and outdoor patients having disabilities and/or complications due to the disease, surgery, radiation therapy and chemotherapy. Physiotherapists also played an important role in the rehabilitation of bone marrow transplant patients, malignant hematological disorders and for post-surgery patients. Physiotherapists performed thorough assessment, diagnosed and designed individualized treatment plans which included chest physiotherapy, various manual therapy techniques like exercises and mobilization, electro therapy, swallowing therapy, cognitive therapy, vaginal dilation, incontinence management and lymphoedema management. Various orthotic appliances like

crutch, walker, splints braces and external breast prosthesis were also provided through the Physiotherapy dept. A total number of 6855 patient-visits occurred in ACTREC during 2018.

Research

A randomized controlled trial on lymphoedema management with due approval from IEC III is ongoing.

Education

The staff was involved in education of observers and trainees of physiotherapy.

Medical Social Work

In-Charge:

Ms. Baghyshree Tilu,
Mr. Abhitabh Ravtale

Trained medical social workers have given support including financial, psychological and emotional support to cancer patients and their caregivers – factors that go a long way towards alleviation of suffering and improving the quality of life during difficult times. Patients are informed about treatment procedures, travel concession, and socioeconomically challenged patients are directed towards avenues of financial support and accommodation. A special counseling effort to patients has been made to ensure completion of treatment and to minimize dropout due to socio economic reasons. Dedicated involvement with Blood Bank ensures that blood/ components are made available to our patients through Blood donation camps conducted in the periphery in association with philanthropic organizations, corporates and voluntary donations. MSW evaluates patient needs to fund treatment in both emergency and planned setting and make available funding from of the treatment through various poor patient donation funds. MSW also works towards getting the benefit of governmental schemes, NGO support and CSR fund support for patient care. MSW department has also liaised with NGOs and corporates to organize various cultural programs for cancer patients, distribution of gifts, skill development like tailoring classes, festival celebrations, fun and gala events and conduct of stress management workshops and Yoga class. In 2018, during the year, a total of 3364 patients were counseled and guided.

Patient Support Groups and Services

St. Jude Child Care Centre ACTREC campus unit provides pediatric patients from lower socio economic group a clean, hygienic and secure place to stay in, while on treatment at the hospital. It also provides psycho socio support, grocery items, nutritional supplements and potable water as well as conducts educational and recreational activities like yoga, meditation, theatre, art therapy, music therapy.

V CARE Foundation operates the help desk in the patient waiting area and offers counseling services and distributes

cancer informative books. V CARE also arranges gifts to patients, celebrates cancer survivor's day. It also arranges picnics, programs on occasion of festivals like Dusshera/ Diwali. As part of skill development program the foundation offers tailoring class at Vasundhara patient hostel for the purpose of rehabilitation of cancer patients and also sponsors daily newspapers for patients.

JASCAP donates for Supplementary fund which is being used for poor patients and also maintains book stall at the hospital in which they provide books on cancer information in various languages, CDs and DVDs are available to cancer patients at a nominal cost.

Cancer Patients Aid Association provides nutritional supplements to the patients and celebrates National Cancer Rose Day, distributes gifts to patients and arranges snacks and lunch party on occasion of festivals for patients and their relatives staying in hostel.

Make a wish Foundation identifies and fulfills the wishes of pediatric patients. The wishes involve giving them toys, arranging celebrity visits which are an all-time favorite of the children.

Mahindra Foundation distributes kits to post-operative breast cancer patients which have been of great practical benefit to our patients.

Vasantha Memorial Trust provides counseling to cancer patients and their relatives. The Trust also organizes art and craft activities for pediatric patients, and games and musical programs for adult patients.

Madat Charitable Trust Provides counseling to cancer patients and their relatives and also provides financial assistance to cancer patients in case of emergency/urgent need of medicines, distributes wigs to cancer patients, assists in conducting Breast Cancer Post surgery rehabilitation class.

Kaivalyadham, Lonavala Yoga classes conducted thrice in a week for patients and their relatives has bestowed considerable benefit and well-being to patients.

Medical Oncology Department

Officer-in-Charge

Dr. Navin Khattry

Medical Oncologists

Dr. Sudeep Gupta, Dr. Kumar Prabhash, Dr. Manju Sengar, Dr. Amit Joshi, Dr. Jaya Ghosh, Dr. Bhausheeb Bagal, Dr. Tushar Vora, Dr. Hasmukh Jain, Dr. Anant Gokarn, Dr. Sachin Punatar, Dr. Avinash Bonda, Dr. Lingaraj Nayak

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, ~720 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 2018, 62 transplants (29 allogeneic, 33 autologous) were performed in ACTREC. Around 10,000 outpatient visits took place in BMT and adult hematolymphoid unit this year at an average of ~750 visits per month, and ~250 new referrals (non-TMH). 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 who do not have a fully matched related/ unrelated donor. ACTREC is one of the largest centers accomplishing haploidentical transplants; around 60 transplants have been performed over the past 5 years, with ~50% overall survival. For the year 2018, in the 17-bed leukemia/ lymphoma ward around 1000 inpatient admissions were registered.

Adult Solid Tumor Unit: In 2018, around 16000 outpatient visits occurred in this unit, and tumors of the head and neck, breast, ovary, testicular, cervix and gastrointestinal region

comprised the bulk of cancers treated at ACTREC. The 7 inpatient beds dedicated to solid tumors had ~750 inpatient admissions. Around 375 new patient registrations in solid tumors took place in 2018.

Pediatric Oncology Unit: In the pediatric oncology OPD and 5 bed inpatient services, around 5000 outpatient visits took place in 2018 and with the five inpatient beds around 375 patients were admitted.

In 2018, close to 1500 OPD procedures including ascitic tapping, bone marrow aspiration, intrathecal methotrexate and pleural fluid tapping were performed in procedure room situated in leukemia ward and approximately 22000, day care services (chemotherapy + emergency managements + hydrations) were undertaken.

The year 2018 witnessed the initiation of gastrointestinal endoscopies at ACTREC, which was a joint collaboration of medical oncology and gastrointestinal services.

Research

Faculty members of the department are involved in several investigator initiated and sponsored clinical trials as well as 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.



Microbiology Laboratory

Officer-in-Charge

Dr. Vivek Bhat

Overview

The Microbiology Laboratory is involved in patient service, academics and research. Patient services include processing and reporting of bacteriology, serology, mycobacteriology, mycology and other clinical microbiological samples at ACTREC. Sterility testing for Blood Bank services, environmental surveillance, infection control services and waste management support. The faculty is also involved in research projects, and educational programs.

Service

The Microbiology Laboratory provided the following patient related & hospital services at ACTREC. A total of 18601 samples were processed in the laboratory in the year 2018. These include bacteriology cultures for blood (4728), CSF/body fluids (73), drain fluids (455), pus (30), urine(681), feces (1206), swabs (867), respiratory samples (241) & others (279); Serology: HBsAg (1193), HIV (1180), HCV (1191), Anti HbC total (81), Anti-HbC IgM (101), PCT (721), Rapid malaria antigen (540), Dengue (575); Others (12). Tests for clinical microbiology included urine (1237), faeces (471), clostridium difficile (195) & Adeno/Noro virus detection (159), Mycobacteriology (Acid Fast Staining) (98), Mycology (175) (Identification of fungi in clinical material and susceptibility testing and special staining, Routine Fungal Culture). The scope of mycology and serology services has been enhanced

offering patients the convenience of availing these tests at ACTREC. Additional hospital services included sterility testing for blood bank services: PBSC (269), SDP (1053), RDP (15), PCS (558), FFP (44), RDP (46) PCS (38), Cryoprecipitate (11), others (78). Environmental surveillance for OT/ICU/ Brachytherapy/ BMT units/CCE and water testing are regularly performed as well as infection control services and waste management support is provided by the laboratory staff.

Research

The laboratory OIC and staff is engaged in 3 ongoing research projects, of which two are IEC approved. The findings of this research led to 3 publications in both National and International journals published in 2018.

Education

Teaching is one of the activities carried out and the staff is involved in teaching students of MD Microbiology, nursing department, TMC laboratory staff and housekeeping staff from TMC as well as other institutions. The faculty is closely involved, along with other diagnostic laboratories, in the conduct of the Advanced Training Course in Medical Laboratory Technology [AMLT] at ACTREC. During 2018, the laboratory staff members participated and presented papers at three national conferences.



Nursing Department

Assistant Nursing Superintendent:

Dr. Meera Achrekar

Overview

The Nursing department of ACTREC provides comprehensive and excellent nursing care for individuals of all ages diagnosed with cancer, assisting them to recover optimal health and experience good quality of life. Due attention is given to implementation of patient safety goals, continuing education, and research. New initiatives during 2018 included capturing of Surgical Site Infection rates (SSI), patient satisfaction with nursing care and initiation of Catheter Associated Urinary Tract Infection (CAUTI) bundle. One student enrolled for one year fellowship program in Bone Marrow Transplant Nursing. Various hands-on training workshops were organized. Emphasis is placed on the all-round development of nursing staff. The Nursing Department is gearing for certification in Nursing Excellence.

Service

The focus of 2018 was on continuous quality improvement, and the department reinforced safety goals to ensure a safe environment for the patient. Thirty two nurses joined permanent position in 2018. New Standard Operating Procedures were added to bring about uniformity in nursing practice. Uninterrupted monitoring of patients and use of standard protocols helped us to maintain the hospital acquired pressure ulcer rate (2018 -0.4%) below 2% .New admissions to day care were 397 with a total of 23681 sittings, 240 patients underwent minor procedures and 1509 major surgeries were undertaken. Complications were handled with expert medical and nursing care. Patients provided a positive feedback about the care received. When asked about overall satisfaction with nursing care, around 92% of patients expressed very good and above. In the year 2018, 170 PICC were inserted, and the nurse-led PICC clinics showed good clinical outcomes.

Research

Various audits; medication safety, CAUTI bundle, VAP, thrombophlebitis were carried out, results of which showed a decreasing trend in the associated complications. Short research projects were undertaken such as; 'use of peripherally inserted central line in a tertiary care cancer centre' and 'patient satisfaction with nurse's communication

and knowledge of nurses on end of life care'. The obtained research findings were presented in an international conference.



Education

Members of the department attended in-house CNEs and national/ international conferences. 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 saw wide participation from various states of India. CNE was organised on medication safety, essentials of cardiopulmonary resuscitation, and monitoring, capturing and analysing data for quality indicators. Staff members attended sessions on 'Abhilasha', breast conservation therapy, and one nurse was sent for certification in chemotherapy administration. In 2018, there were seven nurses for BMT observer-ship and 6 nurses for chemotherapy administration from hospitals across the country. Five institutions visited ACTREC as part of their educational tour and around 393 participants attended the cancer awareness program. A workshop in collaboration with European Bone Marrow Transplant Group was organized for nurses involved in transplant care.

Pathology Laboratory

Officer-in-Charge

Dr. Asawari Patil

Staff Pathologists:

Dr. Epari Sridhar, Dr. Swapnil Rane

Overview

The Pathology laboratory at ACTREC is a part of the Department of Pathology, TMC, and 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 (by rotation).

Service

The 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 well-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 sent to TMH Cytopathology lab, which is accredited by NABL.

In the year 2018, the laboratory processed around 3003 histopathology specimens and 1593 frozen sections on 697 cases. The laboratory has over 44 antibodies standardized for IHC and performed around 4337 IHC tests in 1685 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 in ACTREC.

Education

Pathologists at Tata Memorial Hospital and ACTREC participate in DMG (Disease Management Group) meetings, joint clinics/multidisciplinary meetings and virtual tumor boards regularly. They also participate in national/international conferences as expert faculty or for oral/poster presentations. Resident doctors 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.



Radiation Oncology Department

Officer-in-Charge

Dr. Tejpal Gupta

Radiation Oncologists:

Dr. Vedang Murthy, Dr. Supriya Sastri,
Dr. Jayant Sastri Goda, Dr. Tabassum Wadasadawala

Medical Physicists:

Dr. SV Jamema, Ms. Reena Phurailatpam, Mr Kishore Joshi

Overview

The department of Radiation Oncology at ACTREC fulfills the Centre's mandate of high-quality service, education, and research (clinical and translational) in collaboration with colleagues from TMH and scientists from Cancer Research Institute (CRI). The group generates high-quality evidence for the use of advanced radiotherapy technology (IMRT, IGRT, SBRT) in cancers of various sites including brain, head-neck, breast, cervix, genito-urinary tract and hematolymphoid malignancies.

Service

A total of 1097 patients were treated with external beam radiotherapy and 699 brachytherapy procedures/ treatments were performed at ACTREC in 2018.

Research

New phase III randomized controlled trials comparing moderate hypofractionation versus extreme hypofractionation in prostate cancer, addition to nelfinavir standard chemoradiation in locally advanced cervical cancer, and post-operative adjuvant radiotherapy versus observation in early stage oral cancer were successfully initiated during 2018 at ACTREC. Ongoing studies in cancers of various sites

including brain, head-neck, breast, cervix and genito-urinary tract, and hemato-lymphoid malignancies were continued during the year. The use of complex and high-precision techniques either to escalate dose to the target volumes and/ or reduce irradiation of surrounding normal critical structure has considerably increased in the last couple of years resulting in improved therapeutic index. The integrated multi-leaf collimator (MLC) system on Bhabhatron-II telecobalt unit for field shaping though commissioned in 2017 has been used infrequently in routine practice due to logistical and shaper software related issues.

Education

The department of Radiation Oncology of TMC has a training program for students pursuing MD in Radiation Oncology under the Homi Bhabha National Institute. Annually, 16 students enroll and are on rotation at ACTREC (3-month posting) as a part of the program. The department has also initiated a teaching course for radiation oncology residents under the aegis of the Indian College of Radiation Oncology (ICRO). Staff members routinely participate in virtual tumor boards (VTB) organized through the National Cancer Grid (NCG) and extend their expertise for site-based discussion on digital platform 'Chart rounds India.'



Radiobiology Group

Radiation Oncologists

Dr. Jayant Sastri Goda
Dr. Supriya Sastri
Dr. Tabassum Wadasadawala

Overview

The radiobiology and clinical biology 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. The laboratory is working in the field of developing newer formulations of radiation modifiers, besides repositioning drugs for radiation modification. It 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 locoregional delivery of the chemotherapeutic drug. Besides this, hydrogel and intranasal formulations of temozolamide in orthotopic GBM models is attempted. A novel selenium compound (3-3 DSePA) as a lung radioprotector against radiation Pneumonitis is in the final stage of development.

Education

The Radiation Oncologists associated with the lab actively train MSc biotechnology students in molecular biology pertaining to radiobiology. In the year 2018 three post MSc students and one Post PhD research associate was accepted for training.



Radiodiagnosis Department

Officer-in-Charge

Dr. Seema Kembhavi

Medical Officers:

Dr. Suyash Kulkarni (Interventional Radiology)
Dr. Nitin Shetty (Interventional Radiology)
Dr. Amit Kumar Janu
Dr. Kunal Gala (Interventional Radiology)
Dr. Raghunath Nagvekar (Interventional Radiology)

Overview

The department is well-equipped to provide all the diagnostic imaging services required for patients at ACTREC. These include computed radiography (CR), ultrasonography (USG), Color Doppler, Computed Tomography (CT),

Magnetic Resonance Imaging (MRI), Mammography (MG) with Digital Breast Tomosynthesis (DBT) and Interventional radiology (IR). The CT machine is shared between PET-CT department, Radiotherapy (RT) for planning scans and diagnostic CT scans. In the MRI service, all routine scans across

all body systems are carried out and MRI under General Anesthesia is exclusively available for patients from paediatric services and some adults who need it. In addition, advanced MR imaging including perfusion imaging, diffusion weighted imaging, MR angiography, diffusion tractography (diffusion tensor imaging) and functional MR imaging are also performed. MRI scans are also used for RT planning. All these services are provided to ACTREC based patients on priority and then extended to TMH patients, to make the best use of available time slots on the machines. The IR procedures are being successfully managed, despite of a continued steady increase in the spectrum and number of cases during 2018 at the ACTREC Interventional Radiology Suite. Emergency services such as urgent radiography, sonography, Doppler studies and CT are available round the clock. Besides these, USG and CT examination of animals are also done as a part of approved animal research projects. To support these activities besides the regular staff, 3 Senior and 5 Junior Registrars from TMC are posted on monthly rotation. The senior registrars in Radiodiagnosis and Interventional Radiology (IR) work as residential doctors for the department.

Service

During the report period, a total of 2789 CR investigations (2048 routine and 741 portables, average of 232 X-rays/

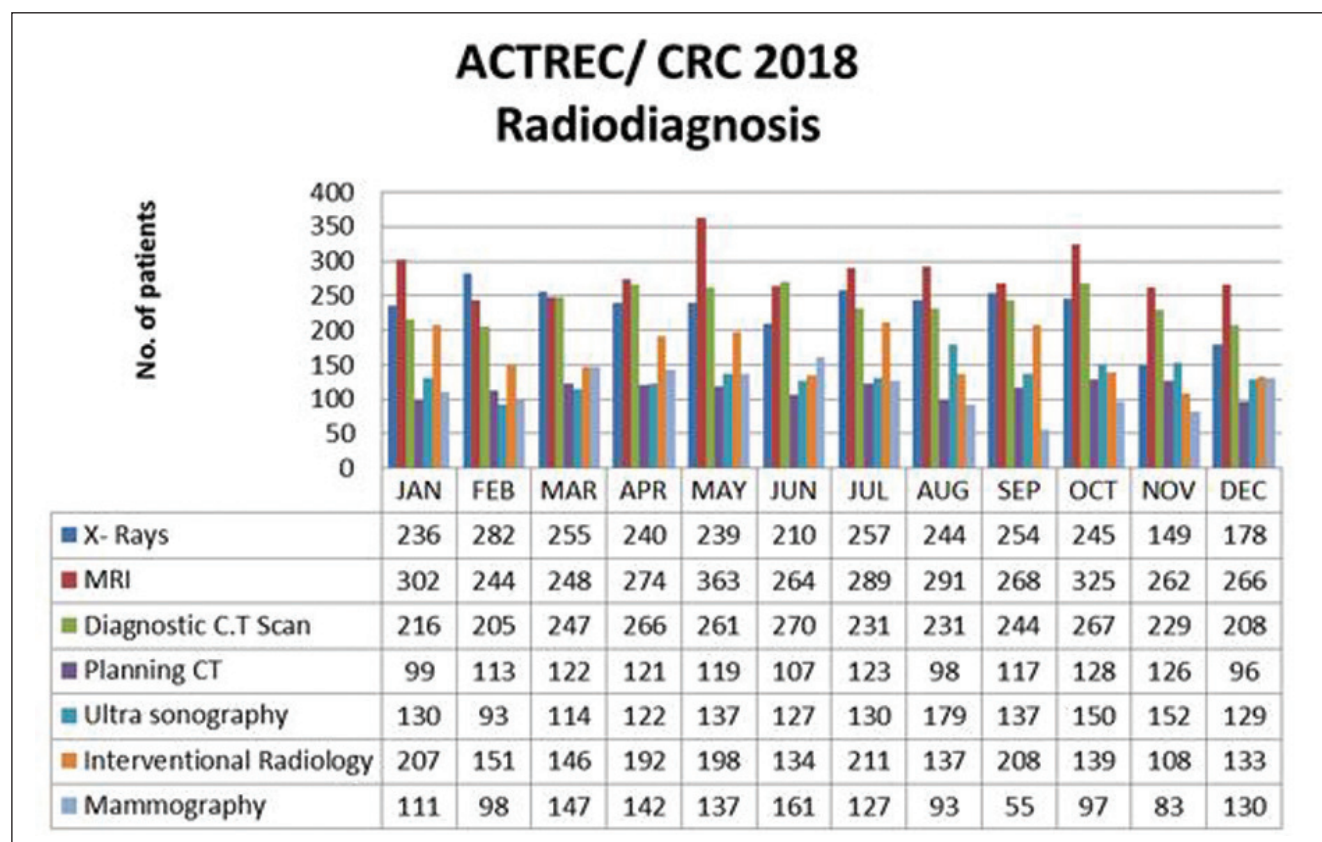
month), 1600 USG/ Color Doppler (average of 133 scans/month), 2875 Diagnostic CT scans (average of 239 patients/month), 1369 Radiotherapy planning CT scans (average 114 patients/month), 3396 MRI (average of 283 patients/month) and 1381 MGs (average 115/month) were performed. In addition, IR performed 1964 varied procedures (average of 163 patients /month).

Research

Faculty members of the department are involved in clinical research projects as PIs and also promote the research of other clinical colleagues by providing support in imaging services. In one such project, members are involved in pre-clinical research, pertaining to development of ultrasound triggered drug delivery system in small animal models.

Education

The Officer-in-Charge and other members of the department participated and presented their research findings at several national/ international conferences in 2018. Breast MRI workshop using workstations was conducted under the aegis of the ICGCW conference in the PS mini-auditorium. In addition, MRI safety awareness program was conducted for labor staff in ACTREC.



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

Neurophysiologist:

Dr. Parthiban Velayutham

Overview

The department of Surgical Oncology has been providing continued care to a wide range of cancer patients. This includes inpatient care as well as outpatient clinics. The department conducts regular OPDs for breast, head and neck and neurosurgery. The breast surgical service has regular OPDs 5 days a week and offers all major surgical procedures. The head and neck service conducts limited outpatient clinics from Monday to Thursday and full day clinic on Fridays and provides surgical treatment at ACTREC. Advanced diagnostics including digital mammography, MRI and PET-CT scan and supportive interventional radiology, medical oncology and radiation oncology services enable comprehensive treatment for breast and head and neck cancer patients at ACTREC. The operation theatre complex underwent complete renovation last year in a phased manner, causing a reduction in the number of the working operating theatres. However, the renovated OT complex with five operation theatres became fully functional from 26th December 2018. The service will run five regular operating theatres five days a week and two operating theatres during Saturdays. 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 have expanded its activities over last year with regular performance of minimally invasive laparoscopic surgery and other complex surgeries like excentration.

Service

Despite disruption in service due to OT renovation, more than 1500 major procedures have been performed in 2018. This included major surgeries in Breast (666), head and neck (326), GI (367), Urology (62), Paediatrics (23), and Gynaec-Oncology (70). The breast (6395) and head and neck (2467) had more than 8500 OPD consultations.

Research

The faculty members are involved in several DMG coordinated research projects with scientists at ACTREC, alongside their counterparts at TMH and collaborators at other institutes such as IIT-Bombay and BARC. The division of neurosurgery has a joint project with the Department of Remote sensing and Robotics, BARC, Mumbai to develop an indigenous robotic stereotactic system and have now setup an experimental OT at ACTREC for testing this robotic system on phantoms. The division of plastic surgery has got all the required permissions to start an anatomy dissection lab at ACTREC.

Education

Departmental faculty members are actively involved in various capacities in national and international bodies/associations and presented their clinical research findings in numerous national/international conferences and workshops during the year 2018.

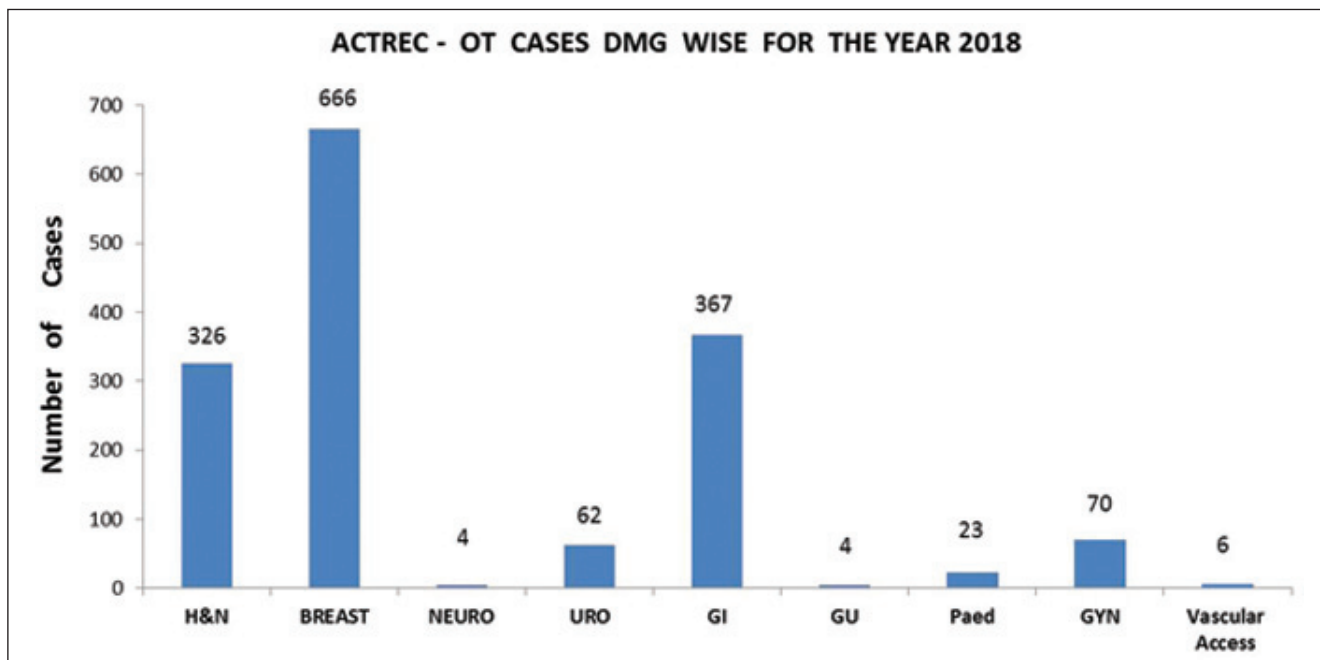


Fig1: DMG- wise number of surgeries in ACTREC in 2018.

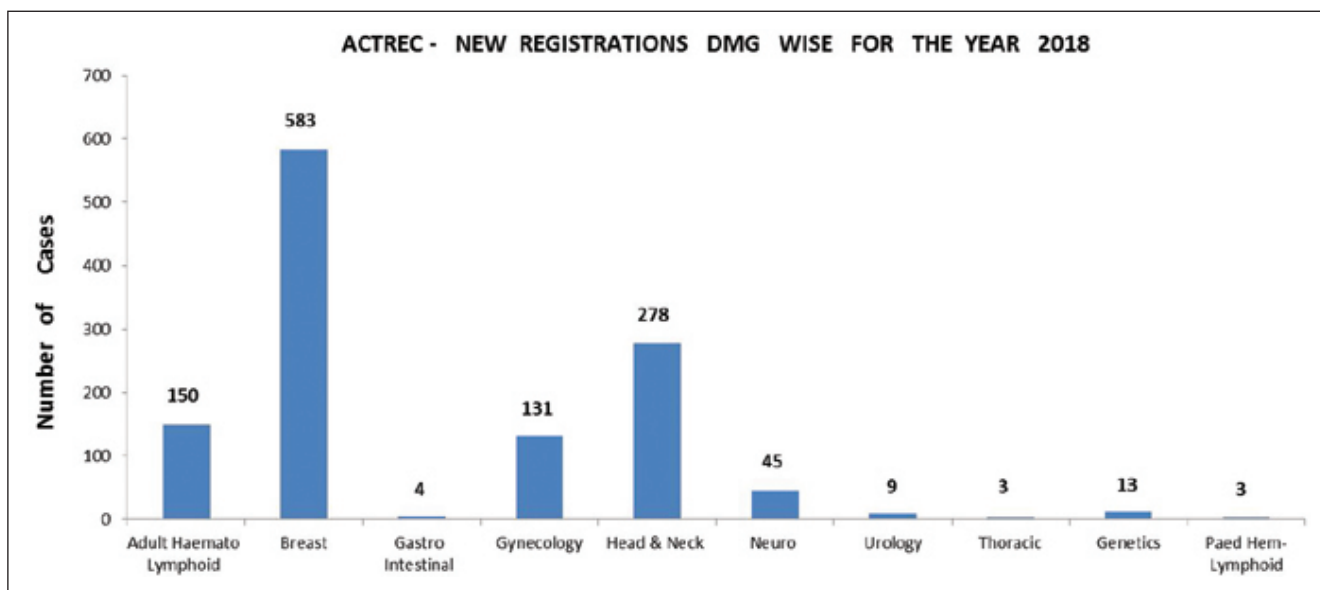


Fig2 : DMG- wise number of registrations in ACTREC in 2018.



Transfusion Medicine Department

Officer-in-Charge

Dr. Shashank Ojha

Scientific Officer

Mrs. Manda Kamble

Blood Bank Officer

Dr. Minal Poojary

Overview

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 BMT, Hematolymphoid, 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 include blood donation and apheresis, red cell serology, blood component separation, TTI testing, storage and issue of blood products. Specialized services include peripheral blood stem cell (PBSC) harvest, cryopreservation and storage, leukodepletion and gamma irradiation of blood components for BMT patients.

During the period from January to December 2018, the department collected a total of 2563 blood units, prepared 4475 blood components, and issued 4670 blood components. In addition, 1060 plateletpheresis and 138 leukapheresis (118 PBSC and 20 granulocyte concentrates) procedures were performed. Under specialized blood components, 1770 units were leucodepleted and 1853 gamma irradiated. Blood grouping and cross-matching was done on 5059 and 5634 blood samples respectively. The department also organized 37 outdoor blood donation and 3 platelet donation awareness camps.

Research

Faculty members of this department are involved in four ongoing projects in collaboration with other departments at ACTREC and TMH. These are, 'analysis of transfusion practices in hematopoietic stem cell transplant patients' (PI: Dr Shashank Ojha), 'a preclinical study to evaluate the efficacy of scfv-CD28-CD3ζ CAR T-Cells manufactured from healthy volunteers and patients with relapsed/ refractory acute

lymphoblastic leukemia in *ex vivo* setting' and (Co-Investigators: Dr Shashank Ojha and Dr Minal Poojary), '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' and 'Determination of select biochemical reference intervals in Indian voluntary blood donors'(Co-Investigators: Dr Shashank Ojha and Dr Minal Poojary).

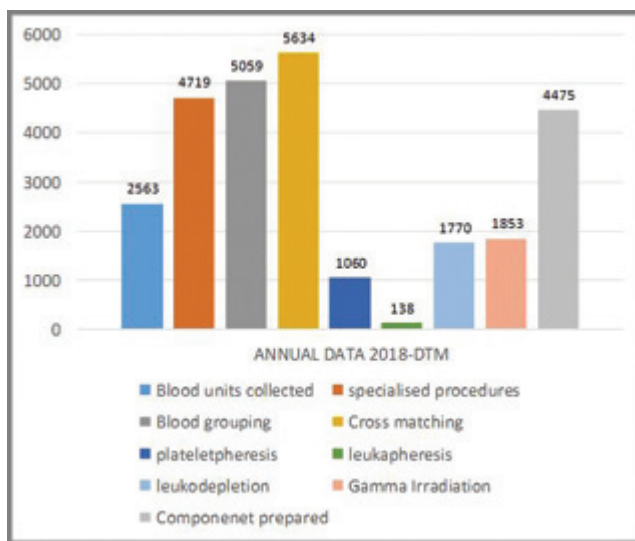


Figure: DTM data – 2018

Education

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

CANCER RESEARCH INSTITUTE

Dr. Shubhada Chiplunkar (Director, ACTREC) (up to November 2018)

Dr. Sudeep Gupta (Director, ACTREC) (December, 2018)

Dr. Prasanna Venkatraman (Deputy Director) (September 2018 –onwards)

Basic Research Team

- **Dr. Dibyendu Bhattacharyya**
- **Dr. Kakoli Bose**
- Dr. Pradip Chaudhari
- **Dr. Murali Krishna Chilakapati**
- **Dr. Shubhada Chiplunkar**
- **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. Jyoti Kode
- Dr. Pradnya Kowtal
- **Dr. Manoj Mahimkar**
- Dr. Sonam Mehrotra (DBT Wellcome Fellow)
- **Dr. Pritha Ray**
- **Dr. Rajiv Sarin**
- Mrs. Sharada Sawant
- **Dr. Neelam Shirsat**
- **Dr. Tanuja Teni**
- Dr. Rahul Thorat
- **Dr. Ashok Varma**
- **Dr. Prasanna Venkatraman**
- **Dr. Sanjeev Waghmare**
- Dr. Ujjwala Warawdekar

Principal Investigators (PIs) are shown in bold

Cancer Cell Biology Group – I

Principal Investigator:

Dr. Tanuja Teni

Overview

The research programs of this group are focused to gain insights into the molecular basis of oral and cervical tumorigenesis. Studies to identify the p53 mutant interactome associated with its gain of function activity in oral cancer cells are ongoing. To determine the molecular mechanisms underlying radioresistance, the validation of select proteins namely TCTP and Moesin for their association with radioresistance is being pursued in the established radioresistant oral cancer cell lines. To decipher the role of HPV16/18 in therapy resistance and the underlying molecular mechanisms, studies to establish HPV positive and HPV negative cervical cancer chemo-radiotherapy resistant cell lines have been initiated. Studies to decipher the non-canonical roles of Mcl-1 in DNA damage response and autophagy and to assess the possible interaction of CLU with DNA repair proteins in the nucleolus, in response to DNA damage have been initiated. Studies to understand the possible regulation of Activin A in oral cancer cells by p63 and their possible role in oral cancer cell migration are also ongoing.

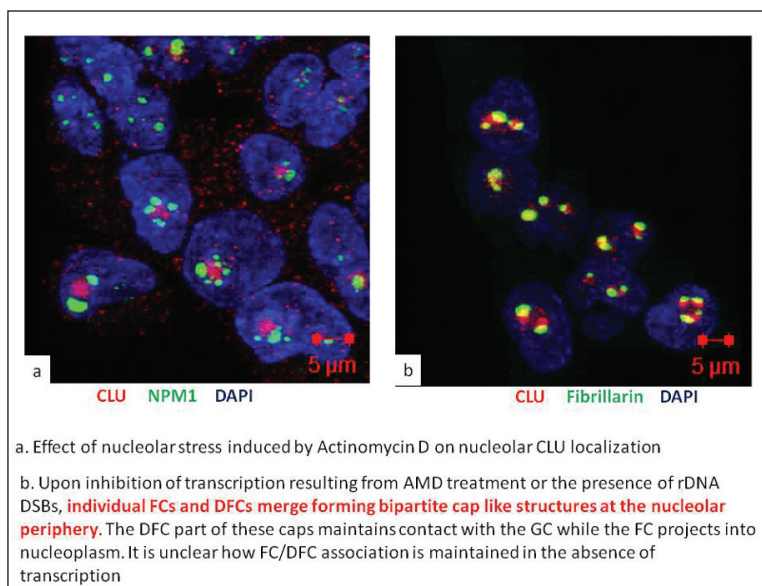
Research

To generate p53 overexpressing stable clones, transfection of pTRE2-Hyg inducible expressing Wild Type (WT) or mutant p53 (R175H, R248W and R273H) constructs in SCC-9 and SCC-15, which are p53 deficient OSCC cells has been initiated. siRNA mediated TCTP knockdown in SCC029B 70 Gy cells resulted in significant reduction of α H2AX, pP53 and pCHK2 and radio-sensitization in radioresistant oral cancer cells as compared to control cells. Studies have been initiated to determine the optimal dose of cisplatin to be used in combination with radiation for the concurrent chemoradiotherapy treatment in HPV16 positive and negative cervical cancer cell lines by clonogenic/MTT assay. Studies in the lab indicate that radiation induced autophagy is pro-survival in oral cancer cell lines and positively correlates with the increased expression of Mcl-1. Increased levels of NHEJ proteins like Ku70 and reduced phosphorylation of BRCA1 was observed post IR treatment in Mcl-1 knockdown cells. Co-localization

of CLU with nucleolar marker proteins like Fibrillarin and NPM1 confirmed its nucleolar accumulation. The localization of CLU under nucleolar stress triggered by Actinomycin D and Doxorubicin, exhibited formation of bipartite cap-like structures at the nucleolar periphery (Figure). The group findings demonstrated that Activin β A is the predominant form of Activin overexpressed in oral cells and that p63 can directly bind to the promoter of Activin β A, possibly regulating its expression.

Education

The Principal Investigator is a recognized guide for the Ph.D. degree 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. This year five trainees worked in the Laboratory for Master's dissertation or research experience. Besides these, two batches of five and six students each, from two dental colleges were assigned to the laboratory as observers for three and two days respectively. The Laboratory also has an in-house program of data presentations and Journal club every week. Faculty and students of the Laboratory attended various conferences and presented their research findings as oral or poster presentations.



Cancer Cell Biology Group – II

Principal Investigator:

Dr. Sorab Dalal

Overview

The two major areas of research in the 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 identified LCN2 as a potential therapeutic target in colorectal cancer and has identified mechanisms by which 14-3-3-ligand complexes form and dissociate, and acquired data has shown the way this mechanism regulates centrosome duplication. Finally, this work 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.

Research

Previous work from this laboratory demonstrated that loss of 14-3-3 ϵ and 14-3-3 γ 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 14-3-3 ϵ and 14-3-3 γ lead 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 a patent application submitted to DBT.

Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute and six students (Arunabha Bose, Sarika Tilwani, Nazia Chaudhary, Amol Lonare, Bhagyashree and Monika Jaiswal) worked on their doctoral theses in this laboratory during 2018. Eight trainees worked in the lab this year, six for Master's dissertation, two for experience and one on a Bachelors project. Lab members participated in weekly in-house seminars and journal club, and presented their research findings at three conferences/ meetings during 2018.



Cancer Cell Biology Group – Other Projects

Scientific Officer:

Dr. Ujjwala Warawdekar

Overview

The research focus is to assess Minimal Residual Disease [MRD] in solid tumors in evaluating the efficacy of therapy and disease outcome. Measurement of CTCs in the peripheral blood of cancer patients is a valuable liquid biopsy biomarker for prognostication and tailoring therapy. Circulating tumour cells (CTCs) along with other components like nucleic acids and exosomes are entities that escape into circulation due to an increased tumour burden by means of cell shedding, or the aggressive characteristics of the primary tumour. Studies have demonstrated presence of CTCs and its association with tumor progression and metastasis, as also a change in CTC number predicts response to therapy and evaluates residual disease. Attempts at ex-vivo CTC culture and CTC xenograft models for personalized cancer medicine are some developments. The use of circulating biomarkers like miRNAs to gauge improved disease free survival in breast cancer patients' consequent to pre-surgery single depot injection of hydroxyprogesterone is in process

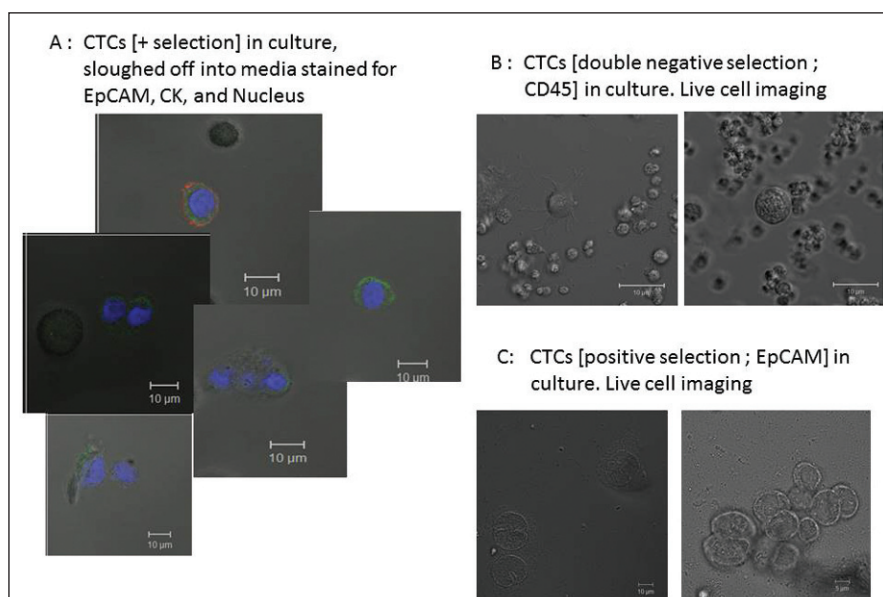
Research

A protocol for isolation and enumeration of CTCs from the peripheral blood of breast cancer patients has been established and the methodology for CTC evaluation, validated in this lab. CTC isolation and ex-vivo culture from treatment naive patients with either metastatic or locally advanced breast cancer using two methodologies exploiting tumor cell size and cell surface antigen expression [EpCAM] has been completed. Tumor heterogeneity and a metastatic setting can manifest in a lowered expression of EpCAM, which are captured as the EpCAM - or CD45 - CTCs. Both types, as well as the CTCs captured on the filter were maintained in ex-vivo culture under appropriate experimental conditions. An independent fraction of CTCs was evaluated for the expression of EpCAM, CK, and MUC-1 to ascertain quantitatively the presence of CTCs across the samples. CTCs in culture were

monitored using live cell imaging and those captured on the filter were imaged using staining techniques of Giemsa and H & E to identify characteristic nuclei as well as a larger cell size. CTCs in culture were viable for an extended period of time, though development of CTC cell line/s did not materialize [Figure B & C]. Subsequently these cultures were stained for epithelial markers, presence of a nucleus, absence of CD45, and images were acquired on a confocal microscope [Figure A]. Tumor core biopsies have been assessed by IHC for EpCAM, Pan Cytokeratin, Bcl2 and p53. Expression analysis for EpCAM, CK-19, CK-18, Muc-1, cFN, CD44, E-Cadherin, Vimentin, Connexin 43, Connexin 26 and b- Actin was done to analyze RNA differences across samples. The expression of EpCAM in the biopsy specimen confirmed credibility of immunomagnetic enrichment for capture of CTCs. A detailed clinical analysis correlating marker expression, CTC numbers and outcome is in progress and on-going.

Education

Engaging in the Centre's academic and training program, participating to acquire new skills, in workshops and conferences have been some of the academic activities. Four trainees for Master's dissertation were accepted; two each, in the first and second half, of 2018. The faculty participated in two international and two national conferences this year.



Cancer Genetics, Epigenetics & Genomics Group – I

Principal Investigator:

Dr. Neelam Shirsat

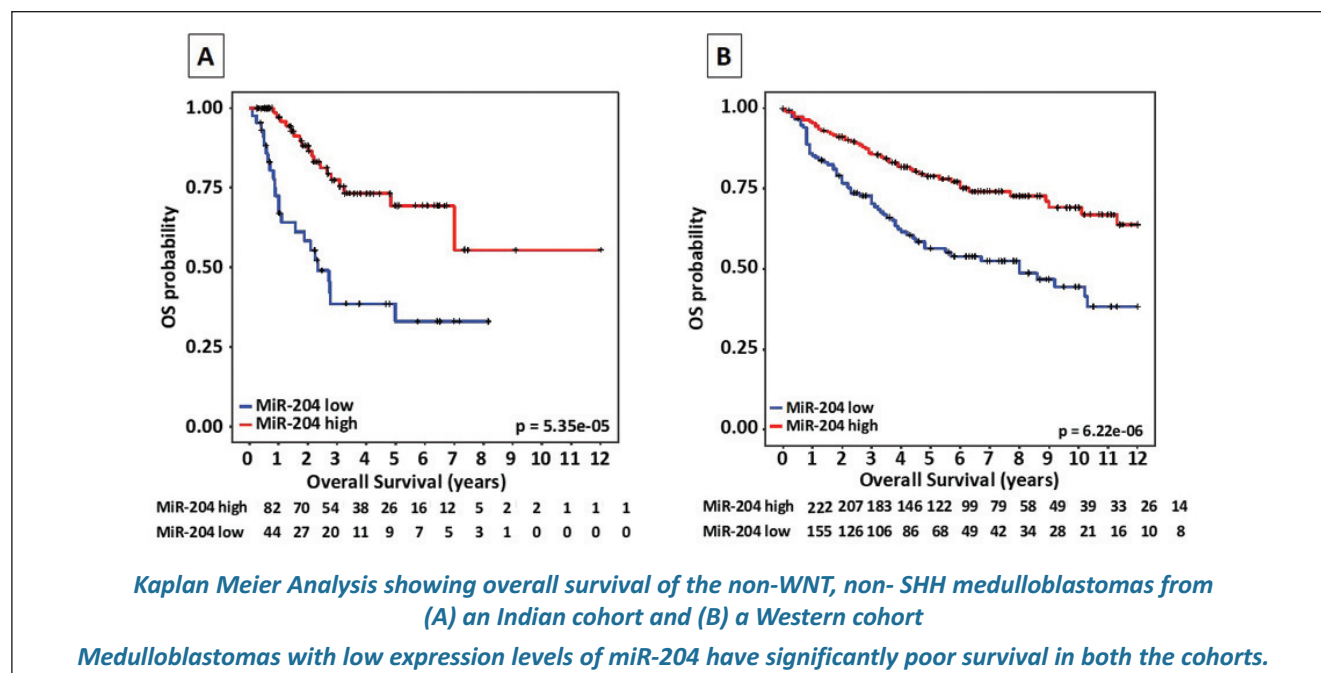
Overview

MiR-204 was identified as a valuable marker for risk stratification and has therapeutic potential in the treatment of medulloblastoma, a malignant brain tumor in children. MiR-204 expression levels identify a subset of non-WNT, non-SHH medulloblastomas having high incidence of metastasis and poor overall survival. This finding was validated in an independent western cohort of 760 medulloblastomas. A serum microRNA signature is identified as a biomarker that distinguishes metastatic disease from the localized prostate cancer with an accuracy of 93% as determined using a machine learning algorithm. This microRNA signature can be used as a biomarker for diagnosis and monitoring of patients with prostate cancer.

Research

The four molecular subgroups of medulloblastomas differ in their microRNA expression profile. WNT subgroup tumors have the best survival rates and the most distinctive microRNA profile. Several reports from this laboratory have shown tumor-suppressive nature of many of these microRNAs. MiR-204 is one of the microRNAs that are

overexpressed in the WNT subgroup. MiR-204 expression levels identify a subset of the non-WNT, non-SHH medulloblastomas having high incidence of metastasis and poor overall survival. These findings have been validated in an independent western cohort of 760 medulloblastomas (Figure). Restoration of miR-204 expression in medulloblastoma cell lines was found to inhibit their anchorage-independent growth, invasion potential and tumorigenicity accompanied by autophagy inhibition. Up regulation of miR-204 expression, upon treatment with HDAC inhibitors suggests therapeutic role for these inhibitors in the treatment of medulloblastomas. Exome sequence analysis of the WNT subgroup tumors showed mutations in one or more chromatin modifier genes belonging to the SWI/SNF complex, ASCOM complex or Histone Acetylases in each tumor. Copy Number Variation analysis showed monosomy of chromosome 6 in 70% cases. *ARID1B*, a SWI-SNF family chromatin modifier gene is located on chromosome 6 and was found to be mutated in the WNT subgroup medulloblastomas. In order to delineate its role, *ARID1B* gene was knocked out in HEK293FT cells using CRISPR technology. Transcriptome sequencing of *ARID1B* knock-out clones showed down-regulation of multiple genes, reported to



inhibit canonical WNT signaling pathway. Furthermore, TOP-FLASH reporter assay showed activation of WNT signaling in *ARID1B* knock-out clones and further increase in the signaling upon co-transfection with mutant beta-catenin. Designing of optimal treatment strategy at each stage of prostate cancer is hindered due to lack of accurate prognostication markers that can distinguish aggressive tumors from indolent tumors. A serum microRNA signature was identified as a biomarker that distinguishes metastatic disease from localized prostate cancer with an accuracy of 93% as determined with a machine learning algorithm. Further analysis on a larger dataset would validate the microRNA signature as a biomarker for monitoring the disease following treatment of localized prostate cancer patients.

Education:

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences of the Homi Bhabha National Institute. Seven students -Ms. Shalaka Masurkar, Ms. Raikamal Paul, Mr. Harish Bharambe, Mr. Akash Deogharkar, Ms. Shweta Gopalakrishnan, and Ms. Purna Bapat worked on their theses, whereas Mr. Satishkumar Singh obtained his doctorate in 2018. Students in the group participated in four national and one international conference in 2018. During the year, training was imparted to five students.



Cancer Genetics, Epigenetics & Genomics Group – II

Principal Investigator:

Dr. Manoj Mahimkar

Overview

Mahimkar laboratory focuses on understanding the genetic basis of tobacco-related cancers by studying genomic alterations at the level of copy number across the genome, and identifying genes/ gene clusters underlying the altered genomic loci. Signatures associated with the progression of pre-invasive lesions to invasive oral squamous cell carcinoma have been identified, and candidate driver alterations unique to primary tumors with lymph node metastasis and related to patient survival have been found. In parallel studies, the chemo preventive efficacy of polymeric black tea polyphenols (PBPs), abundantly found in black tea in inhibiting carcinogen (BaP and NNK)-induced lung adenomas in A/J mice is being tested. The group has for the first time demonstrated that administration of PBPs in drinking water throughout the carcinogen treatment period significantly decreases the multiplicity of surface tumors and microscopic lung lesions, including adenomas.

Research

Cancer progresses through the accumulation of genetic and epigenetic changes, ultimately resulting in gross genomic instability. The group has identified signatures associated with the progression of pre-invasive lesions to invasive OSCC and found candidate driver alterations unique to primary tumors with lymph node metastasis and related to patient survival. These observations have been validated by FISH and data obtained indicates that amplification of these loci; 1p36.33 & 11q22, is associated with nodal metastasis. Genomic analysis of oral precancerous lesions revealed that 8q24.3 gain is an early potential change in oral carcinogenesis. Positive correlations between 11q22 amplification and lymph node metastasis, reduced survival, increased cancer recurrence and poor response to radiation treatment were observed. Functional analysis of genes underlying the 11q22 locus revealed association of BIRC2 and BIRC3 with lymph node metastasis. Presently screening of samples for global DNA methylation is on-going. Investigations on the

chemopreventive efficacy of polymeric black tea polyphenols (PBPs), abundantly found in black tea, to inhibit carcinogen induced lung adenoma in A/J mice demonstrated that administration of (1.5% 3%, 5% & 10%) PBPs in drinking water throughout the treatment period significantly decreased the multiplicity of surface tumors as well as microscopic lung lesions, including adenomas. 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). Currently work on early molecular changes associated with pre and post treatment of PBPs, PBP dose response studies using experimental lung

and oral cancer models show interesting dose response relations in both models.

Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. In 2018, one of his five graduate students- Ms. Rasika Hudlikar was awarded the PhD degree while Ms. Usha Patel Ms. Mayuri Inchanalkar Ms. Vaishnavi Nimbalkar and Mr Zaid Shaikh are presently working on their doctoral theses. The lab participates in the Centre's training program and, during 2018, three trainees were accepted for their Master's dissertation and two for experience; in addition four students from the Yenepoya Dental College came as observers.



Cancer Genetics, Epigenetics & Genomics Group – III

Principal Investigator:
Dr. Sanjay Gupta

Overview

Histone variants and isoforms, as well as their multiple post-translational modifications regulate processes like gene expression, DNA repair, and therefore are emerging as key players in human health including cancer. On-going studies have shown that changes in the H2A isoforms and H3 variants, their site-specific post-translational modification, 3'-UTR organization and deposition machineries of histones affect the process of tumorigenesis and resistance mechanisms. The group has identified the critical role in human cell lines and gastric cancer tissues of mitogen and stress activated kinase 1, protein phosphatase 1 and histone deacetylases in regulation of cell cycle dependent H3 [serine-10] phosphorylation, along with acetylation in DNA damage response. Taking in view the translational perspective, the group has developed a liquid biopsy based 'real time' monitoring method for epigenetic modifiers and sub-grouping of the patients for treatment with specific inhibitors. Therefore, identification of "histone-signature" will help in better understanding of cancer and will lead towards better usage of "epigenetic" agents for diagnosis and therapeutic purposes in disease management.

Research

Research in this laboratory demonstrates differential kinetics of histone H3 Serine 10 phosphorylation posttranslational modification in G1 and G2/M phase of cell cycle in response to ionizing radiation induced DNA damage. The group has identified alterations in epigenetic modifiers in acquired radio-resistance and chemo-resistance of breast and liver cancer cells. Additionally the importance of global histone H3 acetylation and phosphorylation and the significance of histone modifying enzymes during the course of cellular transformation of gastric cells and in human gastric tumors have been demonstrated by this group. Taking in view the translational perspective, a liquid biopsy based 'real time' monitoring method for sub-grouping of patients for epi-drug treatment as chemo-sensitizer or potential therapeutic target has been developed in this laboratory. Recent findings from this group have shown an increase in histone HIST2H2AC and HIST2H3A/C isoforms in various human cancer cell lines and human tumor samples compared to normal counterparts. On-going research suggests differential tissue, lineage and cancer type specific expression of histone H2A and H3 genes. Research from this group also shows, that the cancer

epigenome has condensed chromatin organization, with decrease in euchromatin and increase of heterochromatin, thereby co-relating with activating and repressive histone PTMs. Presently, the focus is on studying the stem-loop binding protein in regulation of 3' tail of canonical histone mRNAs and how hypoxia engages with different proteins involved in chromatin organization and dynamics.

Education

The Principal Investigator is a mentor for Ph.D. in Life Sciences of the Homi Bhabha National Institute. Presently, seven

students – Ms. Asmita Sharda, Mr. Ramchandra Amnekar, Mr. Sanket Shah, Mr. Mudasir Rashid, Ms. Tripti Verma, Mr. Abhiram Natu and Ms. Sukanya Rauniyar are working on their doctoral theses. PI is in doctoral committees of research scholars undergoing Ph.D. program at ACTREC as well as other institutes like BARC, NIRRH. The faculty organized the 14th Indo-Australian Biotechnology Conference at ACTREC. In 2018, the faculty accepted trainees for Master's dissertation and experience. Lab members met for in-house data presentation, abstract and journal club and participated in national/ international conferences.



Cancer Genetics, Epigenetics & Genomics Group – IV

Principal Investigator:

Dr. Amit Dutt

Overview

The goal of 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. The group specifically focuses on the genomic features of genetic alterations underlying oncogenesis and cancer progression in the lung, breast, cervical, gallbladder, head and neck, and others 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 is involved in exploring a possible pathogenic basis for cancer.

Research

Basic research: The group has performed an integrated analysis of whole exome sequencing, copy number alterations, immuno-histochemical, and phospho-proteome array profiling to establish an activating role of *ERBB2* and *KRAS* somatic mutations in gallbladder tumors. This study implicates *ERBB2* as an important therapeutic target in early-stage gallbladder cancer, and presents the first evidence that the presence of *KRAS* mutations may preclude gallbladder cancer patients to respond to anti-EGFR treatment, similar to the clinical algorithm commonly practiced to opt for anti-EGFR treatment in colorectal cancer. Similarly, in breast cancer, the group has recently described the first leads to model a successful randomized study *in vitro* by systematically elucidating the role of protein kinases that potentially underlie the clinical outcome of pre-operative progesterone intervention in breast cancer. The study also suggests that inhibition of *miR-129-2* reinstates *PR* in breast cancer cells, and hence could potentially be helpful for patients with inadequate *PR* expression levels under adjuvant or neo-adjuvant settings along with hormonal therapy.

Tool development: The group has developed ClinOme, a Graphical User Interface (GUI) based automated computational tool for analysis of raw NGS data followed by comprehensive clinical report generation. ClinOme automates quality check, primary, secondary and tertiary analysis of raw NGS data followed by the generation of a report that can be easily understood by the clinician. It integrates the therapeutic guidelines available through FDA/NCCN, NCBI, MSKCC, Washington University, Illumina and other resources. It provides easy to interpret categorization of genomic alterations along with approved as well as experimental therapeutic options for each responsive and resistant genotype-drug combination. The output of ClinOme analysis consist of a report with detailed patient centric

genotype to help design informed therapeutic option, which is currently under testing.

Education

The Principal Investigator is a recognized guide for the Ph.D. course in Life Sciences of the Homi Bhabha National Institute. Presently eight research scholars –Ms. Trupti Togar, Mr. Sanket Desai, Mr. Asim, Mr. Bhaskar Dharavath, Ms. Neelima Yadav, Mr. Suhail Ahmad, Ms. Supriya Hait, and Mr. Aniket Sawant are working towards their doctoral theses. During 2018, the lab presented their research findings as invited oral presentations at 3 international and ~30 national meetings.



Cancer Genetics, Epigenetics & Genomics Group – V

Principal Investigator:

Dr. Rajiv Sarin

Co-Investigator:

Dr. Pradnya Kowtal

Overview

The group aims to understand the molecular basis of inherited and somatic cancers, and develop translational algorithms through molecular biology and functional genomics. The group addresses these questions through: A) Large cohort of over 7000 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 (ICGCC) project covering 421 Gingivo-Buccal SCC patients with full clinico-pathological annotation, follow up and somatic / germline NGS analysis and functional studies.

Service

The group runs a Cancer Genetics Clinic to provide genetic counseling to the families enrolled at ACTREC and TMH. During 2018 the clinic enrolled 1450 new hereditary cancer families and conducted counseling for ~2000 previously and newly enrolled families. Follow up counseling and risk management guidance was provided to ~3000 new and previously enrolled families.

Research

In inherited cancer syndromes, genetic analyses of mutational hotspot or full gene using Sanger sequencing or NGS and MLPA was performed. Four new Indian BRCA1 founder and recurrent mutations were identified this year bringing the total of BRCA1/2 founder mutations identified by the group

to 20. One new founder mutation in Mismatch Repair Genes in Lynch Syndrome families was identified. Genotype phenotype correlation of novel variants in STK11 gene was carried out. Frequent occurrence of allele dropout not detected earlier by Sanger Sequencing was uncovered through NGS in *TP53* gene, data of which has been published in 2018. Under the ICGC project, 4 oral cancer cell lines with full genomic characterization have been established. These are being used for functional analysis with stable knockouts that inhibit the arachidonic acid pathway; role in head and neck cancers identified earlier through whole exome analysis. In the ICGC project targeted sequencing of oral tumors and adjacent normal tissue is on-going to understand molecular signatures of field cancerization.

Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. Four doctoral students – Mr Moquital Haque, Ms Vasudha Mishra, Ms Anuja Lipsa and Mr Amogh Auti are presently working on their theses. Ms Nikhat Khan was awarded the PhD degree during 2018. The lab provided training to 10 students - 7 for Master's dissertation and 3 for lab work experience. The lab conducts an active weekly academic program in which the updates in lab work, seminal research papers and interesting research papers are presented. Four parallel workshops for Hands-on Training in Genetic Counseling, Molecular testing, Next Generation Sequencing technology, Bioinformatics and Breast MRI, with 65 participants, and a three day conference attended by 150 Indian and overseas delegates were organized and hosted in December 2018.



Cell & Molecular Imaging Group – I

Principal Investigator:

Dr. Abhijit De

Overview

Imaging of molecular functions provides real-time visualization and quantitative measurement abilities of cellular or physiological processes in normal or diseased conditions. Research by the group involves medical imaging methodologies suitable for testing experimental medicine and concept therapeutics in preclinical models. The mandate of this laboratory is translating diverse experimental therapeutics developed through research.

Research

A major focus of this laboratory is to understand the therapeutic potential of human sodium iodide symporter (hNIS) or SLC5A5 gene that naturally over-expresses in a majority of breast cancers (BC). However, human NIS expression is primarily recorded as a cytoplasmic protein, thus limiting the scope of this iodine pump protein as a target for radio-iodine therapy. In 2018, the disparity of hNIS

expression in cancer tissue sample and poor functional relevance in clinical scenario of BC was addressed, by developing unique cell lineages based on MCF-7 adenocarcinoma. A novel role of mannosidase enzymes in N-glycosylation processing of human NIS, which holds significant potential on developing applicable corrective measures for targeted radioiodine treatment for BC, was demonstrated in this laboratory. Collaboration with IIT Mumbai, for development of biocompatible gold nanospheres for photothermal therapy which has exceptional potentials of clinical application is an on-going project. Localized treatment of palpable tumors with accumulated nano-sized particles when exposed to a brief NIR laser irradiation confers excellent tumor tissue ablation while keeping the surrounding tissue safe. The efficacy of this cost-effective procedure against human drug-resistant and radio-resistant tumor cells in a preclinical setting was demonstrated by this group. Developing molecular sensors for imaging STAT3 activation, which regulates important disease related

cell signalling in BC cells is another area of interest. In 2018, significant progress in validating this molecular sensor which is based on optical reporter imaging satisfying resonance energy transfer mechanism was made in this laboratory. Characterization of patient tumor tissue samples revealing the importance of phosphoserine post-translational modification as a measure of STAT3 activation in Neoadjuvant chemotherapy patients was also done in 2018. The PI is the recipient of a new international bi-lateral fund (DBT Indo-Russia) to pursue studies on a novel mushroom luciferase in developing reporter imaging applications.

Education

The Principal Investigator is affiliated to HBNI as a guide for Ph.D. degree in Life Sciences. In 2018, six students- Ms. Shalini Dimri, Mr. Arijit Mal, Ms. Maitreyi Rathod, Mr. Sumit Mishra, Mr. Pranay Dey and Mr. Aaiyas Abdulhamid Mujawar are presently working towards the Ph.D. degree. The faculty accepted trainees for their Master's dissertation. The group members presented their findings in several national/ international conferences/ workshops in 2018. The PI has completed a tenure as a member of External Thesis Advisory Committee at Shobhaben Pratapbhai Patel School of Pharmacy, NMIMS, Mumbai, and been a PhD Thesis Examiner for students of various institutes in the country. The PI is serving as an Editor for three international journal boards, i.e. Scientific Reports (NPG), PlosOne and Breast Cancer (Dove Press).



Cell & Molecular Imaging Group – II

Principal Investigator:

Dr. Dibyendu Bhattacharyya

Overview

The focus in Bhattacharyya laboratory is on intracellular vesicular trafficking, and on biogenesis, size and shape control mechanisms of organelles. Organelles' size and shapes are greatly altered in cancer and such alterations are a hallmark of cancer 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. This laboratory also has an interest in developing novel tools and forms for different types of microscopy. The laboratory of Dr. Bhattacharyya is also studying vesicular trafficking in early secretory pathways as well as the biogenesis of exosomes, a class of nano-sized extracellular vesicles implicated in cancer metastasis.

Research

At present the group is studying ultrastructure's of several organelles including Golgi, ER, Nucleus, nucleolus, mitochondria's. Previously studies by this group have 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 have been discovered. Studies by this group have uncovered the mechanism of ER arrival of COPI vesicles via ER arrival sites (ERAS) and findings from this lab show that GRIP domain Golgin mediate Golgi stacking which is regulated by Arl-GTPase cascade switch. Research on exosome uptake in human cells and organelle dynamics and inter-organelle contact sites in neurons as well as optimizing photo changeable fluorescent proteins such as mEOS3 which are essential for super resolution microscopy is on-going in this laboratory.

Education

The Principal Investigator is a recognized guide for Ph.D. in the Life Sciences of Homi Bhabha National Institute. Presently, six Ph.D students – Ms. Prasanna Iyer, Mr. Praveen Marathe, Ms. Sudeshna Roychowdhury, Ms. Naini

Chakraborty, Ms. Shreyosi Chatterjee, Ms Roma Dahara, are working on their doctoral dissertation. Lab members participate in weekly data presentation sessions, and presented their findings at four local/ national conferences in 2018.



Cell & Molecular Imaging Group – III

Principal Investigator:

Dr. Murali Krishna Chilakapati

Overview

Cancer is a leading cause of death accounting for around 8 million cases worldwide. It is predicted that by the end of the year 2020, over 10 million people would die globally each year because of cancer, with 70% deaths from the developing countries. The high mortality rate, mainly due to late detection and recurrences, is ascribed to limitations of conventional diagnostic methodologies. Screening and early detection are thus important tools for the overall management of cancer and to achieve decreased morbidity and higher disease-free survival rates. Currently practised diagnostic approaches involve invasive procedures and are prone to subjective errors; thus, it is crucial to develop sensitive, preferably non-invasive diagnostic methods. Optical spectroscopic methods, such as infra-red, Raman, and fluorescence spectroscopy, are being investigated as candidate adjunct/alternative approaches. Due to associated advantages, Raman is found to be more suited for non-invasive, online clinical applications. This laboratory is actively pursuing the development of Raman based methods with the following areas: (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 ¹H NMR, Raman and Infrared spectroscopy for oral cancer diagnosis using saliva; and (e) Investigations on experimental carcinogenesis in animal models.

Research

The group is actively pursuing non-invasive and minimally invasive applications of Raman spectroscopy in cancer. Raman mapping of cells and tissue section for in depth understanding is another area of interest.

Non-invasive applications: Studies in this laboratory on oral cancer reveal that Raman spectroscopy is capable of classifying normal, premalignant and malignant, and can also identify cancer field effects and malignancy-related changes. Also Raman spectroscopy in early identification of recurrence/ second primary is demonstrated and validation studies are being carried out. Presently this laboratory is involved in exploring utility Raman spectroscopy prognosis applications.

Minimally-invasive applications: Studies on cell smears (brush biopsies) and sera demonstrated classification of healthy subjects, habitual tobacco users, and oral premalignant subjects. Recent studies validate these findings, especially classifying different premalignant conditions and identification of recurrence. The group demonstrated utility of Raman exfoliative cytology in identification of subjects prone to recurrence/poor prognosis. **Animal models:** Studies on micro tumors, attributable to mechanical irritation in control hamster buccal pouch, using Raman and histopathology and molecular markers are being pursued. Serum Raman investigation is being carried out to understand spectral profiles at different time point during carcinogenesis and these studies would support findings on human subjects.

Raman mapping: Raman maps of cells and tissues are being carried out for understanding at organelle or layer level. Lab is actively involved with BARC, [Bombay and Vizag] IPR, Ahmedabad, IIT Mumbai, IIT Khargapur at national level. Internationally, several collaborations are on with groups from Finland, England and Japan.

Education

The lab members also participated in the Centre's training programs and accepted 4 trainees for research experience. Lab members presented their findings at 5 international conferences and attended two workshops. Three distinguished scientists from abroad visited this laboratory in 2018.



Hemato-Oncology Group

Principal Investigator:

Dr. Rukmini Govekar

Overview

Chronic myeloid leukemia (CML) epitomizes successful targeted therapy. The transforming fusion gene BCR/ABL encodes a constitutively active tyrosine kinase and inhibition of this activity effectively controls the disease in the initial chronic phase (CP) in about 90% patients. However, resistance to TKIs occurs in a section of patients who progress to the terminal blast crisis (BC). About 80% of BC patients are unresponsive to TKI therapy because the disease is probably driven by BCR/ABL independent pathways. This laboratory is interested in understanding the molecular alterations associated with resistance to tyrosine kinase inhibitors in BC in order to identify potential therapeutic targets. Proteomic and genomic analysis of cell lines representing blast crisis, both sensitive and resistant to TKIs have been carried out in order to identify the molecular alterations underlying resistance.

Research

Mass spectrometry based (nLC-ESI-Q-TOF) proteomic analysis of K562 cells sensitive to imatinib, the first generation TKI was carried out in the presence and absence of imatinib at a dose that inhibited BCR/ABL activity without affecting cell viability. The differentiators were identified using both labeled and label-free approaches to widen the search and totally 319 differentiators, which belong to pathways

modulated by BCR/ABL, were identified. Bioinformatic analysis of differentiators identified 14-3-3 isoform as a key differentiator. Knock-out of 14-3-3 isoform in BCR/ABL expressing cells altered the sensitivity of the cells to imatinib. Further, a major metabolic pathway was altered in resistant cells and its role in drug resistance is being investigated. In cells resistant to imatinib a pathway other than BCR/ABL pathway has been identified and its components would be explored as therapeutic targets. Genomic analysis has shown that chromosomal aberrations accumulate during progression of cells from TKI-sensitive to resistant phenotype. In an interesting observation by this group, majority of the aberrations are detected in a single chromosome in the experimental system and its significance needs to be explored. Thus this data has widened the understanding of the molecular basis of imatinib resistance in CML BC.

Education

The Principal Investigator is recognized as a PhD Life Sciences guide of the Homi Bhabha National Institute. Presently five graduate students – Ms. Mythreyi Narasimhan, Mr. Rahul Mojidra, Ms. Smita Ghorpade-Shelke, Mr. Manish Bhat and Ms. Neha Agarwal are working towards a doctoral degree. In 2018, three trainees worked towards their MSc dissertation in this laboratory. The PI delivered several talks and lectures as an invited faculty at conferences and workshops held in institutes/ colleges in Mumbai during the year 2018.

Hemato-Oncology Group – Other Projects

Scientific Officer:

Dr. Syed Hasan

Overview

The major focus of this laboratory is to study the molecular and functional aspects of novel agents in Acute Myeloid Leukemia (AML) and hereditary breast cancer without BRCA1/2 mutations. The survival of cancer cells is dependent on the mitochondrial apoptotic pathways involving BCL-2 proteins and their proliferation is controlled by cyclin dependent kinases (CDKs). The discovery and development of small molecule cancer drugs has been revolutionised over the last decade but AML remains an incurable disease. This group is interested in developing *in vitro* and animal models to study signalling between BCL-2 and CDK-7 and combining their targeted actions for the improved therapeutic strategies to overcome apoptotic resistance in AML. On targeted therapeutic approaches in AML, this lab is collaborating with a biotech based company - Aurigene Drug Discovery and Development Technologies Bangalore and Prof. Marina Konopleva at MD Anderson Cancer Centre, Houston. Monitoring of minimal residual disease (MRD) by molecular markers and identification of miRNA-mRNA network in AML are other research aspects of the laboratory.

Research

This group is evaluating effects of small molecule inhibitors on primary patient-derived tumor cells and determination of anti-tumor activity in patient-derived xenograft models. AML is the commonest type of acute leukemia in adults and second common in children. It is genetically heterogeneous disease with very poor survival. The long-term overall survival (OS at 5 years) of AML patients is <30%. The current chemotherapy regimens remain inadequate and fail to induce or sustain long term remissions in AML due to the

emergence of apoptosis resistant leukemic blasts following chemotherapy. The resistance leads to relapse and eventually patients die of leukemia. There is an urgent need to develop novel strategies, targets and targeted therapy for the management of AML. In collaboration with Aurigene discovery technologies a highly specific CDK-7 inhibitor which is covalent irreversible, and orally bio-available has been developed. The preliminary data derived from AML indicates that targeted therapy by BCL-2 & CDK7 inhibitors synergistically modulate apoptosis and proliferation. Targeting BCL-2 and CDK-7 mediated pathways will improve understanding of AML and promote develop novel, rational treatment approaches to improve therapeutic outcome. There are different on-going projects including multidisciplinary approach to evaluate the pathogenicity of missense mutations causing hereditary breast cancer (funded by Department of Science and Technology). In this project the functional consequences of pathogenic mutations of breast cancer using genome editing tools such as CRISPR-Cas9 are being evaluated. A recent study from this laboratory on miRNA-mRNA profiling reveals prognostic impact of *SMC1A* expression in *NPM1* mutated acute myeloid leukemia.

Education

The Scientific Officer is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. Presently Ms Tarang Gaur is working towards a doctoral thesis. During 2018, group members presented research findings at two International conferences. The lab members in collaboration with BMT and Hematopathology department conduct weekly journal club and data presentation. In 2018, two trainees were accepted in the lab.

Protein Biochemistry, Biophysics & Structural Biology Group – I

Principal Investigator:

Dr. Prasanna Venkatraman

Overview

The group aims to build protein interaction networks using PSMD9 and PSMD10/Gankyrin, as central nodes and identify vulnerable nodes and edges that can be manipulated in diseases such as cancer. In 2018, major advances were made in advancing information from patient data derived PSMD9 sub network in characterizing EGF stimulated EMT markers in PSMD9 CRISPR knock out MCF7 breast cancer cells. Directed evolution has resulted in the identification of a super binding short dipeptide motif that can interfere with PSMD9 interaction with hnRNPA1. This result is crucial in this group's efforts to find peptide mimetics and inhibitors of NFkB signalling. Studies will expand the network of PSMD9 PSMD10 to include regulation of mitochondrial biogenesis, ribosome assembly and protein translation and also to extend out interest in protein interactions to understand the molecular details of 14-3-3 binding to client proteins and short peptides.

Research

Gankyrin Interaction network: Pertaining to the studies on the Gankyrin Interaction network, new leads from PSMD10-CLIC1 interaction point towards the involvement of endosome biogenesis.

On the regulation of PSMD9 and PSMD10 in organelle biogenesis: Both PSMD9 and PSMD10 are found to be associated with various Ribosomal Proteins, ER and Mitochondrial Proteins. The key findings include increased translation and enhanced mitochondrial fission in PSMD9 overexpressing cells, while enhanced ER stress response and mitochondrial fusion are observed in PSMD10 overexpressing cells.

On the directed evolution of a di peptide at the interface of PSMD9-hnRNPA1 interaction Guided by differential binding

affinities of c-terminal peptides to the PDZ domain of PSMD9, convert a low affinity tetra peptide binder ($\sim 600\mu\text{M}$) to a tight binding sequence ($\sim 5\mu\text{M}$) capable of inhibiting PSMD9-hnRNPA1 interaction.

On 14-3-3 γ NPM1 interaction regulating centrosome duplication: In depth analysis of available crystal structures, peptide binding studies using fluorescence polarization and SPR, site directed mutagenesis and thermal stability of the proteins has enabled construction of a working model for the recognition of protein ligands by 14-3-3, a rate limiting step in centrosome duplication (in collaboration with Sorab Dalal)

Education

The PI is a member of the current academic committee, member of the doctoral committee of more than 20 students and the chair of several Doctoral Committees. In 2018, the PI organized a National Biophysical workshop funded by Tata Trust, to which a few Masters Students were invited and participating PhD students were from institutions like NCBS, VIT, Vellore and Bose Institute. The PI also conducted an Indo-US IUSSTF symposium in collaboration with IIT Mumbai and Broad Institute on the future of medicine in the post genome and proteome era.

In 2018, the PI was deputed in a team of delegates to visit institutes of excellence in Europe and UK. The PI was instrumental in arranging the visit to Karolinska Institute; Sweden with the aim of bringing back innovative ideas for a new research institute at ACTREC and at the end, a critical feedback to generate the report was given by the PI. The PI was re-designated as the deputy Director CRI (September 2018). In 2018, lab members have presented their findings at National and International conferences and have won awards.



Protein Biochemistry, Biophysics & Structural Biology Group – II

Principal Investigator:

Dr. Ashok Varma

Overview

Interdisciplinary approaches are being used by this group to evaluate the folding pattern of proteins. Categorizing the pathogenicity of the mutations discovered from larger cohort of patients to determining the three dimensional molecular structures of cancer associated proteins is the main focus of this group. Pathogenicity of mutations discovered in functional domains of BRCA1/2 gene from Indian/Russian families has been characterized. Furthermore, different domains of BRCA1/2 have been expressed, purified and functionally characterized for its folding behaviors. For the proteomics project, serum proteomics using mass spectrometry was applied to explore the predictive and prognostic biomarkers in Head and Neck squamous cell carcinoma treated with radiotherapy. A set of proteins has been identified for further evaluation. Different national and international collaborative projects are on-going with five PhD students and other members of the laboratory.

Research

The focus of this laboratory is to find genomics, proteomics biomarkers and furthermore determine the three dimensional structure of proteins to evaluate the folding pattern at the atomic level. This group has cloned different

pathogenic mutations identified in BRCA1/2, PML-RARA, and FANCI. Further, these have been expressed in bacterial system to get highly active protein in native condition. Pathogenicity of cancer predisposing mutations identified in the BARD1BRCT domain has also been evaluated biophysically. Different functional domains of BRCA1/2, PML-RARA have been purified. The data generated by this group has identified differentially expressed signatures / proteins of HNSCC patients at different time points before, during and after radiation treatment, that play a role in tumor microenvironment. The proteomics data from this laboratory has led to the identification of proteins from serum of head and neck cancer patients, which has been further co-related with response to treatment.

Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. In 2018 six graduate students - Ms. Suchita Dubey, Ms. Lipi Das, Mr. Mudassar Ali Khan, Mr. Siddharth Barua, Ms. Neha Mishra and Mr. Subhashish Chakraborty were working towards a doctoral degree. The faculty accepted three trainees for dissertation projects and several for experience in the year 2018.

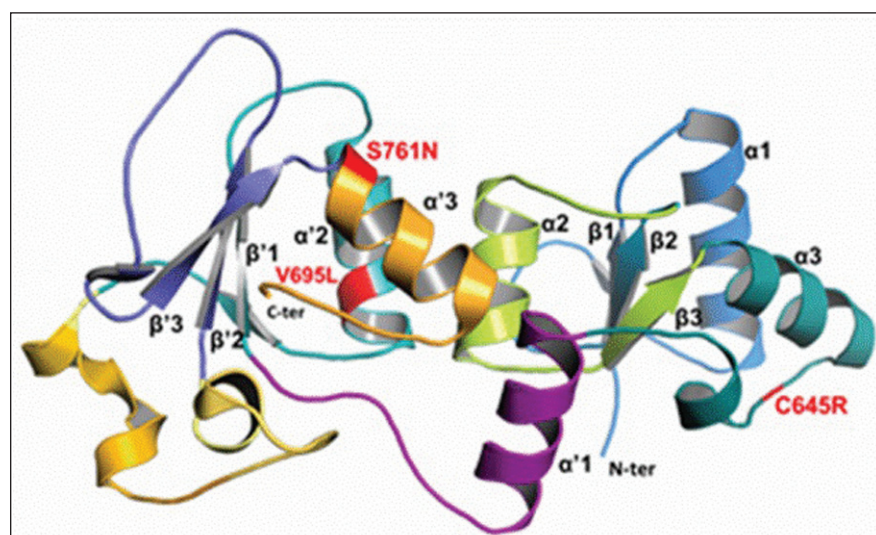


Figure: Structure of BARD1 BRCT showing cancer predisposing mutation sites

Protein Biochemistry, Biophysics & Structural Biology Group – III

Principal Investigator:

Dr. Kakoli Bose

Overview

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

Research

The highlights of the research findings in 2018 include revelation of the structural basis of HtrA2 mutations that are implicated in diseased phenotypes. Crystallography data of one such mutant has been deposited in the Protein Data Bank (PDB ID: 5WYN). The group has made several important discoveries such as the mode of interaction of HtrA2 with its natural substrate, and the identification of a novel binding

partner and design of its promising inhibitors. These crucial pieces of information could provide a means to manipulate HtrA2 with desired characteristics. The group has also developed a database 'PDZscape', which comprises of PDZ domain containing proteins, and is freely available to users worldwide.

Education

The Principal Investigator is recognized as a guide for the Ph.D. (Life Sciences) degree of the Homi Bhabha National Institute. Currently eight graduate students - Ms. Saujanya Acharya, Mr. Ajay Wagh, Mr. K. Raghupathi, Ms. Rashmi Puja, Ms. Aasna Parui, Ms. Sucheta Chopra, Ms. Rucha Kulkarni and Mr. Shubham Deshmukh, are working on their doctoral dissertation. Twelve trainees were taken up during 2018 for Master's dissertation and three for experience. Lab members meet once a week for data presentation and journal club. The PI organized a 'BioPhysics Paschim' meeting in December 2018. The faculty and students presented their research findings at three international conferences/ meetings (One in Germany and the others in India).



Stem Cell Biology & Cell Signalling Group – I

Principal Investigator:

Dr. Sanjeev Waghmare

Overview

The focus of the Waghmare Laboratory is to unravel the molecular and cellular mechanisms that control both the adult stem cells and cancer stem-like cells regulation in human cancers. The interest of this group in particular, is on the molecular signalling pathways such as Wnt/Notch/Sonic-hedgehog and some others that regulate self-renewal and differentiation of stem cells. The group is investigating these aspects using transgenic skin epithelia model and human epithelial cancers such as head and neck cancer as experimental models. The identification of various genes that are involved in the maintenance of cancer stem cells and also imparts resistance to chemo-radiotherapy would provide avenues for future therapeutic intervention. Recently, Dr. Waghmare's group have developed the primary head and neck oral cancer cell lines from advanced stage treatment naïve patients from an Indian cohort providing a valuable resource to understand the molecular mechanism that would be useful in cancer therapeutics.

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. In transgenic mice over expressing sPLA₂-IIA for the first time revealed depletion of hair follicle stem cells pool mediated through enhanced activation of c-Jun. Further, sPLA₂-IIA knockdown in oral cancer cell lines showed decreased tumorigenic potential. SFRP1 (Secreted frizzled related protein); a Wnt inhibitor is down regulated in various human cancers. The in-silico analysis carried out in this laboratory, showed down regulation of Sfrp1 which is associated with overall poor survival in various 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. Further, another Wnt inhibitor, Dab2 (Disabled-2 protein) is down regulated in various human cancers. This group's finding suggests that Dab2 knockout mice showed defect in the cell proliferation and in addition, these stem cells lose their stem-ness characteristics. Oral cancer patients (60-80%) diagnosed at an advanced stage have poor clinical outcome. Despite the isolation of cancer stem cells, there is a lack of knowledge on their regulatory mechanisms. This group has developed primary oral cancer cell lines from advanced stage treatment naïve samples. Further, this group has isolated CD44+/ALDH+ cancer stem-like cells (CSCs) from oral cancer cell lines and carried out the *in vitro* and *in vivo* characterization. On-going studies would provide insight on the molecular mechanism underlying the maintenance of these cancer stem cells. The molecular signatures obtained will be utilized to stratify chemotherapy responders and non-responders for better clinical intervention.

Education

The Principal Investigator is recognized as a guide for the Ph.D. degree in Life Sciences under the HBNI. In 2018, Mr. Gopal Chovatiya was awarded the PhD degree, and five PhD students - Mr. Raghava R Sunkara, Mr. Sushant Navrange, Ms. Sayoni Roy, Ms. Priyanka Joshi and Mr Harsh Ashar are pursuing their doctoral training. The PI accepted two research trainees during 2018. The group engages in weekly in-house presentations and journal club. The PI and his students presented their research findings at two international conferences; one in USA during May 2018 and the other at ACTREC in October 2018.

Stem Cell Biology & Cell Signalling Group – II

Principal Investigator:

Dr. Shilpee Dutt

Overview

This laboratory is working towards understanding the molecular mechanisms that govern radiation and chemo resistance in Glioblastoma and Leukemia. The group 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 PI collaborates with clinicians from TMH to explore the translational aspects of the discoveries in the laboratory.

Research

Attempts are being made in this laboratory to address the fundamental issue of therapy resistance in cancer using Glioblastoma and Leukemia as model systems. For this recapitulation of the clinical scenario of glioma resistance in cellular model developed from naïve primary GBM patient samples and in preclinical orthotopic mouse model has been made. These models have allowed capture of inherently Resistant Residual (RR) cells that are cause for recurrence in GBM to understand their survival mechanisms. Subsequent to radiation, RR cells upregulate p21, DUSP5/6 and Cdk1(Y15) leading to homotypic cell fusions forming multinucleated and giant cells (MNGCs) that are transiently senescent, correlate with the poor prognosis of GBM patients and resume growth to form aggressive recurrent tumors (Kaur et al. Carcinogenesis 2015, Scientific Reports 2016, Cellular Oncology 2018). Additionally, proteasomes play crucial role in the survival of MNGCs via regulating NF-Kb pathway (Rajendra et al. Oncotarget 2018). This is the first report demonstrating the existence and captured residual resistant cells of GBM and delineated molecular pathways used by

residual cells to sustain survival and recur. Using cellular models of leukemia resistance, the dependency of early drug resistant cells on DNA double strand break repair (DSBR) mechanism acquired during the onset of resistance has been unraveled. GCN5 was shown to be up regulated and correlate significantly with poor patient survival in MRD-positive AML patient. However, late drug resistant cells evolve to acquire multiple mechanisms of resistance. Accordingly, clinical utility of ATM kinase and GCN5 inhibitors in effectively eliminating leukemic resistant cells only during early but not late stages of drug resistance was demonstrated (Salunkhe et al. International Journal of Cancer 2018). Additionally, CytoPred: a 7 gene pair matrix that can prognosticate leukemia patients with high sensitivity and specificity was identified (Salunkhe et al. Briefings in Bioinformatics 2018).

Education

The Principal Investigator is recognized as a PhD guide in Life Sciences of the Homi Bhabha National Institute. Presently seven research scholars – Ms.Jyothi Nair, Ms. Anagha Acharekar, Mr. Saket Vatsa Mishra, Ms.Tejashree Mahaddalkar, Ms. Madhura Ketkar, Ms.Debashmita Sarkar and Ms. Bhawna Singh, are working towards their doctoral theses. One student - Mr. Sameer Salunkhe was awarded the PhD degree in 2018. The laboratory has one (DST-NPF) post-doctoral fellow- Dr.Atanu Ghorai and eight students were accepted as trainees in 2018. The PI delivers lectures for the core course and electives, and marks the assignments. The laboratory conducts regular data presentation and journal clubs. Lab members presented their research findings at national and international conferences. Together students and the PI have attended 14 conferences in 2018 (10 oral and 4 poster presentations).



Stem Cell Biology & Cell Signalling Group – III

Principal Investigator:

Dr. Pritha Ray

Overview

The research findings of the group in 2018 have revealed an intricate association of autophagy with the initiation and maintenance of chemoresistance and IGF1R signalling and identified unique secretory molecules critical for adherence and migration of chemoresistant cancer cells from a co-culture system. A beneficial role of metformin to impede platinum-resistance by lowering cancer stem cell population which possibly is mediated by up-regulation of Taurine was observed. An intriguing association was found between IGF1R and hCtr1 (platinum influx protein) in metastatic tissues of a small cohort of high grade serous ovarian carcinoma (HGSOC) patients and their clinical outcome.

Research

Using classical autophagic molecular markers and electron micrographs, this group showed that drug treatment promoted high autophagic flux only in early resistant (ER) cells but not in sensitive and late resistant (LR) cells. Inhibition of Erk by U0126 stalled autophagy at autophagosome-lysosome fusion indicating a critical role of Erk maintaining the autophagic flux. The LR cells contrarily showed low autophagy and high p62 accumulation. All these data indicate that higher autophagic flux is required more for promotion than maintenance of chemoresistance and P62 is possibly involved in sustenance of chemoresistant properties. Furthermore, in a co-culture model of fibroblast cells with cancer cells of different degree of resistance, this group demonstrated that LR cells possessed higher adhesion and migration properties. Using a rigorous subtraction based LCMS approach, several unique molecules secreted by LR cells

in response to co-culture were identified and these are under further characterization. The group also deciphered, the long-term effect of Metformin along with drugs upon chemoresistance and showed that the observed decrease in resistance was associated with reduced cancer stem cell population which was possibly mediated by Taurine up-regulation. Other exciting directions of the research encompass real time monitoring of modulation in PIP3-Akt interaction using a BRET sensor during acquirement of chemoresistance, development of orthotopic ovarian tumor model and the degree of Notch signalling activation in EOC subtypes and its role in stroma-cancer cell cross talk. Earlier study on the co-operative role of FOXO3A and RUNX1 in IGF1R transcriptional regulation in ER cells has matured into a manuscript. The innovative role of IGF-1R as a prognostic factor and its association with hCtr1 was detected in a small cohort of Indian HGSOC patients. A collaborative effort to develop and evaluate Folic Acid receptor targeted nanoparticles in ovarian cancer cell with Dr. P. Vavia; ICT has been communicated for publication.

Education

The Principal Investigator is recognized as a PhD Life Sciences guide of the Homi Bhabha National Institute. Currently six students – Mr. Ajit Dhadve, Mr. Aniketh Bishnu, Mr. Abhilash Deo, Mr. Souvik Mukherjee, Mr. Pratham Phadte and Ms. Megha Mehrotra are working towards their Ph.D. degree. During 2018, five trainees were taken up – 2 on their Master's dissertation and three for experience. The group has an active in-house data presentation program. Members also presented their work at national/ international conferences.

Tumour Immunology Group

Principal Investigator:

Dr. Shubhada Chiplunkar

Co-Investigator:

Dr. Jyoti Kode

Overview

The focus of this laboratory is on investigating immune dysfunctions in patients, understanding the crosstalk of immune cells, mesenchymal stem cells and suppressor cells in the tumor microenvironment and development of immunotherapeutic strategies using gamma delta T cells ($\gamma\delta$ T cells). The mechanism that regulates tumor directed cytotoxicity under hypoxia and energy metabolism of $\gamma\delta$ T cells, the spectrum of exhaustion markers expressed by T cells and functional role of $\gamma\delta$ -T cells in colorectal cancer were examined. Cross-talk between mesenchymal stem cells (MSC) from oral/pancreatic tumors and acute myeloid leukemia (AML) were studied to understand immune evasion and chemoresistance in these malignancies.

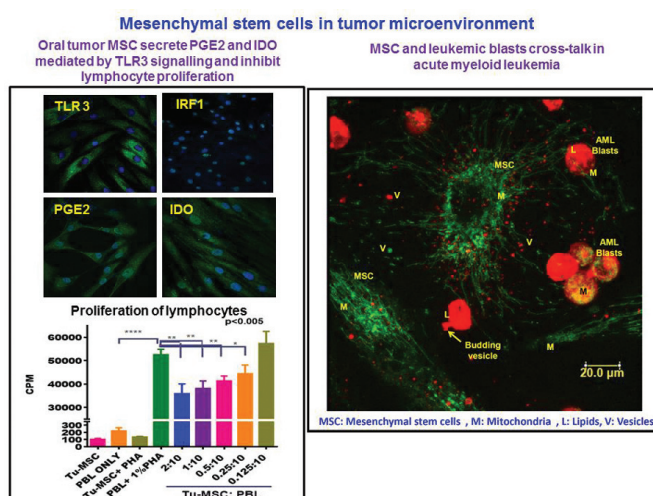
Research

The research focus is on $\gamma\delta$ T cells mediated cytotoxicity against various solid tumors and leukemic blasts treated with bisphosphonates. Data revealed that histone acetylation/methylation of promoter region of perforin and granzyme B, Notch and TCR signaling and presence of regulatory T cells and myeloid derived suppressor cells modulate the anti-tumor functions of $\gamma\delta$ T cells. Pro tumor subset T $\gamma\delta$ 17 cells increased in hypoxic conditions. Mesenchymal stem cells from oral tumors contributed to immune evasion while AML MSC and their soluble factors reduced AML xenograft in an immunodeficient mouse model. Frequency, proliferation and activation of $\gamma\delta$ T cells were not affected under hypoxia whereas their cytolytic ability was lost due to decreased calcium flux and enhanced exhaustion. Hypoxia regulates the fate of effector functions of $\gamma\delta$ T cells, which use glycolysis for proliferation but not for cytotoxic potential, impacting tumor progression. Colorectal cancer microenvironment induces exhaustion markers and inhibitory receptors in the tumor infiltrating T cells which may be the strategy adopted by tumor cells to escape immunosurveillance. CD26 expression on donor PBSC harvest was identified as a potential prognostic marker for acute graft versus host disease and overall survival of hematopoietic stem cell transplant patients. Hexane fraction of marine mollusk *Turbo brunneus* extract inhibited osteoclast function and demonstrated preservation of bone micro-architecture

in bilaterally ovariectomized mice model. As a part of a collaborative project patient-derived pancreatic cancer organoids were established from liver biopsy of metastatic pancreatic tumor. Peripheral blood lymphocytes of oral cancer patients showed low proliferative response and decreased expression of activation markers at the end of radiotherapy which improved after treatment with ayurvedic formulations (Collaborative project with ICTRC, Wagholi).

Education

The Principal Investigator (PI) and the Co-Investigator (Co-I) are recognized guides for PhD Life Sciences of the Homi Bhabha National Institute. During 2018, the PI's graduate student Mr. Sajad Bhat submitted his thesis while Ms. Shalini KS continued working on her Ph.D. dissertation. Three graduate students - Ms. Shruti Kandekar, Ms. Manasi Nagare and Mr. Naythan Dcunha with the Co-I, are working on their Ph.D. dissertation. Dr Rushikesh Patil was on a project with the PI as a DST-INSPIRE faculty. The lab actively participated in the Centre's training program, wherein eleven trainees undertook training including - Ms Yolande Fendjio from University of Dschang, Cameroon under Merck African Oncology Training Program. Lab members participated in ten international and twenty-six national conferences during 2018.



CRI Research Support Facilities

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 carrying out drug screening. During the year 2018, 1290 compounds were received from 166 clients including six corporate R&D organizations from more than 18 states across India. 1249 compounds were tested for their *in vitro* activity and 41 compounds were examined for MTD (n=4) and *in vivo* efficacy assays (n= 37). Two new xenografts namely OVCAR-

3 (Ovary), OCI-AML-2 (Acute Myeloid Leukemia) were developed in the year 2018. One radio protector from BARC/DAE was found efficacious against K562 xenograft in immunodeficient mouse model. These observations were confirmed using PET-CT imaging of tumor bearing animals. The facility conducted the 2nd Workshop on “Advanced Techniques in Anti-Cancer Drug Evaluation” during 8th-12th October, 2018. The participants included PhD students, college teachers, basic researchers, MD (pharmacology) students from India, a MD Pathology scientist from Mauritius and altogether were a 38-member batch.

Bioinformatics Facility

Officer-in-charge:

Dr. Ashok Varma

Scientific Officer:

Nikhil Gadewal

The Bioinformatics facility of ACTREC provides infrastructural and technical support to scientists, clinicians and research scholars of the Centre to fulfill the bioinformatics requirements of their on-going research projects. The Facility aids in analysis of data from microarray and next-generation sequencing as well as molecular modeling, database development and data mining. At present, the centre is well equipped with 5 workstations, one nVIDIA Tesla GPU, 1 webserver and 7 PCs. This facility receives substantial funding support from DBT and is established as a BTIS-net centre of this region. It achieves its mandate of education and training by organizing workshops for college teachers, PhD and other research scholars, provides infrastructural support for NGS data analysis at international workshops held by in-house faculty and accepts BTech, MSc and MTech students for

degree dissertation. In 2018, in association with the IT department, the facility assisted in installation of the high performance computing cluster at ACTREC for NGS-data analysis, molecular dynamics and simulation studies as well as database development of Histome: The Human Infobase database. Further, *In-silico* molecular modeling, dynamics and protein-protein interactions have been performed using the nVIDIA Tesla GPU workstation. A two-day workshop on, ‘Applications in Bioinformatics’ was held in March 2018 with 17 participants who received lectures cum hands-on training on structural bioinformatics, molecular modeling and dynamics, next generation sequence analysis, and proteomics. In 2018, seven project students completed their degree dissertation and the OIC with associated staff published their research findings in 3 articles in international peer reviewed journals.

Biophysics Facility

Scientific Officer:

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 various projects, enabling the characterization of the intrinsic properties of macromolecules and their assemblies (size, shape, folding, and stability) as well as of the interactions in which they are involved (stoichiometry, thermodynamic and kinetic parameters). The facility is equipped with Jasco J-815 Circular Dichroism Spectropolarimeter, FluroLog -3 Modular Spectrofluorimeter, Dynamic Light Scattering (DLS) DynaPro Plate Reader II and BIAcore T200 for automated surface

plasmon resonance (SPR). Along with technically sound instrumentation, the facility also provides, if required, expertise to assist users in experimental design and data interpretation. Subject to individual requirements, either an experiment is performed for the users or help is provided towards operating these instruments independently with minimal supervision. These services are also available for students, research scholars, and scientists from other academic institutions as well as industries on payment basis. During the year 2018, besides in-house users, facility services were also used by investigators and students from Calicut University, Mumbai University and Premas Biotech Ltd.

Biorepository

Officer-in-charge:

Dr. Poonam Gera

The ACTREC Biorepository is a facility to collect, annotate, store, and distribute biological samples to in-house researchers under a specified mechanism for duly approved research projects. The bio specimens are collected from the Operation Theatres, Frozen room and Surgical Pathology as well as the breast OPD. During the year 2018, with due consent from patients, tissue samples from 397 cases were procured. Majority of these samples were from head and neck tumors, followed by breast tumors, gastrointestinal, neurological and other tissue types. For all the possible cases paired adjacent normal samples were also collected and stored. In addition 123 core biopsy samples were collected from the breast OPD. Cryopreserved tissue samples were provided to 7 Principal Investigators with approved projects depending on various protocols at the Tata Memorial Centre.

The Biorepository had initiated an in-house quality check of cryo preserved tissues and a brief report of this was presented by the OIC, at the International Society of Biological and Environmental Repositories (ISBER) annual meeting held in May 2018 at Texas, USA. The OIC was awarded an international travel fellowship by Department of Science & Technology (DST) to attend this meeting.

The OIC is a Pathologist and a co-investigator on 7 projects which requires expertise in evaluation and review of H & E and IHC slides. The OIC was one of the organizers of the 4th Indian Cancer Genetics Conference and Workshop (ICGW) held in ACTREC during December 2018. The facility accepted three students for training; one for Master's dissertation and two for experience and held lab demonstrations for various students and visiting faculty in 2018.

CRI - Lab 1

Wellcome DBT – IA Intermediate Fellow:

Dr. Sonam Mehrotra

Overview

Dr Mehrotra's research involves understanding mechanisms that regulate response to replication stress in cells. Specifically, investigating the role of a novel cancer associated gene named BRCA2 and CDKN1A Interacting Protein (BCCIP) in stabilization of stalled replication forks using mammalian cell cultures and *Drosophila melanogaster* as model systems. Many components of homologous-recombination (HR) mediated DNA repair, such as BRCA2 and RAD51 are involved in replication-stress response where their functions are mechanistically different from their roles during HR-dependent DNA repair. They remain poorly understood. Research pertaining to this study will provide important insights regarding the role of replication stress in tumorigenesis and resistance to radiation therapy.

Research

Role of BRCA2 and CDKN1A Interacting Protein (BCCIP) during replication stress response: BCCIP associates with both BRCA2 and RAD51 to form a multi-protein complex required during HR-mediated DNA repair and the role of BCCIP during replication stress response is being investigated. The data acquired by this group reveals that BCCIP protein expression increases chromosome aberrations and defects during mitosis. DNA fibre analysis enabled monitoring genome wide perturbations on a single molecular level and showed that down regulation of BCCIP significantly increased stalled replication forks and reduced replication recovery after

hydroxyurea induced replication stress. Prolonged replication inhibition leads to degradation of replication forks by exonucleases such as MRE-11. Both BRCA2 and Rad 51 have been shown to prevent fork degradation by preventing the binding of MRE-11 to stalled replication forks. Further investigations in this laboratory, were whether BCCIP is involved in the prevention of MRE-11 mediated fork degradation by inhibition of MRE11 by Mirin in BCCIP β deficient cells. Results generated by this group revealed a significant reduction in the number of stalled replication forks and increased the number of recovered forks by Mirin treatment of BCCIP β deficient cells. These data suggest that BCCIP β is required for stabilizing stalled replication forks by preventing degradation of nascent DNA strands by exonucleases. The results obtained by this group, therefore suggest that in addition to its role during HR, BCCIP also plays crucial roles in stabilization and restart of stalled replication forks. The key findings obtained were, BCCIP β is required for replication fork stabilization and recovery after short term replication stress by protection of nascent DNA from exonucleases.

Education

Dr. Mehrotra is jointly guiding a PhD student; Ms. Bhawana Singh and has a post-doctoral research associate, Dr. Shoaib Mansuri as well as a JRF on the project. In 2018, the lab members participated in two national and two international conferences.



Common Facilities

Officer-in-Charge

Dr. Sanjay Gupta

The common facility operation and maintenance offers supportive services like X-ray developing 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 different research groups. All the facilities are well-equipped with high-end research equipment and are located in different floors and wings of the Khanolkar

Shodika building. Recently, ACTREC procured two new water purification system (Rephile Bioscience Ltd.) and a Chemidoc machine (Biorad model) in the facility. Along with these, autoclaves and oven in different research groups are also maintained by common facility technician. All the major equipment under common facility is covered under annual maintenance contract and the process is to provide safe, sustainable, efficient, and reliable facilities.



Common Instrument Room (CIR)

Officer-in-Charge:

Mr. Uday Dandekar

Over the past 41 years, the Institute has maintained a “Common Instrument Room” as a facility housing vital scientific equipment that are routinely required by the Centre’s staff and students, to optimize their utilization and make them available round the clock on all days of the week - including holidays. The facility also provides technical guidance and support to various research laboratories in the procurement and maintenance of their capital equipment. Technically qualified staff members attached to this facility handle routine maintenance of all the equipment and render help to the end users, thus ensuring proper use of the

equipment. Requisite spares for centrifuges, low temperature freezers, CO_2 incubators, etc. and consumables like centrifuge tubes, thermal paper rolls, etc. are purchased on a regular basis and kept in stock in the facility to reduce downtime of the equipment. In all, a total of 102 equipment are currently housed in this facility. During 2018, a UV-VIS Spectrophotometer, circulating refrigerated water bath, multiblock thermal cyclers, cytocentrifuge, refrigerated centrifuge, refrigerated shaker incubators, chemiluminescence gel documentation system were procured and installed in the CIR.

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) LSM510 confocal microscope, (2) Multiphoton confocal LSM780 microscope, (3) 3i Mariana spinning disk confocal microscope, (4) Leica SP8 confocal microscope with STED super resolution system, (5) Leica

DMI600B microscope - from Bhattacharyya lab, (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 outsider users. 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

Office-in-Charge:

Dr. Pradnya Kowtal

The DNA sequencing facility has two automated DNA sequencers - an eight capillary Genetic analyzer 3500 and a 48 capillary Genetic analyzer 3730 from Applied Biosystems/ThermoFisher, both of which are used for DNA sequencing, fragment analysis and single nucleotide polymorphism 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 the year

2018, the facility carried out 7457 sequencing and fragment analysis reactions. The facility was used by researchers from ACTREC, BARC and IIT-B. Various laboratories used the facility services to analyze somatic and germline variants in genes implicated in sporadic and inherited cancers. The facility demonstrated principles of Sanger sequencing and working of the facility to under graduate/ post graduate students and other visitors throughout the year.



Electron Microscopy Facility

Officer-in-charge:

Mrs. Sharada Sawant

The desideratum of this facility is to promote, support and initiate research and training in the applications of transmission electron microscopy (TEM). The facility is equipped with a JEOL JEM 1400Plus TEM that works at 80-120KV with 0.2 nm resolution and magnification up to x12,00,000, and is suitable for biological, polymer, nano gold and material science applications. This system has been commissioned along with 3-D Tomography, EDS and STEM. The facility carries out TEM sample preparation including fixation, resin block making (solid tissues, monolayer cell cultures, single cell suspension), semi-thin sectioning followed by ultrathin sectioning, staining, scanning and imaging. During 2018, the facility processed EM samples for 17 working groups from ACTREC and 5 working groups from BARC/IIT-Mumbai. A total of 144 tissue and monolayer cell culture specimens were prepared for araldite/epon block

making, 192 specimens for semi-thin sectioning, followed by ultrathin sectioning of 162 specimens and further 324 grids contrasted with uranyl acetate and lead citrate. Five hundred and twenty three grids were scanned under EM and over 8091 microphotographs were captured at 120 KV. In addition to this, the facility has also processed 4 samples for negative staining. Further quantitative analysis of EM images was done using iTEM software for 4 working groups. Moreover, the interpretation of the obtained results on the basis of ultrastructural observations was done for all the users and quantitative analysis was done wherever required. In the year 2018, EM demonstrations were given to students on educational visits on 7 different occasions and visitors from national/international institutes on 9 occasions. Lecture and demonstrations on EM were given to JRF 2017 and 2018 academic batch.



Flow Cytometry Facility

Officer-in-Charge:

Prof. Shubhada Chiplunkar

The Flow Cytometry facility is a centralized facility holding 4 flow cytometers – FACS Calibur, Attune NxT, FACS Aria-III and FACS Aria-I, which can perform 3-18 color analysis and 4-way sorting. The data analysis softwares include FACSDiva, CellQuest Pro, FlowJo, FCS Express, Attune NxT, FCAP Array and Modfit. The facility is regularly used by ACTREC basic/clinician scientists (68 users/ 21 labs) for research applications including immunophenotyping by multicolor analysis (upto 16 colors), DNA content and cell cycle analysis, apoptosis studies, detection of mitochondrial membrane potential, stem cell analysis - side cell population, dermal stem cell analysis, functional assays like proliferation assay, intracellular calcium influx, oxidative burst analysis, intracellular cytokine

analysis, cytometric bead array for cytokines, 4-way live/single cell sorting. The facility provides technical expertise in panel designing and data analysis to researchers and offers its services to investigators from other institutes/industry on a payment basis. In the year 2018, requests for demonstrations by visiting clinicians, scientists and students were successfully effectuated. The facility supported the Mumbai Immunology Group AMNIS Workshop – ‘Microscopy in Flow’ held on 24th July, 2018, organized for college students and teachers, by Mumbai Immunology Group and also participated in the 2nd Workshop on ‘Advanced Techniques in Anti-Cancer Drug Evaluation’ organized at ACTREC from 8th-12th October, 2018.

Histology Facility

Scientific Officer:

Dr. Arvind Ingle

The Histology facility provides the following services to the Centre: (a) slides of unstained/ haematoxylin and eosin (H&E) stained histology sections of animal tissues including bone/ tumour 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 2018,

the facility received 4929 tissue samples in fixative and 1920 human paraffin blocks and, after processing, supplied 5397 stained and 24415 unstained slides to 20 research laboratories. In addition, 3681 tissues were processed for cryo-sectioning, and 925 H&E stained and 3681 unstained slides were supplied to 11 research laboratories.



Laboratory Animal Facility (LAF)

Officer-in-Charge

Dr. Arvind Ingle

Scientific Officer:

Dr. Rahul Thorat

The main objective of the Laboratory Animal Facility (LAF) is to breed, maintain and supply laboratory animals to the institutional scientists. During the year 2018, LAF undertook planned breeding of 10 normal strains of mice, one each Nude and SCID mice, one hybrid strain, 46 Transgenic/ Knock-Out mice strains/sub-strains, one strain of rat and two hamster strains, and supplied 3910 normal mice, 518 Nude mice, 1553 NOD SCID mice, 285 rats, 202 hamsters to 25 institutional researchers against 86 IAEC-sanctioned research proposals. Towards quality control, LAF examined 59 stool/ animal samples and 230 food, water, bedding material and room air samples for routine microbiological testing, 236 hair/ stool/ cellophane samples for clinical-pathology, 76 samples for serological detection of three rodent pathogens from 17 strains, and carried out PCR-based tests for 11 infectious agents using 34 random samples from these 16 strains. For checking genetic purity, LAF undertook

biochemical marker testing of 40 mice from seven strains, and PCR based tests for 17 microsatellite markers on 36 DNA samples from 11 mouse strains. LAF used Flow Cytometry to assess the T- and B-cell profile in 14 blood samples of Nude/ SCID mice, as also control BALB/c and Swiss mice. As a part of its embryo freezing program, LAF collected 474 embryos at the 8-cell to morula stage from 85 mice of 4 strains and froze the embryos in 25 cryo-vials under liquid nitrogen. During the report period, LAF also supplied 9500 normal mice, 295 nude mice, 256 SCID mice, and 128 rats as breeding nuclei/ experimental animals to 16 CPCSEA registered outside Indian organizations, and provided microbiological status testing services to one outside organization. The senior faculty participated in three international conferences and one faculty underwent study leave of six months in 2018 at University of Alabama, USA. The senior faculty accepted six observers in the facility during the year.

Macromolecular Crystallography and X-Ray Diffraction Facility

Officer-in-Charge:

Dr. Ashok Varma

Macromolecular crystallography and X-ray diffraction facility helps scientists to determine precise position of each atom and molecules present in crystallized proteins. This facility has been installed and commissioned in ACTREC in the year 2012. The facility is also connected remotely to synchrotron facility located in different countries. Different groups from ACTREC as well as other academic institutions use the services of the X-ray diffraction facility. The OIC and the staff of the facility assist scientists, research scholars in protein

crystallization, structure determination and refinement. The dedicated facility comprises of (1) Crystallization unit, (2) Microscope to visualize the crystals, (2) Microstar-Microfocus Rotating Anode, (3) Integrated computer controller motorized Image Plate detector and (4) computers to process the data and determine the crystal structure of proteins. In the year 2018, a total 14 crystals have been tested for diffraction analysis. This facility also provides training to different academic faculty and research scholars.



Mass Spectrometry Facility

Officer-in-Charge:

Dr. Rukmini Govekar

Scientific Officer:

Mr. Shashadhar Dolas

Mass Spectrometry Facility at ACTREC houses two state-of-the-art mass spectrometry platforms connected to high performance liquid chromatographic systems: one is the Nano-LC (ABSCIEX, Eksigent)-ESI-Q-TOF (ABSCIEX, Triple TOF 5600 plus) and the other is the MALDI-TOF/TOF (Bruker Daltonics, Ultraflex II) equipped with the liquid chromatography system (Agilent 1200 series micro LC) and the spotter (Bruker Daltonics, Proteineer). The facility has been analyzing samples on MALDI-TOF-TOF since 2008 for in-house and external users. On the more recent ESI-Q-TOF, 263 complex protein mixtures and 34 samples of enriched proteins were analyzed for global identification of proteins. Label free quantification on SWATH was performed successfully for 46 complex protein samples and sixteen

iTRAQ labelled samples were quantitated. Fourteen samples were analyzed for the determination of post translational modifications [PTMs]. The facility staff demonstrated the working of nLC-ESI-QTOF and MALDI-TOF-TOF on several occasions in the year 2018. Visiting HBNI delegates were shown around the facility on January 18th, 2018. Training was imparted to faculty members from Cancer Biology Division, Somaiya college, Mumbai (January 23rd, 2018), participants from the NER training program held at ACTREC (January 30th, 2018), students of the TMC PG diploma course on patient navigation (June 6th, 2018), students and faculty of NB Mehta Science College, Bordi (September 5th, 2018) and the JRF ACTREC 2018 Batch (October 29th, 2018 Students).

Molecular Imaging Facility

Officer-in-Charge:

Dr. Abhijit De

This facility has completed 5 years of successful service to the preclinical *in vivo* molecular imaging research community at ACTREC. Molecular imaging, provides real-time visualization and quantitative measurement of cellular processes at the molecular or genetic level, and is a value addition to translating basic research findings to the clinic. The facility received one IVIS Lumina II (Perkin Elmer, USA) sponsored by DBT project in 2013 and, later one IVIS Spectrum imaging system (Perkin Elmer, USA) in 2014. Over time, with extramural grants one data server, two computer terminals for storing and analysis of imaging data, as well as additional gas anesthesia systems were added for optimal operation to this facility. The installed systems offer fast scanning of multiple mice, rats or other small animals emitting photon signal from various sources such as bioluminescence, near-infrared fluorescence and Cerenkov luminescence. Several laboratories in ACTREC and institutions like IIT, Bombay are reaping the benefits by using this facility for investigations on various cancer therapeutic and other applications. The data generated from this facility has led to more than a dozen publications in top international journals and generated 3 Indian patents.

Salient features of the systems installed in this facility include: high-performance, user-friendly acquisition and fully software-controlled image capture; data back-up storage server linked through ACTREC LAN as well as onsite and remote image processing units. The systems are integrated with a heated stage and accessories for isoflurane based gas anesthesia needed for the non-invasive scanning procedure; they provide the ability to scan and quantify fluorescent, bioluminescent as well as Cerenkov signals (around 400–900 nm) from tissue culture plates, tubes or mice. There is an integrated fluorescence system for switching between fluorescent and bioluminescent spectral imaging. The excitation/ emission filters accommodate majority fluorescent dyes or fluorescent proteins in the green to far-red spectral range. Spectral imaging options to obtain data from a sequence of images at different wavelengths in the visible range for determining the location of bioluminescent reporter are available. The filters can distinguish reporters with different wavelengths emitting from the same animal. An important feature is the laser scanner for 3D surface topography to develop single-view diffuse tomographic reconstructions (DLIT and FLIT mode).



Next Generation Sequencing Facility

Chairperson:

Dr Rajiv Sarin

The Next Generation Sequencing (NGS) facility at ACTREC has a HiSeq 1500 from Illumina and an Ion Torrent personal Genome Machine from ThermoFisher. During 2018 the NGS facility provided support for workshops organized by the Chairperson of the facility and Dr Ashok Varma, PI, Varma lab and Coordinator, DBT North East Region (NER) Training program, on Cancer Genomics. The two workshops were attended by 15 faculty (March 12-16, 2018) and 20 Research Scholars (March 19-23, 2018) from the states of North East

Region of India. During the workshops, preparation of exome and transcriptome libraries and demonstration of functioning of the NGS machines was assisted by the facility. The NGS facility also participated in the NGS workshop under the auspices of 4th Indian Cancer Genetics Conference and Workshop ICGCW 2018 hosted by Dr Rajiv Sarin, OIC, Cancer Genetics Unit from December 3-7, 2018. There were 10 participants for this workshop. The NGS facility demonstrated functioning of facility and machines to visiting students, faculty and other visitors referred by ACTREC administration and SCOPE cell.

Small Animal Imaging Facility

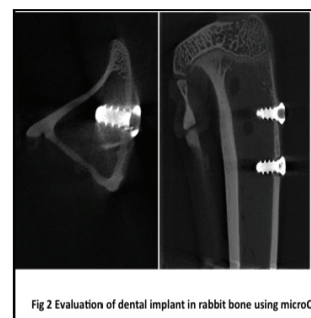
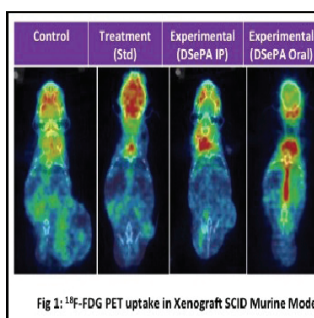
Scientific Officer:

Dr. Pradip Chaudhari

Overview: The focus of this facility is preclinical animal imaging. Technetium-99m complexes and Fluorine-18 tracers are used for imaging tumor bearing mouse models. The facility conducts and guides research projects for PET, SPECT and CT rodents imaging, from ACTREC, DAE units, academic and pharmaceutical industries. The other interest is the animal oncology clinic for the cancer management of pet animals with spontaneous cancer. During 2018, 157 referral cases underwent surgeries, single/combination chemotherapy and radiation therapy as per clinical requirement. The senior faculty is assisted by scientific officer/ staff of the facility. **Service:** This facility offers preclinical PET, SPECT and CT imaging services to basic and translational research scientists. In 2018, 11 projects, mainly proof-of-concept, normal tracer and tumor uptake studies, were supported and expertise of designing imaging protocols, animal model development, data quantitation, and analysis was shared.

Research: Evaluation of novel anticancer agent DsePA (3, 3'-Diselenodipropionic acid) in xenograft mouse model (Fig 1) and Nanofibrous coated Titanium dental implants in rabbit model (Fig 2) are some examples. The goal in animal oncology

is to develop areas on comparative aspects of animal and human cancers. With this view, Flint Animal Cancer Hospital (Colorado State University, USA) was visited to strengthen the facility. This facility also houses animal cancer biorepository for preservation of clinical material such as blood and tissues. **Education:** The faculty organized the 5th CME on 'Preclinical imaging and drug discovery' at ACTREC from September 26-28, 2018 and participated in 3 national training courses and 1 international conference. In 2018, the faculty accepted four trainees from pharmaceutical background for their master's dissertation, and conducted orientation tours [10] for under graduate/ post-graduate students and visitors.



Administrative & Core Infrastructure Groups

Senior Administration Officer		Mr. U. V. Mote
Estate Management	Admin. Officer	Mr. M. Y. Shaikh
	Dy. Admin. Officer	Mr. V. V. Pimpalkhare
	Jr. Admin. Officer	Mr. Vinod Kumar Singh
Human Resource Development	Jr. Admin. Officer	Mrs. Shilpa Sardesai
Accounts	Deputy Controller Accounts, ACTREC	Mr. Vihar Y. Pawar
Purchase	Jr. Purchase Officer	Mr. A. Y. Patole
Stores	Assistant Stores Officer	Mrs. Kanchana Gopalkrishnan
Engineering	OIC (ES)	Mr. P. B. Baburaj
Security	Dy. C.S.O. (Gr. II)	Mr. R. M. Chavan

Administration Department

Human Resource Development

This Department carries out the functions like manpower planning, performance management, recruitment of staff (regular as well as temporary), training and development of employees, and maintenance of discipline. In the year 2018, 53 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. For the PhD degree under the HBNI deemed university, 17 Junior Research Fellows were selected for the academic program during 2018. Various staff under Technical, Non-Technical & Nursing Category was appointed on contract to distribute the work load increased due to inflow of cancer patients at the Centre. At present 55 Technical, 80 Non-Technical & 58 Nursing staff is working under outsourced contractor at ACTREC. Besides this in 2018, 124 new staff members on various projects have been recruited for assisting in research work. Trainees were appointed for various courses at ACTREC, 6 for ATMLT, 2 as Cytogenetics trainees, 1 BMT Nursing Fellow and 1 Onco-therapeutics Fellow. The department also oversees career planning through merit based review and promotions of employees by holding yearly (Departmental Promotion Committee) DPC meeting of all the eligible employees. 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. It has provided timely welfare measures and facilities necessary for maintaining an excellent working atmosphere, imparted training by deputing 11 staff within and outside Mumbai. The Computer Programmer has developed & implemented the HRD software/programs viz. extension of Employment (Project Staff) and UC Request Portal respectively for HRD and Accounts, improvised the existing developed and implemented software/programs i.e. Recommend and Sanction module (e.g. to send rejection mail, to update proper log details), Synopsis module (e.g. Evaluation & Recommendation Letter screen), developed and integrated the report of "Details of Employee at a Glance" in PIS program and provided the inputs for development of Recruitment Module. The HRD also executes timely payment of PRIS, update allowance to eligible employees, providing duplicate Service Book to staff, service verification of staff those completed 18 years of service, are other activities carried out by HRD. Implementation of the Reservation Policy of the Government of India duly adopted by TMC in respect of SC/ ST/ OBC/ PWD/ Ex-Serviceman is carried out regularly, systematically, all efforts have been made to ensure and achieve the prescribed percentage of reserved posts. TMC merit scholarships were awarded to 3 children of ACTREC staff members. During 2018, nine staff members achieved superannuation and one staff retired voluntarily.

Estate Management

The General Administration's Estate Management (EM) section controls and manages all the activities of students hostel (including outside hostel), guest house and faculty club. This section also handles, staff and patient canteens, Retreat cafeteria, housekeeping, transportation, horticulture, pest control services, photocopier machines, courier / Post services, outsourcing of firemen, Refilling of gas cylinders in laboratories / BMT / patient hostels, clearing of service bills of various contracts as well as different cancer registry projects of CCE.

Housekeeping services at all the buildings on the campus such as Khanolkar Shodhika, Paymaster Shodhika, Jussawalla Shodhika, Vasundhara Patients Hostel, three Students Hostels, Retreat, Faculty Club Guest House and other areas of the campus. Housekeeping services maintain cleanliness, good sanitation and hygienic conditions on the campus.

The Centre takes pride in the large variety of flora on its campus through Horticulture. A garden covering an area of ~1500 sq.m, a plant nursery for in-house needs and lawns at different locations in the campus are well maintained by a professionally trained horticulturist and team of gardeners. Separate garden was developed at the newly constructed BioBank. A 'Nisarg-Runa Biogas Plant' is running successfully on the campus, and ensures the disposal of organic/ kitchen waste in an eco-friendly manner.

Disposal of Capital items/equipment and local scrap materials are undertaken by the section which has earned revenue of Rs.11, 01746/- to the Centre.

As per Instructions of Government of India, the following days were observed during the year 2018 at ACTREC.

1. Republic Day -26th January
2. Matry's Day - 30th January
3. Anti-Terrorism Day - 21st May
4. 123rd Birth Anniversary of Prof. Vasant Ramji Khanolkar, - 13th April
5. International Yoga Day - 21st June
6. Independence Day - 15th August
7. Sadhbhavna Diwas - 20th August
8. Hindi Diwas & Pakhwara – 14 to 28th September
9. Mahatama Gandhi Jayanti and Bharat Swachh Abhiyan - 2nd October
10. Rashtriya Ekta Diwas (Sardar Vallabh Bhai Patel Birth Anniversary) - 31st October
11. Vigilance Awareness Week – As per dates declared by the CVC
12. Observance of Fire Service Week - 14 to 20th April
13. Constitution Day -26th December

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 Account Department is responsible for patient billing, receipting and settling of account of different categories of patient's i.e. smart card, cash paying, trust and company referred. The procurement of various supplies, materials and equipment required for the centre was undertaken by following 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 plan projects. During the year 2018, hospital and other income to the extent of Rs.22.33 Crore has been generated.

In all, there were a total of 222 on-going projects at ACTREC during the year 2018. A sum of Rupees 8.68 Crore was received from governmental agencies such as DBT, DST, and ICMR to meet the expenditure on 195 of these on-going projects. In addition, 8 new extramurally funded projects to the tune of Rs.7.66 Crore for a three year period were sanctioned by the above mentioned funding agencies, of which Rs.1.50 Crore was received during the calendar year.

Engineering Services

The Engineering services at ACTREC encompassing a strong team of trained electrical, mechanical, civil engineers and supervisors with technicians and other support staff who are responsible for the operation and maintenance of various critical engineering systems on a round the clock basis to create a sound, safe and smooth functioning. This safe environment is created to support patient treatment, research and educational activities of the centre. The departmental staff members include 6 engineers, 2 supervisors, 18 technical staff and 1 auxiliary staff. The key engineering jobs and activities include: (1) Air conditioning system with chilling plant, cooling tower, package units, water coolers, refrigerators, deep freezers, medical oxygen system, LPG distribution network, mechanical & fabrication work; (2) In-house repair & maintenance of close to 500 window/split Air conditioners; (3) 33KV high tension switch gears, transformers, LT panel, lighting & power distribution, DG sets, cabling, lifts, communication and PA system, patient calling system, telecommunication system;(4)Maintenance of water supply and fire hydrant systems, as well as sanitary and drainage system; (5) Civil work including all alterations, additions, masonry, plumbing, painting, carpentry, maintenance of buildings, roads & compound walls of the 60 acres of campus;(6) Co-ordination with Architects/

Planners for the construction of new buildings on the campus;(7) Liaison work with local bodies for obtaining various NOCs and permissions; (8) Distribution of liquid Nitrogen on regular basis to research lab; (9)Maintenance of laboratory equipment, furniture of various hospital utilities; (10) Planning & implementing the up-gradation/replacement of facilities, carrying out prevention, corrective and deferred maintenance of the building, making short-term and long-term recommendations for financial allocation.

Purchase Department

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, reminders etc. is done with the help of Material Management System (MMS), which is in-house software developed by our 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 66 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, 30 purchase orders are being processed through GeM (Government e-marketplace). During 2018-19, procurement of the equipment(s) worth value of Rs.9.46 Crore, consumables worth Rs.16.80 Crore and contracts for the supply of Spares/AMC worth Rs.6.38 Crore have been procured as well as are in the pipeline.

Stores Department

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 the Stores department provides support for asset verification and audits.

In the Financial Year 2017-18:

1. Total number of PSN generated : 8851
2. Total number of GRIN generated : 6643
3. Total number of Assets : 932

The Stores department has achieved paperless system and the routine working of the department is computerized through the various software and programs installed. Thus

there is online receiving of indents, generating PSNs through system and forwarding them to the purchase department. Purchase Order copies are received online. The member of the inspection committee after satisfactory physical verification of materials confirms GRIN inspection online. Store Officer approves the GRIN online. Delivery note and confirmation of receipt of material are done through online procedure. Asset Numbers and Installation Reports are also generated online.

Security Section

The major responsibility and duty of this section is to maintain strict access control and regulation of men, material and vehicles on the campus as well as to always ensure the safety and security of ACTREC property, personnel, students and patients. The prime priority is enhancing and improving the peripheral security measures, by imparting on the job training to the security staff, so as to combat with unforeseen situations/ and threat perceptions. Improvised surveillance system has been inducted in the prevailing security measures which cover 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 detection system has been completed and work of firefighting system is in progress to tackle any kind of fire exigencies. The Prime Motto is to have a fear free atmosphere in the ACTREC Campus. A security audit of ACTREC was carried out by officials of the Subsidiary Intelligence Bureau, National Security Guard, State Intelligence Bureau and Maharashtra State Police Force-1. Certain additional security measures recommended by the Subsidiary Intelligence Bureau were inducted in the prevailing security system and a compliance report is forwarded to the Bureau. Vigilance Awareness Week was observed at ACTREC from 29th October to 3rd November 2018. Mr. Mervin Alexander, Joint Secretary (Account & Admin), DAE, was the Chief Guest at the function, who shared his thoughts and expertise on “Eradicate Corruption- Build a New India (भ्रष्टाचार मिटाओ - नया भारत बनाओ)”. Ceremonial parades were performed on the eve of Republic Day and Independence Day by the security staff of ACTREC. Proper liaison was 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 run vehicle, patient related transport facilities condemnation of old vehicles, obtaining RTO permits and licenses for newly procured vehicles.

Information Technology

IT Coordinator:

Mr. Prasad Kanvinde

Officers:

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

In fulfillment of its mandate, IT department provides computational facility, infrastructure and support for information access, processing, printing, archiving, dissemination, etc. 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 50Mbps Reliance connectivity. A summation of the activities of IT department during 2018 is provided below.

Networking: Day-to-day support, upkeep, administration and maintenance of passive and active network components constitute vital networking activities. The Centre has scaled up network back bone connectivity on 10Gbps. Recently perimeter firewalls with 10G interface were procured and configured in HA mode for redundancy purpose. The center has also been equipped with state of art, latest wireless network devices on new standards with 600Mbps bandwidth with high availability configuration of wireless controller. The department has extended gigabit wired network connectivity and wireless network to CCE building. The department has also established the wired network connectivity to newly constructed Archival building.

Hardware: Installation and migration of newly procured IBM Domino mailing solution, Installation and commissioning of 350TB of Scale out NAS storage system and successful allotment of quota based shared storage space to various clinical and research labs, installation and commissioning of Audio-visual equipment for Board room of CCE and release of work order for revamping of ACTREC website to NIC empaneled vendor. The HPC system was installed and commissioned as well as made accessible to all the end users of ACTREC and TMC. Procurement of PCs and matching accessories were the other procurements in 2018.

Software: Patient information processing at the centre is essentially online, multi-location and round-the-clock. In 2018, updates for PABR, DIS, RIS, ROIS, OT, Accounts, Pharmacy, and Stores & Purchase were made available. Development of ACTREC RC software where indenter is raising the indent of various variants of generic item code and generating PO was a major achievement. All these programs were developed in line with institute mandate of paperless online transactions and if required to make seamless transactions on the remote server of TMH. Engineering project/ARC work order are the major achievements under the software category.



Library

Librarian:

Dr. Satish Munnolli

The ACTREC library, a resource centre of scientific information, proactively engages in the acquisition, organization and delivery of scientific and clinical information to its users. The library provides services to support and

enhance research, patient care, and on-going educational programs of the institute. During 2018, the library subscribed to 81 journals in cancer and allied areas, to strengthen user needs. Till date the library has a collection of 5884 books,

12595 bound volumes of journals, 620 theses, 3384 staff publications, 411 reports and 20 videos. Unlimited access to ScienceDirect under the DAE - Elsevier consortium provides over 2500 scientific, technical and medical journals. ClinicalKey and UpToDate - two online clinical resources 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. To provide seamless access to journals and online resources J-Gate Biomedical Sciences has been subscribed and to provide remote access to its end users, EzProxy application has been renewed. The library has enabled trial access to 'Grammarly' and 'FEBS Press Publications' in 2018. The library continues to maintain staff publications records, and communicates the weekly publications of the Centre through 'Science Sparks @ ACTREC'. Services such as publication statistics, citations of publications, h-index, impact factor, authenticity of journals, open access models and APC, bibliographic services,

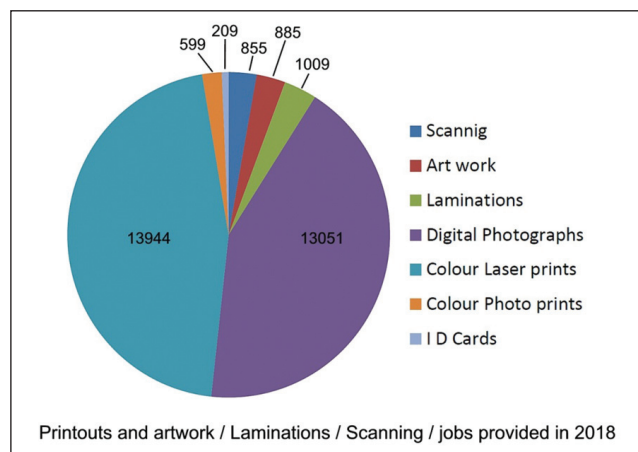
reference and referral services are provided in anticipation and on demand throughout the year. Articles on request are one of its most availed services, through which the library has provided 848 articles against 926 requests during 2018. It has also provided 91 documents to government affiliated libraries and individual visitors. The library follows a scientific approach to procure information requirements and select the most suitable and economical subscription models while subscribing to online journals and resources. The library conducts an information literacy program for new students, which has been a regular and popular program. Apart from users' orientation, one-on-one discussions on searching techniques, authentic information sources, group discussions on search strategies, research metrics, impact factor, h-Index, bibliography management tools are organized in the library; 81 individuals were benefited by the services that focus mainly on the use of online resources. Special sessions on nursing information resources, review of literature, and search strategies were conducted for nursing students as a part of their curriculum.



Photography

Officer-in-Charge:
Mr. Shivner Sawant

The team of Photography section of ACTREC provides support to the scientific/ medical staff and students towards photo-recording of their experimental results - including gels, animal experiments, patient material and others. The state-of-the-art facility has high end digital cameras to record images with high resolution and to get visual clues to research activities. Using the advanced computing and desk top publishing equipment and software, this section handles design, printing and display of announcement brochures/flyers, banners, programs, letterheads, invitation cards, envelopes, badges, certificates, posters, workshop protocols/ abstract books and others for the scientific meetings viz., conferences, workshops as well as cultural events organized at ACTREC. The section also assists in the preparation of posters/ slide presentations for the scientific community, and handles printing of identity cards on the data card printer for the security and administrative services. The section takes photographs of the campus, group functions, and



infrastructure of the Centre, carefully archives all the images, and provides them for use in the Centre's print publications, audiovisual presentations, website management as well as 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 2018, this facility provided photographic support for 46 events held at the Centre, including 38 national and 8 international meetings, and provided users and groups with 13051 digital photographs and 13944 colour laser prints, and undertook lamination, scanning, art work and photo printing.



Science Communication and Professional Education (SCOPE) Cell

Officer-in-Charge:

Dr. Aparna Bagwe (till October 2018)

Officer-in-Charge:

Dr. Satish Munnolli (from November 2018)

The SCOPE Cell manages the Science Communication and Professional Education programs of the Centre since its inception in 2005.

Science Communication: During the period January to December 2018, the SCOPE Cell has ensured the timely provision of vital data and reports about the Centre to governmental and other agencies when required. The OIC [Dr. Aparna Bagwe] associated with Dr. Ujjwala Warawdekar; Scientific Officer 'F', CRI Laboratory 1, responsibly handled the editing, compilation, and proof reading of ACTREC's 2017 annual report as well as its executive summary for the 2017 DAE report. The SCOPE Cell maintained close liaison with core infrastructure groups of the Centre to ensure smooth conduct of all the scientific meetings and seminars held at ACTREC and, with help from the Steno Pool, facilitated the venue bookings, dissemination of information about in-house meetings and seminars through emails/ print circulars. Staff of the Cell handled routine maintenance and updates of Principle Investigators (PIs) webpages, scientific meeting webpages, JRF intake related uploads and routine uploads of Tenders/ Advertisements on to the Centre's website/ active involvement in Indo-Australian Biotechnology Conference.

Professional Education: In support of the Centre's doctoral program, the SCOPE Cell handled the intake of JRF 2018 batch of doctoral students which involved coordination with Academic Committee and finalization of the advertisement, call for projects, pre-screening of applications with support from the Steno Pool (1386 online applications against 16 projects), conduct of written entrance exam and interviews, up to JRF selection. Staff of the SCOPE Cell also ensured the smooth conduct of the academic coursework for the fresh

batch of students, involving schedule preparation, conduct of orientation and lab visits, handling PI lab choices, timely conduct of the core course/ elective lectures and exams, seeking elective choices, DC formation, 1st year seminar presentation, 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, staff handled trainee intake and registration, provided them selection/ appointment/ extension letters and identity cards, kept a track of fee/ deposit payments and refunds, and handled end of training matters such as I-card return and deposit refund. In 2018, 304 trainees were allocated to senior and mid-level faculty/ staff of the Centre (97 for Master's dissertation, 117 for research experience, six on collaborative projects, four research associates, 35 summer trainees and 45 observers).

The OIC [Dr. Aparna Bagwe] of the Cell delivered lectures on 'Laboratory Safety at ACTREC' to new trainees twice this year. The Cell coordinated in compilation of articles for 'ACTREC Antaranga' a trilingual in-house magazine (first issue) released on Independence Day. It also provided logistic support for 6 educational visit including TMC KEVAT program; Senior Citizens from Kendriya Vihar, Kharghar; AFMC, Pune; from 36 finalists of DAE's All India Essay Competition & BL4S winning team of RN Podar School (Oct 2018) and college students from Boardi & Satana. The Cell, supported by the ACTREC Events Committee, conducted the Centre's Open Day (Dec 2018) that drew ~ 500 students and accompanying faculty from 32 colleges / research institutions of Mumbai and Navi Mumbai.



Scientific Resources

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. Shubhada Chiplunkar, Director, ACTREC
Members	Dr. HKV Narayan, Dy. Director, ACTREC Dr. Sudeep Gupta, Dy. Director, CRC-ACTREC Dr. Rajiv Sarin, SO 'H' Dr. Neelam Shirsat, SO 'H'

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. Shubhada Chiplunkar, Director, ACTREC
Co-Chairperson	Dr. Sudeep Gupta, Dy Director, CRC - ACTREC
Member Secretary	Dr. Tanuja Teni, SO 'G'
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. Shubhada Chiplunkar, Director, ACTREC
Member Secretary	Dr. Arvind Ingle
Members	Dr. Neelam Shirsat Dr. Sanjeev Waghmare Dr. Rahul Thorat 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. Shubhada Chiplunkar, Director, ACTREC
Member Secretary	Dr. Manoj Mahimkar, Basic Scientist
Members	Dr. Sanjay Gupta, Internal Expert Dr. Pritha Ray, Internal Expert Dr. Sanjeev Waghmare, Internal Expert Dr. Shashank Ojha, Biosafety Officer Dr. Shubha Tole, TIFR - DBT Nominee Dr. Geetanjali Sachdeva, NIRRH - Outside Expert

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.

Chairperson	Dr. Shubhada Chiplunkar, Director, ACTREC
Member Secretary	Dr. Pradip Chaudhari, Radiation Safety Officer, CRI
Members	Dr. Tejpal Gupta, Dept. of Radiation Oncology, ACTREC Dr. Shashank Ojha, Dept. of Transfusion Medicine, ACTREC Dr. Swamidas Jamima, CRC, ACTREC Ms. Reena Devi, 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.

Convener	Dr. Sorab Dalal
Members	Dr. Rukmini Govekar Dr. Sanjay Gupta Dr. Prasanna Venkatraman Dr. Ashok Varma Dr. Abhijit De Dr. Shilpee Dutt

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.

Chairperson	Dr. Meera Achrekar, Prof. & Asst. Nursing Suptdt, ACTREC
Members	Dr. Arvind Ingle, OIC Lab Animal Facility & Scientific Officer 'G', ACTREC Dr. Prafulla Parikh, Asst. Prof., General Medicine, ACTREC Dr. Rukmini Govekar, Scientific Officer 'F', ACTREC Mrs. Bhagyashree Tillu, Medical Social Worker, ACTREC Mr. VK Singh, Jr. Administrative Officer (EM), 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.

Chairperson	Dr. Sanjay Gupta
Members	Dr. Prasanna Venkatraman Dr. Rukmini Govekar Dr. Sanjeev Waghmare
Student Members	Ms. Rajashree Kadam Ms. Asmita Sharada

Grievance Committees

Grievance Committees have been constituted to redress the grievances of all regular staff as well as of temporary staff, registrars and students working at ACTREC, TMC.

Committee for Regular Staff

Dr. Sorab Dalal, PI & Sc. Officer 'G'

Dr. Arvind Ingle, OIC, LAF & Sc. Officer 'G'
(Representative of SC/ST)

Dr. Ashok Varma, PI & Sc. Officer 'F'

Dr. Rukmini Govekar, PI & Sc. Officer 'F'

Dr. Vikram Gota, Assoc. Prof. Clin. Pharmacol. 'F'

Mr. Mushtaq Shaikh, Admin. Officer (EM)

Mr. Suresh Dakave, Technician 'H' & Representative, TMH
Workers Union, ACTREC

Committee for Temporary Staff, Students, Registrars, etc

Dr. Prashant Bhat, Medical Superintendent

Dr. Sanjay Gupta, PI & Sc. Officer 'G'

Mr. Anand Jadhav, Sc. Officer 'D', IT Dept (Representative of
SC/ST)

Mrs. Shilpa Sardesai, Jr. Admin. Officer (HRD)

Mr. Janardan Rane, Technician 'G' & Representative, TMH
Workers Union, ACTREC

Mr. Md. Moquitul Haque, Student (SRF), Sarin Lab, CRI

Ms. Arunabha Bose, Student (SRF), Sorab Lab, CRI

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

Ms. Rajashri Kadam (Batch 2013)

Ms. Asmita Sharda (Batch 2013)

Mr. Arijit Mal (Batch 2014)

Mr. Joel Christie (Batch 2015)

Ms. Kuheli Banerjee (Batch 2016)



Institutional Ethics Committee III

TMC IEC – III (ACTREC)

Member Secretary,
Dr. Prafulla Parikh

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 **1st April 2018 to 31st March 2020**.

The committee has met 86 times in the past 09 years and 304 projects have been approved till December 2018. 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 were discussed and approved by the committee.

The membership details of the present IEC-III are as follows:

Institutional Ethics Committee (IEC)-III

Sr. No.	IEC-III Registration No. ECR/149/Inst/MH/2013	Affiliation	Gender	Expertise
1.	Dr. Rita Mulherkar Chairperson	Former Scientist, Genetic Engineering Unit, ACTREC	Female	Basic Scientist
2.	Dr. Rabindranath Mukhopadhyaya	Former Scientist, Virology Lab, ACTREC	Male	Basic Scientist
3.	Dr. Prafulla Parikh Member Secretary	Assistant Professor, General Medicine 'F' ACTREC	Female	Physician
4.	Dr. Padmaja Marathe Member	Prof. (Additional), Dept of Pharmacology and Therapeutics, Seth GS Medical College and KEM Hospital, Parel, Mumbai 400 012	Female	Clinical Pharmacologist (Basic Medical Scientist)
5.	Mrs. Deepa Ramani Member	Ex-play group teacher, store and purchase in-charge	Female	Layperson
6.	Mrs. Lakshmi. R. Member	Co-ordinator, Sanjeevani life beyond cancer, Mumbai. Trust	Female	NGO Representative
7.	Dr. B.B. Singh Member	Advocate, Mumbai High Court	Male	Legal Expert
8.	Dr. Tanuja Teni Member	Principal Investigator, Scientific Officer 'G', ACTREC	Female	Basic Scientist
9.	Dr. Supriya Chopra Member	Professor, Radiation Oncologist 'F', ACTREC, TMC	Female	Radiation Oncologist

Sr. No.	IEC-III Registration No. ECR/149/Inst/MH/2013	Affiliation	Gender	Expertise
10.	Dr. Reshma Ambulkar Member and DSMU Member Secretary	Professor, Anaesthetist 'F', Dept. of Anaesthesia, ACTREC, TMC	Female	Anesthetist
11.	Dr. Amita Maheshwari Member	Professor, Gynaecologic Oncologist, Dept. Of Gynaecologic Oncology, Tata Memorial Hospital, TMC.	Female	Surgeon
12.	Dr. Gaurav Narula Member	Professor Pediatric Medical Oncologist, Tata Memorial Hospital, TMC.	Male	Medical Oncologist
13.	Dr. Shilpee Dutt Member	Principal Investigator, Scientific Officer 'F', ACTREC	Female	Basic Scientist
14.	Dr. Bhausaheb Bagal Member	Associate Professor, Dept. of Medical Oncology, Tata Memorial Hospital, TMC.	Male	Medical Oncologist
15.	Dr. P.G. Subramanian Member	Professor, Pathologist 'F', Officer in-charge Hematopathology Lab, ACTREC, TMC	Male	Basic Medical Scientist

Other staff members

Sr. No	Name and Designation
1	Ms. Kasturi Awatagiri, Clinical Trial/IEC Coordinator
2	Mr. Bhavesh Bandekar, DSMU Coordinator
3	Ms. Nilam Sawant, Administrative Assistant

IEC-III PERFORMANCE 2018

The committee conducted 12 full board committee meetings in 2018 for meticulous scrupulous examination of the scientific and ethical contents of submitted projects, owing to which 30 new projects and 09 old projects from 2016-2018 were examined.

Regulatory Registration:

- TMC IEC-III was re-registered with DCGI under Rule 122DD vide registration no. **ECR/149/Inst/MH/2013/RR-16** on 08th May 2017 and it is valid up to 20th April 2019.
- IEC III is also register with HHS and IORG No. IRB00009642.
- 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.

Table 1: Review type

Review type	2017	2018
Full Board	36	24
Expedited	6	6
Exempted	0	0
Total	42	30

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

Full board review	2017	2018
Approved	18	14
Approved with modification	5	1
Resubmit	4	7
Not approved	3	2
Withdrawn by PI	0	0
Deferred	0	0
Under review process	0	0
Review exempted	0	0
Total	30	24

Table 3: IEC decision on expedited review projects

Expedited projects	2017	2018
Approved	6	6
Total	6	6

Table 4: IEC decision on projects carried forward previous years

Projects carried forward	2017	2018
Approved	6	9
Resubmitted	1	0
Closed by IEC	1	0
Withdrawn by PI	0	0
Exempted from review	0	0
Total	8	9

Table 5: Summary of the source of funding

Source of funding	2017	2018
IM	16	6
EM	6	7
IM + EM	3	7
Pharma	5	1
Others	1	0
Non funded projects	5	9
Total	36	30

Achievements

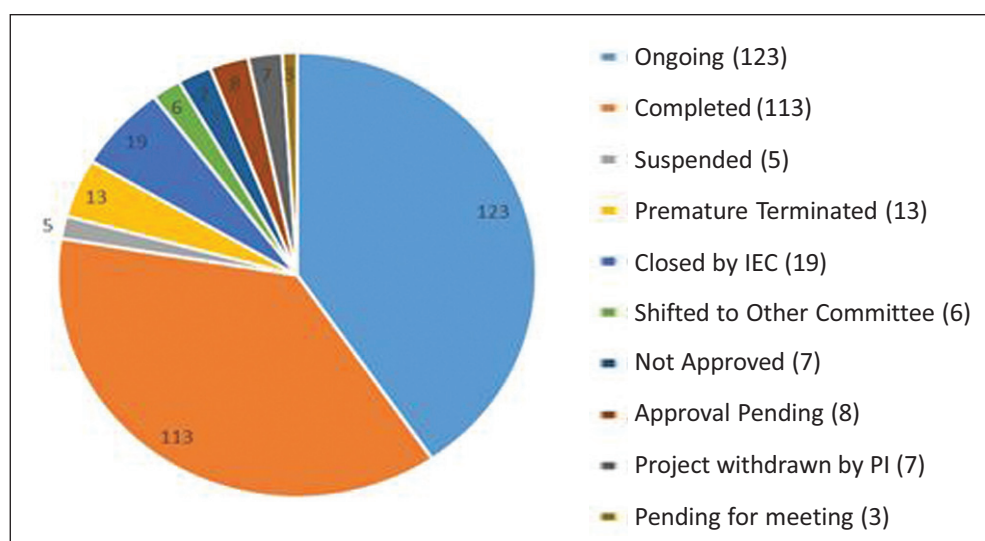
- Tata Memorial Centre, Institutional Ethics Committee III (IEC-III) has been assessed and accredited by National Accreditation Board for Hospitals and Healthcare Providers (NABH). The accreditation was granted on 11th December 2017 valid until 10th December 2020.
- Institutional Ethics Committees, Tata Memorial Centre (IEC-I, II and III) were awarded re-accreditation by the Association for the Accreditation of Human Research Protection Programs (AAHRPP) on 20th March 2017 and it is valid until 20th March 2022.
- The IEC III in 2018 launched a web portal (<https://iecportal.org>) to facilitate online submission, review and status of research projects.

Education

- Online Submission of new research projects.
- Conflicts of Interest & Confidentiality Training for IEC members.
- Ethical Review of submitted protocols.
- IEC SOP Training.
- Overview of Tumor Tissue repository functioning.

An effort to reduce the carbon foot print by increasing paperless documentation and communication within and for IEC will be one of the major undertakings in the near future.

Overall summary of project status (n=304)



Research projects approved by IEC III

Principal Investigator (PI)	Project Title
Dr. Aliasgar Moiyadi	Markers of systemic inflammation in patients with treatment naïve glioblastoma - a retrospective validation study and analysis of influence on survival.
Dr. Amit Dutt	Understanding the mechanistics of resistance to tyrosine kinase inhibitors in non-small cell lung cancer patients.
Mr. Bhavesh Bandekar	Retrospective review of assessment of PI's compliance for submission of Continue Review Application (CRA) & IEC decisions taken on CRA and lapses in IEC approval by IEC-III, Tata Memorial Centre.
Dr. Dhanlaxmi Shetty	The role of cytogenetic abnormalities as a prognostic marker: pathogenesis and clinical course in patients with B-Chronic Lymphocytic Leukemia (B-CLL).
Dr. Indraneel Mitra	A study to investigate the mechanistic underpinnings of oncogenic transformation of NIH3T3 cells by circulating cell-free chromatin.
Dr. Kakoli Bose	Understanding the structural and functional intricacies that govern dynamic regulation of PKM2.
Dr. Manoj Mahimkar	Molecular genetic analysis of clinically high risk oral leukoplakia to identify potentially high risk lesions.
Dr. Meera Achrekar	Use of peripherally inserted central line (PICC) in a tertiary care cancer centre in India.
Dr. Navin Khattry	A Phase 1 study to Determine Safety, Tolerability, Pharmacokinetics and Activity of K0706, a Novel Tyrosine Kinase Inhibitor (TKI), in Subjects with Chronic Myeloid Leukemia (CML) or Philadelphia Chromosome Positive Acute Lymphoblastic Leukemia (Ph+ALL).
Dr. Navin Khattry	Protocol CINC424D2301: A phase III randomized open -label multi-center study of ruxolitinib vs..best available therapy in patients with corticosteroid - refractory chronic graft vs host disease after allogeneic stem cell transplantation (REACH 3))
Dr. Navin Khattry	A Phase III, Randomized, Double-Blind, Placebo Controlled Study of curcumin to reduce mucositis in autologous transplant setting.
Dr. Nikhil Patkar	Ultradeep Error Corrected Next-generation Sequencing of ABL1 Kinase Domain Mutations in BCR-ABL1 Positive Malignancies.
Dr. Parthiban Velayutham	Threshold Identification of cortical stimulation for mapping motor functional areas: A Prospective Observational Cohort study.
Dr. Preeti Chavan	Pathophysiological significance of blood rheology and inhibitors of coagulation factors in predicting thrombotic thrombocytopenic purpura in post hematopoietic Stem Cell Transplant Patients.
Dr. Pritha Ray	Investigating association of PIK3CA/Akt signalling with oncogenic p53 mutations to develop therapeutic strategies for high grade serous ovarian cancer.
Dr. Pritha Ray	Investigation of the level of NOTCH-3 and its target gene expression across subtypes of epithelial ovarian cancer
Dr. Reshma Ambulkar	A Prospective study to evaluate the use of surveillance venous ultrasonography to detect incidence of deep venous thrombosis in perioperative period in cancer patients undergoing neurosurgery.
Dr. Rushikesh Patil	Understanding the metabolic pathways regulating functions of δ T cells in cancer.
Dr. Shripad Banavali	A retrospective data review to evaluate the quality of generic brands of L-asparaginase versus innovator Medac in childhood acute lymphoblastic leukemia.

Principal Investigator (PI)	Project Title
Dr. Sorab Dalal	Can LCN2 protein levels predict the response to neo-adjuvant chemo and radio therapy in rectal cancer?
Dr. Sudeep Gupta	To study the role of Activator protein -1 (AP-1) in surgery generated hypoxia stress.
Dr. Syed Hasan	Molecular and functional characterization of small molecule inhibitors to evaluate anti-tumor activity in acute myeloid leukemia.
Dr. Syed Hasan	Evaluation of in vitro effects of novel small molecule inhibitors on primary patient-derived Multiple Myeloma cells.
Dr. Vanita Noronha	A study to evaluate the role of pantoprazole in advanced head and neck cancers (Pantoprazole in the Treatment of Head And Neck cancer, i.e. PanTheAN.
Dr. Vedang Murthy	Randomised controlled of Prostate Radiotherapy In high risk and node positive disease comparing Moderate and Extreme hypofractionation (PRIME trial).
Dr. Vedang Murthy	Evaluation of PSMA PET_CT volume of dominant inrraprostatic lesion with respect to mpMri volume for focal boost radiotherapy Planning.
Dr. Vijay Patil	TOP: Adult diffuse lower grade gliomas : Temozolomide Or PCV as adjuvant therapy.
Dr. Vikram Gota	A prospective, open label, randomized, parallel design study of 4 generic formulations of intramuscular L-asparaginase in childhood precursor B-cell Acute Lymphoblastic Leukemia (ALL).
Dr. Vikram Gota	To study the pharmacokinetics of Nivolumab in Indian patients with solid tumours.



Data Safety Monitoring Unit DSMU-III (ACTREC)

Member Secretary,
Dr. Reshma Ambulkar

The Data Safety Monitoring Unit (DSMU) is a unit of the IEC-III of Tata Memorial Centre and 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-III (1st April 2018 to 31st March 2020) is given below:

Sr No.	Names	Affiliation	Gender	Expertise
1	Dr. Reshma Ambulkar, Member Secretary	Professor, Dept. of Anaesthesia, Critical Care and Pain, ACTREC.	Female	Clinician
2	Dr. Jayant Goda, Joint Secretary	Professor, Dept. of Radiation Oncology, ACTREC	Male	Clinician Scientist
3	Dr. Vikram Gota, Member	Associate Professor and Scientific Officer 'F', Dept. of Clinical Pharmacology, ACTREC	Male	Clinical Pharmacologist
4	Dr. Jyoti Kode, Member	Scientific Officer 'F', Chiplunkar Lab, ACTREC	Female	Basic Scientist
5	Dr. Shalaka Joshi, Member	Associate Professor, Dept. of Surgical Oncology, Room No. 1207, Homi Bhabha Block, Tata Memorial Hospital, Parel, Mumbai 400012.	Female	Surgeon
6	Dr. Sachin Punatar, Member	Assistant Professor, Dept. of Medical Oncology, Tata Memorial Hospital, TMC.	Male	Clinician
7	Dr. Malini Joshi, Member	Professor, Dept. of Anaesthesia, Critical Care and Pain, ACTREC	Female	Clinician
8	Dr. Vijay Patil, Member	Associate Professor, Dept. of Medical Oncology, Tata Memorial Hospital, TMC	Male	Clinician
9	Dr. Amit Dutt, Member	Scientific Officer 'F', ACTREC	Male	Basic Scientist
10	Dr. Ashok Varma, Member	Scientific Officer 'F', ACTREC	Male	Basic Scientist

The important responsibilities of the committee:

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

DSMU-III activities (2018)

During the year 2018, 12 meetings were conducted and the minutes were forwarded to IEC-III 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-III and IEC-III.

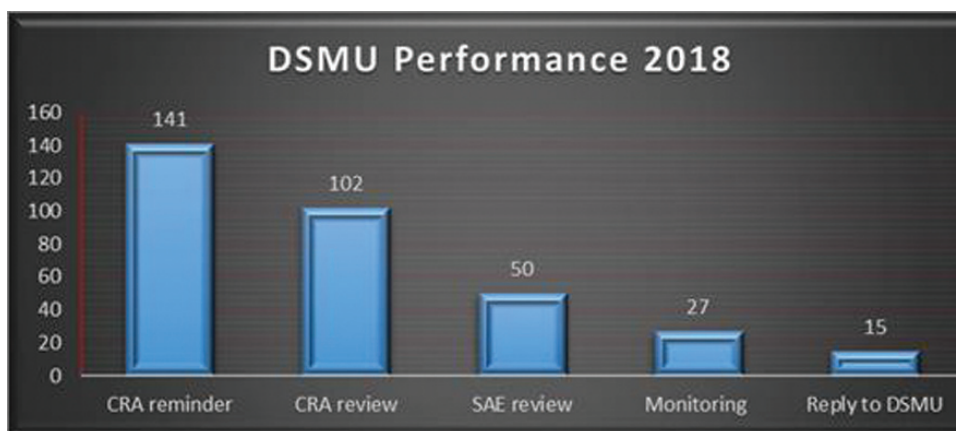
The committee conducted 27 site monitoring visits, 50 SAE reports reviewed and sent 141 reminders to PIs for Continue Review Application submission as required. A detailed initial review of 102 Continue Review Applications (CRA) were done by DSMU Member Secretary and comments from the DSMU were forwarded to the IEC for further action.

The DSMU Member Secretary or representative of the DSMU presented the minutes of DSMU meeting to IEC for further action. Twenty seven monitoring reports were discussed in the full board and based on IEC comments, recommendation

and query letters were issued to PIs. In all, 21 replies were reviewed by DSMU and their comments were forwarded to IEC.

Activities:

- New SOPs on "Constitution of Data Safety Monitoring Unit (2b)" was introduced and included in the IEC SOPs Version 5 dated 03/10/2018 as per the SIDCER recommendation.
- Online submission of the CRA (Continue Review Application) was started w.e.f. 29.10.2018 to ensure accurate and effective submission of progress report
- Online submission of Serious Adverse Events was started w.e.f. 06.12.2018 to ensure accurate and timely reporting of SAEs by the investigators in TMC.
- Initiated maintaining and updating of a database for internal SAEs that occur at ACTREC, which assists follow-up of significant events that occur on a trial.



Academics at ACTREC

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 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. Shubhada Chiplunkar, 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 doctoral program with support from SCOPE Cell for student intake and academic coursework, from ACTREC Administration for enrolment and fellowship matters, and from the Program Office for HBNI matters.

During 2018, 105 graduate students were enrolled into the Centre's Ph.D. program; these included the new batch of 17 students of the JRF 2018 batch (see photograph).



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

During the year 2018, 7 students completed research towards their doctoral dissertation and were awarded the Ph.D. degree (see the tabulation that follows).

Mr. Pratik Rajeev Chaudhari Guide: Dr. Milind Vaidya	Role of hemidesmosomal linker proteins in neoplastic progression of squamous cell carcinomas
Ms. Nikhat Nahid Khan Guide: Dr. Rajiv Sarin	Study of mutation landscape and stepwise carcinogenesis in hereditary colorectal cancer
Mr. Satishkumar Vishram Singh Guide: Dr. Neelam Shirsat	Molecular mechanism underlying pathogenesis of WNT signalling associated medulloblastomas
Mr. Mukul Sacchit Godbole Guide: Dr. Amit Dutt	Identifying the targets of progesterone in human breast cancer
Ms. Vishal Sonali Shrinivas Meena Dr. Sorab Dalal	Regulation of cell to cell adhesion and differentiation of spermatogonia stem cells by 14-3-3g
Mr. Sameer Jagannathrao Salunkhe Guide: Dr. Shilpee Dutt	Role of DNA damage repair pathways in chemoresistant leukemic cells
Mr. Gopalbhai Chovatiya Guide: Dr. Sanjeev Waghmare	Delineating the role of signaling pathways in epidermal stem cell regulation

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 234 participants during 2018, of which 39 trainees worked for their dissertation, 5 were on collaborative projects, 107 trainees came for research experience, 45 were observers, 4 were Research Associates and 34 were summer 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 find 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. The third batch of AMLT comprising of four students started coursework in early 2018. 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), Histopathology (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

ACTREC routinely accepts educational visits from college/ university students from across the country. Six educational visits took place during 2018. Thirty students from TMC's one-year Advanced PG Diploma Course in Patient Navigation (KEVAT) visited the campus and the facilities of ACTREC in June 2018. A group of 28 senior citizens, residents of Kendriya Vihar, Kharghar, interacted with faculty on various aspects of cancer during the presentation and were shown around the campus (August 2018). A batch of 18 students from N.B.

Mehta Science College, Bordi and a group of 10 AFMC - Faculty and PG Residents studying Community Medicine visited the laboratories and facilities at ACTREC [September 2018]. In October 2018, twenty students from KANMS Sonawane Arts, Commerce and Science College, Satana were at ACTREC as a part of their academic tour of research institutes. Educational visits of the finalists of DAE's All India Essay Contest as well as the plus BL4S winning team of RN Podar School (October 2018) covered several ACTREC facilities.



Clinical Research Secretariat -ACTREC

Officer-in-Charge

Dr. Vikram Gota

Data Manager:

Mrs. Sadhana Kannan

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

The CRS at ACTREC provided scientific and technical inputs spanning a range of activities from protocol development to manuscript publication, to support both, basic and clinical research investigators. The services have also included support to phase II and III clinical trials, which are single or multi-centric, through managing randomisation (20 trials-TMH & ACTREC), CRF development, electronic data capture, clinical data organization through REDCap (10 studies) and statistical analysis.

The Clinical Research Assist Group (CRAG) comprising of a team of experts in clinical research methodologies and biostatistics has been constituted under CRS to assist investigators of TMC in designing complex trials and research projects. Four projects were assisted by CRAG this year. Also,

the lead statistician carried out 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 13 publications in the year 2018.

The CRS has been involved in teaching biostatistics to students of PhD, MSc Nursing and junior residents of Radiation Oncology of Tata Memorial Centre. A proposal to commence post graduate diploma course in Biostatistics has been initiated. Our lead statistician has also registered for Ph.D. in health sciences. In the year 2018 on-the-job training was imparted to junior statisticians of CRS-TMH for a period of three months and six journal club meetings were conducted for clinicians at ACTREC.

Open Day 2018

ACTREC's Open Day was conducted on 6th and 7th of December 2018. The two day event showcases the research labs and facilities of ACTREC to aspiring students keen in pursuing research in 'Life Sciences' as a career. Close to 490 students and 40 faculty members from 31 science degree



colleges of Mumbai and Navi Mumbai participated and visited the centre. On each day, in the morning and in the afternoon, batches of 15 students and faculty of respective colleges visited labs to witness the functioning of research laboratories well- equipped with technically sophisticated infrastructure. The program included a poster session in the CRI entrance foyer, followed by an overview of ACTREC, delivered by the members of the Events Committee. After the brief introduction of the centre, each college group along with an ACTREC student volunteer was taken to eight departments, facilities and research labs of CRI and CRC in which varied aspects of cancer research, diagnosis and treatment were demonstrated. Eight groups conducted the demonstration this year with the themes - Cancer Research using Small Laboratory Animals, Comparative Oncology Program and Small Animal Imaging Facility, Raman Spectroscopy for Cancer Diagnosis, Principles and practical aspects of Transmission Electron Microscopy, Flow Cytometry, Protein Structure for Drug Discovery, Composite Lab and Radiation Oncology. The visiting college students and faculty provided the feedback appreciating the educational program.

14th National Research Scholars Meet (NRSM 2018)

The National Research Scholars Meet (NRSM) in Life Sciences is an annual event organized by the graduate student fraternity of ACTREC. The idea of organizing such a unique meeting was first conceptualized in 2005 and since, this event has gained popularity and esteem among students representing diverse fields of biological sciences. The 14th National Research Scholars Meet was held at ACTREC on 3rd and 4th December 2018, with the motto “Envision, Innovate, and Translate”.

The meet began with a welcome address by Dr. Sudeep Gupta, Director, ACTREC. In the inaugural address, the Chief Guest, Dr. Bharat Vatwani, Raman Magsaysay awardee and Founder of Shraddha Rehabilitation Centre gave the audience a reality check, on the life of destitute and mentally challenged patients living on the streets, and emphasized the responsibility of society to help them get them back into

mainstream lifestyle. He and his team members have successfully rescued several mentally-ill persons living on the streets by providing free shelter, food, psychiatric treatment and finally reuniting them with their families.

The plenary speaker, Dr. V.V. Robin from ISSER Tirupathi, gave an insight of the beautiful Western Ghats Sky Islands; their description, formation of species, and a glimpse into reasons for extinction. He also mentioned the importance of species conservation and increased our awareness on healthy ecosystems. Dr Naveen Khatri, the Deputy Director—CRC, Dr. Prasanna Venkatraman, Deputy Director-CRI were distinguished guests present at the function and during the release of the 14th NRSM abstract book.

The first keynote address was delivered by Dr. Thomas Pucadyil from IISER-Pune who spoke about the diverse players and convergent mechanisms of Membrane Fission. Research scholars from various institutes across the country presented their findings in two sessions of oral presentations, with an intervening poster session. The second keynote address was delivered by Dr. Souvik Maiti, from IGIB, New Delhi on “Interfering with Interference: targeting the microRNA”. This was followed by Company-Tech talks delivered by Mr. J.V.V. Ravikanth, Beckman Coulter Life Sciences and Mr. Rajas Warke, Himedia. The *Scientifia quiz*, encompassed intriguing questions on Science and other areas of general interest, was highly appreciated and enjoyed by all the participants. An evening cultural event included a mesmerising dance performance by Dr. Purva Pandit and troupe. These events were followed by banquet dinner.

Day two of the meet began with a keynote address by Dr. Rajesh Gokhale, NII, New Delhi, who spoke about the amalgamation of science and adventures of bio-entrepreneurship in India. This was followed by Company-Tech talks delivered by Mr. Pardhasaradhi Godithala, Bioserve and oral presentation by Research Scholars from various institutes across the country, with an intervening poster session. There was an ‘Interactive Session’ with new age entrepreneurs, Dr. Aman Sharma from Exocan, Dr. Narayan Rao from BARC and Dr. Bosco Hendrique from Bidydes, where discussions on successful career building by merging Science



and Industry were tackled. There was a special talk by yet another Ramon Magsaysay awardee “Sonam Wangchuk”, SECMOL, Ladakh. This was an interactive webinar session where he spoke on, ‘the way to envision and translate education system in rural areas’. Along with developing scientific aptitude, the 14th NRSM also unveiled the creative talent hidden within the researchers. The Meet hosted

“Creative corner”, an event for showcasing participant’s talent in photography, painting, and poetry. The two-day meet ended with a valedictory function where awards were presented to the winners of oral and poster presentations, and a vote of thanks was delivered by the organizers. The 14th NRSM proved to be a successful event which aimed to follow an idea’s journey from its inception to its application.



Conferences, Workshops & Seminars at ACTREC

12 January & 30 January	CNE Workshops on ‘Essentials of cardiopulmonary resuscitation’ and ‘Medication safety’ Organizer: Dr. Meera Achrekar, ACTREC
14 February	CNE Workshop on ‘Monitoring and capturing quality indicators – Part I’ Organizer: Dr. Meera Achrekar, ACTREC
28 February & 1 March	Training program for diagnostic laboratory staff Organizer : Dr. Preeti Chavan, ACTREC
8-9 March	Bioinformatics Workshop National: Organizer: Dr. Ashok Varma, ACTREC
12-14 March & 19-21 March	NER Training program on NGS Organizer: Dr. Rajiv Sarin, ACTREC
28 March	CNE Workshop on Quality Indicators Organizer: Dr. Meera Achrekar, ACTREC
5-7 April	International Flow Cytometry Workshop Organizer: Dr. Prashant Tembhare, ACTREC
19 July	ACTREC AMNIS Workshop (Microscopy in Flow) Organizer: Dr. Shubhada Chiplunkar, ACTREC
20 July	CNE Workshop on Monitoring & Capturing Quality Indicators Organizer: Dr. Meera Achrekar, ACTREC
24 July	MIG AMNIS Workshop (Microscopy in Flow) Organizer: Dr. Shubhada Chiplunkar, ACTREC
2-4 August	15 th Advanced Flow Cytometry Workshop Organizer: Dr. Prashant Tembhare, ACTREC
20-21 September	CVAD Workshop Organizer: Dr. Meera Achrekar, ACTREC
26-28 September	In vivo Preclinical Imaging and Drug Discovery Organizer: Dr. Pradip Chaudhari, ACTREC
1 October	Monsoon Retreat Joint Organizers: Dr. Pritha Ray & Dr. Shilpee Dutt, ACTREC
8-12 October	2 nd Workshop on “Advanced Techniques in Anti-Cancer Drug Evaluation” Organizer: Dr. Jyoti Kode, ACTREC
22-23 October	14 th Indo-Australian Biotechnology Conference ‘Emerging modalities to improve cancer outcomes’. Organizer: Dr. Sanjay Gupta, ACTREC
28-31 October	UK-India Cancer Bioinformatics Workshop on ‘Next-Generation Sequencing Data Analysis’. Organizer: Dr. Amit Dutt, ACTREC

3-4 December	14 th National Research Scholars Meet in Life Sciences Organizers: JRF ACTREC Students
3-10 December	4 th Indian Cancer Genetics Conference & Workshop Organizer : Dr. Pradnya Kowtal
6-7 December	Open Day Organizer : Events Committee
9-11 December	Indo-US Symposium/ workshop Organizer: Dr. Prasanna Venkatraman
14-15 December	National Conference on Haematopoietic Stem Cell Transplant Nursing Organizer: Dr. Meera Achrekar, ACTREC
16 December	12 th edition of BPP at ACTREC Organizer: Dr. Kakoli Bose, ACTREC

Orations

12 April	Science and Society Oration: "Organ Donation – Gift of Life" Mrs. Arati Gokhale, Central Coordinator, Zonal Transplant Coordination Centre, KEM Hospital, Pune
10 May	Nurses' Day Oration Oncology nursing: Perceptions and Expectations Dr. Navin Khattry, OIC Medical Oncology Department, ACTREC, Navi Mumbai

Guest Seminars

30 January	Radiation Countermeasure and Bio-dosimetry research activities at Armed Forces Radiation Research Institute: Opportunities and Challenges Col. Dr. L. Andrew Huff, Director, Armed Forces Radiobiology Research Institute, Uniformed Services University of the Health Sciences, Bethesda, USA
6 February	Liquid biopsies and translational proteomics to uncover cancer insights Dr. Prashant Kumar, Faculty Scientist & DST-Ramanujan Fellow, Institute of Bioinformatics, Bangalore
16 February	Emerging targets in cancer immunotherapy: moving discoveries to clinic Dr. Deepak Mittal, Senior Research Officer, QIMR Berghofer Medical Research Institute, Herston, Australia
26 February	Expression of heat shock response genes during tumor progression in <i>Drosophila</i> Prof. S.C. Lakhotia, BHU Distinguished Professor and INSA Senior Scientist, Banaras Hindu University, Varanasi
5 March	Proteomic analysis of DNA damage response and tumorigenesis Dr. Junjie Chen, Professor and Chair, Department of Experimental Radiation Oncology, The University of Texas MD Anderson Cancer Center, Houston, USA
12 June	Molecular mechanisms of metastasis Dr. Georg F. Weber, Associate Professor, University of Cincinnati Medical Center, Cincinnati, OH, USA
26 June	Clash of the titans: AMPK versus Akt in cancer progression Prof. Annapoorni Rangarajan, Dept. of Molecular Reproduction, Development and Genetics, Indian Institute of Science, Bangalore
20 August	Parsing the contribution of fibroblast heterogeneity to tissue fibrosis Dr. Colin Jamora, Professor, Institute for Stem Cell Biology and Regenerative Medicine, Bengaluru
18 September	Cancer diagnosis and margin analysis by molecular assessment of biopsy specimens using mass spectrometric imaging Dr. Shibdas Banerjee, Indian Institute of Science Education and Research, Tirupati

24 October	Cell-membrane active biomimetic polymers: motifs for antimicrobial mechanism Prof. Vani Vemparala, Professor 'G', The Institute of Mathematical Sciences, CIT Campus, Taramani, Chennai
24 October	Human health and cancer: a difficult journey for clinicians and basic scientists Dr. Mrinal Kanti Ghosh, CSIR-Indian Institute of Chemical Biology, Kolkata
28 November	WNT/b-Catenin signalling in prostate cancer progression and immune evasion Dr. Rachana Patel, Associate Scientist, Cancer Research UK Beatson Institute, Glasgow, UK
28 November	Receptor tyrosine kinase signalling in the absence of kinase activity and cancer of non-genetic origin Prof. John E. Ladbury, Dean of the Faculty of Biological Sciences, University of Leeds LC, UK
30 November	Modulation of the tumor immune microenvironment of castration- resistant prostate cancer Dr. Purnima Dubey, Associate Professor, The Ohio State University College of Medicine, Columbus, USA
7 December	Metabolic re-wiring in Cancer: Biological and Therapeutic Insights Prof. Arun Sreekumar, Professor, Baylor College of Medicine, Houston, TX
24 December	Nanotheranostics in cancer diagnosis and treatment Dr. Priyanka Sabherwal, Ex-Senior Scientist, Institute of Nano Science and Technology, Mohali



Conference Reports

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

Organizer: Dr. Pradip Chaudhari, ACTREC



The 5th Continuing Education Hands-on Workshop on "In vivo Preclinical Imaging and Drug Discovery", organized jointly with Indian College of Nuclear Medicine (ICNM) was held at ACTREC during 26th to 28th September 2018. Twenty five participants from across the country representing pharmacy colleges, academic universities, R&D organizations of the government and pharmaceutical industry attended the workshop. The workshop with inputs from eminent scientists and experts, aimed to provide training on proper animal handling, PET, SPECT, CT techniques and was programmed

to offer participants theoretical insights to common translation imaging modalities as well as hands-on experience with imaging procedures and protocols. The faculty comprised of nine speakers from various institutes and the pharmaceutical industry within the country as well as six international speakers from academia and manufacturing industry. Besides the one-on-one interaction with the physically present faculty, Skype enabled enthusiastic and interesting discussions with international experts not attending the workshop.

ACTREC Retreat 2018

Joint Organizers: Dr. Pritha Ray and Dr. Shilpee Dutt, ACTREC



The annual scientific retreat of ACTREC was held on 1st October, 2018 in the KS auditorium. Based on the recent challenges associated with cancer research, treatment and cure, the theme of the scientific session was selected to be as “Therapy Resistance in Cancer: Challenges and New Leads”. A total of 12 speakers, representation from both basic and clinical cancer research enthusiastically shared their data and insights on therapy resistance which added a distinct flavor to the interests of the audience. The talks ranged from

disease specific biological and clinical challenges, identification of new therapeutic markers, various model systems to decipher resistance biology and high throughput assays to integrate genomics, proteomics and metabolomics information on resistance development. There were many questions raised by the students and other members in the audience making the sessions very interactive. On the whole, this year’s scientific retreat was quite enjoyable and ended with many queries and hopes.



Hands-on Workshop on 'Advanced Techniques in Anti-Cancer Drug Evaluation'

Organizer: Dr Jyoti Kode, ACTREC



The second Hands-on Workshop on 'Advanced Techniques in Anti-Cancer Drug Evaluation' was held at ACTREC during 8th to 12th October 2018. Thirty eight participants comprising of students, faculty and corporate, from across India, Mauritius and East Africa representing pharmacy colleges, academic institutes, R&D organizations of the government and pharmaceutical industry attended the workshop. The study modules covering ; in vitro and in vivo drug screening techniques, maintenance of quality animals, study of immunomodulatory activity, bioanalysis and pharmacokinetics, confocal and transmission electron microscopy, molecular imaging (PET-CT/SPECT/Optical Imaging), and structural biology & bioinformatics in drug discovery and design were formulated with inputs and support from several Laboratories and Facilities of ACTREC. The workshop comprised a series of lectures from experts in

the field of anti-cancer drug testing methods and allied topics which were delivered by national faculty from academic institutes, corporate sector and ACTREC scientists. This educational venture received enthusiastic financial support from corporates such as; Agilent Technologies, Premas Life Sciences Pvt Ltd. and Biotron Healthcare. Hands-on training balanced with invited talks, tutorials and protocol hand-outs, has been the core strength of this workshop. Since this 5-day workshop provides overall knowledge in interdisciplinary topics related to anti-cancer drug testing at pre-clinical level through experiments and clinical trial - regulatory issues through lectures, it collected multiple accolades from all participants. In consideration of the popularity gained by this workshop at the national and international level, it is proposed to be held once in two years as an International workshop.

The 14th Indo-Australian Biotechnology Conference

Organizer: Dr. Sanjay Gupta, ACTREC



The 14th Indo-Australian Biotechnology Conference of the Indo-Australian Biotechnology Society was organized at ACTREC-Tata Memorial Centre on 22nd and 23rd October, 2018 with a theme 'Emerging modalities to improve cancer outcomes'. The decades of research have provided understanding of fundamental basis of cancer. The genetic and epigenetic alterations in genome change the phenotypic behaviour of cells resulting into a devastating clinical outcome, cancer. In spite of advanced cancer healthcare research, the global burden of the disease is increasing. The conference provided a platform to facilitate national and international interdisciplinary collaborations and conceive

new research and clinical directions. 14th IABC was a two day event featuring four plenary lectures and twenty seven scientific talks with PhD/ Post-doctoral fellows, early-mid career scientists had an opportunity to present posters. The focus areas of the conference were immunology and immunotherapy, omics in cancer, DNA repair and cell death mechanisms, cancer stem cells and cancer therapeutics. Thus, the current cancer care system demands extensive research focusing on basic understanding of molecular mechanisms of cancer, identify emerging targets as well as technological improvements for providing affordable and better care for the cancer patients.



12th Biophysics Paschim

Organizer: Dr. Kakoli Bose



The 12th Biophysics Paschim was held at ACTREC by the Coordinator, Dr. Bose, on 16th December 2018. Biophysics Paschim is a tightly-knit and highly focused bi-annual conference on Biophysics and allied areas of research where scientists, students and post-doctoral fellows of the Western region present their research and interact in an informal manner. Such networking facilitates scientists to share their

research, find potential collaborators, discuss new research ideas as well as find solutions to specific problems encountered in their research work. The meeting comprised scientific lectures, poster session, student presentations and a panel discussion. More than 150 participants, representing IIT Bombay, IISER Pune, CDAC, Mumbai University, Pune University, NCCS, Pune, TIFR, BARC and ACTREC attended the meet.



Centre for Cancer Epidemiology (CCE)



Centre for Cancer Epidemiology

Director, **Dr. Rajesh Dikshit**

Dr. Pankaj Chaturvedi, Deputy Director

Dr. Atul Budukh

Miss Sharayu Mhatre

Dr. Atanu Bhattacharyaji

The Centre for Cancer Epidemiology (**CCE**) was established in the year 2009 as a part of Tata Memorial Centre (**TMC**) with the broad vision of conquering Cancer by Epidemiological Research and Education. The centre was housed the campus of Advanced Centre for Training Research & Education in Cancer (**ACTREC**), Navi Mumbai and the building was fully operational since 2015. The departments and sections under the centre were:

1. Department of Medical Records and Cancer Registry
2. Department of Preventive Oncology
3. Section of Molecular Epidemiology and Population genetics
4. Section of cancer Surveillance and Field intervention
5. Section of Biostatistics.

The major goals of the centre included:

- Building a program that identified cancer burden, cancer causation and cancer prevention strategies.
- Building a platform to conduct large scale cutting edge Epidemiological studies with accurate exposure measurement
- Build capabilities to conduct Population genetic studies
- Develop manpower for cancer Surveillance, Epidemiology and Molecular Epidemiological studies
- Partner with universities and other organizations that have complementary capabilities.

The activities of centre during the year 2018 were as follows:

Cancer Registries

1. Preliminary reports of registries in Nepal (Kathmandu region) and in Myanmar (Yangon)
2. Worked with Bhutan for publication of five year report of Population Based Cancer Registry
3. Registry was being established in Muzzafarpur
4. Published the first year report of Population Based Cancer Registry at Gadchiroli
5. The project on improving Cause of Death certification in collaboration with Centre for Disease Control & Prevention foundation in USA was extended to cover Maharashtra state and in India.

Bio-Bank

Fully automated Biobank was established that could store up to 300, 000 million samples at - 80° C. The bio-bank had hi-throughput technology for automated storage and retrieval of samples. This was the first automated bio-bank in India. The Biobank was inaugurated on 22nd March 2019 by Elisabete Weiderpass, Director of International Agency for Research on Cancer (**IARC**) and Sir Rory Collins.

New Projects:

1. Lifestyle and genetic risk factors for gallbladder cancer: Multicentre case control study. Funding from National Cancer grid
2. Prevalence of Gallstone diseases in the regions with high and low incidence of gall bladder cancer: Current status and future perspective for gallbladder cancer prevention
3. Genome-wide association study to identify role of genetic susceptibility in Buccal Mucosa cancer. Funding from the Department of Health Research
4. Development of breast cancer risk prediction model using lifestyle factors and polygenic risk score in Indian population. Funding partly from the National Cancer Institute
5. Evaluating the role of genetic susceptibility For Oropharynx cancer in Indian Origin Population: A case-control study using the candidate gene approach. Applied for funding from the American Society of Clinical Oncology
6. To elucidate geographical differences in the incidence of gallbladder cancer by identifying etiologically distinct types of gallbladder cancer through the study of mutational signature. Funding partly from the International Agency for Research on Cancer / Sanger
7. Early detection programme for Oral, Breast and Cervix cancer in Sangrur district of \ Punjab state. Funding from the Clinical Research Secretariat, Tata Memorial Centre (intramural)
8. Establishment of Tobacco Quit line Services. Funding from the Ministry of Health, Government of India.

Education & Training

The education and training programme consisted of short term and long term training programme and PhD in Epidemiology. Two PhD student submitted thesis for PhD degree. Below is the list of training programme conducted in the year

Training / Workshop / Meetings:

Sr. No.	Training Programme	Date	Venue	Number of Participants
1	Cancer Registration Course for Bhutan registry	25 th – 27 th June	Bhutan	15
2	Cancer Registration Course for Yangon registry.	31 st July – 3 rd August	Yangon, Myanmar	50
3	Cancer Registration Course for Nepal registry	7 th – 14 th August	Mumbai,	07
4	Cancer Registration Course for Shirol, Kolhapur registry	25 th – 29 th September	Mumbai	08
5	Cancer Registration Course for Kabul registry, Afghanistan and Muzaffarpur PBCR, staff	19 th – 27 th November	Mumbai	09
6	Advance Cancer Registration Course for Yangon registry	12 th – 14 th December	Yangon, Myanmar	12
7	Course on Setting up Population Based Cancer Registries For Military Hospital participants	17 th – 21 st December	Yangon, Myanmar	50
8	Oral Cancer Screening trial training (NCI Team)	6 th – 10 th December	Mumbai	30
9	CCE/TMC-Markey Cancer Centre Joint Symposium on Breast Cancer	15 th December	Mumbai	30



Medical Records, Biostatistics & Epidemiology

Head, Dr. Ganesh B.

The department was established in 1957 and completed 62 years of continued service, research and education in Tata Memorial Centre (TMC).

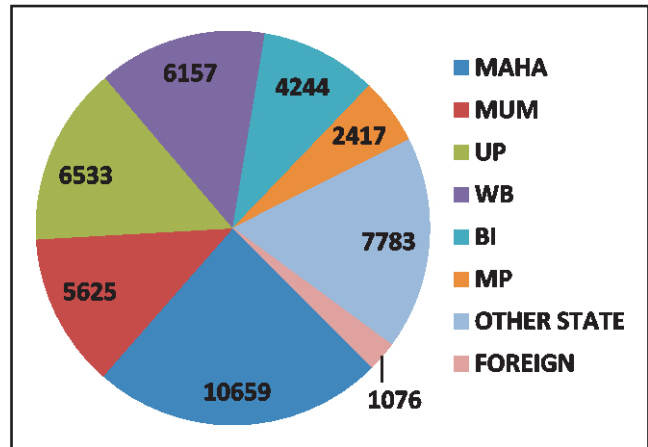
Service

- The department provided case files for patients for the following purposes:
 - Patient Treatment and Follow up: In the year 2018, an approximate of 25,000 case files were issued to patients for Treatment and Follow-up purpose. This number decreased over the years with the implementation Electronic Medical Records and the implementation of paperless records

- Doctors / Clinicians for Research: An approximate of 10,000 case-files were issued for research studies and other activities
- As per the TMC Policy of Retention of Medical Records, scanning of case files for the years 2005-2012 was completed and weeding of old records was in progress. All scanned files would be interfaced with the Electronic Medical records for patient care. From the year 2013, all patient case files were Online
- The department provided patient information in cases of medical insurance claims, Right to Information (RTI) Act, Parliament queries etc.
- The department also provided patient information in Legal matters and Medico-legal cases.



TMH Registrations - 2018



Residential Status of Patients registered - 2018

TMH Case-file Registrations	: 45,667
Referral Registrations	: 21,582
Preventive Oncology	: 7,179
Total TMH registrations	: 74,428
ACTREC Case-file Registrations	: 1,219

Education

The department trained the nursing, infection control, Ph. D. and research students in biostatistics and epidemiology. Cancer registry personnel were also trained for setting up newer registries and hospitals and in Abstraction and International Classification of Diseases coding of diseases.

The Doctoral Training Program started in 2013 was registered under Homi Bhabha National Institute (HBNI). Three Students were enrolled under the Ph.D Program, completed the Ph.D. in May 2018.

Dr. Ganesh is a member of the Expert Committee of Board for Research in Nuclear Science (BRNS), Department of Atomic Energy for various Health Survey Projects. He was the co-principal Investigator for two BRNS projects of DAE.

Research

Biostatistics Consultancy was provided for Statistical Analysis to DMGs, Clinics, Consultants and Students. Assistance was

provided in designing, implementation, analysis and interpretation of clinical data.

The department conducted the Patterns of Care & Survival Studies (POCSS) project for cancer of the breast, cancer cervix and Head & Neck cancers. The project had collected data of 12957 breast cancer, 5066 cervix cancer and 16703 head & neck cancer cases till date. The project abstracts information on stage of the disease, the types of treatment, details of treatment, any recurrence /metastasis, complications, periodic follow-up status which will enable estimation of the survival rates for the above mentioned cancers.

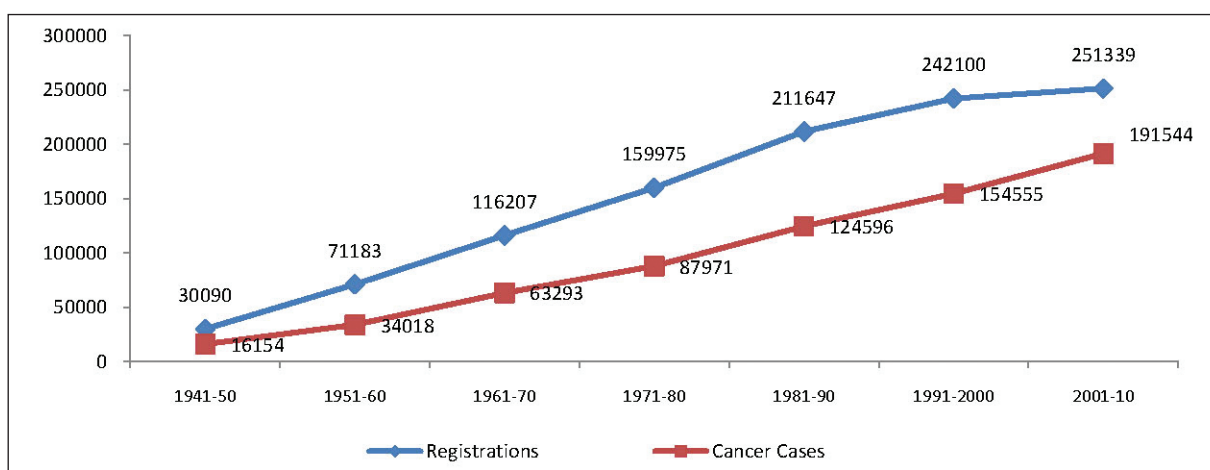
Hospital Based Cancer Registry (HBCR) was one of the major activities of the Department. The Cancer Registry contained demographic and clinical data of the patients registered in the hospital and, in year 2018, data of the year 2017 was collated. The data compilation of the ensuing years was in progress.

The leading site of cancer was Buccal mucosa among males and Breast among females.

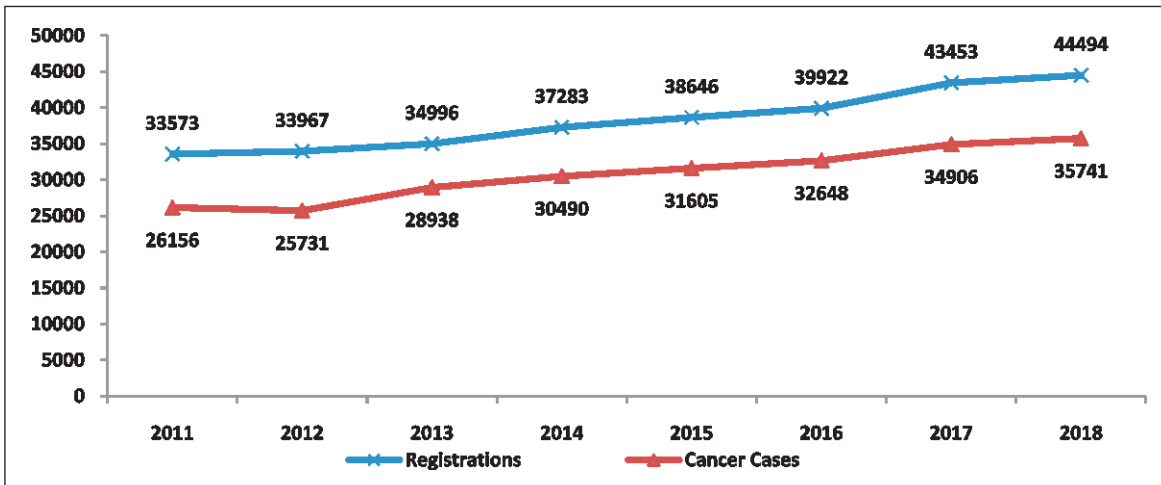
Males					Females				
Rank in 2017	Site	Total	%	Rank in 2001	Rank in 2017	Site	Total	%	Rank in 2001
1	Buccal Mucosa	1944	9.7	3	1	Female Breast	3849	25.8	1
2	Leukemia	1727	8.6	1	2	Cervix	1504	10.1	2
3	Lung	1652	8.3	2	3	Gall Bladder	944	6.3	8
4	NHL*	890	4.5	4	4	Ovary	892	6.0	3
5	Anterior Tongue	821	4.1	7	5	Leukemia	841	5.6	4
6	Prostate	769	3.8	>10	6	Lung	628	4.2	9
7	Stomach	752	3.8	10	7	Thyroid	469	3.1	10
8	Brain & Nervous System	654	3.3	>10	8	NHL*	400	2.7	7
9	Oesophagus	636	3.2	5	9	Endometrium	386	2.6	>10
10	Rectum	620	3.1	>10	10	Buccal Mucosa	351	2.4	6
	All cases	19999	100.0			All cases	14907	100.0	

*NHL = Non Hodgkin Lymphoma

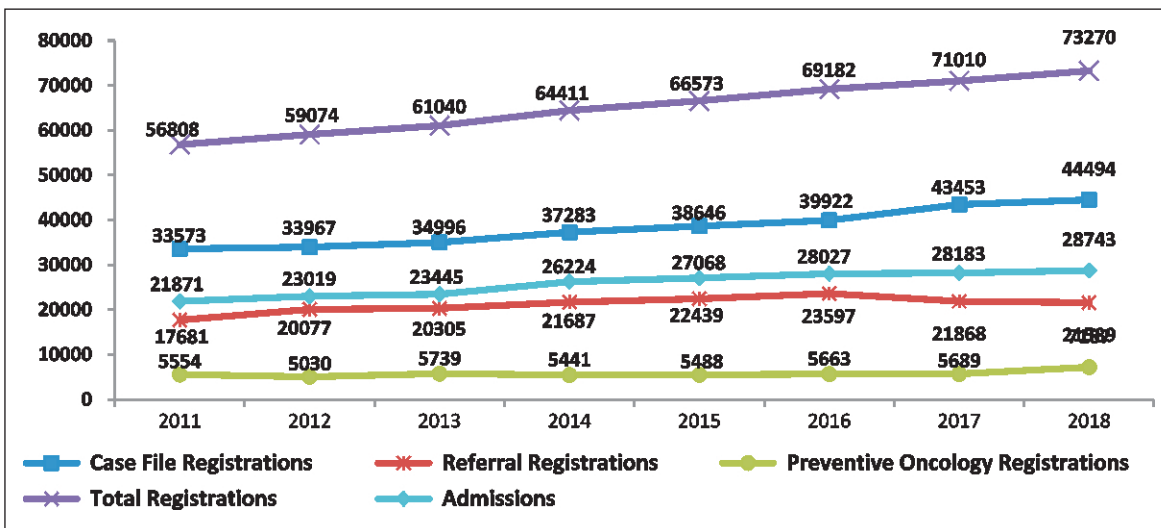
Hospital Cancer Registry - Leading Cancer 2018



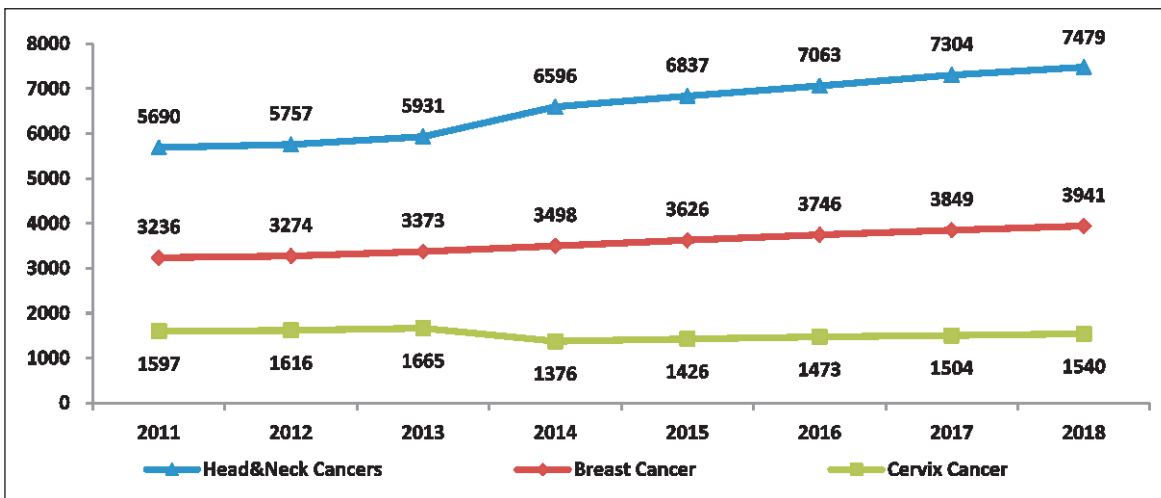
Tata Memorial Hospital – Trends of Patients Registration and Cancer Cases 1941-2010



Trend of Patient Registration and Cancer Cases (2011-2018)



TMH – Registrations and Admissions Trend



Trend in Leading Cancers (2011-2018)

Special DAE Projects

1. TMC-DAE Network of Cancer Registries {Population Based Cancer Registries (PBCR)}:

The department had set up a new Population Based Cancer Registries near the Nuclear Power Plant locations, under the DAE Project in **Ratnagiri, Sindhudurg, Tarapur, Karwar, Rawatbhata, Kakrapar** during 2012 and **Visakhapatnam** during 2014. The first reports for Tarapur, Karwar, Rawatbhata, Kakrapar and Visakhapatnam Cancer registries

Ratnagiri Cancer Registry:

Population 16,12,098 Male: 7,60,030 Female: 8,52,068

Leading Cancer Sites					
Site	Male		Site	Female	
	Nos.	AAR*		Nos.	AAR*
Mouth	134	9.6	Breast	227	13.4
Tongue	56	4.0	Cervix	99	5.6
Larynx	46	3.2	Mouth	86	4.7
All cases	672	46.7	All cases	811	46.4

Sindhudurgh Cancer Registry:

Population 8,49,651 Male: 4,17,332 Female: 4,32,319

Leading Cancer Sites					
Site	Male		Site	Female	
	Nos.	AAR*		Nos.	AAR*
Mouth	79	9.5	Breast	106	11.4
Tongue	37	4.5	Mouth	36	3.6
Lung etc.	25	3.1	Cervix	32	3.4
All cases	375	44.1	All cases	348	36.3

Tarapur Cancer Registry:

Population 5,57,721 Male: 2,92,153 Female: 2,65,568

Leading Cancer Sites					
Site	Male		Site	Female	
	Nos.	AAR*		Nos.	AAR*
Mouth	31	6.2	Breast	49	10.2
Tongue	21	4.5	Cervix	24	5.2
Oesophagus	20	4.8	Ovary	20	4.4
All Cases	216	48.3	All cases	206	45.4

were published during 2018. The data for the other registries are being compiled for report publication. Tablet-PC was implemented on pilot basis in Tarapur and Karwar for the real-time data capture of the cancer registries. The testing for the same was completed and soon would be implemented in the other registries. The department continued operations for PBCR at **Kalpakkam** and **Kudankulam** in collaboration with WIA Cancer Institute, Adyar, Chennai. A proposal to setup Cancer Registries in upcoming Nuclear Power Plant locations was submitted to the authorities.

Rawatbhata Cancer Registry:

Population 1,40,128 Male: 72,654 Female: 67,474

Leading Cancer Sites					
SiteNos.	Male		Site	Female	
	AAR*			Nos.	AAR*
Lung	17	8.9	Cervix	14	7.7
Mouth	17	8.4	Breast	14	7.0
Tongue	11	5.6	Ovary	08	3.9
All Cases	122	63.4	All cases	82	42.0

Karwar Cancer Registry:

Population 1,56,133 Male: 78,633 Female: 77,500

Leading Cancer Sites					
Site No	Male		Site	Female	
	AAR*			Nos.	AAR*
Lung	16	5.2	Breast	67	19.6
Mouth	13	3.8	Cervix	18	5.5
Oesophagus	12	3.6	Ovary	14	4.1
All Cases	129	40.6	All Cases	187	55.4

Kakrapar Cancer Registry:

Population 4,64,238 Male: 2,31,459 Female: 2,32,779

Leading Cancer Sites					
Site	Male		Site	Female	
	Nos.	AAR*		Nos.	AAR*
Tongue	62	8.9	Cervix	65	9.7
Mouth	54	7.9	Breast	58	8.0
Larynx	15	2.7	Ovary	14	2.0
All cases	260	41.5	All cases	225	32.4

Kalpakkam Cancer Registry:**Population 40,69,603 Male: 21,14,763 Female: 19,54,840**

Leading Cancer Sites					
Site	Male		Site	Female	
	Nos.	CIR**		Nos.	CIR**
Stomach	395	10.1	Breast	1256	29.9
Lung	308	8.1	Cervix	874	21.5
Mouth	247	6.1	Ovary	279	6.6
All cases	3556	91.6	All cases	4452	108.2

Kundankulam Cancer Registry:**Population 31,31,579 Male: 15,97,500 Female: 15,34,079**

Leading Cancer Sites					
Site	Male		Site	Female	
	Nos	AAR*		Nos.	AAR*
Stomach	268	8.4	Breast	694	19.7
Lung	181	5.8	Cervix	460	13.2
Mouth	135	4.2	Ovary	145	4.1
All cases	1881	59.5	All cases	2322	66.9

Vizag Cancer Registry: (Urban)**Population 20,35,922 Male: 10,25,676 Female: 10,10,246**

Leading Cancer Sites					
Site	Male		Site	Female	
	Nos.	AAR*		Nos.	AAR*
Lung	38	3.9	Breast	203	17.3
Stomach	36	3.4	Cervix	118	10.5
Mouth	28	2.6	Ovary	48	4.1
All sites	333	31.8	All sites	615	54.1

*AAR: Age Adjusted Ratio

**CIR : Cummulative Incidence Rate

2. Health Check-up Programs – Service & Research:

Health Check-up activities continued at **Kaiga** and **Rawatbhata** under the department supervision and guidance. The Kaiga Health check-up completed the screening with 12564 individuals and the final report of Kaiga Health check-up for (0-16 km) was submitted to Director, Tata Memorial Centre for approval. The Kota Health Survey will be screening 75000 individuals of which 24574 individuals were screened from an enumerated population of the 35,849 individuals.

3. Tobacco Survey Program:

It was observed that the tobacco usage among the resident population of the registry area i.e. talukas Supa, Ankola, Yellapur and Karwar was high than the national average. Hence, a Tobacco Survey has been initiated in 2015 in the areas of Supa, Ankola, Yellapur and Karwar. A population of 44,827 was enrolled under the program of the 400000 population to be covered.

Preventive Oncology

Head, Dr. Sharmila Pimple

Dr. Gauravi Mishra

The Department of Preventive Oncology was a designated World Health Organizations's Collaborating Centre for Cancer Prevention, Screening and Early Detection (IND 59), South East Asia Regional Office (SEARO), since 2002 with five main thrust areas:

- **Information, Education and Communication (IEC):** Programmes 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:** Programmes 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 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.

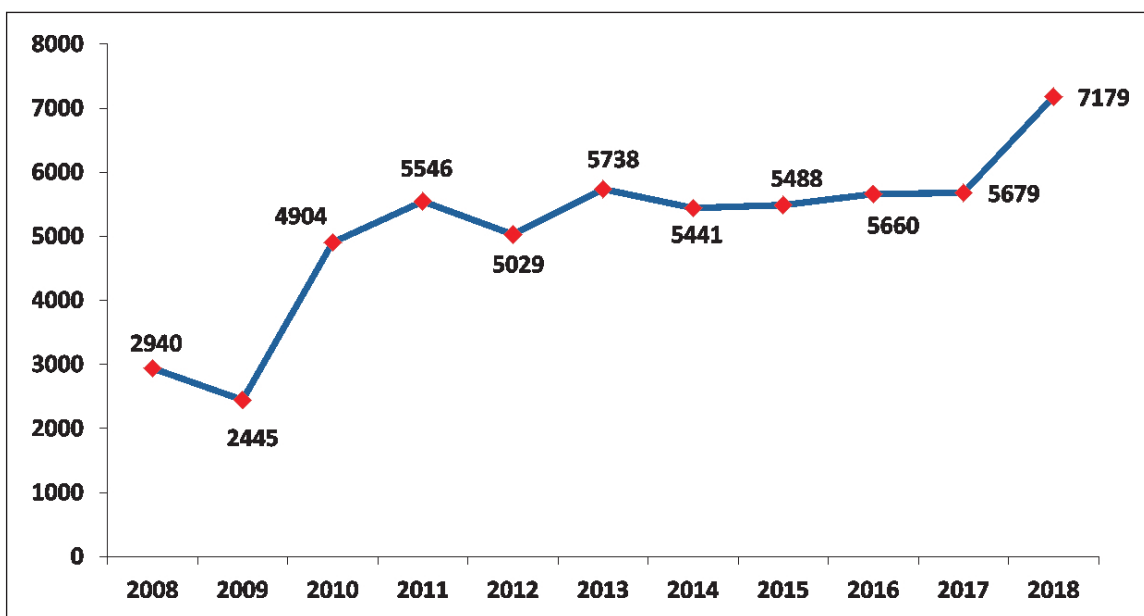
Department of Preventive Oncology conducted Information, Education and Communication programmes for creating awareness for early warning signs of common cancer, risk prevention, life style modification and improving health

seeking behavior towards early detection of common cancers were conducted across all sections of the society. Screening of Oral, Breast and Cervical cancers was undertaken through Hospital and Community based Screening clinics. Training Workshops for Health Manpower development, Technology transfer & Dissemination were organized for Government and Non-Government workforce for cancer control, prevention, screening and early detection. Special events were organized to commemorate National and World cancer days by conducting cancer awareness drives and free cancer screening and detection services. Hospital and Workplace tobacco cessation programmes were organized for tobacco users across various sections of the society.

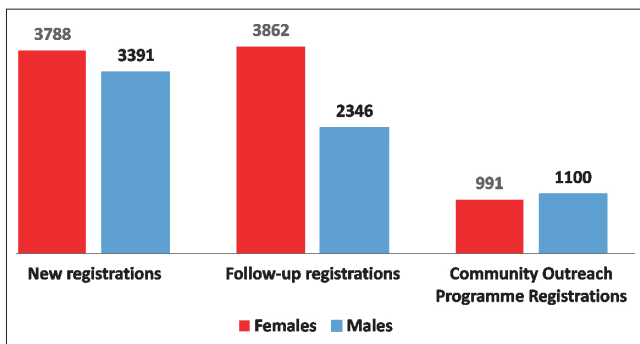
Service

1. Preventive Oncology Hospital & Community Based Screening Clinic:

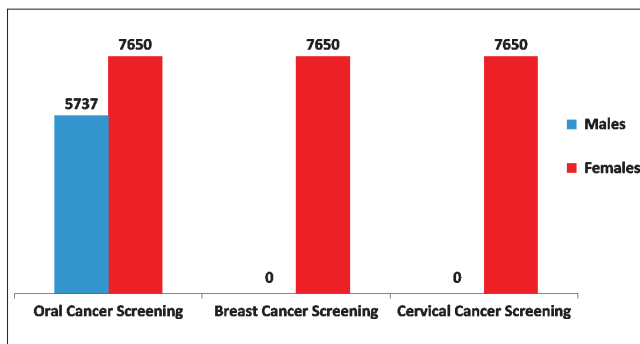
A total of **7179** new patients were registered for Preventive Oncology services. Another 6208 were registered for follow up screening services. A total of 13387 individuals (7650 women & 5737 men) availed of the Preventive Oncology screening services in 2018.



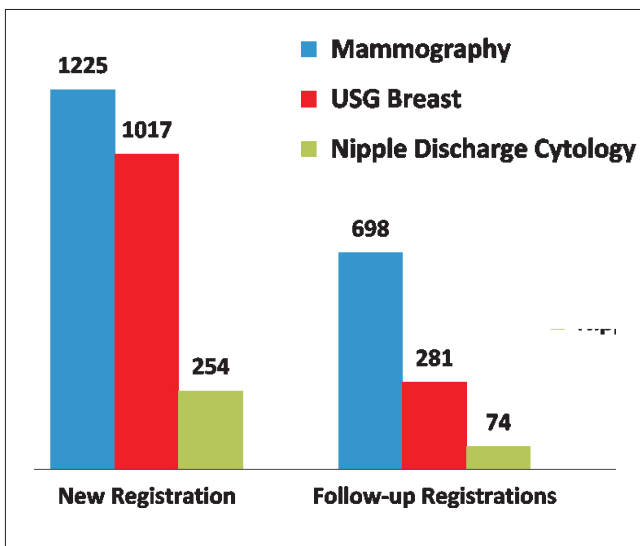
New Patient Registration Trends 2008 – 2018



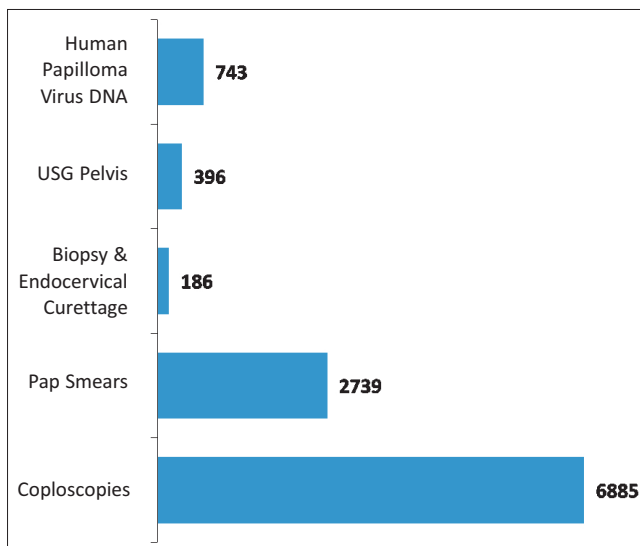
Total Registrations for Preventive Oncology Screening OPD



Total Persons Screened for Oral, Breast and Cervical Cancer

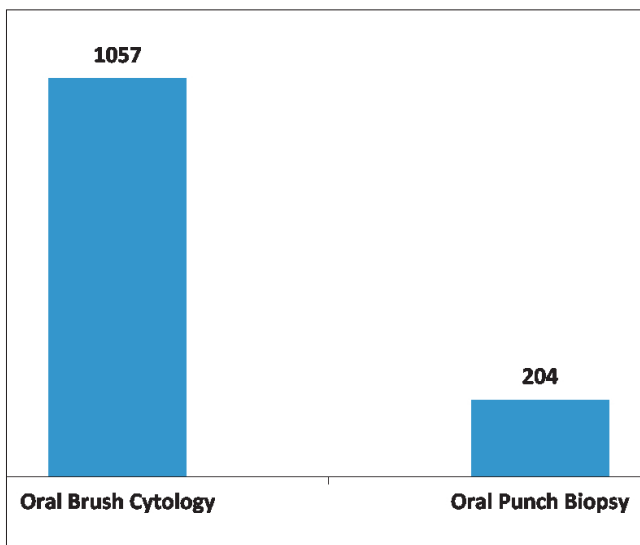


Total Distribution of Investigations conducted for Breast Cancer Screening

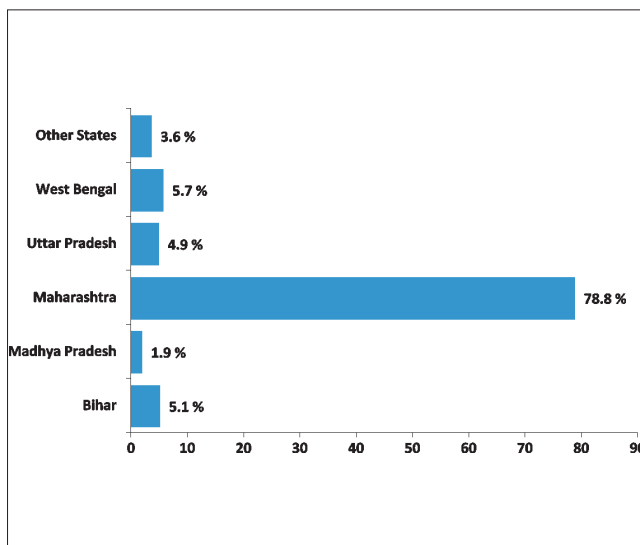


Distribution of Investigations done for Cervical Cancer Screening

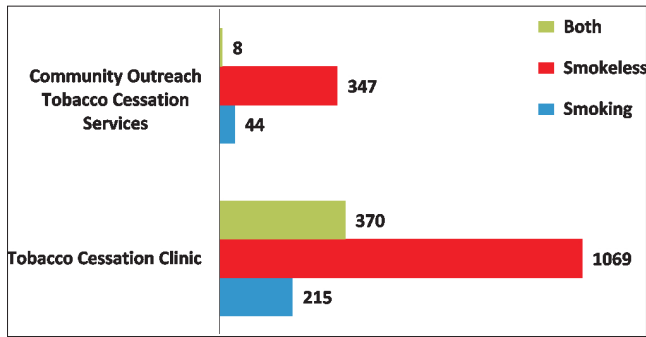
DNA = Deoxyribonucleic Acid
 Pap = Papnicolaov
 USG = Ultrasonography



Distribution of Investigations Done for Oral Cancer Screening

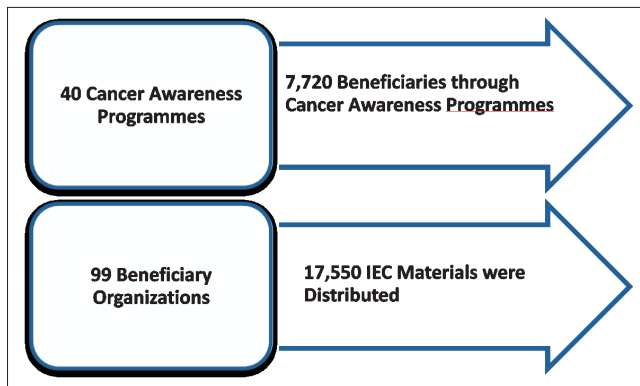


Distribution of Sources of Registration at Department of Preventive Oncology



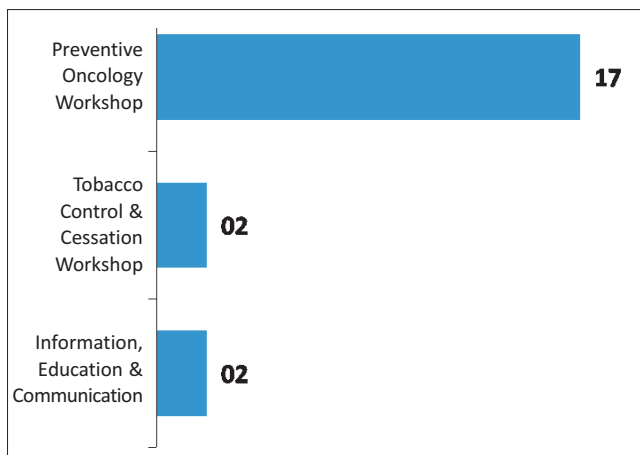
Distribution of Tobacco users counseled at Tobacco Cessation Clinic

Oral, Breast & Cervical cancer screening camps were conducted in collaboration with Public Health & Family Welfare, Govt. of Maharashtra, Police Department and Tata Trust and at Mira Road. Out of 2091 screened at above places. 563 were positive (26.9%), who were sent for further management.

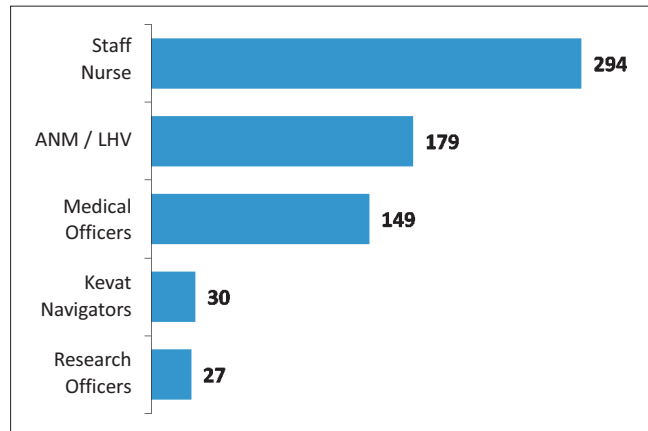


Education

PhD and 2-year Fellowship programs were ongoing in Preventive Oncology. Capacity building and training programs etc. were held for medical and paramedical workforce.



Number of Capacity Building Workshops Conducted



Categories of Medical and Para Medical staff trained

ANM = Auxillary Nurse Midwife

LHV = Lady Health Visitor

Research

There were 12 Investigator initiated research projects and one (01) Industry sponsored project for investigating effective screening tools and strategies for cervix cancer screening, HPV vaccination, Oral cancer screening and Tobacco control, cessation interventions were ongoing.

Two projects were funded through the Department of Biotechnology (DBT) and Biotechnology Industry Research Assistance Council" (BIRAC), respectively.

Extended Follow up of the Randomized trial of 2 versus 3 doses of Human Papilloma Virus (HPV) Vaccine in India was ongoing in collaboration with International Agency for Research on Cancer (IARC), France.

Ten (10) research papers were published in National and International journals.

TMC Satellite Centres



Dr. Bhubaneswar Borooh Cancer Institute, Guwahati



Dr. Bhubaneswar Borooh Cancer Institute (BBCI), Guwahati is one of the oldest comprehensive cancer centre in the entire North Eastern Region of India. The Institute is named after Dr Bhubaneswar Borooh, who was a great physician, freedom fighter and philanthropist of Assam. Established in 1973, the Institute was funded in a project mode by the North Eastern Council, Department of Atomic Energy, Govt. of India and Govt. of Assam since 1989 to 2017. In a landmark decision taken by the Cabinet Committee on Security, the Institute was taken over by Department of Atomic Energy, Govt. of India under the administrative control of Tata Memorial Centre, Mumbai on 27th Nov 2017. The service rules of DAE-TMC became operational from 1st of July 2018.

During the year 2017-18, the Institute registered 10,982 new patients which increased to 12,641 in 2018-19. As per Population Based Cancer Registry of ICMR, the North Eastern Region has recorded highest incidence of cancer in the country. The incidence of cancer in Urban Kamrup District (Guwahati) in male and female is 206 and 165 per lakh of population respectively. Cancers of oesophagus, hypopharynx, gall bladder, lung, nasopharynx, stomach, liver, uterine cervix are very common in the North Eastern region. The number of new cancer patients in the North Eastern Region in a year is 39,000 against an estimated population of 4.5 crores. Assam with a population of 3.12 crore alone contribute to 30,000 new cancer patients.

High dose radio-isotope therapy facility in the Department of Nuclear Medicine & Molecular Imaging, which is first of its kind in the entire North Eastern Region was inaugurated by Prof. Jagdish Mukhi, Hon'ble Governor of Assam on completion of one year of takeover of BBCI by DAE on 27.11.2018. The 1st North East Annual EBM Conference with support from TMH was held from 23rd to 25th November 2018. It was largely attended by participants from North Eastern States and other parts of the country. This turn out to be very resourceful to the participants. Hon'ble Minister of State, H&FW, Govt. of India Shri Ashwini Kumar Choubey paid a maiden visit to BBCI on 16.02.2018.

In academic front, the Institute started M.Sc in Cancer Biology and one year Post Basic Diploma in Oncology Nursing in 2018. Similarly, research projects like E- Mortality (*e-Mor* project) with technical support by the National Center for Disease Informatics and Research- ICMR, determination and validation of low cost population based screening device for early detection of oral cancer in Kamrup and Darrang districts in collaboration with Tata Trusts, Multi-centric case control study to identify genetic and life style risk factors of gall bladder cancer (funded by the National Cancer Grid), Genome-wide Association Study to Identify Role of Genetic Susceptibility in Buccal Mucosa Cancer - a multi-centric project (funded by the Department of Health Research,

Government of India), and development of a Low Cost Automated Screening System for Cervical Cancer (Cerviscan II) with support from Centre for Development of Advanced Computing, Govt. of India has been started in 2018-19. POWERGRID Capacity Development Centre in Oncology under CSR Scheme is nearing completion.

Minister of Health & Family Welfare Department, Govt. of Assam conferred Health Care Excellence Award of News18 to BCCI for outstanding contribution in Health Education on 9th February 2019. Department of Preventive Oncology, BCCI was also presented Healthcare Excellence Award for Community Oncology Programme.

Discipline of Skull Base Surgery and Micro Vascular Surgery were started with recruitment of highly trained faculties. To overcome the acute shortage of staff, the Management of the Institute has initiated the recruitment process to fill up existing 78 vacant posts. Step has also been taken for recruitment of additional 166 posts sanctioned by the Cabinet Committee on Security. The backlog of promotion of hospital staff has been completed to a great extent and the process is ongoing. The process of transition has turned out to be smooth and satisfactory. The private OPD service too was introduced from 1st December 2017 which witnessed high turnout of private patients.

Mobile Cancer Detection Programme for prevention & early detection of oral cavity, breast and cervical cancer was started in a more organized way in collaboration with Piramal Swasthya in 2018. The St. Jude India Childcare Centre was established in February 2019. The centre provides free accommodation, food, counseling and learning opportunities. Assam Gas Company Limited under CSR scheme is also providing free investigation and treatment services to all childhood cancer patients at BCCI.

For the benefit of the post graduate students and faculties, Digital Library has been started with all available e-resources similar to TMH, Mumbai. The process for computerization which includes registration, admission and discharge, billing, reporting, accounting and prescription etc. has been started. To give succor to the patients, a pharmacy similar to Tata Memorial Hospital, Mumbai was started where prices of medicines are highly subsidized. This initiative has received wider appreciation from patients and public.

BCCI is celebrating 'Year of Community Oncology' (2018-19) with introduction of Home Care Services for terminally ill cancer patients in the city of Guwahati in collaboration with Cipla Foundation. Training programmes and workshops are regularly organized for healthcare providers of the North Eastern Region in the field of Palliative Medicine and Community Oncology. The Ministry of Health & Family Welfare, Govt. of India has established a Regional Satellite Centre for Tobacco Quitline Services at BCCI in the month of September 2018.

Shri K N Vyas, Chairman, Atomic Energy Commission and Secretary, Department of Atomic Energy, Govt. of India inaugurated a state-of-the-art Linear Accelerator with IMRT, IGRT, VMAT, 6X-FFF energy on 9th February 2019.

The introduction of newer facilities, manpower, academic courses, research projects, and patient related services have made a profound impact in the trilogy of "service, education, and research" of the institute. The institute has received unwavering support from TMC, Mumbai in this journey. The institute shall strive to meet the expectations of the public and live-up to its reputation as one of the premier cancer centers of the region.



Homi Bhabha Cancer Hospital & Research Centre, Mullanpur Village, District Mohali, Punjab



The Punjab Government allocated a 50 acre plot of land to construct a cancer hospital in Mullanpur Village of Mohali District in Punjab. The hospital was named the “Homi Bhabha Cancer Hospital & Research Centre” (HBCHRC).

Due to unavoidable circumstances, the cost of the entire project escalated from INR 480 crore to INR 664 crore and, the time frame for commissioning the hospital was extended to end of 2020.

M/s. DDF Consultants Private Limited, New Delhi was appointed as Engineering, Procurement & Construction (EPC) Consultant and M/s. Shapoorji & Pallonji and Co. Pvt. Ltd. as EPC Developer.

The construction of HBCH&RC was in full swing with almost completion of the **structural works** for Main Hospital Building, the Resident Doctor’s Hostel, the Resident Nurse’s Hostel and the Dharamshala Blocks. The internal finishing items with Mechanical, Electrical & Plumbing (MEP) services & external development work had begun for the above buildings.

Homi Bhabha Cancer Hospital, Sangrur



The Homi Bhabha Cancer Hospital (**HBCH**) was commissioned on January 20, 2015 as a 30 bedded facility in a rural place called Sangrur – about 125 km. from Chandigarh. It was a unique example of hand holding between State Government and Central Government; the State Government represented through the Punjab Health Systems Corporation and the Central Government represented by Tata Memorial Centre.

HBCH, Sangrur had all the required equipments for cancer management. The list of equipments included the High end Linear Accelerator; Bhabhatron; 18 channel Brachytherapy; High Bore CT; Digital Mammography; Digital X-ray; Mobile X-ray (Digital); Higher end Ultrasonography (**USG**); a Mobile USG in the Intensive Care Unit; and, the well-equipped Operation Theatre with Minimal Invasive Support. The 1.5 Tesla Magnetic Resonance Imaging machine was donated by the Punjab State government.

In addition to above, Cryostat (LIECA) for frozen section and the VENTANA BENCHMARK XT automated Immunohistochemistry machines were commissioned during the year 2018.

Recently the HBCH, Sangrur was upgraded from 30 to 100 - bed hospital and, the extended new building was inaugurated by by Capt. Sri Amarinder Singh, Hon'ble Chief Minister, Punjab on 12.11.2018.

It was planned to start Interventional Radiology, Palliative Services and Plastic & Reconstructive Surgery in the near future.

Services

The year 2018 catered to **2696** new cancer patients and over **1241** surgeries were performed. Almost **9000** patients underwent radiological investigations. More than **60000** biochemistry investigations and over **32000** pathological studies were performed. Radiotherapy was offered to **2041** patients and chemotherapy to **7378**.

Education

During the last three years, five (05) B.Sc., courses were started for Laboratory, Radiology, Radiation Therapy, Anesthesia and Operation Theatre techniques. In each stream, only two students were taken annually. In 2018, M.Sc. (Histopathology) course was planned after due approvals. All these courses were conducted through the Baba Farid University of Health Sciences, Punjab.

The HBCH, Sangrur was declared as Training Centre by Baba Farid University of Health Sciences, Punjab.

The Memorandum of Understanding with Saint Longowal Institute of Engineering & Technology (**SLIET**) was signed to start M.Sc. in Medical Physics and, was waiting for approval from Atomic Energy Regulatory Board.

There were two six months certificate courses in Laboratory and Onco Physiotherapy. The main idea of starting courses in the rural set up was to share the rich knowledge available with the local population and, aimed to develop paramedical staff for cancer management in Punjab.

An annual Cancer Awareness Walk was organized, involving the ladies from various colleges along with periodic lectures on cancer awareness and prevention.

A prevention programme for Cancer was launched during the month of November 2018 with project cost of INR 1.72 crore, covering a 2 lakh population in two Tehsils of Sangrur District.

Research

There were two publications by the medical staff along with formulation of the Sangrur Hospital Based Cancer Registry for the year 2018.



Homi Bhabha Cancer Hospital, Varanasi



Following a MOU with the Indian Railways, the earlier Indian Railways Cancer Institute at Lahartara, Varanasi was taken over. It was renovated, equipped with advanced diagnostic and therapeutic equipment and came into being as the Homi Bhabha Cancer Hospital (HBCH), Varanasi, as a unit of the Department of Atomic Energy (DAE), Government of India and managed by Tata Memorial Centre, Mumbai. The aim was to bring comprehensive and high quality cancer care at affordable costs to the doorsteps of patients of Varanasi, its neighboring districts and States of India. This outreach program aimed to offer similar quality services at similar costs as provided by Tata Memorial Hospital, Mumbai. The Homi Bhabha Cancer Hospital commissioned on 1st May 2018, was a **179 bed** hospital.

The Hospital offered services in Surgical and Head & Neck Oncology, Radiation Oncology, Adult Medical Oncology and Paediatric Oncology (both Surgical and Medical), Preventive Oncology, Palliative Medicine etc.

Under diagnostic services, Radiology Department had a MRI (3 Tesla), a PET-CT Scanner, one CT (16 slice), two USG machines, one Digital radiography system (Fixed & Portable) along with one mammography system.

The Laboratory Medicine services were fully functional and equipped with latest technologies for specialized tests in

Pathology, Microbiology and Biochemistry. In Laboratory Medicine, besides all routine diagnostic tests, the Pathology department had started immunohistochemistry; the Microbiology department focused their other activities that included Infection Control and proper management of Biomedical Waste in hospitals. The hospital had a fully functional Transfusion Medicine Centre.

The Hospital also had a Population based Cancer Registry in the district of Varanasi covering a population of 3.6 million.

Efforts were ongoing to develop infrastructure for Bone Marrow Transplant facility in the near future.

Service

The year 2018 saw a total of **7844** new Cancer patients at HBCH, Varanasi.

Services	Date of Operation of Patients	Number
Registration	01 th May, 2018	7844
Admissions	09 th May, 2018	1643
Surgeries	10 th May, 2018	587
Radiotherapy	14 th May, 2018	641
Chemotherapy	22 nd May, 2018	7948

Services	Date of Operation of Patients	Number
Hydration + antibiotic+ procedure	26 th May, 2018	2443 (891+1229+323)
Radiodiagnosis	05 th May, 2018	3592
Nuclear medicine	06 th Sept., 2018	601
Pathology	01 th May, 2018	1933
Cytopathology	01 th May, 2018	649
Biochemistry	01 th May, 2018	16682
Haematopathology	01 th May, 2018	15531
Microbiology	05 th May, 2018	3728
Dispensary value in Rupees	01 st May, 2018 till 31 st Dec. 2018	7,91, 80,148

Academics

The Head & Neck DMG conducted a One Day CME on Head & Neck Cancer Management.

The Preventive Oncology department conducted Hands on training for Doctors and nurses from Assam in the month of September and December 2018. The department also conducted regular cancer awareness and outreach cancer screening programmes in Varanasi District. Radiation Oncology- Dr. Satyajit Pradhan was elected as Chairman of Indian College of Radiation Oncology (ICRO).

The Microbiology department conducted training for Nursing staff, Phlebotomy team and housekeeping staff on Hospital Bio-Medical Waste Management; and, for nursing team on Sepsis detection by Blood Culture

Future

In the next phase, a multistoried Annexe building was planned. This building would house the hospital kitchen and Cafeteria, Administrative and Faculty offices, space for Dharamshala for patients and some hostel facility. Additional land would be made available across the road in front of the Hospital for constructing accommodation for staff members.

Bone marrow transplant facility would soon be started along with Molecular Diagnostic & Cytogenetic Laboratory and Mycology & Mycobacteriology sections.



Homi Bhabha Cancer Hospital & Research Centre, Visakhapatnam



The Homi Bhabha Cancer Hospital & Research Centre (HBCHRC) in the City of Destiny, Visakhapatnam catered to patients from various districts of Andhra Pradesh and also from the neighboring States Orissa, Chhattisgarh, Telangana and Jharkhand.

The permanent building for the 100 bed hospital was under construction and, the Radiotherapy Block and the Dharamshala were nearing completion.

The Temporary Out- Patient facilities were started on 2nd June, 2014 and, complete Chemotherapy and Palliative care services were provided since then.

The institution had a well developed, integrated and fully functional Palliative care, Pediatric Oncology, Gynecological Oncology, Surgical Oncology, Head & Neck and Dispensary departments. The well equipped digitalized diagnostic departments of Radiology, Pathology (Histopathology, Cytology), Biochemistry and Molecular Biology catered to increasing number of patients as newer diagnostic tests were regularly added. The Dental services would be started in the near future.

Surgical Operations were performed at the city centre supported with 06 Intensive Care Unit beds, provided by the Visakhapatnam Port Trust Authorities as a part of their Corporate Social Responsibility.

There was increasing registration of patient at the hospital with the numbers reaching almost 200 per day. There were

3532 new patient registrations in the year 2018 with **over 23000** patients for second opinion or for investigations. Six hundred (**600**) surgeries were performed and chemotherapy was administered to **5379** patients.

The HBCHRC gynaecological oncologist, Dr. Leela carried out regular community screening camps in the rural areas round Visakhapatnam. In the year 2018, majority of local corporate employees, school teachers and ladies from local societies underwent cervical cancer screening services that helped increase the awareness and benefit of such initiatives.

With the strong supports from the Jiv Daya foundation in association with Snehasandhya Age Care foundation, the home care & hospice of Palliative care services continued to be augmented.

The State Government Health Scheme for patients Below Poverty Line and the Dr. NTR Arogyasree Schemes were also granted to the institution.

Free daily meals (thrice a day) for all In-patients at the City facility in Port Trust Hospital and one meal every day for out-patients at Main campus were provided entirely by the donors and by means of donations to HBCHRC. The patients were also provided with free bus services from the city Railway station & Bus Station to HBCHRC campus.

Conferences and workshops were held in Palliative Medicine and in Gynecology malignancies. Eight (08) articles were published by the medical staff in National and International journals.

Staff Honours



Staff Achievements

Agarwal, JP

- AROI Overseas Award (Over 50 years of age), Thiruvananthapuram,

Ambulkar, Reshma

- Secretary, Mumbai branch of Indian Society of Critical Care Medicine for 2017 – 2018,

Badwe, RA

- 6th Dr. Banoo Coyalji Memorial Oration at KEM, Pune
- Dr. Amitabh Singh Memorial Oration SOOCON at Patna
- Life time Achievement award from Indian Medical Association – Mumbai West,

Baheti, A

- Educational grant for investigating the role of MRI in detecting peritoneal metastases in gastric cancer patients
- Chair, Indian Society of GI Radiology (ISGAR) Junior Executive Committee.

Bajpai, Jyoti

- Selected for Indo-American Cancer Association (IACA) grant for Melanoma and Immuno-Oncology observership under International Observership Programme in Memorial Sloan Kettering Cancer Center (MSKCC), Manhattan, New York City, United States, 2018
- Selected for European Society for Medical Oncology (ESMO) leadership generation programme from India, 2018
- Organizing Secretary of Evidence Based Management of Cancers in India (EBM) 2018: Cancer Immunotherapy
- Founder General Secretary: Immuno-Oncology Society of India (I-OSI).

Bhat, Vasudev

- Best Paper award at PHOCON 2018 -Single fixed dose rasburicase for treatment of hyperuricemia in children with hematolymphoid malignancy and laboratory tumor lysis syndrome (TLS): A retrospective analysis.

Chaturvedi, Pankaj

- Secretary General of International Federation of Head Neck Oncology Societies
- Chairman, Oral Cancer Foundation of India.

Choukar, Devendra

- Secretary of Foundation for Head and Neck Oncology.

D'Lima, Cynthia

- Secretary, 1. Asia Pacific Association of Surgical Tissue Banks.

D'Souza, Anita

- Secretary, Oncology Nursing Association of India.

Daddi, Anuprita

- Competed in the Standard Chartered Mumbai Marathon 2018 half marathon which she completed 21kms in 02 hours & 25mins.

Damani, Anuja

- IDEA-PC Award to attend American Society of Clinical Oncology Award at Chicago, IL.

Deodhar, Jayita

- Academic curriculum coordinator for KEVAT:Patient Navigation Training Programme of Tata Memorial Hospital.

Desai, AV

- Second Prize for Oral Presentation: "Challenges faced by researchers conducting clinical trials at a tertiary cancer center" in the 6th National Conference of Forum for Ethics Review Committees in India (FERCICON – 2018) at Kasturba Medical College, Mangalore held on 29th Nov 2018 to 1st Dec 2018.

Deshpande, DD

- "Life time Achievement award" at North-East CME-cum-workshop organized by BCCI at Guwahati.

Dighe, Swati

- Best Diagnostic Paper Award for presenting 'Retrospective Analysis of Unsatisfactory Pap smears in Gynaecology' at the First Conference & Workshop of Association of Cytologists of Maharashtra (ACM), organized by Department of Cytopathology, at TMH on 10th -11th February 2018.

Divatia, JV

- Editor-in-Chief, Indian Journal of Anaesthesia
- President, Society of Oncoanaesthesia and Perioperative Care (SOAPC).

Ghosal, A

- Selected to ACORD 2018 and CReDO 2018.

Gujral, Sumeet

- President of the “The Cytometry Society”.

Gulia, Ashish

- Representing India in APMSTS board (Asia Pacific Musculoskeletal Oncology Society)
- Organizing Secretary, The Asia Pacific Musculoskeletal Tumor Society 2018.

Gupta, Tejpal

- General Secretary, Indian Society of Neuro-Oncology (ISNO).

Iyer, UH

- First Prize for Oral Presentation: “Factors influencing the number and type of deviations in clinical trials; Audit from a tertiary care cancer centre” in the 6th National Conference of Forum for Ethics Review Committees in India (FERCICON – 2018) at Kasturba Medical College, Mangalore held on 29th Nov 2018 to 1st Dec 2018.

Jagdish, Prathepa

- President, Oncology Nursing Association of India.

Jamema, SV

- Best Poster Nomination at ESTRO meets Asia, Singapore, for the poster titled “Commissioning of Brachytherapy applicator for image guided adaptive brachytherapy using 3.0T MRI.

Joshi, Swapna

- Vice President of Trained Nurses Association of India.

Kane, SV

- Elected as the first president of the Association of Cytologists of Maharashtra (ACM).

Kinhikar, RA

- Chairperson for Physics Dosimetry Session at First ESTRO-Meets Asia Meeting held at Singapore
- Expert at Guy’s Cancer Centre, London and Sidcup to explore about the “Hub & Spoke” model of Radiotherapy facility
- Guest lecture “Quality Assurance of SBRT Process” for M. Sc. (Radiological Physics) students of Dr. BCCI, Guwahati.

Karmarkar, Shruti

- Nalinibai Thakkar National Award for the best paper entitled ‘Evaluation of Cell Blocks & Smears From Gynaecologic Effusion Specimens: An Experience of 160 Cases Diagnosed at a Tertiary Cancer Referral Centre’ presented at CYTOCON 2018 held at Goa.

Kelkar, Rohini

- Vice President, Hospital Infection Society of India
- Deputy Chief Editor, Journal of Patient Safety and Infection Control.

Krishnatry, Rahul

- Poster Alder Hey 2018 Ispno International Traveling Fellowships Award; International Symposium on Pediatric Neuro-Oncology 2018, Denver, USA.

Kulkarni, AP

- Secretary General of Asia Pacific Association of Critical Care Medicine.

Kulkarni, SS

- Secretary General, Society of Interventional Onco-Radiology of India.

Lasarado, Carmine

- President, Association of periOperative Registered Nurses.

Laskar, Siddharta

- Steering Committee Member, International Lymphoma Radiation Oncology Group (ILROG)
- Nominated Expert from India, CERN Knowledge Transfer Forum, Geneva.

Mahajan, A

- Grant from NITI Aayog for the developing an imaging biobank; the Machine Learning and Artificial Intelligence Database (MAD) and Tumor Radiomics Atlas Project (TRAP) for Cancer
- Awarded ‘Most Promising Young Radiologist’ by Rad2023 and the Express Healthcare Group
- Best clinical research award, International Congress of ORL-HNS 2018 (ICORL 2018), South Korea
- Best abstract in European Lung Cancer Congress (ELCC 2018), Geneva
- 3rd Prize in Multimodal Brain Tumor Segmentation Challenge 2018.

Menon, Santosh

- Secretary of Society of Genitourinary Pathologists of India.

Mishra, T

- President, Society of Indian Radiographers.

Moulik, Naimalya Roy

- Best Poster Award at PHOCON 2018 – Unforeseen toxicities in Burkitt lymphoma treated with Rituximab: The Tata Memorial Experience.

Muckaden, Mary Ann

- President of Indian Association of Palliative Care
- Lead in Indo-American Cancer Association for Palliative Care
- Advisor for Cipla foundation.

Mytra, S

- Oration: All India Difficult Airway Association (AIDAA) Oration at NAC 2018 in Kolkata, 8th September 2018
- President, All India Difficult Airway Association (AIDAA)
- Secretary, Indian College of Critical Care Medicine (ISCCM)
- Secretary, for India International Nosocomial Infection Control Consortium (INICC) Argentina (headquarters)
- "Research Mentor" for European Society of Intensive Care Medicine (ESICM).

Narula, Gaurav

- Founded (Feb 2018) and Established Immuno-Oncology Society of India (I-OSI).

Pai, Prathamesh

- Secretary of the Indian Society for Thyroid Surgeons.

Parmar, Vani

- Low cost imaging based breast cancer diagnostic system funded by DST – INR 2.3 Crore from US-India Endowment Fund
- Developed and initiated setting of a 3D printer to print silicone breast implants at ACTREC.

Patil, Ruchi

- 3rd prize for oral presentation at IAPCON 2018 in New Delhi.

Prabhudesai, Neelam

- the Best Technical Paper Award for presenting 'Feasibility of Frozen Section on FNAC Samples in Rapid On-site Evaluation' at the First Conference & Workshop of Association of Cytologists of Maharashtra (ACM), organized by Department of Cytopathology, at TMH on 10th -11th February 2018.

Puri, Ajay

- Global trial planning committee for international multicentre trial on surveillance in sarcomas
- President, Asia Pacific Musculoskeletal Tumor Society
- President Indian Musculoskeletal Tumor Society
- Dr. KC Gopalkrishnan oration at Insight Kochi
- Prof. M.L. Chatterjee Memorial Oration at WBOA , Kolkata.

Qureshi, Sajid

- Webmaster of "International Society of Pediatric Surgical Oncology".

Rangarajan, Venkatesh

- Hall Anger Oration' during the proceedings of 2nd Annual Conference of Nuclear Medicine Physicist Association (NMPAICON2018) in Mumbai on February 17th 2018.

Rekhi, Bharat

- Dr V.R. Khanolkar award, including for best published paper, for the year 2017-18. on 29th November 2018
- Awarded best proffered paper/oral presentation during the 48th Annual meeting of Indian Academy of Cytologists (Cytocon2018), Goa
- Best Proffered Paper Award for presenting 'Clinico-Cytopathologic Spectrum Including Uncommon Forms of 9 Cases of Chordomas with Immunohistochemical Results, including Brachyury Immuno-staining: A Single Institutional Experience' at CYTOCON 2018 held at Goa.

Sarin, Rajiv

- Keynote Lecture titled "Impact of Genetic Testing in Diverse populations: From West to East" at the 7th Annual Clinical Cancer Genetics and Genomics Conference, Chicago
- Chairperson, National Apex Committee on Stem Cell Research and Therapy, Indian Council of Medical Research.

Sastri, Supriya

- Recipient of Young Leader Award/Participant, Princess Margaret Hospital-UICC
- Lead Coordinator, EMBRACE II, GEC ESTRO Group, Europe
- International Young Leader, UICC.

Sathaye, Neeraja

- Second prize in poster presentation: 1st International workshop on Maxillofacial Prosthodontics, held at Lucknow 15th - 18th March 2018.

Shetty, Nitin

- Secretary ,Indian Society of Vascular and Interventional Radiology (ISVIR).

Shrikhande, SV

- President Elect, Indian Chapter of IHPBA
- Dr. Das Mohapatra Memorial Oration at ASICON 2018, held at Chennai.

Sridhar, Epari

- Oration at 3rd IAPM APCON 2018, Vizianagaram, Andhrapradesh, entitled "Neuro-Oncopathology: Redefining era of Histo-molecular pathology".

Thota Raghu

- Vaidya Ratna National Award by Bahujan Sahitya Academy (National).

Wagh, Gauri

- First prize for oral presentation for the presentation entitled “Intratumoral Genomic Heterogeneity of HER2 gene amplification in a series of 222 breast cancer cases: A western Indian Tertiary Cancer Center Experience” at the 7th International Oncoplastic Breast Surgery Symposium (IOPBS) in conjunction with the 16th Women’s Cancer Initiative-Tata Memorial Hospital (WCI-TMH).

Waghela, Chirag

- Best Poster Award for presenting the ‘Role of ROSE & Gardeners as a Quality Initiative for Patient Care’ at the 2nd National Conference & Workshop on Managing Quality in Clinical Laboratories on 20th-21st January 2018, held at TMH
- Jwala Devi National Award for the best innovative technical paper, “Modified Ultrafast Giemsa for Critical Cytology Samples & Rapid On-site Evaluation” at CYTOCON 2018 held at Goa.

Books and Chapters

Books

1. Agrawal, A., Rangarajan, V. (eds.), *PET/CT in Lung Cancer, Clinicians’ Guides to Radionuclide Hybrid Imaging*, Springer. 2018
DOI: <https://doi.org/10.1007/978-3-319-72661-8>.
2. Pathuthara S., Kane, S. (eds.), *Synoptic Reporting in Cytopathology*, Tata Memorial Hospital, Mumbai, 2018.
3. Purandare, N., Shah, S. (eds.), *PET/CT in Hepatobiliary and Pancreatic Malignancies, Clinicians’ Guides to Radionuclide Hybrid Imaging*, Springer. 2018
DOI: <https://doi.org/10.1007/978-3-319-60507-4>.
4. Yadav, P., Jaiswal, D., Shakhddhar, V. *Mastering Cancer Reconstructive Surgery with Free Flaps*. Jaypee Brothers Medical Publishers (P) Ltd. New Delhi. 2018.

Books Chapters

1. Agrawal, A., Purandare, N., Shah, S., Puranik, A., Rangarajan, V. (2018). PET/CT in Gall Bladder and Biliary Tract Malignancies. In N. Purandare & S. Shah (Eds.), *PET/CT in Hepatobiliary and Pancreatic Malignancies: Clinicians’ guides to radionuclide hybrid imaging* (pp.75-84). Cham: Springer. doi: https://doi.org/10.1007/978-3-319-60507-4_8
2. Agrawal, A., Rangarajan, V. (2018). 18F-FDG PET/CT: Normal Variants, Artifacts, and Pitfalls in Lung Cancer. In A. Agrawal & V. Rangarajan (Eds.), *PET/CT in Lung Cancer: Clinicians’ guides to radionuclide hybrid*

imaging (pp.61-74). Cham: Springer. doi: https://doi.org/10.1007/978-3-319-72661-8_6

3. Agrawal, A., Rangarajan, V., Purandare, N. (2018). 18F-FDG PET/CT in Lung Cancer. In A. Agrawal & V. Rangarajan (Eds.), *PET/CT in Lung Cancer: Clinicians’ guides to radionuclide hybrid imaging* (pp.47-59). Cham: Springer. doi: https://doi.org/10.1007/978-3-319-72661-8_5
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5. Bhosale, S., Divatia, J., Kulkarni, A. (2018). Approach to Invasive Aspergillosis in the Intensive Care Unit. In S. Todi, K. Zirpe, & Y. Mehta (Eds.), *Critical Care Update 2018* (pp.213-220). New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.
6. Chaudhari, V., Bhandare, M., Shrikhande, S.V. (2018). Gallbladder Cancer. In S. Barreto & J. Windsor (Eds.), *Surgical Diseases of the Pancreas and Biliary Tree* (pp.391-426). Singapore: Springer. doi: https://doi.org/10.1007/978-981-10-8755-4_15
7. Deodhar, K. (2018). Pathology of Hepatobiliary and Pancreatic Cancer. In N. Purandare & S. Shah (Eds.), *PET/CT in Hepatobiliary and Pancreatic Malignancies: Clinicians’ guides to radionuclide hybrid imaging* (pp.13-20). Cham: Springer. doi: https://doi.org/10.1007/978-3-319-60507-4_2

8. deSouza A. (2018). Hepatobiliary and Pancreatic Malignancies: Epidemiology, Clinical Presentation, Diagnosis, and Staging. In N. Purandare & S. Shah (Eds.), *PET/CT in Hepatobiliary and Pancreatic Malignancies: Clinicians' guides to radionuclide hybrid imaging* (pp.1-11). Cham: Springer. doi: https://doi.org/10.1007/978-3-319-60507-4_1
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12. Dholam, K. Gurav, S. (2018). Prosthetic Rehabilitation and Reconstruction. In P. Yadav, D. Jaiswal, & V. Shakhddhar. *Mastering Cancer Reconstructive Surgery with Free Flaps* (pp.132-145). New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.
13. Divatia, J. (2018). Future monitoring technologies in anesthesia and intensive care. In A. Trikha, & P. Singh (Eds.), *Monitoring in Anesthesia and Critical Care* (pp.425-432). New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.
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20. Joshi, T., Jaiswal, D. (2018). Medial Sural Artery Perforator Flap. In P. Yadav, D. Jaiswal, & V. Shakhddhar. *Mastering Cancer Reconstructive Surgery with Free Flaps* (pp.97-101). New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.
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TMC Satellite Centres

HBCH-Sangrur

- 1 Jain S, Phulari RG, Rathore R, Shah AK, Sancheti S (2018) - Quantitative assessment of tumor-associated tissue eosinophilia and mast cells in tumor proper and lymph nodes of oral squamous cell carcinoma. *Journal of Oral Maxillofacial Pathology*. 22(1):145. PMID: 29731576
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- 4 Sharma V, Gupta S, Patel M, Dora T, Sancheti S (2018) - Diffuse Large B Cell Lymphoma of Larynx. *Journal of Association of Physicians of India*. 2018 May;66(5):91-3. PMID: 30477070.

HBCHRC-Visakhapatnam

- 1 Adusumilli P, Nayak L, Viswanath V, Digumarti L, Digumarti RR (2018) - Palliative care and end-of-life measure outcomes: Experience of a tertiary care institute from South India. *South Asian Journal Cancer*. 7(3):210-213.
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- 5 Viswanath V, Palat G, Chary S, Broderick A (2018) - Challenges of Using Methadone in the Indian Pain and Palliative Care Practice. *Indian Journal of Palliative Care*. 24(Suppl 1):S30-S35.

TMC Audits



KAILASH CHAND JAIN & CO. (Regd.)

CHARTERED ACCOUNTANTS

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AUDITOR'S REPORT

**The Chairman,
Governing Council of Tata Memorial Centre,**

Opinion

We have audited the attached Financial Statements of **Tata Memorial Centre (the Centre)** which comprise the Balance Sheet as at 31st March, 2019 and the Statement of Income and Expenditure Account, the Statement of Receipts and Payments Account and the Notes to the Financial Statements for the year ended on that date including a summary of significant accounting policies and other explanatory information, as required by the Bombay Public Trusts Act, 1950 (the Act).

In our opinion, the accompanying financial statements give the information required by the Act in the manner so required, we report that:

- (a) In the case of the Balance Sheet, of the state of affairs of the Centre as at 31st March, 2019.
- (b) In the case of Income and Expenditure Account, of the Excess of Expense over Income of the Centre for the year ended on that date.

Basis for Opinion

We conducted our audit in accordance with the Standards on Auditing (SAs) issued by Institute of Chartered Accountants of India. Our responsibilities under those standards are further described in the 'Auditor's Responsibilities for the Audit of the Financial Statements' section of our report. We are independent of the entity in accordance with the ethical requirements that are relevant to our audit of the financial statements in, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Management's Responsibility for the Financial Statements

The trustees are responsible for the preparation and fair presentation of these financial statements in accordance with the aforesaid Accounting Standards generally accepted in India and for such Internal control as management determines is necessary to enable the preparation of Financial Statements that are free from material misstatements, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the entity's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the

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entity or to cease operations, or has no realistic alternative but to do so. Those charged with governance are responsible for overseeing the entity's financial reporting process.

Auditor's Responsibility for the Audit of Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Standards on Auditing issued by the Institute of Chartered Accountants of India, will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

As per our report of even date attached

For Kailash Chand Jain & Co.

Chartered Accountants

Firm Regn No: 112318W



Saurabh Chouhan

Partner

Membership No: 167453

Date: 10 August, 2019

Place: Mumbai

UDIN: 19167453AAAADZ6062



TATA MEMORIAL CENTRE			
TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER.			
BALANCE SHEET AS AT 31ST MARCH, 2019			
			in ₹
PARTICULARS	Schedule	As at 31.03.2019	As at 31.03.2018
CAPITAL FUND AND LIABILITIES			
Capital Fund	1	-	-
Earmarked / Endowment Fund	2	2,39,53,18,387	2,18,12,93,512
Academic Fund	3	13,52,35,172	11,76,03,234
Current Liabilities & Provisions	4	19,92,39,09,439	18,03,06,63,381
TOTAL		22,45,44,62,998	20,32,95,60,127
ASSETS			
Fixed Assets			
Gross Block		8,81,06,56,752	8,17,97,41,255
Less: Provision for Depreciation		4,10,84,53,227	3,75,54,54,217
Net Block		4,70,22,03,525	4,42,42,87,038
Capital Work - in - Progress		7,26,04,18,717	4,38,13,14,763
Total	5	11,96,26,22,242	8,80,56,01,801
Current Assets, Loans and Advances	6	9,27,07,92,089	8,44,95,03,859
Capital Fund	1	1,22,10,48,667	3,07,44,54,467
TOTAL		22,45,44,62,998	20,32,95,60,127
Significant Accounting Policies	13		
Notes on Accounts	14		

As per our report of even date attached
For Kailash Chand Jain & co.
Chartered Accountants
Firm Reg No. 112318W

Saurabh Chouhan
Partner
Membership No. : 167453
Mumbai
Date - 10/8/19



For and on behalf of the Governing Council

S. Mohapatra
Mr. S. Mohapatra
JCFA, TMC

A. N. Sathe
Mr. Anil Sathe
CAO, TMC

C. S. Pramesh
Dr. C S Pramesh
Director, TMH

R. A. Badwe
Dr. R.A. Badwe
Director, TMC



TATA MEMORIAL CENTRE			
TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER.			
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31 MARCH 2019			
in ₹			
		Year Ended 31.03.2019	Year Ended 31.03.2018
A) INCOME			
Grant in Aid - Govt of India	7	3,32,91,26,362	3,57,88,74,434
Hospital Income		2,96,07,28,701	2,41,33,11,647
Sale of Drugs and Surgical Goods		3,54,68,76,848	2,65,00,95,804
Interest Income	8	34,37,91,160	32,59,78,616
Other Income	9	9,42,91,040	10,82,55,126
TOTAL (A)		10,27,48,14,111	9,07,65,15,627
B) EXPENDITURE			
Academic Expenses		6,90,72,397	6,19,41,930
Consumption of drugs and Surgical Goods	10	3,16,33,03,122	2,50,53,93,201
Consumables		1,08,45,66,540	91,47,27,492
Staff Cost / Salaries	11	5,53,62,32,371	4,72,41,37,854
Other Administrative Expenses	12	1,26,93,83,468	91,11,64,084
TOTAL (B)		11,12,25,57,898	9,11,73,64,561
Excess of Income over expenditure before Depreciation and Provisions on retirement benefits of employees (A-B)		(84,77,43,787)	(4,08,48,934)
Less : Depreciation		45,56,53,690	42,22,75,404
Less : Provision for Retirement Benefits			
Gratuity		5,30,71,070	10,34,21,199
Pension		63,68,41,125	7,52,78,511
Leave Encashment		11,98,25,460	21,09,82,287
Balance being deficit / (surplus) for the year trf to Balance Sheet		2,11,31,35,132	85,28,06,335
Significant Accounting Policies	13		
Notes on Accounts	14		


As per our report of even date attached
For Kailash Chand Jain & co.
Chartered Accountants
Firm Reg No. 112318W

Saurabh Chouhan
Partner
Membership No. : 167453
Mumbai


Date - 10/8/19




For and on behalf of the Governing Council


Mr. S. Mohapatra
JCFA, TMC


Mr. Anil Sathe
CAO, TMC


Dr. C S Pramesh
Director, TMH


Dr. R.A. Badwe
Director, TMC



TATA MEMORIAL CENTRE

TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER

SCHEDULE 1 - CAPITAL FUND

in ₹

PARTICULARS	As at 31.03.2019		As at 31.03.2018	
CAPITAL FUND				
Balance at the beginning of the Year	(3,07,44,54,468)		(4,26,67,31,515)	
Add: Non Recurring Grant Utilised during the year	3,77,11,30,000		1,96,75,21,000	
Add: Recurring Grant utilised for Capital Expenditure	76,80,824		36,73,566	
Add: Assets purchased from Donation	17,85,47,821		6,31,72,294	
Add: Assets purchased out of Sponsored Project & Workshop Fund	91,82,287		1,07,16,523	
	89,20,86,464		(2,22,16,48,132)	-
Less: Deficit/ (surplus) Transferred from the Income & Expenditure Account	2,11,31,35,132		85,28,06,335	
Total		(1,22,10,48,667)		(3,07,44,54,468)



TATA MEMORIAL CENTRE TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER												
SCHEDULE 2- EARMARKED / ENDOWMENT FUND												
in ₹												
PARTICULARS	As at 31.03.2019						As at 31.03.2018					
	SCIENCE & RESEARCH FUND	SAMJAL MISTRY FUND	DONATION	PROJECTS	WORKSHOP	TOTAL	SCIENCE & RESEARCH FUND	SAMJAL MISTRY FUND	DONATION	PROJECTS	WORKSHOP	TOTAL
A.												
Balance at the beginning of the Year	22,76,21,149	1,84,04,843	1,26,93,59,310	61,49,05,121	5,10,03,088	2,18,12,93,511	21,39,84,209	1,84,04,843	1,09,29,83,068	58,91,67,753	5,18,20,596	1,96,63,60,469
Addition during the year			90,58,59,126	48,80,04,082	7,72,38,912	1,47,10,82,120			64,34,13,602	23,66,22,921	4,81,52,759	92,81,89,262
Re-grouping						-						-
Interest on Saving / Bank FD received	1,38,73,001	9,38,955	78,56,247	3,09,94,246		5,36,62,449	1,36,36,940	12,60,652	51,07,183	2,29,97,234		4,30,02,009
Dividend		3,534				3,534		3,562				3,562
TDS Projects & Others				66,05,113		66,05,113				1,33,343		1,33,343
Total (A)	24,14,94,150	1,93,47,332	2,18,30,54,683	1,14,05,08,562	12,82,42,000	3,71,26,46,727	22,76,21,149	1,96,69,057	1,74,15,03,853	84,89,41,251	9,99,73,335	2,93,77,08,645
B. Utilisation / Expenditure towards objective of fund												
Revenue Expenditure												
Capital Expenditure			60,39,54,245	45,28,69,688	7,18,31,810	1,12,86,55,743		-	40,89,72,250	22,33,19,607	4,89,70,247	68,12,62,104
Transfer to Samjial Scholarship Account			17,85,47,821	90,14,485	1,67,802	18,77,30,108			6,31,72,294	1,07,16,523		7,38,88,817
Transfer to Samjial Patient welfare						4,71,244						6,32,107
Total (B)			78,25,02,066	46,18,84,173	7,19,99,612	1,31,73,28,340			47,21,44,543	23,40,36,130	4,89,70,247	6,32,107
Closing Balance at the end of the year (A-B)	24,14,94,150	1,84,04,843	1,40,05,52,617	67,86,24,389	5,62,42,388	2,39,53,18,387	22,76,21,149	1,84,04,843	1,26,93,59,310	61,49,05,121	5,10,03,088	2,18,12,93,512



TATA MEMORIAL CENTRE		
TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER		
SCHEDULE 3 - ACADEMIC FUND		
in ₹		
PARTICULARS	As at 31.03.2019	As at 31.03.2018
Opening Balance	11,76,03,233	9,37,11,838
Add :- Addition During the year	6,90,72,397	6,19,41,930
	18,66,75,630	15,56,53,768
Less : Deduction During the year	5,14,40,458	3,80,50,534
Total	13,52,35,172	11,76,03,233

TATA MEMORIAL CENTRE				
TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER				
SCHEDULE 4 - CURRENT LIABILITIES AND PROVISIONS				
in ₹				
PARTICULARS		As at 31.03.2019		As at 31.03.2018
A) CURRENT LIABILITIES & DEPOSITS				
Deposits				
- From Student	1,98,76,533		2,28,00,477	
- From Patient	2,06,70,50,906		1,75,27,25,622	
- From Suppliers & Contract	18,79,46,575	2,27,48,74,014	11,86,11,791	1,89,41,37,890
Other Current Liabilities				
Undisbursed and Unclaimed Salaries		16,23,030		14,91,211
New pension scheme liability		66,21,265		37,34,017
Sundry Creditors-Capital		5,20,52,740		84,40,658
Other Liabilities		27,91,46,823		15,54,74,161
Book OD		40,11,79,844		5,21,78,967
Statutory Liabilities		3,17,80,101		2,95,20,853
Outstanding Expenses				
- Salary	59,74,13,907		48,97,98,176	
- Operational Expenses	79,53,73,913	1,39,27,87,820	68,51,99,526	1,17,49,97,702
Unutilised Grant from Govt of India c/f*				
- Recurring Grant	-		25,77,64,000	
- Women & Childern Weelfare Fund	23,12,216		-	
- Non Recurring Grant	60,90,10,000	61,13,22,216	39,01,40,000	64,79,04,000
TOTAL (A)		5,05,13,87,853		3,96,78,79,459
B) PROVISIONS(for retirement benefits of employee)				
Gratuity		1,40,67,50,160		1,35,36,79,087
Leave Encashment		1,40,87,57,990		1,28,89,32,527
Pension		12,05,70,13,436		11,42,01,72,308
TOTAL (B)		14,87,25,21,586		14,06,27,83,922
TOTAL (A+B)		19,92,39,09,439		18,03,06,63,381



TATA MEMORIAL CENTRE

Schedule 5 - FIXED ASSETS

DESCRIPTION	GROSS BLOCK					DEPRECIATION					NET BLOCK	
	Cost / Valuation as at the beginning of the year (01/04/2018)	Total Additions / adjustments during the year	Deletions / Adjustment	Cost / Valuation at the end of the year (31/03/2019)	As at the beginning of the year (01/04/2018)	Depreciation on the opening balance	Depreciation on Additions during the year	Total Depreciation during the year	On Deletion / Adjustment	Total up to the year end (31/03/2019)	As at the Current year Ended 31/03/2019	As at the Previous year Ended 31/03/2018
A. FIXED ASSETS :												
1. LAND:	1,97,608			1,97,608	-						1,97,608	1,97,608
a) Freehold												
2. BUILDINGS :												
a) On Freehold Land	1,78,90,10,461	5,76,47,212		1,84,66,57,673	25,78,40,130	2,87,73,379	4,35,273	2,92,08,652	-	28,70,48,782	1,55,96,08,891	1,53,11,70,331
3. PLANT MACHINERY & EQUIPMENT	5,58,15,98,854	52,55,91,853	10,78,95,785	5,99,92,94,922	2,92,20,25,369	33,56,23,367	1,97,54,149	35,53,77,516	8,37,32,410	3,19,36,70,475	2,80,56,24,447	2,65,95,75,485
4. VEHICLES	4,37,90,606	46,43,460	-	4,84,34,066	2,55,11,023	37,14,156	4,29,385	41,43,541	-	2,96,54,564	1,87,79,502	1,82,79,583
5. FURNITURE, FIXTURES	19,90,48,871	2,16,49,813	6,30,548	22,00,68,136	14,06,63,904	95,41,834	11,17,717	1,06,59,551	6,14,106	15,07,09,349	6,93,58,785	5,83,84,967
6. OFFICE EQUIPMENT	4,82,03,331	1,20,47,077	5,71,600	5,96,78,808	2,05,98,585	23,55,786	3,38,382	26,92,168	3,22,842	2,29,67,911	3,67,10,897	2,76,04,746
7. COMPUTER/ PERIPHERALS	51,78,91,524	13,64,19,509	1,79,85,494	63,63,25,539	38,88,15,206	4,34,96,999	1,00,75,262	5,35,72,261	1,79,85,321	42,44,02,146	21,19,23,393	12,90,76,318
TOTAL (A)	8,17,97,41,255	75,79,98,924	12,70,83,427	8,81,06,56,752	3,75,54,54,217	42,35,03,521	3,21,50,168	45,56,53,689	10,26,54,679	4,10,84,53,227	4,70,22,03,523	4,42,42,87,038
CWIP	4,38,21,17,133	3,11,79,86,498	23,88,82,546	7,26,12,21,087							7,26,12,21,087	4,38,21,17,133
LESS: PROVISION FOR DOUBTFUL CAPITAL ADV (LAND)	8,02,370			8,02,370							8,02,370	8,02,370
NET CAPITAL WIP (B)	4,38,13,14,763			7,26,04,18,717							7,26,04,18,717	4,38,13,14,763
TOTAL (A + B)	12,56,10,56,018	3,87,59,85,422	36,59,65,973	16,07,10,75,469	3,75,54,54,217	42,35,03,521	3,21,50,168	45,56,53,689	10,26,54,679	4,10,84,53,227	11,96,26,22,240	8,80,56,01,801
PREVIOUS YEAR (TMC)	10,53,29,71,392	2,10,63,32,725	7,82,48,099	12,56,10,56,018	3,34,17,14,580	40,76,99,762	1,45,75,640	42,22,75,402	85,35,765	3,75,54,54,217	8,80,56,01,801	7,19,12,56,809

Note: Capital work in progress includes freehold land amounting to Rs.802370 (previous year Rs.802370) which is disputed and hence provided as doubtful from the financial year 2009-10



TATA MEMORIAL CENTRE

TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION
IN CANCER

SCHEDULE 6 - CURRENT ASSETS, LOANS AND ADVANCES

in ₹

PARTICULARS	As at 31.03.2019		As at 31.03.2018	
A. CURRENT ASSETS				
1. Inventories				
Stock of Drugs, Medical and Surgical Goods	35,70,16,595		32,44,17,950	
Stores & stationery	1,04,27,507	36,74,44,102	91,66,044	33,35,83,994
2. Sundry Debtors				
a) Outstanding more than six months				
Considered Good	13,78,69,060		15,88,31,630	
Considered Doubtful	2,02,77,810		1,55,69,096	
	15,81,46,870		17,44,00,726	
Outstanding less than six months				
Considered Good	55,07,44,786		24,62,33,535	
Considered Doubtful	-		-	
	70,88,91,656		42,06,34,261	
b) Less: Provision for Doubtful Debts	2,02,77,810	68,86,13,846	1,55,69,096	40,50,65,165
3. Cash Balances				
Cash in Hand	1,12,25,998		53,260	
Cheques on Hand	2,01,00,000		30,000	
Franking Balance	6,91,697	3,20,17,695	3,96,591	4,79,851
4. Bank Balances				
With Scheduled Banks :				
- Current Accounts	49,88,67,495		2,57,65,232	
- Fixed Deposit Accounts	5,62,50,36,975		5,47,60,07,273	
- Margin Money Deposit Accounts	1,16,64,46,929		1,40,66,00,000	
- Fixed Deposits Projects	55,70,01,686		52,28,45,230	
- On Savings Accounts	14,50,560	7,84,88,03,645	22,37,044	7,43,34,54,779
TOTAL (A)		8,93,68,79,288		8,17,25,83,788

contd.....



TATA MEMORIAL CENTRE

TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION
IN CANCER

SCHEDULE 6 - CURRENT ASSETS, LOANS AND ADVANCES

in ₹

PARTICULARS	As at 31.03.2019		As at 31.03.2018	
B. LOANS AND ADVANCES				
1. Advances recoverable in cash or in kind or for value to be received (unsecured, considered good)				
Considered Good	1,86,34,362		1,74,54,879	
Considered Doubtful	-		-	
	1,86,34,362		1,74,54,879	
Less: Provision for Doubtful Advances	-	1,86,34,362	-	1,74,54,879
b) Prepaid expenses		2,80,82,559		1,41,20,902
c) Other Deposits		4,99,82,284		4,22,70,060
c) Receivable from Govt of India				
2. Loans & Advances to staff				
Interest Bearing Advances	58,58,787		50,22,586	
Non Interest Bearing Advances	52,96,464	1,11,55,251	54,95,959	1,05,18,545
3. Interest Accrued				
Interest Accrued on Fixed Deposits	14,87,02,946		13,41,45,457	
Interest Accrued on Corpus Deposits	1,66,00,283		1,55,63,604	
Interest Accrued on Sam Jal Deposits	6,11,959	16,59,15,188	4,86,646	15,01,95,707
4. Interest Accrued but not due		98,19,620		1,06,69,743
5. Tax Deducted at Source		5,03,23,537		3,16,90,234
TOTAL (B)		33,39,12,801		27,69,20,070
TOTAL (A+B)		9,27,07,92,089		8,44,95,03,859

TATA MEMORIAL CENTRE

TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER.

SCHEDULE 7 - RECURRING GRANT

in ₹

PARTICULARS	As at 31.03.2019		As at 31.03.2018	
Balance at the beginning of the Year	25,77,64,000		3,12,000	
Add: Grant Received During the year	3,07,90,43,186		3,84,00,00,000	
Total	3,33,68,07,186		3,84,03,12,000	
Less: Grant Utilised for Capital Expenditure (A)	76,80,824		36,73,566	
Balance	3,32,91,26,362		3,83,66,38,434	
Less: Grant Utilised for Revenue Expenditure (B)	3,32,91,26,362		3,57,88,74,434	
Unspent Balance c/f		-		25,77,64,000



TATA MEMORIAL CENTRE

TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER SCHEDULE 8 - INTEREST INCOME

	Year Ended 31.03.2019	Year Ended 31.03.2018	in ₹
PARTICULARS			
Interest : (gross) (includes tax deducted at source)			
from banks :			
on fixed deposits/ margin money deposits	33,97,65,351	32,08,41,757	
on saving accounts	14,97,805	2,67,879	
from others :			
on Vehicle Advances	88,666	1,03,006	
on House Building Advances	17,19,732	19,16,591	
on Computer Advances	13,748	6,073	
Interest accrued but not Due on staff Advances	18,22,146	20,25,670	
Interest on Income Tax Refund	7,05,858	9,02,696	
	-	19,40,614	
Total	34,37,91,160	32,59,78,616	



TATA MEMORIAL CENTRE
TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND
EDUCATION IN CANCER.

SCHEDULE 9 - OTHER INCOME

PARTICULARS	Year Ended 31.03.2019	Year Ended 31.03.2018
Miscellaneous Receipts	5,84,05,924	4,66,69,669
Animal House Receipts	59,61,153	68,94,356
Project Overheads	79,71,849	59,91,285
Effect of exchange fluctuation (net)	(1,50,608)	3,62,75,156
Mobilisation Interest	2,21,02,722	1,24,24,658
TOTAL	9,42,91,040	10,82,55,124



TATA MEMORIAL CENTRE
TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND
EDUCATION IN CANCER

SCHEDULE 10 - CONSUMPTION OF DRUGS & SURGICAL GOODS

in ₹

PARTICULARS	Year Ended 31.03.2019	Year Ended 31.03.2018
Opening stock of Drugs / Surgical goods	32,44,17,950	27,83,05,663
Add: Purchases	3,23,67,42,839	2,56,62,79,797
Less: Closing stock of Drugs / Surgical goods	35,61,57,710	32,44,17,950
Less: Return/ Rejected / Expired Drugs / Surgical goods	4,16,99,957	1,47,74,309
TOTAL	3,16,33,03,122	2,50,53,93,201

TATA MEMORIAL CENTRE

TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER.

SCHEDULE 11 - STAFF COST / SALARIES

in ₹

PARTICULARS	Year Ended 31.03.2019	Year Ended 31.03.2018
a) Salaries and Wages	2,53,01,67,759	2,18,01,22,851
b) Allowances and Bonus	1,83,00,13,994	1,52,00,20,830
c) Expenses on Employee's Retirement and Terminal Benefits	14,67,94,587	11,63,57,603
d) Pension scheme	49,63,50,635	49,63,58,231
e) Fellowships	53,29,05,396	41,12,78,339
TOTAL	5,53,62,32,371	4,72,41,37,854



TATA MEMORIAL CENTRE

**TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER
SCHEDULE 12 - OTHER ADMINISTRATIVE EXPENSES**

	Year Ended 31.03.2019	Year Ended 31.03.2018
PARTICULARS		
a) Linen and Laundry	5,26,87,226	4,98,60,164
b) Library Expenses	15,66,88,173	7,03,99,211
c) Electricity	30,51,28,617	25,36,89,958
d) Water Charges	1,72,38,011	1,65,08,406
e) Repairs and Maintenance	39,04,95,532	32,11,68,656
f) Animal House Expenses	38,91,826	35,35,345
g) Rates, Taxes and Insurance	4,18,98,986	1,78,58,682
h) Minor Equipments and Replacement of Capital Equipments	31,13,281	13,57,681
i) Postage, Telephone and Communication Charges	93,30,928	88,12,774
j) Printing and Stationery	3,44,50,670	3,50,56,122
k) Travelling and Conveyance Expenses	5,08,35,253	3,44,33,921
l) Intra Mural Research Expenses	1,67,39,825	1,77,26,921
m) Cancer Registry Program Expenses	7,43,64,040	1,23,56,220
n) Auditors Remuneration		
Audit fees	90,500	1,00,000
GST	36,000	36,000
o) Symposium and Training	1,26,500	36,000
p) Professional Charges	24,69,488	20,09,644
q) Advertisement Expenses	38,90,630	71,78,094
r) Provision for Doubtful Debts	3,83,68,483	3,01,45,243
s) Hostel maintenance expenses	47,08,714	(37,50,416)
t) Miscellaneous Expenses	1,33,74,391	1,49,96,605
u) Bad debts written off	2,91,41,581.94	3,50,58,141
v) Loss / (Profit) on sale of Assets	10,03,868	12,08,632
	1,94,37,444	(1,85,81,920)
TOTAL	1,26,93,83,468	91,11,64,084



TATA MEMORIAL CENTRE **[TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT,** **RESEARCH AND EDUCATION IN CANCER]**

The Tata Memorial Centre (TMC) Comprising of the Tata Memorial Hospital (TMH) and the Advance Centre for Treatment, Research & Education in Cancer (ACTREC) functions as a grant- in- aid Institute under the administrative control of the Department of Atomic Energy, Government of India and recognized as the national cancer centre with a mandate for Service, Education and Research in Cancer. Two new hospitals in Visakhapatnam, Andhra Pradesh and Mullanpur District Punjab. The satellite centre in Sangrur is functional. The hospital in Visakhapatnam is providing OPD and day care services. The Centre is registered under the Societies Registration Act (1860) and the Bombay Public Trust Act (1950).

SCHEDULE 13 : SIGNIFICANT ACCOUNTING POLICIES

1. Basis of Preparation of Financial Statements

The financial statements are prepared on historical cost convention, unless otherwise specifically stated, on the accrual basis of accounting and comply with the framework and format laid down by the Controller General of Accounts, Government of India and applicable accounting standards issued by the Institute of Chartered Accountants of India (ICAI) to the extent applicable and in the manner so required.

Revenues and costs are accrued, that is, recognized as they are earned or incurred and recorded in the financial statements of the periods to which they relate. The Centre follows accrual basis of accounting, except for Grants, Donations, Workshops/Projects and Commuted Pensions (in case of existing pensioners), which are accounted for on cash basis

2. Use of Estimates

The preparation of the financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amount of assets and liabilities as of the Balance Sheet, reported amounts of revenues and expenses for the year ended and disclosure of contingent liabilities as of the balance sheet date. The estimates and assumptions used in these financial statements are based upon management's evaluation of the relevant facts and circumstances as on the date of the financial statements. Actual results may differ from those estimates. Any revision to accounting estimates is recognized prospectively.

3. Revenue Recognition

- i) Hospital income from services rendered to patients is recognized as and when the bills for the services are generated.
- ii) Interest income is recognized on a time proportion basis taking into account the amount invested and the rate of interest.
- iii) Interest on employee advances are recognized in the year on accrual basis.
- iv) Other Revenue items are recognized only when it is reasonably certain that the ultimate collection will be made. Deposits from students in excess of 3 years and



deposits from suppliers in excess of 4 years written back are recognised under miscellaneous income.

- v) Interest earned on general fixed deposit pertaining to donation allocated as per average interest rate among respective donation.

4. Fixed Assets and Depreciation

- i) Fixed assets are capitalized at acquisition cost (net of duty / tax credits availed, if any), including directly attributable costs such as freight, insurance and specific installation charges for bringing the assets to working condition for use.
- ii) Expenditure relating to existing fixed assets is added to the cost of the assets, where it increases the performance / life of the asset as assessed earlier.
- iii) Fixed Assets are stated at cost less accumulated depreciation.
- iv) Fixed assets purchased on non-government funded projects and from donations are transferred to the assets of the Centre at purchase price.
- v) Fixed assets are eliminated from financial statements only on disposal.

Depreciation on fixed assets is provided under straight line method based on useful life of the asset determined by the management at the following rates :

Asset	Rate of depreciation
Buildings	1.63%
Electrical & Gas Installation	4.75%
Plant & Machinery	7.07%
Furniture and Fixtures	9.50%
Office Equipment	4.75%
Computers and peripherals	16.21%
Vehicles - Buses	11.31%
- Car, Jeep	9.50%

- i) Depreciation on assets purchased during the year is provided from the date of its purchase / installation
- ii) Individual assets costing less than Rs.5,000/- are expensed out in the year of purchase / WDV.
- iii) Where any asset has been sold, the depreciation on such asset is calculated on pro-rata basis up to the date, on which such asset has been sold.

5. Inventories

- i) Inventories consist of Drugs and Surgical meant for sale purpose and are valued at lower of cost or Net Realisable Value. Cost is determined on first-in-first-out basis.
- ii) Stock of consumables, stationery are valued at cost



- ii) Stock of linen, laundry, cutlery and crockery, are treated as consumed as and when purchased

6. Government Grant

- i) Recurring and Non-recurring grant related to the revenue are recognized on systematic basis in the income and expenditure account over the period, necessary to match them with the related costs which they are intended to compensate.
- ii) Non-recurring grant to the extent utilised for capital expenditure are transferred to Capital Fund. Unutilised grants are carried forward as Current Liabilities in the Balance Sheet.

7. Donation

Donations in kind received prior to 1st April, 2003 are included under 'Earmarked / Endowment Funds' at comparable purchase price. With effect from 1st April, 2003, donations received in kind are being recorded in the books at nominal value. Donations are received for patient care and cancer research. Assets purchased on donations are treated as assets of the Centre and capitalised accordingly. Donation includes amount received as Corporate Social Responsibility (CSR).

8. Foreign Exchange Transactions

- a. Transactions in foreign currencies are recorded at the exchange rates prevailing on the transaction dates.
- b. Monetary items denominated in foreign currencies remaining unsettled at the year-end are translated at the year-end exchange rates.
- c. All exchange gains / losses on settlement / translation, are recognized in the Income & Expenditure account

9. Employee Benefits

Short Term Employee Benefits:

All employee benefits wholly payable within twelve months of rendering the service are classified as short term employee benefits. Benefits such as salaries, wages, bonus, etc are recognized in the period in which the employee renders the related service.

Post Employment Benefits:

i) Defined Contribution Plans:

Employee benefits in the form of Contributory Provident Fund and New Pension Scheme (for employees joined from 1st January, 2004) are considered as defined contribution plans. The contribution paid / payable under the scheme is recognized in the period in which the employee renders the related service.

ii) Defined Benefit Plans:

Retirement benefits in the form of gratuity to eligible employees, leave encashment and pension scheme (other than employees covered in (i) above) are considered as defined benefit plans. The present value of the obligation under such defined benefit plans is determined based on actuarial valuation using the



Projected Unit Credit Method, which recognizes each period of service as giving rise to additional unit of employee benefit entitlement and measures each unit separately to build up the final obligation.

The obligation is measured using at the present value of the estimated future cash flows. The discount rates used for determining the present value of the obligation under defined benefit plans, is based on the market yields on Government securities as at the Balance Sheet date, having maturity periods approximating to the terms of related obligations.

10. Provision, Contingent Liabilities and Contingent Assets

- a. Provisions are recognized for liabilities that can be measured only by using a substantial degree of estimation, if
 1. The Centre has a present obligation as a result of past event.
 2. A probable outflow of resources is expected to settle the obligation.
 3. The amount of obligation can be reliably estimated.
- b. Contingent liability is disclosed in the case of :
 1. A present obligation arising from past event, when it is not probable that an outflow of resources will be required to settle the obligation.
 2. A possible obligation, unless the probability of outflow of resources is remote.
- c. Provisions, Contingent Liabilities are reviewed at each Balance Sheet date.
- d. Provision for doubtful debts has been made in respect of debtors which remains outstanding for more than 3 years.

11. Events occurring After the Balance Sheet Date

Where material, events occurring after the date of the Balance Sheet are considered upto the date of approval of accounts by the members of the Governing Council.

12. Academic Fund

A percentage as prescribed by the Governing Council of Tata Memorial Centre is transferred from the Hospital Income to a separate fund named as the "Academic Fund". The expenditure incurred towards fulfillment of the objectives is debited to the said fund.

13. Science & Research Fund

The Science & Research Fund / Corpus is created in 2000 with the purpose of utilising the interest in the Fund for (i) Support of preventive oncology activities in the country (ii) Support for attending international conferences and training programmes on cancer related topics and (iii) Any other purpose with the approval of the Committee.

14. Sam Mistry Fund

The fund is created as per the will of Late Sam Jal Mistry and Late Alice Sam Mistry in 1999. As per the will, the interest and dividend on shares generated from the fund will be utilised equally for treatment to poor cancer patients and scholarship to PG students.



SCHEDULES FORMING PART OF ACCOUNTS

SCHEDULE 14: NOTES ON ACCOUNTS

1. Contingent liabilities not provided for in respect of :
Claims against the hospital made by patients are not acknowledged as debts, since the same are not quantifiable.
2. Estimated amount of contracts remaining to be executed on capital account is not ascertained.
3. Sundry debtors, and creditors' balances, and balances of certain liabilities are subject to confirmation, reconciliation and consequent adjustments, if any.
4. Fixed Deposits of the Centre includes an amount of Rs. 116,64,46,929/- (Pr Year Rs. 140,66,00,000/- which represents Earmarked Funds kept aside for the capital commitments.
5. Net excess amount charged to patients as per revised schedule of charges amounting of Rs.2,37,92,299/- has been accounted under Patient Welfare Fund.
6. Prior Period income for the current Year Rs. Nil (PY Rs.15,98,913/-) included in Income & Expenditure account during the financial year. Outstanding Salary and pension expenses for the current year Rs.59,74,13,907/- (PY Rs.48,97,98,176/-) included in Income & Expenditure account during the financial year.
7. The Centre is covered by a system of internal audit conducted by the Department of Atomic Energy and Indian Audit and Accounts Department.
8. The Centre has filed a writ petition in the Honorable High Court Bombay for non-applicability of Bombay Labour Fund Act, 1956 in the year 2001-02, the final verdict for which is still pending. Each year the centre recovers the LWF amount from employees and also contributes towards the said liability amounting to Rs.1,03,37,885/- (incl interest of Rs.5,95,599/-) respectively which is disclosed under current liabilities in the financial statement. The centre has also kept as deposit Rs.5, 50,000/- with Hon'ble Bombay High Court.



9. The disclosures pursuant to Accounting Standard 15 (Revised) on "Employee Benefits" are as follows:

(in Rs.)	
Defined Contribution Plan :	
Contribution to Defined Contribution Plan, recognised as an expense and included in "Staff and Welfare" - Schedule 11 in the Income and Expenditure Account are as under :	
- Employers contribution to Provident Fund - Rs.33,61,368/-	
- Employer's Contribution to New Pension Scheme - Rs9,20,82,419/-	

		Gratuity	
		31-3-2019	31-3-2018
I	Change in obligation during the year		
1	Liability at the beginning of the year	1,35,36,79,087	1,25,02,57,888
2	Interest Cost	10,17,09,889	8,73,20,880
3	Current Service Cost	5,17,07,022	4,83,75,715
4	Past Service Cost	0	9,31,88,630
5	Benefit Paid	(9,51,57,399)	(6,84,04,251)
6	Actuarial (Gain)/Loss	(51,88,442)	(5,70,59,775)
7	Liability at the end of the year	140,67,50,157	1,35,36,79,087
II	Net asset / (liability) recognised in the Balance Sheet		
1	Liability at the end of the year	140,67,50,157	1,35,36,79,087
2	Plan assets at the end of the year	0	0
3	Liability recognised in the Balance sheet	140,67,50,157	1,35,36,79,087
III	Expenses recognized in the Income and Expenditure account		
1	Current Service Cost	5,17,07,022	4,83,75,715
2	Interest Cost	10,17,09,889	8,73,20,880
3	Expected Return on Plan Assets		
4	Actuarial (Gain)/Loss	(51,88,442)	(5,70,59,775)
5	Past service cost	0	9,31,88,630
6	Total expenses recognised in the Income and Expenditure Account	14,82,28,469	17,18,25,450
IV	Principal actuarial assumptions at the Balance Sheet date:		
1	Discount rate at	7.60%	7.85%
2	Expected return on plan assets	0.00%	0.00%
3	Salary escalation	7.00%	7.00%
General description of the defined benefit plan :			
1	The Centre operates a gratuity scheme, which is an unfunded scheme for qualifying employees. The Scheme provides for lump sum payment to		



	<p>employees on retirement, death while in employment or termination of employment of an amount equivalent to 15 days salary for every completed year of service or part thereof in excess of six months, provided the employee has completed five years in service.</p> <p>Vide Order No. 7/5/2012-P&PW(F)/B dated 26th August, 2016, the Ministry of Finance has extended the benefits of 'Retirement Gratuity and Death Gratuity' to the Central Government employees covered by new Defined Contribution Pension System on the same terms and conditions, as are applicable to employees covered by Central Civil Service (Pension) Rule,1972. 838 number of employees are covered under this scheme.</p>
2	<p>The Centre operates a leave encashment scheme, which is an unfunded scheme. The present value of obligation under this scheme is based on an actuarial valuation, using the Projected Unit Credit Method, which recognizes each period of service as giving rise to additional unit of employee benefit entitlement and measures each unit separately to build up the final obligation. Based on the actuarial valuation, the liability as at 31st March, 2019 works out to Rs. 140,87,57,987/-.</p>
3	<p>The Centre operates a Pension scheme which is an unfunded scheme for employees, who have joined prior to 1st January, 2004. The benefit is payable at the time of superannuation or voluntary retirement after completion of minimum of 20 years service. Based on the actuarial valuation, the liability as at 31st March, 2019 works out to Rs. 12,05,70,13,434/-.</p>

10. Figures for the previous year have been regrouped / reclassified wherever necessary to make them comparable with those of the present year.

For Kailash Chand Jain & Co
Chartered Accountants
ICAI Registration No. : 112318W

Saurabh Chouhan
Partner
Membership No.167453

Date: 10/8/19
Place : Mumbai



Mr. S. Mohapatra
Jt. Controller (F&A)

Mr. Anil Sathe
CAO, TMC

For Tata Memorial Centre

Dr. R.A. Badwe
Director



From Left: Director TMC, Dr. RA Badwe with Deputy Director Centre for Cancer Epidemiology, Dr. Pankaj Chaturvedi; Secretary Department of Atomic Energy, Dr. KN Vyas; Chief Administrative Officer TMC, Mr. AN Sathe and, Deputy Director HBCH-Varanasi Dr. Satyajit Pradhan in the Homi Bhabha Cancer Hospital, Varanasi.



Chief Minister of Uttar Pradesh, Shri Yogi Adityanath visiting Homi Bhabha Cancer Hospital in Varanasi with TMC project coordinator Mr. T. Anbumani on his right side.

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