

# TATA MEMORIAL CENTRE

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



# Atoms for Cancer Care Annual Report 2017-2018



Release of the Book "Indelible Footprints of the Sands of Time" to commensurate the 75th Jubilee celebrations of Tata Memorial Hospital in May 2017.









# ANNUAL REPORT 2017-18

of

# TATA MEMORIAL CENTRE

(A Grant-in-Aid Institute of the Department of Atomic Energy, 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.

Homi Bhabha Cancer Hospital and Research Centre, Mohali.

Dr. Bhubaneswar Borooah Cancer Institute, Guwahati.

Homi Bhabha Cancer Hospital, Varanasi.

Mahamana Pandit Madan Mohan Malviya Cancer Centre, Varanasi.



# Mission and Vision of the 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,
- Emphasis on research that is affordable, innovative and relevant to the needs of the country.

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# **Governing Council**



## Chairman

#### **Dr. Sekhar Basu**

Chairman, Atomic Energy Commission & Secretary, Department of Atomic Energy, Government of India.

Members, Ex-Ofiicio		
Mr. S. Mervin Alexander	Dr. RA Badwe	
Joint Secretary to the Govt. of India,	Director, Tata Memorial Centre,	
Department of Atomic Energy,	Parel, Mumbai 400 012.	
Research & Development Section.		
Co-opt	ted Members	
Mr. SM Sane	Dr. Snehlata Deshmukh	
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Department of Atomic Energy, Government of India.	University of Mumbai.	
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Distinguished Biotechnology Fellow & Advisor,	Government of Maharashtra.	
Translational Health Science & Technology Institute,		
National Institute of Immunology, New Delhi.		
Shri. R. Venkataramanan	Mrs. RF Savaksha	
Sir Dorabji Tata Trust,	Secretary & Chief Accountant,	
World Trade Centre, 26 <sup>th</sup> Floor,	Sir Dorabji Tata Trust,	
Cuffee Parade, Mumbai 400 005.	24, Bombay House, Mumbai 400 001.	

#### Shri Lakshman Sethuraman,

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

#### Dr. AK D'cruz, Director, Tata Memorial Hospital,

Parel, Mumbai 400 012.

## Dr. KS Sharma,

Director (Academics), Tata Memorial Centre, Parel, Mumbai 400 012.

#### Mr. AN Sathe,

Chief Administrative Officer, Tata Memorial Centre, Parel, Mumbai 400 012. **Permanent Invitees** 

## Dr. SV Chiplunkar,

Director, Advanced Centre for Treatment Research & Education in Cancer (ACTREC), Kharghar, Navi Mumbai 410210. Dr. D. Raghunadharao, Director, Homi Bhabha Cancer Hospital & Research Centre (HBCHRC), Aganampudi, Visakhapatnam.

#### Secretary

Tata Memorial Centre



# Message from Director, TMC



The trilogy of service, research & education continues to guide us in the year 2017.

The year began with a unique meeting on health care delivery. A constellation of experts and regulators from 15 countries deliberated on the best model for health care delivery and distilled The Mumbai declaration which has guided the new health care policy from GOI that followed in few months. Over and above the global experts, the discussions had very astute contributions from Nobel Laureate Prof. Sen and health Minister of India Shri. JP Nadda and health minister of Maharashtra Shri. Sawant and Shri. Tawde, the minister for health education. Attendance of close to 1000 delegates betrayed the need and interest in public debate on health care delivery.

EBM straddled the foundation day of TMH, 28<sup>th</sup> Feb and focused on guiding national policy for common cancers. Head and neck cancers were at the centre stage with deliberations to evolve implementable guidelines as well as address common clinical questions in trials to create robust evidence for India.

The culmination of Platinum Jubilee was marked by the Honorable Prime Minister Shri Narendra Modi unveiling the book tracing 75 glorious years of TMH by Mrs. Nishu Singh Goel. The Hon PM praised the house of Tatas for creating such a unique institution to care for rich as well as poor and commended their vision of putting up a dedicated cancer hospital 75 years ago as an idea way ahead of its time. The Hon PM spoke to all the faculty and guests about how good and illustrious was the performance of staff of TMH. The event at the Hon PM's residence was attended by Shri Ratan Tata, Dr. Sekhar Basu Secretary DAE and Mrs. Nishu Singh Goel and was beamed live to TMC Rustom Choksi auditorium and across India on DD network.

The year has witnessed some major activity in planning the new cancer hospital, Mahamana Pandit Madan Mohan Malavia cancer hospital within BHU campus, taking over and refurbishment of Railway Cancer hospital, Varanasi and B Borooah Cancer Institute (BBCI) in Guwahati. The Tata Trust is building the BHU campus MPMMCH and is also refurbishing the railway hospital. Creating manpower and purchase of equipment has been planned so that the railway hospital could be functional by May 2018. The BBCI was taken over on 27<sup>th</sup> November 2017. Various activities from computerization to construction/reconstruction activity have been planned so that we implement on the lines of TMC by July 2018. By the end of this year a third of work for HBCH in Visakhapatnam and Chandigarh (Mullanpur) and Hadron Beam Therapy unit in ACTREC has been completed. The civil work has just begun for Solid Tumour building, RRU in ACTREC and Dharmashala / Hostel in Haffkine Campus.

On research front which relates to the title of our report for this year, a major breakthrough has been achieved by successful tagging of lutetium (a radioisotope) to rituximab and Trastuzumab. Both these antibodies have been standard of care for lymphoma and breast cancer. These treatments are expensive and need to be continued for an year. It is being envisaged that radioisotope tagged to this antibody will increase the payload on this molecule and by virtue of its radioactivity the killer ability of the antibody will be increased by 5 times if not more. This is expected to reduce the duration of treatment using this molecule, reducing the cost of treatment to a third or fourth of the one year treatment. The galloping mood on the research front is further boosted by the 37 publications in journals with more than 10 impact factor during this year. Thirty seven publications in Journals more than 10 impact factor (including Lancet Oncology, JAMA Oncology, Cell and Nature), speaks volumes about the quality of output after some focused effort by our faculty. These publications span the whole spectrum of cancer care from basic, translation, clinical research to public health and health care implementation.

National cancer grid continues to grow with over 140 centres and facilities coming together to offer uniform care across our country. The first two multi-centre trials have been launched during this year and we await a wholehearted cooperation from all the constituents of NCG.

Education reached its zenith with MCI recognising another landmark course in DM onco-pathology with persistent persuasion of Dr Sharma. We also launched the first program on patient navigation 'Kevat' in India selecting 30 students from across India with a special emphasis on Northeast.

We are at cross road where more than 4 roads converge and we don't have to decide about one road over other but pursue all roads testing our multitasking and delegation to its limits.

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Dr. Rajendra Badwe



# Message from Director, TMH



Unlike in previous years I write this message with a tinge of sadness having decided to move on at the end of the year. It has been 34 years in an institution that gave me an opportunity to achieve whatever I did. As director of the hospital I had the pleasure to lead administrative staff over the last 8 year to many 'firsts' in addition to ensuring that the institution always had an infrastructure comparable to the best in the world. Our efforts were primarily focused in ensuring patient navigation at the hospital to be a seamless process – we went paperless, upgraded our PACS (picture archiving and communication system), smart card introduction making transactions cashless, online access to patient reports from anywhere in the country etc. One of the major achievement personally was efforts towards making the hospital financially independent. While maintaining the 60: 40 ratios of general: paying patients we were able to augment collection in excess to the annual operational budget sans the salary payment of the staff. Transactions at the dispensary providing highly subsidized medications to patients grew 5 fold to over 200 crores annually with a negligible variance at audit. The staff of the administration, IT department, nursing and office of the medical superintendent have been exemplary and provided great support towards these achievements. On a professional front leading the head and neck group has been satisfying and rewarding. Our head and neck disease management group has had the distinction of podium presentations at the American Society of Clinical Oncology (ASCO) 4 years in a row 2015 – 18 including a plenary presentation. ASCO is probably the largest oncology meeting worldwide with the annual attendance of 30,000 delegates. This achievement is a unique distinction that not many departments would achieve globally. We have now established international recognition placing many of our clinicians in leadership positions in head and neck organizations globally.

As we pass the baton to the next generation of young dynamic colleagues, I am sure the institution is in safe and capable hands. The only advice I have for them is to strive from 'international recognition' to 'international leadership'. Leadership that is recognized by objective criteria of practice defining / changing studies, translating into best outcomes for our patients.

Dr. Anil D'cruz

# Message from Director - Academics, TMC





The Tata Memorial Centre (TMC) is the only postgraduate and superspecialty institute of 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 specialty 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 superspeciality 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 will begin their course in 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, there was felt a need for professionals to manage clinical trial sites. This received good response from science and pharma graduates; in year 2017, the third 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.

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, Orissa.

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 2017 and 120 students (Including 16 students from North East Region) participated in this program. We selected 5 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. Kailash Sharma

# Message from Director, ACTREC





ACTREC, TMC has evolved as a unique model where basic, clinical research and patient care thrive under one roof. ACTREC fosters an environment to translate laboratory discoveries to patient's bedside. Our clinicians and scientists are working diligently to deliver frontline affordable cancer treatment through innovative research outcome for patient benefit. These are exciting times for ACTREC as new projects are being launched that would accelerate the pace of cancer research and treatment at ACTREC.

Immunotherapy is fast gaining attention as a preferred modality for cancer treatment as it has brought a paradigm shift in the treatment of some malignancies providing long term durable responses. A GMP facility is being established at ACTREC that will harness the power of the immune system to fight cancer. A preclinical study to evaluate the efficacy of CAR-T cells from patients with relapsed / refractory ALL is initiated in collaboration with IIT-B.

At ACTREC, mutational landscapes of several cancers are being unraveled through exome / transcriptome sequencing and the data is being used to develop more tailored approaches for cancer diagnosis and treatment. A computational biology/ bioinformatics lab is being established that would develop a high throughput analysis pipeline and provide the path toward personalized medicine. The combined power of genomics and immunotherapy will change the way cancer is treated.

ACTREC supports the education and training of the next generation of cancer researchers and clinicians. Advanced training courses and workshops were organized during the year for students and teachers from various universities of the North East region and other parts of India. ACTREC remains a much sought after destination for young postgraduates who nurture the dream of pursuing a Ph.D. career in various disciplines of cancer biology.

Several NGO groups working with us and Corporates, through their CSR donations, have helped us in providing the best facilities and moral support to our patients and their relatives. We are grateful to them for helping our patients fight the war against cancer courageously. Our staff voluntarily participated in promoting cancer awareness by organizing camps and lectures. We are thankful to Kaivalyadham, Lonavla for regularly conducting Yoga therapy sessions for our patients.

Using leading edge technology and innovative research, ACTREC will continue to provide affordable cancer care to one and all.

hiplunkov

(Dr. Shubhada Chiplunkar)



# Message from Director, HBCHRC - Visakhapatnam



It comes as no surprise that the institute saw a substantial increase in the foot fall of patients, investigations, procedures and treatments in the 3<sup>rd</sup> year of our operations. I have purposefully avoided plotting tables and graphs for this report.

What stands out as significant are two aspects: the first is the inauguration of the facility in 3<sup>rd</sup> floor of the Golden Jubilee Hospital of the Visakhapatnam Port Trust. This gave us the ability to organize surgeries at our own state of the art operating suite, a 6 bedded ICU care and an 18-bedded ward, all in the heart of the city. We are also able to house both doctors and nurses in the quarters nearby as well as in the picturesque hill top quarters overlooking the Bay.

The second is the engagement of individual donors and philanthropists as well as tapping into Corporate Social Responsibility funds towards providing an airconditioned waiting hall, free food for both out and in-patients and relatives, efforts at early detection and screening of rural women for cervical cancer, purchase of essential equipment like digital colposcopy, digital hysteroscopy, digital laparoscopy, apheresis machine, hemodialysis machine, water treatment plant, a van for home care, an ambulance and finally a mobile mammography machine.

With the commissioning of the main hospital appearing to be delayed for over a couple of years more, we also took recourse to donations to expand the 'temporary' facility with the addition of a new day care chemotherapy ward, a medical records room, a women's cancer screening clinic, a molecular oncology facility, a store and pharmacy godowns here and at the port hospital. We also built rest rooms for the drivers, multipurpose workers and electricians to shelter them from the elements. We expanded the canteen kitchen by adding a store room, a grinding room, scullery and a ventilated cooking area.

Several donors also came forward to help the construction of much needed albeit 'temporary' classroom cum meeting hall to seat 125. We hosted our first volunteer's training program on the 31<sup>st</sup> of December in the new facility. We now hold all the teaching sessions with all the audio-visual aids.

We have also obtained licenses for an independent pharmacy as well as narcotic license for the facility at the Port Hospital. We now have 2 medical social workers and 2 nurses fully funded by the *Jiv Daya Foundation* of Dallas. Additionally, we have access to free medication for pain and palliative care. We also have the promise of nearly 3 kilos of oral morphine from the same organization.

We are glad to be associated with several good charities. With *Vikastarangini*, we have monthly or twice monthly cervical screening camp. It is partly funded by the *Srinivasa Charitable Trust* of Vizianagaram and the *Manavseva* Charity from Boston.

We also enjoy the trust of Divis Labaratories and the Rotary Clubs of Visakhapatnam in Capacity Building in Cancer Screening of Auxiliary Nurse Midwives, Multi-Purpose Health Workers and Anganwadi workers. The Rotary clubs of Naperville, Secunderabad and Pune, also made substantial donations in the form of essential equipment. We have embarked on raising awareness on cancer prevention and screening as well as in palliative care, in and around the city of Vizag, targeting schools, colleges, office and factory workers.

We have successfully held several early morning beach walks to raise awareness for the World Hospice and Palliative Care Day, Oral, Breast and Cervical Cancer Screening, Volunteerism and Cancer Survivors with renowned celebrities for each of these causes. This Program is spearheaded by Dr. D Leela, our gynaecological oncologist.

We won the bid to host the Annual Conference of the Indian Society for Colposcopy and Cervical Pathology in April 2019.

We have made inroads into gaining the confidence of the Dr. NTR *Arogyasree* Scheme, the world's best health scheme from the state of Andhra Pradesh, into giving us concessions in order to soon start treating patients below poverty line, on a cashless facility, using an online approval and payment process, with the visit of the CEO of the scheme. Additionally, all the serving and retired employees as well as dependents are covered under the scheme.

With assistance from the CEO of the DR. NTR *Arogyasree* Scheme, we hope to gain access to the best electronic repository of cancer patients, to create, perhaps for the 1<sup>st</sup> time, a state cancer registry. The software suitable for such abstraction and analysis will soon be readied by Dr. Ganesh Bala from TMC, Mumbai.

We have also made good inroads into the near adoption of a Palliative Care Policy by the State Government, in collaboration with the collaborating with the Sneha Sandhya Age Care Foundation, the one and only Palliative Care and Hospice project in the state. The policy was drafted by none other than Prof. Rajagopal of Pallium India, who visited the Agananmpudi Campus and the Hospice. We jointly run with the Age Care Foundation. This is spearheaded by Dr. Vidya Viswanath, our palliative care physician.

Dr. Sonali Smita Nayak, our pathologist, has been to the Methodist Hospital, Texas Medical Centre, Houston, on an UICC ICETT Fellowship for training in Liquid based Cervical Cytology. We are the only centre in the State to be performing this test, as well as RT PCR for high risk HPV types.

Dr. Sailaja Kagita, the Young Scientist in Molecular Biology, has won a 65-lakh rupee grant from DBT for elucidating genetic signatures induced by pesticide, insecticide, herbicide, larvicide, piscicide and molluscicide signatures, using a combination of molecular biology techniques, with special reference to lymphomas.

The staff recruitment has not kept pace with the patient load. Those remaining after attrition due to the substantially low remuneration or perpetual ad-hocism are understandably disinterested. The morale of the staff is rather low, perpetually driving them towards greener pastures, either within the TMC system or without. This puts a lot of physical and mental strain on the remaining staff, who are still holding fort. Coupled with this is the glaring disparity in salaries for equivalent posts across the TMC governed hospitals, the least being paid to those in this centre.

And, finally, we proudly hoisted the national flag on our premises this republic day.

Dr. D. Raghunadharao

# **National Cancer Grid**

#### 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 120 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.

#### Standardization of cancer treatment

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 evidencebased guidelines for treatment. The National Cancer Grid guidelines on management of common cancers has been endorsed by all participating centres and is 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.

#### Quality assurance / Improvement

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.

#### Web-based second opinion service

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

#### 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 webbased 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.

## **Education and 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.

#### Training in North East India

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 likely to be replicated in other parts of the country as well.

#### **Cancer Research 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 (CReDO) 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.

### **Multicentric Cancer 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.

#### **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. Exploiting the volumes of individual cancer centres, an effort is being made to consider the feasibility of group negotiations for equipment, drugs and consumables. With a longterm 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 five 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 Tata Memorial Centre (TMC), a Grant-in-Aid institution of the Department of Atomic Energy (DAE), Government of India (GOI), comprised of eight 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 (HBCH) at Sangrur, Punjab; the Homi Bhabha Cancer Hospital & Research Centre (HBCHRC) at Aganampudi, Visakhapatnam; the Homi Bhabha Cancer Hospital & Research Centre (HBCHRC) at Mohali, Punjab; the recently acquired, Dr. Bhubaneswar Borooah Cancer Institute (BBCI) at Guwahati; and, the soon to be established two cancer centres in Varanasi, the Indian Railway Cancer Institute & Research Centre (to be renamed the Homi Bhabha Cancer Hospita) and the Mahamana Pandit Madan Mohan Malviya Cancer Centre (MPMMMCC) at Banaras Hindu University (BHU).

A comprehensive Memorandum of Understanding (MoU) was signed between TMC and BHU (on 21<sup>st</sup> September 2017) to set up a cancer centre on BHU campus, and to be called the Mahamana Pandit Madan Mohan Malviya Cancer Centre. This facility would be operational by end of 2018.

The taking over of the functioning Dr. Bhubaneswar Borooah Cancer Institute (BBCI) on the 27th November 2017 as a unit of TMC was significant; it paved a way to provide affordable cancer care to the population of Northeast India.

The Indian Railway Cancer Institute & Research Centre, Varanasi was redeveloped and was due to be operational in May 2018 as the Homi Bhabha Cancer Hospital.

The indigenous radiotherapy machine, the **Bhabhatron** was supplied to 20 centres across India and the third world countries in the past 2 years; more than a lakh of cancer patients were treated using it.

The International Peer Review provided a ready mechanism by which TMC was able to demonstrate that its cancer service, research, education and training were of world class in domains of clinical effectiveness, governance, patient focus, research infrastructure, breadth and depth of science, and teaching, training and development. The report of the Second International Peer Review held in 2016 was tabled by the Chairman of the committee, Professor AD Purushotham. The report benchmarked the Tata Memorial Cancer Centre's clinical services, research, education and training programmes as that of the highest standards, considering the complexities of its milieu. The panel highlighted that the rapid evolution of TMC as a whole, together with their vision of becoming a leading global comprehensive cancer centre, demanded increased management responsibility and accountability that ensured a balance between the tripartite missions. This would demand a level of corporate leadership ability in addition to excellence in service delivery, research and education. For this purpose, the recently introduced **360°-Development Programme (Train the Trainers)** was a further commitment of TMC to develop both current and future leaders in its ecosystem.

The **National Cancer Grid** (NCG) funded through the DAE, continued to grow and now had more than 120 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 18000 patients from over 50 countries have utilized this service.

For the first time in India, TMC in collaboration with the Tata Institute of Social Sciences (TISS) with support of Tata Trusts announced a one-year Advanced Diploma in Patient Navigation called **"Kevat"**. The aim of initiating this program was to create a trained taskforce to facilitate cancer patient's journey right from entry to the hospital to followup and getting back to normalcy; and taking into consideration, their emotional and socioeconomic needs in a holistic manner.

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).

TMC had initiated the training of African, Sub-Saharan country doctors and nurses under the Indo-African Forum Summit III.

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

TMC successfully conducted initial **imaging studies in radioisotope tagged monoclonal antibodies for breast cancer and lymphoma**. These radioisotope tagged monoclonal antibodies will be validated for therapeutic use in the next 3 years.

Among the many International presentations, **three (03) trial studies** presented at the European Society for Medical Oncology (ESMO) and at the American Society for Radiation Oncology (ASTRO) **proved to be of landmark significance in cancer treatment.** 

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.

The Department of Surgical Oncology launched India's first Online Oncology Tutorial as an innovative way of conducting online Continuing Medical Education (CME) program.

From the data collated till year 2014, it was found that the leading site of cancer was of the buccal mucosa among males and of the breast among females.

## TATA MEMORIAL HOSPITAL (TMH), MUMBAI -MAHARASHTRA

Tata Memorial Hospital concluded its Platinum Jubilee (1941-2016) celebrations with various educational and cultural events. The celebrations ended with the **"Mumbai Declaration"** pledge and the unveiling of the book titled, **"Indelible Footprints on the Sand of Time"** by our honourable Prime Minister, Shri Narendra Damodardas Modi on 25<sup>th</sup> May 2017. The Mumbai Declaration was a charter of recommendations for the betterment of our Indian healthcare system. The book looked back at the history of TMH and TMC, and highlighted its role as torch bearer of affordable and specialized cancer management in India. **The platinum jubilee oration was delivered by Nobel laureate, Professor Amaratya Sen on "Healthcare for All: Why and How?" in January, 2017.** 

To ease the congestion within the hospital, the management was in the process of segregating and isolating the nonessential patient services from the clinical service areas. Thus, non-medical services were slowly shifted out of the premises to the compound areas. Move was also afoot to restrict the number of attendants per patient to two only. These measures would go a long way to decongest the hospital premises.

TMH continued to provide services to cancer patients from low income families through the **Mahatma Jyotiba Phule Jan Arogya Yogana (MJPJAY)** scheme launched by Maharashtra State from 1<sup>st</sup> April 2017. This scheme replaced the earlier Rajiv Gandhi Jeevan Yogna Scheme (RGJYS). The tie up of the hospital with the State of Maharashtra continued and more districts were being added for the training programs for all medical and paramedical personnel in cancer screening and treatment.

Taking digitalization forward, the hospital became almost paperless, filmless and cashless. Now more than 90% of the patients deal in cashless transactions through the use of smart cards that they were provided with. Newer modules to further the process of digitalization included; browser based software for receipting, smart card pin assignment, sample transfer and receiving for hematology laboratory, refund voucher; implementation of web - based modules at TMH, ACTREC, Visakhapatnam and Sangrur; tracking system for Molecular Pathology Department; complaint management system; **pensioner portal on Internet**, etc.

#### Services

The TMH bed strength remained at 629, but the patient registrations increased. The year 2017 saw a total of **72001** new registrations, an **increase of 3%** over last year. The new patients numbered **44455**, those referred for second opinion numbered **21853** and, those of Preventive services were **5693**. Among the new patients, only 39 % were from Maharashtra (10789 from Maharashtra and 5545 from Mumbai); the majority of the others were from the northeast parts of India. There were almost a thousand foreign nationals who had registered.

TMH provided comprehensive cancer management through its eleven (11) Disease Management Groups (DMG's) that applied evidence-based medicine guidelines to all patients; thereby, taking a step forward to reach the goal of individualized management in cancer. The cancer care was comprehensive and began from preventive measures, identifying high cancer-risk individuals, cancer education, early cancer detection, counselling of patients and their family, prompt initiation of appropriate therapy, socioeconomic support, rehabilitation and palliation, and towards End-of-life care. The government along with various philanthropic individuals and NGO's contributed socioeconomically in many ways to help the needy and, also provided seed money to initiate treatment in deserving cases.

The numbers for surgery and anesthesia were lower in 2017 due to the renovations in some of the Operation Theatres for a varying period of time.

The surgical team of about 40 doctors expanded their reach by operating and providing their expertise to the satellite centres in Sangrur, Visakhapatnam, Ratnagiri and Aurangabad. The Head & Neck surgical services were now being offered in the worlds' first hospital on train, the Lifeline Express or the **Jeevan Rekha Express**. In 2007, more than 8,000 major surgeries and over 250 Robotic assisted surgeries were performed. The Department of **Surgical Oncology** provided state of the art surgical care with minimal access surgeries, skull-base procedures, major vascular replacements, limb salvage, microvascular surgery and robotic surgeries. The department conducted **26000** major and minor surgeries at TMH and **1650** at ACTREC this year. A total of **259** Robotic assisted surgeries were performed in 2017.

An MoU with government of Maharashtra offered basic oncology facilities in 28 district hospitals with a team of TMH alumni (Maharashtra Cancer Warriors). TMH continued the MoU with Lifeline Express to offer preventive and basic surgical services on the world's first hospital on a train. The Head Neck service received NIH R01 grant for research on carcinogenesis of smokeless tobacco.

The **Tissue Bank** produced over **10000** grafts that were utilized by almost 700 hospitals across the country.

The department of **Anesthesiology**, **Critical & Pain** had a fulltime staff of 28 consultants and catered to the demands of 15 operating theatres and 09 other locations. A total of **20670** patients were anaesthetized at TMH and ACTREC, **980** at Sangrur and **231** at Vishakhapatnam. The recovery room catered to **12626** patients and a total of **2218** patients were admitted to post-surgical and medical Intensive Care Units (ICU). The Pain clinic attended to **8829** new patients.

The department of Radiation Oncology offered optimized and efficient treatment with the top of the line machines by 22 Radiation Oncologists and 15 Medical Physicists. The department was well-equipped with the latest techniques and technology. External Beam Radiation was offered through its six Linear Accelerators (LA) and four Telecobalt units to 6684 patients. There was also the ease of image acquisition for 4D treatments like Image Gated Radiotherapy, Image Guided Radiotherapy (IGRT) and, Intensity Modulated Radiotherapy (IMRT) and surgery (IMRS). The IGRT and IMRT techniques were used on almost 3,400 patients. Radiosurgery was delivered using the "Brain-Lab" system comprising of micro-multileaf collimator (mMLC). Extracranial SBRT facilities have been expanded for virtual visual biofeedback to further improve precision of treatment delivery. To provide state of art and high precision treatments, researches were planned to be accredited through external dosimetry audits. Brachytherapy formed an integral part of many treatment protocols in the department and was used in over 3400 patients. The department of Medical Physics complemented the Radiation Oncology department by performing machine Calibrations, Quality Assurances, maintenance of these 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, QA, source procurement and their disposal as per the Atomic Energy Regulatory Board (AERB) guidelines.

Malignancies are systemic in nature and hence, all of them were reviewed by the Medical Oncology department. The therapy offered included chemotherapy, targeted-therapies, hormonal therapy, immune therapy and Bone Marrow Transplantation (BMT); depending on the type of cancer. The fulltime staff of 24 medical oncologists attended to more than 300000 patients. The medical oncologists saw more than 4500 childhood cancer cases. The department along with various Non Government Organizations saw to it that children with cancer were not deprived of complete treatment due to socioeconomic reasons. There were many educational and social activities conducted by them that compensated for their missing schooling and social participations. It was indeed remarkable to know that the Treatment Refusal & Abandonment rate was below 4% and that their overall 5-Year Survival rate was above 70%.

The Medical Oncology department had started the **Medical Oncology Molecular Laboratory** in 2005 and now offered cost-effective and standardized tests for predictive markers in cancer management. Last year, over 2000 samples were examined. Molecular profiling at the moment was ongoing for lung, thyroid and oesophageal cancers. Slowly their realm would expand to include other common cancers in India. This department worked in conjunction with the Pharmacology department and the various research laboratories at ACTREC.

The department of Pathology performed 64914 histopathological examinations; a 10% increase that included cases of biopsies, big specimens and outside processed referral material. A total number of 5766 frozen section samples along with 122242 immunostained slides were examined. The department maintained a National Tumor Tissue Repository to facilitate translational research. External Quality Assurance (EQAS) program in Histopathology was continued in the year 2017 with 52 participants across India. A digital EQAS cycle was carried out successfully; and that received great response from all the participants. EQAS for immunohistochemistry was successfully initiated for the laboratories under the aegis of the National Cancer Grid (NCG). All pathology and related services were accredited by the National Accreditation Board for Testing & Calibration Laboratories (NABL).

The **Molecular Pathology** department utilized techniques that would diagnose, prognosticate and predict cancers. The department performed **4672** tests of solid tumors; a 19.5%

increase. Six new relevant molecular diagnostic assays were introduced in the year 2017. The molecular pathology department worked in tandem with the Medical Oncology Molecular Laboratory and with various laboratories at ACTREC including their Pharmacology division.

The **Cytopathology** department implemented synoptic report formats that ensured uniform and unambiguous reporting. The departmental workload consisted of **25207** samples and **100828** smears. The External Quality Assessment Scheme (EQAS) of diagnostic cytopathology service showed a 16% increase of participants (225 to 260) compared to the previous year.

The output of **Clinical Biochemistry** department increased by more than 20% over the year 2016. Investigations were performed using more than 130 different types of assay analysis. The department's Tumor Marker assays and Serum protein electrophoresis were considered as National benchmark. A total of **3360366** Biochemistry investigations and **224449** tumor analysis were performed.

The department of **Microbiology** had the state-of-the-art equipment for rapid diagnosis of bacterial, fungal and viral infections. The department also had the latest equipment to diagnose and detect drug resistant tuberculosis. Institutional issues pertaining to hospital infection surveillance and prevention and, of waste management was also under their purview. A total of **210373** samples were processed by the department with an overall increase of 10%.

The department of **Radiodiagnosis** was fully and adequately equipped with all modalities that included Magnetic Resonance Imaging (MRI), Computed Tomography (CT), Digital Mammography, Interventional suites etc. There were handful of Ultrasound and Color Doppler units with portability along with Conventional radiography systems using Computed Radiographic imaging. A total of **165779** investigations were performed by the department.

The **Nuclear Medicine & Molecular Imaging** department continued to perform the largest number of PET scans in the country. The department performed **16081** PET-CT and **3947** SPECT scans in the year 2017.

The **Palliative Medicine** department played an important role in improving the quality of life of patients and alleviated their sufferings. The departmental staff also provided the patients with end-of-life support. The home care visits provided to the patients continued to be popular. There were a total of **6858** new referrals that included 350 paediatric patients. The home care team of four members visited **2121 households** to provide palliative services. The **Psychiatry** department offered psychological assessment to cancer patients. These services were offered on individual and group basis and, also included psychoeducational activities along with support to the care-givers and the survivors. In year 2017, their services were utilized by **3141** patients. The physical rehabilitation of cancer patients was performed by the **Physiotherapy** department and **18422** patients benefitted. The **Occupational Therapy** department collaborated with their Rehabilitation and Research Centre (RRC) at Dr. E.B. Memorial Home Bandra and provided Jaw stretcher keys and lymphedema kits to TMH dispensary for patients. A total of **12461** patients were attended upon along with 1011 patients at RRC, Bandra and, over 1,500 prosthesis and orthoses were provided to the patients. The services of the **Speech & Swallowing Therapy** were well utilized for dysphagia rehabilitation and for voice modulation. Their latest equipment, the Fiberoptic Endoscopic Evaluation of Swallowing (FEES) was fully utilized in 2017. A total of **10775** patients attended the department, of which 5520 were new patients.

The **Dental & Prosthetic Surgery** unit was involved in maxillofacial prosthetic rehabilitation & dental care for head & neck, and other cancer patients. Their outpatients catered to **13285** patients and **1102** patients were offered prosthesis.

The department of **Transfusion Medicine** focused more on blood donation camps and, the blood donors increased in number to **13951** in the year 2017. Specialised procedures including irradiation and granulocyte transfusion increased by 15%. The department prepared **54423** blood components and **4791** plateletpheresis units.

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 **14400** consultations during the year and, performed **11562** echocardiography tests, **4264** pulmonary function tests and **38584** electrocardiograms in 2007.

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 **7168** endoscopies, evaluated **2636** patients in the hepatology clinic and advised appropriate nutrition to **18101** cancer patients.

The department of **Preventive Oncology** conducted Informational, Educational and Communication programmes that created awareness of the early warning signs of common cancers. Such programmes were conducted across all section of the society and also included life style modification to improve health as an individual and for the community.

Tobacco cessation clinics were ongoing and were also attended by high risk Public sector employees. The department attended to **13115** patients in the year 2017. The department registered 5679 new and 7436 patients for follow-up screening services. The department screened 384 women for oral, breast and cervical cancers under its community based cancer screening programs. The department conducted 27 Cancer Awareness programs across Mumbai.

## Education

The Academics division of Tata Memorial Centre (TMC) was affiliated to Homi Bhabha National Institute (HBNI), Mumbai – A Deemed University, and focused on Postgraduate training in Oncology and other broad specialties. More than 150 post graduate students were admitted for various superspecialty courses. In a first in India, DM course was offered in Interventional Radiology in the year 2017 and two students were admitted. It also got approval to start DM course in Oncopathology from the year 2018.

Many PhD courses were offered in basic sciences at the research centre at ACTREC.

M.Sc courses in Nursing and Clinical Research and, technical courses in medical imaging and radiotherapy were also ongoing.

TMC was a recognized training centre for cancer by several national and international organizations, including WHO, IAEA and INCTR.

More than **450** national medical specialists visited our hospital as observers along with thirty one **(31)** foreign medical faculties.

The academic section continued the Summer School in Oncology – 2017 in collaboration with Kings College, London, UK.

#### 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 work including translational ones, animal studies etc. were carried out at ACTREC, which was the research arm. The CRS also provided statistical support to the entire organization including that for **125** clinical trials. A total amount of INR 9062571/- was provided for 15 intramural trials supported through the DAE-CTC.

To ensure Good Clinical Practices and to monitor the adequacy of clinical research methodologies, the CRS regularly conducted conferences and workshops that stressed the appropriateness and significance of adherence to national and international guidelines and standards. The Standard Operating Procedures (SOP) were regularly updated to adhere to the above standards and circulated to all. For implementation of the SOP and to maintain the highest scientific standards in research, three (03) Institutional Ethics Committees (IEC) were constituted. Two (02) IEC's were in TMH and one (01) in ACTREC. The IEC's reviewed both; the industry sponsored trials as well as, the investigator initiated research. The IEC received **193** projects in the year 2017 and, financial assistance was requested for **172** projects. In all, 208 projects were completed in 2017. All IEC were accredited by the NABL and AAHRPP.

At the same time and, keeping the patient safety in mind, the Data Safety Monitoring Subcommittees (DSMSC), each per IEC ensured the integrity of scientific and ethical aspects of research. A total of **366 Serious Adverse Events (SAE)** were reported from 43 clinical trials. The DSMSC reviewed **386** status reports and, monitored 13 investigator initiated studies out of a total of 91 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 (HRPP) that afforded protections for all research participants.

There were many research studies presented at National and International conferences. The three international acclaimed trials that had potential to change cancer management were: The Efficacy of Stereotactic Conformal Radiotherapy vs Conventional Radiotherapy on Benign and Low-Grade Brain Tumors. A Randomized Clinical Trial, published as Original Investigation in the JAMA Oncology Journal of the American Medical Association; Neoadjuvant chemotherapy followed by surgery versus concomitant cisplatin and radiation therapy in patients with stage IB2, IIA or IIB squamous carcinoma of cervix: A randomized controlled trial, presented at the European Society for Medical Oncology in Spain and; Cisplatin Chemo-radiation Versus Radiation in FIGO Stage IIIB Squamous Cell Carcinoma of the Uterine Cervix - A Phase III Randomized Trial (CRACx Trial: NCT00193791), presented at the European Society of Gynecological Oncology in Austria.

#### Awards

The hospital got the Indian Research Excellence Citation Award -2017 from Clarivate Analytics.



Director TMC, Dr. RA Badwe receiving the Indian Research Excellence Citation Award - 2017 from Clarivate Analytics.

Tata Memorial Hospital was awarded the Rajbhasha Shield by 'Akhil Bhartiya Rajbhasha Sansthan' during their 32<sup>nd</sup> Annual conference held in Port Blair.

The hospital also received awards from the local authorities for cleanliness and hygiene.



In the cleanliness survey conducted by Brihanmumbai Mahanagar Palika, Tata Memorial Hospital stood first among all hospitals in 24 Ward of MCGM in Mumbai City.



The Brihanmumbai Mahanagar Palika appreciated the hospital's cleanliness and hygiene under the Swachha Bharat Abhiyan.



## ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER (ACTREC), NAVI MUMBAI - MAHARASHTRA

The Advanced Centre for Treatment, Research and Education in Cancer (ACTREC) is the R&D wing of the Tata Memorial Centre and is located in Kharghar, Navi Mumbai. ACTREC comprises of (1) the Clinical Research Centre and 120-bed Research Hospital that together focus on clinical and translational research on cancer and on the 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 involved in a large number of basic, applied, translational and clinical research projects that strive for a better understanding of cancer in a bid 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 2017, there were 217 on-going projects at ACTREC; 171 of these projects received financial support of Rs. 6.92 crore from governmental agencies such as DBT, DST, ICMR, etc. In addition, 11 new extramurally funded projects were sanctioned Rs. 11.00 crore for a three

year period by these funding agencies. Research carried out by faculty of the Centre resulted in 123 PubMed-indexed publications during 2017, of which 50 articles accrued from basic/ applied research studies and 73 from studies based on clinical/ translational research or medical technology. During 2017, 46 regular staff members were appointed at the Centre in the scientific, technical, nursing and administrative cadres, while three employees superannuated, five employees voluntarily retired, six resigned and one expired.

#### **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, six Bone marrow transplant beds and 16 Day care beds. NABL reaccredited the diagnostic labs following an on-site reassessment in March 2017. A new Endoscopy system was installed in May 2017. New patient waiting area was inaugurated on the ground floor of Paymaster Shodhika. The BMT unit was renovated under a planned shutdown and was re-commissioned within a month in October 2017. Phase I of the OT renovation and validation was completed in December 2017 and the renovated OTs will be put into use in January 2018.

The department of **Medical Oncology** administers chemotherapy in the neoadjuvant, adjuvant and palliative setting for solid tumors. In 2017, the adult solid tumor unit dealt with ~11,000 out-patient visits; its five in-patient beds dedicated to solid tumors were always occupied. The Bone Marrow Transplant unit has performed over 70 transplants at ACTREC since 2007. Over 5000 out-patient visits took place during 2017. Adult patients with hematolymphoid neoplasms not undergoing transplant are also treated at ACTREC. In 2017, this unit handled around 800 in-patients and ~10,000 out-patient visits. The pediatric oncology unit dealt with ~5,000 out-patient visits in 2017 and its five inpatient beds were always occupied. The department of **Radiation Oncology** provides high quality radiotherapy services and generates evidence for the use of advanced radiotherapy technology Respiratory motion management with the assistance of indigenously developed infra-red marker surface tracking technology has reduced the delivery time of deep inspiratory breath hold techniques. The successful installation, validation testing, clinical commissioning and regulatory approval of the indigenously developed multi-leaf collimator (MLC) system on Bhabhatron-II telecobalt unit for field shaping in 2017 was the first step towards delivery of conformal radiotherapy. Nearly 900 patients received external beam radiotherapy and over 400 brachytherapy procedures were performed this year. The Surgical Oncology department at ACTREC runs four operating theatres five days a week, provides in-patient care for a wide range of cancer patients, and conducts 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. The neurosurgical services offer intra-operative neurophysiologic monitoring, image guided surgeries, brain mapping and monitoring facilities. Minimally invasive laparoscopic GI surgeries as well as complex surgeries like exenteration too are being performed regularly. Over 1600 major surgical procedures in pediatrics, head-neck, breast, gastro-intestinal, gynecology, urology and neurosurgery were performed during 2017. The department of Anesthesiology, Critical Care and Pain at ACTREC provides Anesthesia services at four major operation theatres (only two OTs from May 2017) and three peripheral locations + Pre-Anesthesia Check-up Clinic, Critical Care services at the 7 bedded ICU plus 3 bedded PACU + CPR team, and Acute Pain Services. During 2017, the department provided support during 1502 major OT procedures, 329 in the radiotherapy OT, 383 MRI, 266 interventional radiology, 1309 pre-anesthesia check-up, 1582 ICU and recovery room admissions and 176 acute pain services.

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 and clinical services at ACTREC. In 2017, 3389

MRIs, 2315 diagnostic CT scans, 1373 USGs, 792 Mammographies and 2023 interventional procedures 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. Its license to operate was renewed after a joint CDSCO and state FDA inspection in April 2017, and it received consent for procurement of gamma irradiation chamber from AERB in November 2017. Between January to November 2017, 1897 blood units were collected, 4103 blood components were prepared, 3350 blood components were issued, 906 plateletpheresis and 116 leukapheresis procedures were performed, 1370 and 1711 units of blood components were leucodepleted and gamma irradiated respectively, and blood grouping and cross-matching was done on 4103 and 4922 samples respectively. The department organized 32 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 year 2017 saw new initiatives in assessment of deep vein thrombosis (DVT) with an emphasis on correct use of TED stockings and pictorial communication cards to assist disease/treatment speech disabled patients.

Over the past two decades, 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. During 2017, 11809 cytogenetic tests were performed on over 5000 samples. The lab has NABL accreditation to function at the ACTREC campus, and the CAP proficiency testing program has been continued. The Pathology Lab at ACTREC provides diagnostic services for histopathology, frozen section and immunohistochemistry for patients treated at ACTREC and referral cases from elsewhere. The lab archives all the slides and blocks and, when required, retrieves and issues them for approved projects of pathologists, clinicians and scientists. The lab processed over 2500 samples and 3500 immunohistochemistry tests were performed over the year. The Hematopathology Lab 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 flow cytometry unit examines the utility of circulating plasma cells (myeloma tumor cells) in predicting treatment response in newly diagnosed multiple myeloma using 10-12 color flow cytometry; it also detects circulating tumor cells in

childhood round cell malignancies using high sensitivity flow cytometry and evaluates their role in the prediction of clinical outcome. The **Microbiology** Lab 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 2017 ~14441 patient samples were processed. The **Composite Lab** is NABL accredited and, during January to November 2017, the lab performed 144,548 tests for routine biochemistry, 8627 immunoassays, 45744 tests for hematology, 247 for cytology and 130 for FNAC. The lab also processed murine and canine blood samples for research.

The Clinical Pharmacology group continues to work on its drug/ formulation development pipeline during 2017. The preclinical data clearly show' the utility of Withaferin-A for GVHD prophylaxis. Preclinical evaluation of diselenodipropionic 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 Chromatin Biology group focuses on studying the biology of cell-free DNA (cfDNA) and chromatin (cfCh) derived from the billions of cells that die in the body every day. 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 Hypoxia and Clinical Genomics group 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. The newly established 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.

#### **Cancer Research Institute**

The programs of the Cancer Research Institute's thematic groups continued during 2017, with progress of on-going projects and initiation of new projects on diverse aspects of basic and applied research on cancer.

Cancer Biology group: Teni Lab focuses on gaining insights into the molecular basis of oral tumorigenesis. Since p53 and p63 are frequently altered in oral cancer, attempts are on to identify the differential interacting partners of mutant p53 versus WT p53. Regulation and identification of DNp63 binding sites on survivin, activin A and Notch promoters are under study. Studies on p53 target genes Mcl-1 and CLU assess the role of Mcl-1 in DDR, autophagy and mitochondrial homeostasis, and of CLU in nucleolus and centrosome maintenance. The contribution of TCTP and moesin to radioresistance in oral cancers and the underlying mechanisms involved are also being addressed. Sorab Lab 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. Vaidya Lab focuses on investigation of the functions of keratin, vimentin and their associated proteins in epithelial homeostasis and cancer, and further of their utility as biomarkers of oral cancer. Data revealed that K8 phophorylation in skin SCC derived cells regulates signaling pathways related to cell motility and apoptosis. Preliminary carcinogenesis experiments on K8 wild type and phosphormutant transgenic mice confirmed the in-vitro data. Data revealed that linker proteins regulate cell motility, invasion and tumorigenicity through NDRG1. Alterations in the desmosomal assembly initiated in early oral hyperplastic tissues and, as the disease progressed, the severity of the alterations increased gradually. Dr. Warawdekar worked towards understanding minimal residual disease in solid tumors. Molecular characterization of circulating tumor cells from patients with advanced breast cancer is on-going. Circulating biomarkers like miRNAs are also being used to gauge improved disease free survival in breast cancer patients with large tumors/ positive nodes, consequent to pre-surgery single depot injection of hydroxyprogesterone.

**Cancer Genetics, Epigenetics and Genomics group**: During 2017, Shirsat Lab carried out molecular classification of over 250 medulloblastomas using a microRNA based real

time RT-PCR assay developed in-house, 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. Mahimkar Lab 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). On-going studies from Gupta Lab showed that changes in the H3 variants, their sitespecific post-translational modification and deposition machineries of histones affect the process of tumorigenesis. The group also identified the critical role of mitogen and stress activated kinase 1, protein phosphatase 1/2 and histone deacetylase in regulation of cell cycle dependent H3 serine 10 phosphorylation, as well as that of neighboring acetylations in DNA damage response in human cell lines and gastric cancer tissues. Dutt Lab continued its focus on the somatic genetics of human cancer with the aim to develop effective, Next Generation targeted therapies for cancer patients. The three foci of his lab's research are cancer genomics, functional genomics and pathogen discovery. 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. Sarin Lab worked on delineating the molecular basis of inherited and somatic cancers, and developing translational algorithms through molecular biology and functional genomics. These questions were addressed through projects involving families with inherited cancer syndromes, a case control study of breast cancer, an International sarcoma kindred case control study, and an International Cancer Genome Consortium project on gingivo-buccal squamous cell carcinoma.

**Cell and Molecular Imaging group**: De Lab focused 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. Bhattacharyya Lab focused on intracellular organelle biogenesis and dynamics. The

mechanisms that govern the size control mechanism of Golgi and nucleus were examined using basic cell biological approach and advanced microscopic techniques. Yeast, cell lines and cultured neurons were used as model systems. The group also aims to develop novel tools and forms for different types of microscopy. Chilakapati Lab actively pursued non-invasive and minimally invasive applications of Raman spectroscopy in cancer. This year, the group 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. Work is also on to classify premalignant conditions and identify recurrence. In control hamster buccal pouch, Raman spectra, histopathology and molecular markers are being studied in micro tumors attributable to mechanical irritation. Raman maps of cells and tissues are being used to understand changes at the organelle or layer level.

Hemato-Oncology group: In Rukmini Lab, 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 brought to light 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 for them. Lab findings are being subjected to global analysis of molecular alterations using a multi-omics approach to identify potential therapeutic targets for CML - blast crisis. Dr. Hasan worked towards understanding the biology of acute leukemia and triple negative breast carcinoma. The effects of small molecule inhibitors on primary patientderived AML blasts were also studied along with anti-tumor activity in patient-derived AML xenograft models. A prospective study evaluating molecular prognostic markers and minimal residual disease to potentiate therapy for acute myeloid leukemia patients was recently concluded. A multidisciplinary approach was used to evaluate the pathogenicity of missense mutations causing hereditary breast cancer, using genome editing tools (CRISPR-Cas9).

Protein Biochemistry, Biophysics and Structural Biology group: Prasanna Lab focuses on building protein interaction maps of PSMD9 and PSMD10/Gankyrin -chaperones involved in protein turnover. The group aims to identify vulnerable nodes and edges in the network that can be manipulated in diseases such as cancer. Since they believe that Gankyrin-CLIC1 interaction is one such vulnerable edge in the network, they are developing strategies to inhibit this interaction. Their investigation on the role of a 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 their earlier prediction on the existence of an expanded 'druggable' genome space. Varma Lab has this year 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. Bose Lab focuses on understanding the molecular mechanism of proteins - HtrAs, Pea-15, Bcl2family 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 has also 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.

Stem Cell Biology and Cell Signaling group: Waghmare Lab examines molecular signaling pathways (Wnt/ Notch/ Sonichedgehog, TGF-â, EGFR, etc) that regulate stem cell renewal and whose deregulation is associated with cancer. Data from the lab revealed for the first time that mice overexpressing 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 Lab focuses 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. Research from Ray Lab has 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 has been found in a small cohort of HGSOC patients.

**Tumour Immunology group**: Chiplunkar Lab examines immune dysfunction in cancer patients and aims to develop immunotherapy for cancer. The mechanism that regulates tumor directed cytotoxicity of gd T cells are explored. Data revealed that histone acetylation/ methylation of promoter region of perforin and granzyme B, Notch and TCR signalling and presence of regulatory T cells and myeloid derived suppressor cells modulate the anti-tumor functions of d T cells. Pro tumor subset Tgd17 cells increased in hypoxic conditions. Mesenchymal stem cells (MSC) from oral tumors contributed to immune evasion while AML MSC supported survival of AML blasts and conferred chemoresistance. Among other projects, Dr. Joshi was involved in a study of immunogenetic and phenotypic aspects of IL17 expression in breast tumors with acquisition of normal and tumor specimens from 200 breast cancer patients, as also the validation and identification of housekeeping genes in head and neck cancers.

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. 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 HRdependent DNA repair. This knowledge will be etiologically important for BCCIP deficient cancers.

#### Academics

To fulfil the third mandate of the Centre, strong impetus 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 2017, a total of 114 graduate students were working towards the Ph.D. degree in Life Sciences at ACTREC; these included 21 JRF 2017 batch students who joined in August 2017. Under the short term and summer training program, a total of 299 trainees (254 short term trainees -112 for dissertation and 142 for experience/on collaborative projects; 23 observers; 20 summer trainees and two research associates) worked under the close supervision of the Centre's faculty during the year. In 2017, the Centre organized 21 local/ national/ international conferences, symposia, workshops, training programs, etc., beginning with the Indo-US Conference on 'Advances in Enzymology: Implications in Health, Diseases and Therapeutics' in January and ending in December with the DBT supported NER Center's Training Program targeting faculty and research scholars from the North East Region of India. In March 2017, the Centre conducted its annual ACTREC Oration as well as Science & Society Oration. During the course of the year, the Centre hosted 19 national/ international experts who delivered research seminars on a variety of topics in the life sciences and cancer. The Centre also organized cancer awareness programs aimed at the general public, and educational/ support/ entertainment programs for cancer patients and their caregivers in 2017.

## 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 and Preventive Oncology under its umbrella.

The CCE introduced population based and tribal population based cancer registries in various places like Varanasi, Gadhchiroli, Muzaffarpur etc.

The centre also began the process of improving the Cause of Death (COD) certification.

They recently procured a fully automated Biobank that could store over **3 million** samples for research in Epidemiology.

A lot of research was focused on the genomic association of oral cancers. Multicentric studies were ongoing to evaluate the genetic and environmental risk factors for Gall Bladder cancers.

On the academic front, the CCE had one student for PhD in Epidemiology and they conducted various training programs all over the country.

Recently, they helped the Nepal government in setting up of a Population Based Cancer registry for their country.



## HOMI BHABHA CANCER HOSPITAL (HBCH), SANGRUR - PUNJAB

The HBCH, Sangrur was recognized under the Mukh Mantri Punjab Cancer Raah Kosh Scheme (MMPCRKS) to support cancer patient from Punjab.

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

Till date, more than **10000** patients were registered in the hospital.

The HBCH, Sangrur saw increasing patient footfalls. There had been increase in the number of investigations carried out and the surgeries performed. More than **50000** laboratory investigations and over **6000** radiodiagnostic procedures were carried out in the year 2017. More than **600** surgeries were performed and, Radiotherapy was offered to over **800** patients.

Medicines were sold at less than 60% of the Maximum Retail Price (MRP).

It was proposed to start a **MSc** course in Histopathology from 2018. The hospital had already started BSc courses for technicians in diverse fields of medicine through Baba Farid University of Health Sciences, Faridkot, Punjab.



## HOMI BHABHA CANCER HOSPITAL AND RESEARCH CENTRE (HBCHRC), VISAKHAPATNAM - ANDHRA PRADESH

The various buildings within the campus of HBCHRC, Visakhapatnam were almost completely constructed.

In the interim period, the facilities at the Visakhapatnam Port Trust hospital were being utilized.

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

At present, the hospital offered on outpatient basis, a range of services that included: 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.

Almost **3000** new patients were registered in the year 2017.

## OTHER SATELLITE CANCER CENTRES ACROSS INDIA

The work had begun for the **Homi Bhabha Cancer Hospital & Research Centre in Mullanpur**, Mohali, Punjab. This centre would be ready by end of 2018.

At the behest of the Office of the Prime Minister, Shri Narendra Modi, few more cancer centres were to be taken under the wings of Tata Memorial Centre through the Department of Atomic Energy.

The **Dr. Bhubaneswar Borooah Cancer Institute (BBCI) at Guwahati**, Assam was taken over in November 2017.

The Indian Railway Cancer Institute & Research Centre at Varanasi (Uttar Pradesh) was soon to be taken over and to be renamed the Homi Bhabha Cancer Hospital. The renovations and new equipments were being procured by the Tata Trusts and, later to be handed over to Tata Memorial Centre.

A new cancer hospital was to be set up in the Banaras Hindu University campus at Varanasi, to be called the **Mahamana Pandit Madan Mohan Malviya Cancer Centre**.

# Tata Memorial Hospital

Atoms for Cancer Care



# **Performance Statistics**

	2016	2017
Patient Chart Files - General	27279	29319
Patient Chart Files - Private	13505	15136
Patient Chart Files - Total (A)	40784	44455
Referrals for Investigations / Second Opinion (B)	23474	21853
Preventive Oncology (C)	5660	5693
Total Registrations (A+B+C)	69918	72001
INPATIENT SERVICES		
Admissions		
No. of Admissions	28012	27881
Average Length of stay (Days)	5.80	5.7
Bed Occupancy %	91.00	91.0
SURGICAL ONCOLOGY		
Major OT Procedures	8465	8394
Minor OT Procedures	36474	15402
Robotic Surgery	200	259
MEDICAL ONCOLOGY		
Day Care		
Day Care – General	109341	119289
Day Care – Private	30882	33273
DIGESTIVE DISEASES AND CLINICAL NUTRITION		
Endoscopies	6888	7168
Nutrition Clinic	10257	18101
ANESTHESIOLOGY, CRITICAL CARE & PAIN		
No. of ICU Admissions	2225	2218
Patients in Recovery Ward	12624	12626
Pain Clinic	7708	8829
RADIATION ONCOLOGY		
External Beam Therapy	6528	6684
Brachytherapy	3816	3431
Treatment Planning / Beam Modification	16467	17530

	2016	2017
IMAGING SERVICES		
Radiodiagnosis		
Conventional Radiography	70980	67873
Ultrasonography / Color Doppler	40584	39946
Mammography	14654	14193
C.T. Scan	32664	31991
M.R.I Scan	8337	8111
Interventional Radiology	3114	3665
Nuclear Medicine		
PET-CT	15213	16081
SPECT-CT	5135	3947
GENERAL MEDICINE		
ECG	34491	38584
Echo Cardiography	11108	11562
Pulmonary Function Tests	4140	4264
LABORATORY DIAGNOSTICS		
Pathology	168724	123418
Biochemistry	3195789	3360366
Cytopathology	25207	25207
Molecular Pathology	3910	4672
Microbiology	190802	210373
TRANSFUSION MEDICINE		
Blood components prepared	52071	54423
Plateletpheresis units prepared	4678	4791
Irradiation of blood components	31387	35912
Laboratory Investigations	95148	95861
OTHER CLINICAL SERVICES		
Stoma care	6469	7059
Occupational Therapy	11266	12461
Physiotherapy	14341	18422
Speech Therapy	8403	10775
Psychiatry and Clinical Psychology	3396	3141
DENTAL SERVICES		
Prosthetic Services	1269	1102
TISSUE BANK		
Allografts produced	9366	11009
PALLIATIVE MEDICINE		
No. of Patients	11328	13234
Home Care visits	2411	2121

	2016	2017
MEDICAL SOCIAL WORK		
Guidance	27212	30000
Counselling	29031	28433
EDUCATION		
Residents & Others	180	189
Fellows	27	12
Medical Observers	476	481
Nursing Trainees	18	35
Paramedical Students	37	38
RESEARCH PROFILE		
Extramural Projects	09	11
Pharma Sponsored	10	08
Intramural + Extramural Projects	10	14
Institutional Intramural	43	25
No Funding	88	114
P.G. Thesis (Dissertation)	89	84
PUBLICATIONS		
International	303	341
National	159	165
Book Chapters	13(+2 Books)	15 (+5 Books)
CONFERENCES / WORKSHOPS / SEMINARS	125	108
## Trends











## **Preventive Oncology Registrations**

## **Resource Augmentation**



Novel High Sensitivity 5 Rings PET-CT Machine.



Bus donated by LIC of India in presence of Dr. R.A. Badwe, Director, TMC; Dr. Anil D'cruz, Director, TMH; Shri. Anil Sathe, Chief Administrative Officer, TMC; and Shri. Johnson Lukose, Chief Security Officer, TMC.



Multi Head Microscope [10 Head] donated by Tata Trust.



From Left Mr. N. Mehta, Managing Director, Madhuban Motors Pvt. Ltd., donating Innova vehicle with Dr. R.A. Badwe, Director, Tata Memorial Centre; Dr. Kailash Sharma, Director Academic, TMC; Mr. Johnson Lukose, Chief Security Officer, TMC; and Mr. Anil N. Sathe, Chief Administrative Officer, TMC.

## **Visiting Dignitaries & Annual Events**

Tata Memorial Hospital, the premier cancer institute in India and one of the largest in Asia provided the best cancer treatment to even the poor population of 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 visited the institution and extend their help and support. Every year, the institute received prominent personalities who interacted with the management and the patients. The following renowned personalities who visited the hospital included:

- Ms. Freda C. Lewis, Chief Medical Officer & Executive Vice President, Pfizer on 19<sup>th</sup> January 2017
- Journalists from various Newspapers across India on 3<sup>rd</sup> March 2017



Bollywood and Indian TV personality Ms. Renuka Shahane on Worlds Mental Health Day on 10<sup>th</sup> October 2017.

- Delegation from Medical Services of Bangladesh Armed forces on 14<sup>th</sup> March, 2017
- Team from Roche Asia Pacific Medical Leaders Regional Medical Team on 12<sup>th</sup> April 2017
- Chris Ariyan Emerging Market Group Leader Pfizer on 12<sup>th</sup>April 2017
- Senior Executive of GlaxoSmithKline Pharmaceuticals Ltd. on 26<sup>th</sup> April 2017
- Medical Officers from Armed Forces Medical College, Pune on 9<sup>th</sup> October, 2017 & 14<sup>th</sup> November 2017.
- Bollywood and Indian TV actress Ms. Renuka Shahane visited the hospital on the World Mental Health Day on 10<sup>th</sup> October 2017.



Director TMC, Dr. RA Badwe with Dr. Harsh Vardhan, Ministry of Science & Technology, Ministry of Environment, Forest and Climate Change and Ministry of Earth Sciences.



Director TMC, Dr. RA Badwe, Director Academics Dr. KS Sharma and Head of Medical Oncology TMC, Professor Sripad Banavali receiving donations for pediatric patients from the Airports Authority of India.

## 68<sup>th</sup> Republic Day Celebrations



Director TMC, Dr. RA Badwe with Chief Security Officer Mr. Johnson Lucose at the flag hoisting ceremony.

The Indian Republic Day on 26<sup>th</sup> January was celebrated with a parade by the security staff of the institution in presence of the Director, TMC Dr. RA Badwe; Director, TMH Dr. AK D'cruz; Director Academics, Dr. KA Sharma; the Chief Security Officer Mr. Johnson Lucose and other hospital staff.

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



## **Terry Fox Run**

Director TMH, Dr. AK D'cruz with pediatric patients of the hospital at Nariman Point, Mumbai for the Terry Fox run.

On 19<sup>th</sup> February 2017, '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 NCPA Nariman Point to Marine Drive Flyover and back to Brabourne Stadium. Medical and non-medical TMH staff participated in the run.

## **Concluding Conference of 75th Jubilee Celebrations**



Chairman Department of Atomic Energy – Government of India, Dr. Sekhar and Director TMC, Dr. RA Badwe with Nobel Laurate Professor Amartya Sen along with Director Academics TMC, Dr KS Sharma and Deputy Director ACTREC, Dr. Sudeep Gupta.

The last academic meeting to conclude the 75<sup>th</sup> Jubilee celebrations was held in January 2017. This conference was devoted to **"Healthcare: A Commodity or Basic Human Need?"** The meeting was held from 27<sup>th</sup> to 29<sup>th</sup> January 2017 at TIFR Auditorium, Colaba, Mumbai. A total of 1204 national

and international delegates (including SAARC countries) participated in the meeting. The Oration was given by **Nobel Laureate, Professor Amartya Sen** on the topic **'Healthcare For All - Why And How?'** 

	MUMBAI DECLARATION
Ga We, the ;	chered in Maendral on 29th January, 2007, on the occasion of the Tata Menorial Centre Platinum Jubility Conference - Healthears: A commodity or a basic human meed? perifedpants, call upon the Governments and other Statishnables to prioritize basilheare emmail to providing Universal Health Covernge, Tewards that goal, we must:
ING	CREASE Control government allocation of funds to healthcare, from 1.85 to 35 of GDP, along with a commensurate increase in the station contribution.
R	EDUCE and strengthening social health insurance.
PRIC	RUTIZE preventive attaingion such as immuniation, healthy totanyle, wholesame withit down air and water, and attain, scorpational safety, inform and alcohol control.
ING	CREASE the number of qualified discoses, numes, paramedical workers and technicians by storagthening educational infrastructure.
МА	NDATE periodic capacity building of healthcare providens with regard to protessional competence, accustability, ethical conduct, computation and relevant memory.
(	REATE   institution that will develop and manage doesno surveillance mechanisms as well as analyse and disseminate data to the public domain.
E	NSURE   that all health care providers and touthetions affire to quality norms and evidence-based guidalines.
	OFTER   easy access to pullative case.
R	EALIZE   that healthcase cannot be delivered by the government actor alone, but also needs augmentation by private and non-profit regaritations.
IMPL	EMENT   measures to stop unethical practices and non-smootial tasts and insummits.
REC	ULATE ( effectively because compariso to make them transported and accountable.
LEV	'ERAGE   inducing in improve efficiency, accessibility and cost-effectiveness.
(	REATE   an endling atmosphere for insurations and premote biomedical research. including that on alternative medicine.
ALL	OCATE   strategically, CHE funds to strengthen the health care facilities and support specific health programs,
/	ASSURE   the safety, efficacy, quality and appropriate pectag of diags and medical devices by regulatory bodies.
PRO	OMOTE   health as an important issue in public discusse, with guarant angegement of credit society, publical parties, policy makers and the media.
EMP	HASIZE   that participation of patients and their care given is of atmost importance.
O	OMMIT   to staying true to the principles enloced above till they are all realised.
	20111110

Shri JP Nadda, Union Minister of Health & Family Welfare, provided a comprehensive vision of the Indian government in respect to Indian healthcare. Shri Deepak Sawant, Maharashtra State Minister of Health concurred with the same and, both witnessed the formulation of the 'Mumbai Declaration'. The Mumbai Declaration was a charter of recommendations for the betterment of the Indian healthcare system.

## **15th Conference Evidence Based Medicine**

The aim of the institute was to propagate and promote practice of evidence based medicine in cancer. The philosophy behind the meeting was to identify and answer focused questions relevant to oncology practice in India. National and International cancer specialists from diverse fields of oncology were invited every year to formulate policies pertinent to the Indian cancer scenario. The deliberations were on for 2-3 days that included talks on a particular cancer topic related to the Indian population.

The Evidence Based Medicine conference in the year 2017 was devoted to "From Controversy to Consensus Shaping Indian National Cancer policy". The meeting was held from 24<sup>th</sup> to 26<sup>th</sup> February 2017. The theme aligned well with the one of the goals of National Cancer Grid, an initiative funded by Government of India through the Department of Atomic Energy, of having uniform standards for management of cancers across India. The conference focused on the six most common cancers in India namely oral, breast, lung, cervical, stomach and colorectal cancers. Leading national and international experts discussed the available evidence on various controversial issues in prevention, management and research in each of these cancers. The expert opinion based on these discussions was presented to the attendees during the conference and adopted as policy statement of the National Cancer Grid.



Director TMC, Dr. RA Badwe with Professor William Mackillop.

The Hospital Day Oration was given by Professor William Mackillop, Radiation Oncologist – Queens University, Ontario on the topic "Will better implementation of known evidence be more effective than cancer moonshots?"

The NCG Guidelines for Common Cancers book was issued during the meeting. A total of 698 national and international delegates (including SAARC countries) participated in the meeting.



Director Academic, Dr. KS Sharma, Professor William Mackillop, Dr. RA Badwe, Director TMC, and Director TMH, Dr. AK D'cruz.

## 76<sup>th</sup> Hospital Day Program of Tata Memorial Hospital



Director TMC, Dr. RA Badwe with Director Academic, Dr. KS Sharma at the Hospital Day function.

The 76<sup>th</sup> Annual Hospital Day Function of Tata Memorial Hospital was held on Monday, 28<sup>th</sup> February 2017 from 6:00 pm to 10:00 pm at Sri Shanmukhananda Fine Arts & Sangeetha Sabha, Mumbai. The Hospital Day Committee under the Chairmanship of Mr. S.H. Jafri, Sr PRO organized Aawaz Ki Duniya Orchestra. Staff members came for the program along with their families. People of all age groups present in the audience thoroughly enjoyed the

program. In this function the Labour and Super Staff who had completed 30 years on 28<sup>th</sup> February 2017, along with employees selected as 'Best Workers' for the year 2016 were felicitated by Dr. R. A Badwe, Director TMC; Dr. A.K. D'Cruz, Director TMH; Dr. Kailash Sharma, Director Academics; Dr. Meenakshi Thakur, Head of Radiodiagnosis; Dr. Sarita Khobrekar, Medical Superintendent; Dr. S.D. Banavali, Head of Medical Oncology; and Dr. M.A. Muckaden, Senior Faculty in Palliative Medicine.

Name	Department
Mrs. Maithilee R. Chavan	Palliative Medicine
Mr. Prabhu Murugan	Nursing
Mr. Dattaram D. Niwate	Engineering
Mr. Lawrence John D'Souza	Preventive Oncology
Mr. Vasant Shankar Patil	Pathology
Mrs. Vasundhara C. Patil	Radiation Oncology
Mr. KiranBholanath Solanki	Waste Management
Mrs. Ratan P. Baria	Radiodiagnosis
Mr. Satish Shamrao Warde	Engineering

## List of "Best Workers Award - 2016"

## **Release of Platinum Jubilee Milestone Book**



Launch of the Platinum Jubilee Book by Honorable Prime Minister of India, Shri Narendra Modi with Chairman Department of Atomic Energy – Government of India, Dr. Sekhar Basu with Director TMC, Dr. RA Badwe. Also in picture, Mr. Ratan Tata - Chairman of Tata Trusts and Ms. Nishu Singh Goel, Curator of the book.

May 25<sup>th</sup>, 2017 saw the release of the book, **"Indelible Footprints on the Sand of Time"** by our honorable Prime Minister, Shri Narendra Damodardas Modi from his residence in New Delhi. The book was unveiled in the presence of Dr. Sekhar Basu, Chairman, DAE; Mr. Ratan Tata, Chairman Tata Trusts and Ms. Nishu Singh Goel, the Curator of the book. The book looked back at the history of TMH and TMC, and highlighted its role as torch bearer of affordable and specialized cancer management in India.

## 71<sup>st</sup> Independence Day celebrations



Chief Security Officer Mr. Johnson Lucose.



The hoisting of National Flag by Dr. KS Sharma

The Independence Day on 15<sup>th</sup> August was celebrated by unfurling of the National Flag. The Indian National Anthem was sung and the guard of honor was Dr. KS Sharma, Director Academics – TMC.



## Patient Support Group

## Atoms for Cancer Care

## **Volunteer Patient Services**

Over 34 Non-Government Organizations (NGOs) and more than 150 volunteers helped patients and their relatives; before, during and after their treatment in financial, counselling, holistic and logistic matters. Many of them provided food and clothing, toys etc. for the patients; their activities being silent and mostly unheard of, even the beneficiaries.

Words were not enough to express gratitude to the known and the unknown, who helped the patients and the institution.

The management acknowledged their efforts to all who helped alleviate the misery of the cancer patients in any form. Though not wanting to enumerate them, it was felt that the public must know that there is no dearth of the saviours of humanity. Listed below are few benevolent and altruistic ones, of whom we know, as they often required assistance and guidance from the hospital management. The many missed out, were those who operated individually and on the quiet, and whose identity remains unknown even to the management.

Access Life Assistance Foundation	Providing accommodation.		
Aditya Kalyan (Mr)	Arranging magic shows and OPD activities.		
Al Musaddiqah Women Welfare Organization	Supplies snacks and lunch etc.		
Ameeta Bhatia (Ms)	Counselling, 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.		
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).		
СРАА	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.		

#### List of Volunteers / Volunteer Organizations & their Activities

	Coordinating for the support group meeting.			
	Arranging platelets drive for paediatric and adult patients.			
Gurnani Sati Charitable Trust	Free tea & biscuits (Everyday morning breakfast).			
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, a services like ambulance, funeral arrangement etc. are provided.			
	Educational support to paediatric patients.			
Indian Cancer Society	Guiding for ration and other financial help.			
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.			
Payal Sangrajka (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 .			
	·			

Sanjivani Life Beyond Cancer	Counselling.		
	Financial Support.		
	Arranging Cancer Detection Camps, Documentary Films & Conference for the cancer survivors to share their experience withother 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.		
Thjyagrajan 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 survivors 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.		

The humanitarian services offered by the volunteers and organizations towards the welfare of our patients and their families was appreciated by the hospital management.

# Administration

Atoms for Cancer Care

**Mr. AN Sathe,** Chief Administrative Officer (CAO), TMC

## **General Administration**



The General Administration was headed by Chief Administrative Officer (CAO), Mr. AN Sathe who was responsible for recruitment of manpower, replenishment of materials, procurement of Capital Equipment, Budgeting and overall management, safety and security of all the buildings and assets of all units of TMC across the country. His team coordinated with other departments to provide healthy and smoothly functioning machinery for the hospital.

The administration of Tata Memorial Hospital had a tough job of maintaining the highest standards for the hospital in terms of staff, equipment and facilities. They were kept abreast of all the latest technologies, innovations and equipment required for oncology so that the best services were offered to cancer patients. The administrative staff ensured a hitch-free coordination of all departments and ironed out any glitches that arose.

The general administration also looked into the expansion of Tata Memorial Hospital on the 5-acre plot acquired in the campus of Haffkine Institute, Parel. With the development of various cancer centres across the country under TMC, administrative workload and responsibilities increased.

Another major work of the General Administration was to liaise with the statutory bodies, Central / State Government

authorities' viz. Urban Development Department, CPWD, MCGM, Collector Mumbai City, State Department of Revenue and other for various permissions, Licenses extensions and sanctions etc.

Linen procurement and its washing were looked into and annually, 22 lakh items were recycled at an approx. cost of INR 3 crore per annum.

The number of new staff residential quarters allocated in the year 2017 was 28.

Information was provided to 123 requests received under RTI Act 2005. The First Appellate authority received 17 appeals that were resolved in stipulated period.

The administration supported and processed 1514 application for National Deputation and 398 applications for International Deputation during the year 2017.

A total of 445 employees were added to the Contributory Health Service Scheme (CHSS) and deleted 250 beneficiaries. The total beneficiaries of TMH were 5628; of the total 1321 claims received, 1260 were sanctioned under CHSS.

During calendar year 2017, the Outsourcing department recruited 884 personnel in the various units including Tata Memorial Hospital.

## Accounts

#### Mrs. Indira Pasupathy,

Jt. Controller – TMC (F & A) (Till July 2017)

The Accounts department was responsible for patient billing, receipting and settling 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 status of plan projects.

During the financial year 2016 - 17, Non plan Grant of INR 289 crore was received and was fully utilized. The plan grants sanctioned was INR 181 crore and the targets proposed were met.

Smart Card services were implemented across the hospital for all categories of patients. This resulted in the ease of transacting services in the institution. In this era of digitalization, the accounts department initiated the implementation of online top-up of the smart card facility. To reduce footprint in the billing counter, the accounts department installed kiosk machines for generation of bills and statements from this machine. To promote digital India and digital payment, the accounts department initiated the system of payments through POS, RTGS / NEFT / Payment Gateway / Cheque Payment. Further, the accounts department had the integrated accounting system "Financial Management System" in HBCHRC, Visakhapatnam and at HBCH, Sangrur.

## Engineering

Mr. GS Dhanoa,

Chief Engineer - TMC

Mr. RR Rodrigues Mr. MK Nate Mr. RS Sharma Mr. SR Kalwaghe Mr. RB Kapse Mr. KK Karle Mr. BD Patil

The mandate of the Engineering department at Tata Memorial Centre was to maintain and manage all the facilities under its jurisdiction, and to ensure safety of patients and staff. This involved smooth functioning of the hospital infrastructure including but not limited to MEP (Mechanical, Electrical and Plumbing) services like Medical Gas, HVAC, Telephone & AV, Public Address System, Fire Alarm System, Fire Fighting System, 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 highest power factor, replacing in phase-wise the existing florescent light fittings by LED lights, modification in the existing HVAC system, replacing old MEP equipments with newer technology energy efficient equipments, etc.

In addition to the above work, the department was entrusted with major renovation tasks to upgrade the infrastructure to meet current and future needs. These included refurbishing of auditorium complex, renovation of Hematopathology lab & Isotope Therapy ward, turnkey works of SPECT, miscellaneous modifications & alterations for pharmacy, RMC labs, clinical & non clinical areas, up-gradation of telephone exchange (IP + Analog), ventilation system in kitchen, etc.

Modification of general out-patients area at Golden Jubilee Building (for better crowd management), creation of additional day care beds (approx 60 nos.) in Annex building, renovation of toilet blocks, external structural repairs & painting of all the buildings in TMH complex, turnkey works of CT simulator, up gradation of CCTV system, elevators at GJB, replacement of old chillers & pumps, cooling towers, central & window/split AC in Main bldg, exhaust system in grossing room & RMC, etc. were some of the major maintenance works under way.

The construction of the buildings for Centre for Cancer Epidemiology (CCE) and of the Archive & Records in ACTREC campus was completed.

Apart from providing support services at TMH, the department was actively involved in new construction projects taken-up at different sites of TMC in Mumbai and other parts of the country, namely;

- Construction of National Hadron Beam Therapy Facility at ACTREC:The construction commenced and was expected to be completed by May 2019
- Construction of Radiological Research Unit (RRU) at ACTREC: The construction work was commenced in December 2017 and would be ready by end 2019
- Construction of Hematolymphoid Block and, the Women and Children Cancer Wing at ACTREC: Work commenced in December 2017 and expected to be completed by December 2019
- Plot no 3/330, (adjacent to Haffkine Institute) at Parel Mumbai: The development of the 5-acre plot was scheduled in phases

- Construction of 100 bedded cancer hospital (Homi Bhabha Cancer Hospital & Research Centre) at Mullanpur Village, Dist. Mohali, Punjab on 20 acre of land
- Construction of Mahamana Pt. Madan Mohan Malaviya Cancer Centre at Varanasi, UP on 15 acre of land.

## **Food Service**

#### Mr. RA Patil,

Deputy Admin. Officer, TMH

The Food Service department of the hospital worked with dedication and passion towards serving the patients and staff with gastronomic delights as their first and foremost priority.

The department strived to maintain highest level of hygiene and provided nutritious and delicious meals to all. There were always innovations in the menu to see that the food was not monotonous and bland.

The team members felt a great sense of satisfaction to see the staff and patients' happy faces after all their meals served by the department.

Being a cancer hospital, the diet requirements varied from patient to patient and, the department ensured with pride that their different dietary requirements were complied with. This was not at the cost of the food being unpalatable or tasteless.

The departmental core team comprised of 03 Head cooks, 11 Cooks and 37 ward boys; the cafeteria team consisted of 01 Head butler, 05 Butlers & 12 ward boys, along with 03 supervisors, 01 Technical staff, 02 attendants and 02 clerical staff. The departmental staff took pride in catering to about 1800 persons (patients and staff) four times a day that covered around 7000 servings. The department also arranged for catering services during ~ 130 conferences that were held in the year 2017.

The department ensured that the running expenditure of the cafeteria was kept within the allocated yearly budget.

## **House Keeping**

Mrs. Rajlakmi K. Naik, Oficer in Charge

The role of TMC's Housekeeping department (HKD) was critical in providing a peaceful, infection free and pleasant atmosphere for the speedy recovery of the patients.

The HKD ensured cleanliness and hygiene using the latest equipment, materials and techniques. The department carried out Pest Control with proper schedule and planning. It was also involved in relocation of equipment and furniture in a systematic and timely manner. The general façade cleaning, flower arrangements, garden maintenance and Green Waste Recycling (organic manure plant) was also looked into. The staff members coordinated complaints of the electrical, civil, linen and laundry with their respective departments. The department also decorated the foyer and stage for various academic and cultural functions.

The HKD achieved this huge task by meticulously planning & scheduling its activities; training their in-house staff and, by motivating and mentoring them to improve their performance and enhance their productivity that ensured thorough & timely completion of tasks.

The HKD at TMH was regularly appreciated for being quickly responding, dependable and efficient.

## **Human Resource Development**

Mr. Hemant J. Arekar Mr. Perumpully Sukumaran, HRD Coordinator

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 198 personnel appointed in this year.

#### Handicapped Personnel employed (21)

Category	Orthopedically Handicapped (OH)	Visually Handicapped (VH)	Hearing Handicapped (HH)
GROUP 'A'	01	0	0
GROUP 'B'	03	01	0
GROUP 'C'	10	03	03

#### **Reserved category employment details**

Category	Group 'A'	Group 'B'	Group 'C'
SC	20	126	414
ST	01	15	15
OBC	21	182	176
Total	42	323	605

SC: Scheduled Caste; ST: Scheduled Tribes; OBC: Other Backward Castes.

The SC / ST / OBC officers were included in selection committees for the various interviews conducted. Mr. R.P. Jaiswar, Sr. Personnel Officer, for SC / ST / physically challenged and Mr. A.N. Sathe, Chief Administrative Officer for OBC, were the liasioning officers.

The department promoted 243 employees. Forty six (46) employees ceased from services during this year, of which 33 superannuated and 6 retired voluntarily. All the SC / ST employees were interviewed for 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, 170 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), Department of Atomic Energy (DAE) and Institute of Secretariat Training and Management (ISTM), New Delhi.

## Maintenance, Verification & Disposal

## Mr. RR Rodriques,

Head

The departmental head with his three assistants were responsible for all maintenance and repairs of non medical equipments and electrical / electronic items.

The department took care of the annual maintenance contracts (AMC) for pest control, cable TV, water purifiers etc. and of the cleaning of all the buildings in the campus (external and internal). Shifting and refurbishing of furniture were undertaken. The department was also involved in the mechanical alterations of the firefighting equipment and of conversion of diesel vehicles to CNG type.

The department also took care of all disposals of condemned equipments / furniture / vehicles / waste material and routine day to day scrap.

The maintenance of staff quarters in Mulund was also under their supervision.

The department took physical stock verification of the store / linen and food service section.

The department also took care of AMC contract for pest control, misc. furniture works, shifting & reinstallation of OT table, lights and pendants at HBCH, Sangur, Punjab and HBCHRC, Vizag.

## Personnel

## Mr. Rajendra P. Jaiswar,

Senior Personnel Officer

The Personnel department organized training programme for labor staff through Central Board for Worker's Education, Ministry of Labor and Employment, Govt. of India. About 100 labor staff benefitted during the year. The centre had the backing of 883 number of labour staff governed under Brihanmumbai Muncipal Corporation (BMC) and Central Government (CG) that played an important role in the areas of cleanliness, transport of specimens, and documents etc., that were important support functions in delivery of patient care. During the year, department conducted staff promotional activities and promoted 20 labour staff (BMC &CG). During the year, four BMC employees switched over to the CG rules. Promotion policy for CG employees were prepared and implemented. During the year, 27 labour staffs superannuated / voluntarily retired.

All the labour staffs were trained on behavioral aspects, communication, family budget, dignity of labour, 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 manpower to different wards, departments and sections was fulfilled to maintain a high standard of cleanliness and hygiene. Submission of identity card form for labour staff as well as pensioner and, festival advance form were made available through online process. The Time Keeper Office functioned 24 x 7 to facilitate deployment of labour staff to various departments in the hospital. Computerized leave application and leave record maintenance system was successfully made operative. During the year, 419 BMC files were re-assessed for proper documentation. In 2017, 27 retirement files were scanned and entered in Personalized Document Record (PDR) software. The pension related documents and calculation date could now be easily extracted without referring to the physical personal file of the pensioner. It reduced the time required to perform this activity manually.

Bank / court recovery / pensioners forms etc. and related work of the labour staff was also done through Personal Information System (PIS) transactions. Preparation of service book for CG employees was under process.

The personnel department in-coordination with the selection committee nominated labour staff with good work record for "Best Worker Award" and were felicitated at Annual Hospital Day Function.

## **Public Relations**

#### Mr. Syed H. Jafri,

Senior Public Relations Officer

The Public Relations (PR) played an important role in maintaining a positive image of the organization. The role of PR officers was to be proactive with the various publics of the institution. The department followed the simple principle of compiling data by active research, evaluating & analyzing the problems / data; planned with the management and implemented such programs keeping in considerations the resources available. Prompt feedback was accumulated to analyze the success of these programs and to make them better.

The department monitored the Implementation of the Official Language Policy of the government of India in the hospital and translated various documents and letters from Hindi to English and vice versa. The new session of "Pragya" Hindi classes was started for the staff of the hospital from January, 2017 to provide them training in working knowledge of Hindi.

Various competitions were organized for the staff as part of 'Hindi Fortnight Celebrations' from 14<sup>th</sup> - 30<sup>th</sup> September 2017. The prize distribution function for the winners of the above competitions was held on 20<sup>th</sup> November 2017. Tata Memorial Hospital was awarded the Rajbhasha Shield by 'Akhil Bhartiya Rajbhasha Sansthan' during their 32<sup>nd</sup> Annual conference held in Port Blair. On the occasion of the 'Platinum Jubilee' of the Hospital, a bilingual 'Cancer Terminology' was prepared by the Official Language Implementation committee of the hospital; the glossary being verified by the Commission for Scientific and Technical Terminology, New Delhi. The 12<sup>th</sup> issue of the Annual in-house magazine 'Spandan' was released in 2017.

The various publics which were given priority included:

- Maintained a transparent environment with the media through regular personal contact. This led to a TMH friendly media with positive achievements of TMH being widely reported
- The PR department had arranged welfare activities that played an important role in maintaining healthy relations with staff. The various programs held included, Best Workers Award, Diwali celebrations, the annual Goa excursion for children, the Annual Hospital Day functions, trekking for staff children, Vipassana, Manshakti, refreshers courses, labor staff insurance etc.
- With the help of volunteers and Non Governmental Organizations (NGO), the department organized programmes like outings, cultural activities, yoga sessions; movie shows etc. for the patients regularly. These programmes provided a welcome relief to patients from their pain and tensions, and patients looked forward to such programmes
- The arrangement for all conferences held in the campus were made by the PR department
- Welcoming and seeing off, of visiting dignitaries was also handled by the PR office
- The TMH Helpline functioned under the PR department. The activities of various NGO'S and individual volunteers were coordinated so as to offer maximum help to the patients in the form of financial help, accommodation, counseling and guidance, ration distribution, educational support, rehabilitation program etc.
- All International patients and their relatives liaised with the PR department before arriving in Mumbai and prior to initiating their consultation and treatment process
- All LIC Policy death claims were processed by the PR department so that relatives did not have to face any hardship for claiming their insurance. 207 death claims were processed during the year.

## Purchase

Ms. Shailaja E. Brid, Head (Till August 2017)

The Purchase Department was involved in the procurement of various consumables, capital equipments, minor equipments, spare parts, local purchases etc.

The department provided efficient and exceptional service to the entire hospital by procuring equipment and ensured that the service provided by the suppliers was timely and of good quality.

In the year 2017, the department procured capital equipment worth INR 2 crore through its Import cell. The non rate contract consumables and spares were worth INR 18 crore and, the consumables and other essential services worth INR 46 crore were procured through its rate contract cell.

## **Security**

## Mr. Johnson Lucose,

**Chief Security Officer** 

The Security Department was responsible for all the security aspects of all the buildings within the TMH campus as well as at ACTREC. Apart from the following, the areas of responsibility of the team included fire safety measures, fire fighting, attending to natural calamities such as water logging due to heavy rains, rescue of people trapped in lifts, transport, elevator operations, surveillance, and investigations.

The department also handled:

- Regulation of staff, patients and their attendants, vehicles and material movements
- Handled various complaints of different nature from staff, patients and their attendants
- Scrutinized and verified documents of Foreign National before registration and at the time of admission. 'C' Forms were raised online in respect of Foreign National patients, attendants and observers from International faculties, after completing other formalities with Public relations office
- Liaised with local police and civic officials
- Liaison with Internal, External Intelligence agencies & NSG and effectively implementing the guidelines received from them time to time
- Carrying out vigilance related work.

Besides the above, adequate security arrangements were made during the visits of governmental and other dignitaries in coordination with police and related agencies.

The Vigilance Awareness Week 2017 with motto "My Vision – Corruption Free India" was observed from 30.10.2017 to 04.11.2017 and the pledge in Hindi and English was taken.

#### **Stores**

#### Mr. Arun L. Kuvalekar,

Deputy Administrative Officer (Stores)

The main function of centralized Stores was to stock and support day to day requirement of the various wards / OPD's / Lab / Departments as and when required.

The stores received all stock and non-stock consumable items except drugs and surgical goods. After receiving the same, they generated Goods Receiving and Inspection Note (GRIN) and Delivery Note (DN) at same time. Delivery note details were printed on GRIN print copy and hence stores saved one printed DN copy on every GRIN that was required for office record. Soft copy of GRIN was forwarded to accounts dept. for payment to the vendor. The stores was holding 360 stock items and, the inventory value as on 31<sup>st</sup> march 2017 was INR 4,46,78,772/-. There were no discrepancy in ledger and physical stock items during annual stock taking.

Stores also received capital items including donation or free of cost or under project as per requirement of various department and maintained record in assets inventory record. This helped the Maintenance & Verification Cell and the Bio-medical department to check Warranty, the Annual Maintenance Contracts (AMC) and the Comprehensive Maintenance Contracts (CMC) details to do real time maintenance of asset.

Stores also conducted physical verification and tagging of asset routinely; tagging of asset, painting of asset number and computerized entry of these assets were completed till December 2017. **Dr. Sarita V. Khobrekar,** Medical Superintendent

## **Medical Administration**

Assistant Medical Superintendents Dr. Sandeep Sawakare Dr. Sumedha Patankar Dr. Vinit Samant



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 2017, 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**

#### Mr. Milind H. Raut, Head

Biomedical services were enhanced significantly after establishment of the department of Biomedical Engineering (DoBE) in 2016-17. The department was constituted of four engineers, one administrative officer and one clerical staff.

The departmental activity included maintenance and repairs of hospital medical equipments. Around 94 work orders were issued which were evaluated by biomedical engineers. The DoBE played an important role in keeping all service contracts – AMCs/CMCs on track. A total 99 service contracts of around INR 7.24 crore were renewed that involved, bills verification, scheduled preventive maintenance checks by vendor, negotiations, etc. The department also looked into the same at the other centres in Visakhapatnam, Sangrur and Varanasi. The DoBE entered into 33 new contracts amounting around INR 1.96 crore. The National Accreditation Board for Testing and Calibration Laboratories (NABL) 2017 accreditation audit was successfully accomplished after ensuring calibration and validation of around 450 laboratory equipments as per NABL norms and had been implemented thereafter.

One of the humongous tasks performed was Capital Budget TMH (year 2017-18). In depth survey of the entire hospitals' medical equipment inventory was carried out. This resulted in calculation of total requirement of new equipment on the basis of replacements/additional criteria and also considering end users' needs. Amongst this, only replacements which were certified by DoBE were sanctioned along with some minimum new additions (new facility) of around 122 equipments. Accordingly, generalized specification, technical comparisons and demos were arranged that also involved vigorous market survey. In addition to this, DoBE was actively involved in providing the list of equipment required with their specifications for the new upcoming TMC satellite centers across India, within the required time frames.

## **Central Registration Office (CRO)**

The Central Registration Offices for the General and Private Out Patients Department (OPD) was managed by Mrs. R.M. Chhabria and Mr. Sreenivas Sunkarapalli respectively. To make the process of registration for patients easier and faster, they had a team of 112 staff members. These persons were usually the first point of contact for persons who required availing of the hospital services. The front office staffs were deputed in areas for Registration, Billing, Enquiry, Appointments and Certificate Issuing counters.

While general OPD saw upto 30,000 new case registrations, the private OPD saw cumulatively (including new registrations and second opinion) more than 35,000 new cases. With a view to decongest the OPD areas, few infrastructural and process changes were made in the OPDs.

- Counters catering to non-clinical facilities such as the Mahatma Jyotiba Phule Jan Arogya Yojana (MJPJAY) scheme and the report printing counters, were relocated out of OPD enclosure that resulted in less crowding of the OPD area
- Collection and disbursement of Cost Certificates was centralized to avoid patient movement across different counters
- Electronic calling and token system was introduced in the sample collection area to obviate the need for patients to stand in long queues for several hours
- An additional billing counter was functional from 7.00 am i.e. before the regular hours of the OPD department to cater to patients visiting exclusively for billing purposes and early morning blood tests.

Statistics during the period from January 2017 to December 2017

Patient Registration	General	Private	Total
New Files	29319	15136	44455
Referral (RF) Cards	-	21851	21853
Total			66308

	General	Private	Total
Number of Railway Concession issued	134919	72592	207511

## **Central Sterile Services Department**

#### Mr. Rajeev G. Sawant,

Head (Till August 2017)

The Central Sterile Services Department (CSSD) processed, issued and controlled the sterile stores supply to all departments of the hospital. The CSSD dealt with receiving, cleaning, packing, sterilizing, storing and distributing all surgical instruments and equipment as per well-delineated protocols. The department provided their services to 23 operating theatres and other related areas in the hospital.

The department was well equipped with state-of-the-art, five steam sterilizers, one ethylene oxide sterilizer, two plasma sterilizers, one washer disinfector and one ultrasonic cleaning machine. The department provided uninterrupted service for patient care needs with twenty loads of steam sterilizer, 30 cubic feet materials, one load of 5 cubic feet of gas sterilizer per day and 6-8 loads of 5 cubic feet of plasma sterilizer per day. Several other items like gowns, linen packs, gauze gloves etc. were all sterilized and/or provided to service the needs of the hospital. It was planned to install one washer disinfector for thorough cleaning of robotic instruments; one 30-liter and 60-liters ultrasonic cleaner to manage with increasing load; and to enhance the cleaning quality in 2018.

The department was ready for National Accreditation Board for Hospitals & Healthcare Providers (NABH) accreditation.

## **Medical Social Services**

#### **Mr. Ramkrishna Bhat,** Officer in Charge

The Medical Social Services department was a crucial part of the health care team that helped patients navigate through the complex journey of cancer treatment process. Patients at TMH were faced with several challenges due to diverse cultural, social, and linguistic barriers. The Medical Social Workers (MSW) helped to address these concerns to the best extent possible by participating in the patient's journey of cancer treatment. The MSW network helped the patients' need of finance, accommodation, referral and rehabilitation. During the year 2017-2018, MSW acted as a contact point to more than 30000 patients guiding them through care process at TMH, evaluating and assessing them for their needs and connecting those with resources.

More than 10000 patients were supported with medicine concessions on medicines worth more than a crore of rupees. More than 2000 patients were provided with low cost or free accommodation at Borges memorial, a TMC undertaking.

The MSW team tirelessly worked to collect funds through individuals and institutional donors to support patients; in 2017, an amount of more than 20 crore was disbursed to needy patients.

The seed funding initiative to support patients in the initial phase of treatment before patients could arrange for alternate financing sources had continued to benefit the patients. In 2017, about 760 patients were provided direct financial support under the seed money policy to the tune of INR 60 lakh.

The MSW team also assessed patients for eligibility for various financial schemes such as government run MPJAY, CMRF, HM Fund, PM Fund and other private agency such as ICICI, SBI, and HDFC etc.

Taking a step further in cancer care, the department helped to take care beyond the hospital by conducting home visits for patients who defaulted for radiotherapy treatment.

The departmental staffs were active members in "Kevat - A Patient Navigation Program", the first of its kind in the country that aimed to create a task force of professionals who would help patients get seamless care in the complex journey of cancer care.

The department organized various educational and recreational activities for the patients and their relatives.

## Pharmacy / Dispensary

## Mr. Pravin Baviskar,

Pharmacist

The Dispensary and Pharmacy team of 16 permanents and 30 contract pharmacist catered to more than 10 lakh prescriptions per year for out- and in- patients annually.

The department functioned round the clock 24 x 7 and the three pharmacy outlets generated 933640 sales memo. The daily transactions exceeded 2600 per day and the annual turnover in year 2017 was over INR 220 crore. Medicinal concessions were offered to more than 11000 patients to the tune of over INR 1.3 crore.

The department had arranged an educational program for Pharmacists called PACE (Pharmacy – Continuing Education) that was certified by the Indian Hospitals Pharmaceutical Association (IHPA).

The topics covered included:

- Inventory Management
- Soft Skills & Communication skills
- Double Check & Patient Counselling
- Handling Look alike & Sound alike Drugs. •

This program was expected to help the pharmacy staff to upgrade their skills, brush up their basic knowledge and stay abreast with the latest happenings in medical field.

The department also trained the pharmacy staff joined in other units of TMC to ensure uniform pharmacy care at all units of Tata Memorial Centre.

## **Quality Management**

## Mrs. Chitra V. Hingnekar,

**Quality Manager** 

The Quality Management team was the behind- the- scene silent members that ensured that the safety and the quality of service provided to the patients was consistently of highest standards. They saw to it that the clinical department heads and laboratory officers in charge obtained the continual grant of accreditation by the National Accreditation Board for Testing and Calibration Laboratories (NABL) – a constituent board of Quality Council of India (QCI), through the on-site reassessment held every March.

To maintain the continued compliance to the standards of ISO 15189:2012 and the relevant requirements of NABL, regular training programmes were conducted for the existing and new staff on various aspects of Quality Management, Pre analytical, Universal Safety Precautions, Bio waste Management, Fire Safety and Information technology by the Quality Manager in coordination with the respective TMH staff representatives.

Being a part of the multidisciplinary safety committee, the members ensured that all patient related incidents / accidents in the hospital were reported. The reported incidents were reviewed and, proposed corrective and / or preventive measures were enforced. This evoked a sense of responsibility within the staff for working towards making the hospital safe, as it encourage them to report the incidents. The committee reviewed 411 incidents reported in 2017 during the quarterly meetings.

## Staff Clinic

Dr.Sandeep Tandon, Head

Dr. Pankaj Rajput Dr. Shabina Ansari

In 2017, new initiatives were introduced like staff access to their investigation reports online through the Employee Portal, scanning of staff ECGs and incorporating them in the portal. Efforts were on the way to cut down local purchases by making optimal medications available in TMH dispensary by identifying them as fast moving items. Online Medical Certificate Issue had been initiated, thus saving paper and ensuring online records were maintained.

#### Service

The Staff Clinic provided healthcare to **2398** TMH staff, including 1490 super staff, 908 labour staff (including their dependents) for their day-to-day ailments. In 2017, the Staff Clinic had approximately **42327** consultations, 383 preemployment examinations, 217 Hepatitis B vaccinations and 99 Needlestick injuries.

#### Education

Though the staff clinic OPD was perpetually packed with around 150 to 200 staff patients daily, every possible opportunity was used to educate the staff about their illness and positive health by encouraging and conducting checkups for early detection of modifiable and treatable risk factor for lifestyle diseases like Hypertension, Diabetes, and Dyslipidemias. Staff was educated about the importance of hepatitis B vaccination and ensured completion of vaccination.

#### Research

There was ongoing work on computerizing health related data of all TMH staff including administrative staff and health care workers, to identify staff with increased risk for various lifestyle diseases which would help in preparation and timely execution of appropriate interventional policies focusing on these individuals to reduce long-term disease morbidity.



## Departments

Atoms for Cancer Care

**Dr. Jigeeshu Divatia,** Head

Dr. Kailash Sharma, **Director**, 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

## Anaesthesiology, Critical Care & Pain



Dr. Sheetal Gaikwad Dr. Sukhada Sawarkar Dr. Debashree Lahiri Dr. Bindiya Salunkhe

The department comprised of 28 permanent staff (including one at Homi Bhabha Cancer Hospital, Visakhapatnam), 34 senior residents (including 1 fellow) and 63 post-graduate students [including 6 DM (Critical Care) candidates].

## Service

Eighteen thousand one hundred ninety (**18190**) patients were given anesthesia in the year 2017. Pre-anesthetic evaluation was done on **21538** patients. There were **2218** Intensive Care Unit (ICU) admissions and **12626** patients were admitted in the recovery ward. The Pain section offered treatment to **15298** patients.

The department continued to render their services to the Homi Bhabha Cancer Hospitals in Sangrur and Visakhapatnam.

The department recently started providing anesthesia services to patients requiring anesthesia for undergoing Magnetic Resonance Imaging. The department also introduced services for Endobronchial Ultrasound (EBUS) procedures in Intervention Radiology. Seventy-one (**71**) cases of EBUS were performed with no anaesthesia-related complications.

## **Education**

The department conducted the annual Anaesthesia Review Course (ARC) for post-graduate students, which was a threeday course. The Critical Care division held an annual twoday workshop on hemodynamic monitoring (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.

## Research

The department had more than 40 clinical studies that were either completed or ongoing in 2017.







Dr. Nitin A. Inamdar, Office in Charge

Dr. Mukta Ramadwar Dr. Meera Ghadge Dr. Pranab Sadhukhan Mrs. Purva Naik Dr. Geeta Rathnakumar Dr. Bhoopal Shinde Mr. Tanaji Matle Mrs. Madhuri Godambe

## **Clinical Biochemistry**



The department of Clinical Biochemistry provided routine analysis relying on random access automated analyzers with multiple methodologies like, photometry, turbidimetry, CMIA, rate nephelometry and gel electrophoresis. A number of manual assays and urinalysis were also performed, along with certain Vitamin assays, selected enzyme activity assays, tumor markers, glycosylated haemoglobin, Immunoglobulins, serum protein electrophoresis and Immunofixation, VMA and 5HIAA.

### **Service**

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

There was optimization of specimen handling protocols that minimized turnaround times for critical service areas of the hospital.





Tumor marker assays and serum protein electrophoresis formed an important part of department and had attained the status as national reference center for marker assays.

The department offered **3360366** biochemical test service to 391853 patients and **224449** Tumor marker tests and electrophoresis services to **93806** patients in 2017. There was 22.96% increase in biochemistry and 19.87% increase in Tumor markers workload.

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

## **Education**

The department continued its bi-annual Advanced Clinical Biochemistry training course and conducted the annual CME & workshop in Clinical Biochemistry.

## Research

Research was focused on studying the biochemical parameters in Neuroblastoma and the role of serum free light chain measurement and Bence Jones proteins in the diagnosis of Multiple Myeloma. **Dr. Bharat Rekhi**, Office in Charge

Dr. S. V. Kane

## Cytopathology



The department of Cytopathology offered screening and diagnostic services with a Turnaround time of less than 48 hours. The on-site adequacy testing of Fine Needle Aspirations (FNA) was extended to Endoscopic Ultrasound guided FNAs' and proved to be a boon to both, the clinicians and the patients.

Liquid Based Cytology (LBC) service was launched as an additional test modality that improved the diagnostic yield.

The department continued to be accredited for diagnostic services by the Indian Academy of Cytologists (IAC) and the National Accreditation Board for Testing & Calibration Laboratories (NABL) and, also for training and examination by the IAC. Twenty (20) immunomarkers were accredited by NABL in the year 2017.

The department also provided national level External Quality Assurance System (EQAS) cytopathology service for various laboratories in India.

#### Service

The workload of the department comprised **25207** samples (**100828** smears that included; **3810** exfoliative gynecological, **12961** exfoliative non-gynecological and **8436** fine needle aspiration cytology samples. As compared to the previous year, an increase of 0.36% non-gynecological and 2.55% FNAC

samples and a decrease of 4.86% gynecological samples (due to decrease in samples received from Preventive Oncology) was observed. Immunocytochemistry (ICC) service (with 30 validated immuno-markers) was provided to 94 samples of FNAC in challenging cases. Here Immunocytochemistry was carried out on destained smears where extra sample was not available. This service was accredited by NABL during onsite audit held in 2017.

EQAS Diagnostic Cytopathology service with two cycles of the Proficiency Test series showed a 16% increase of participants (from 225 - 260) compared to the previous year.

### Education

Interesting cytology cases were 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 were taken.

## **Dental & Prosthetic Surgery**

Dr. Kanchan P. Dholam, Head



Dr. Sandeep V. Gurav

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

## Service

In the year 2017, a total of **13285** patients were seen by the dental department. Oral prophylactic services were offered to **1183** patients. Dental prophylaxis using Fuoride Gel Application was offered to **3237** patients. Tooth extraction was performed on **46843** patients. Prosthetic rehabilitation was offered to **1102** patients that included Maxillary, Guide Plane, Radiation protection, Tongue, Palatal augmentation etc.

Dentures (complete / partial), Occlusal guards and extra-oral prosthesis were also offered. Sixty one (61) Implant retained intra-oral prosthesis were also performed.

One hundred (100) patients were treated with implant retained oral rehabilitation (total of 369 implants placed) under NOMURA Dental Implant Project.

## Education

The department of dental and prosthetic Surgery, TMH in coordination with Noble Biocare conducted a training course in Zygoma Implant in March 2017.

A fellowship training program in Oral Oncology and Maxillofacial Prosthetics was also organized.

There were seven (07) observers in the dental department.

#### Research

The ongoing projects included; development of improved indigenous dental implants: Phase I: the evaluation of quality of life in head & neck cancer patients following implant supported dental rehabilitation and the effect of leucocyte rich fibrin on healing of drug - induced osteonecrosis of the jaw. **Dr. Shaesta Mehta,** Head

Dr. Prachi S. Patil

## **Digestive Diseases & Clinical Nutrition**



The department of Digestive Diseases & Clinical Nutrition (DDCN) was involved in the work-up and management of patients with Gastrointestinal and Hepato-pancreatico-biliary cancers. In addition, the department provided gastroenterology & hepatology, endoscopy and clinical nutrition services for all DMGs and hospital staff.

## Service

The departmental members performed almost **7500** procedures (endoscopic & non endoscopic) and offered their consultations to more than **20000** patients.

A total of **7168** endoscopies were performed, of which, **1783** were therapeutic. Over **200** Endoscopic Ulrasonographic examinations were also performed.

The Hepatology clinic saw over **2500** patients and more than **250** Endoscopic Retrograde CholangioPancreatography (ERCP) examinations were performed; both for diagnosis as well as for therapeutic reasons. The Nutrition clinic offered their services to over **18000** patients.

## **Education**

The 6 - month Basic Endoscopic certificate program was continued and the department conducted regular lectures on nutrition for students pursuing dietetics. There was an ongoing exchange program with resident doctors from KEM hospital in Mumbai.

#### Research

There were a total of 15 ongoing research projects. The recent focus had been on the risk of hepatocellular carcinoma in patients with chronic liver disease of viral etiology and iron deficiency and, on Aspirin for Dukes C and high risk Dukes B colorectal cancers, an international multi-centre double blind, randomized placebo controlled phase III trial.

## **Digital Library**

Mrs. Deepali V. Kuberkar, Head (From April 2017)



The Digital Library continuously served the clinicians, researchers and aspiring academician for their various information needs.

There was space allocated for consultation with the departmental research informationist (reference) team, as well as, areas to collaborate with colleagues or for individual study and reflection. This was reflected in an average of 45 users visiting every day for consultation and the use of Computer Cell facility. Another regular feature was of telephonic communication with the end users for problem solving, assistance and information need that increased over time.

## Service

The digital library built its collection and met the core objectives of the organization by way of providing access to arrays of e-resources. Besides these, the library holdings consisted of more than **8120 books**, nineteen thousand two hundred fifty (**19250**) **bound Volumes** in print format, and about **900 Theses**. The library subscribed to **180 journals**; 109 of which were available online. Some of the core clinical e-databases such as BNF (British National Formulary), CINHAL, TNM Atlas, UpToDate and Clinical Key were subscribed continuously. In 2017, the library added (147) print books to its collection. As a DAE consortia member, the digital library had access to Science Direct database that was a major source of information.

The library started using Koha, an open source Integrated Library System (ILS), for circulation and other activities; while DSpace was now operational and used for Institutional Mr. Jagdish Sharma

Repository. The library had indexed about 463 staff publications and was in the process of adding educational videos. The library's web presence was enhanced with the effective use of Web-OPAC. There was a similar growth in terms of Remote Access provided through EZ-Proxy.

The Document Delivery Services offered to TMH users was extended to other libraries. There were 364 requests for a total of 1193 documents of which, 1081 (91%) articles were provided.

Recently, access of online digital content

to all TMC Centers was initiated. UpToDate database was now also accessible to HBCH Sangrur, HBCHRC Vishakhapatnam and BBCI Guwahati.

## Education

Library orientation was always an annual activity for the benefit of newly joined students in various disciplines. Besides hands on instruction to the end users using computer cell facility, library had also organized a training session for the effective use of CINHAL database for the benefit of nursing staff and students. Similarly, UpToDate database training was imparted at the Dr. B. Borooah Cancer Institute for the benefit of clinicians and other staff.

## Research

Usage statistics reflected past, current and future trend of user information needs. It also acted as a tool for assessing the value of resources and services offered.





**Dr. Aruna Alahari Dhir,** Head

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

## **General Medicine**



The department of General Medicine provided both outpatient and inpatient consultation services for management of medical co-morbidities of patients undergoing surgery, radiotherapy and chemotherapy. The staff members also provided valuable inputs in the ICU management of patients. Bedside echocardiographic facility was of great assistance in emergencies.

### Service

Apart from management of common medical issues like diabetes, hypertension, ischemic heart disease, asthma, COPD etc, the department was also involved in treating chemotherapy and radiation induced toxicities; management of infections in the immuno-compromised patients especially HIV; management of acute complications in critically ill




oncology patients, including infections, pulmonary complications, cardiovascular disease and metabolic disorders.

The department provided a total of **14400** consultations during the year that also included those from the specialty clinics. 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 their optimal treatment for cancer.

Patients who could not attend the OPD were advised on telephone.

# **Education**

The cancer thrombosis working group of the hospital conducted quarterly meetings. The faculty was also involved in training the staff in hospital infection and conducted classes for the M.Sc nursing students.

# Research

Research was focused on early detection of cardiotoxicity in patients on treatment for cancer and in cancer survivors.

Mr. Mahesh Sadashiv Mangrulkar, Head

# **Information Technology**

Mr. Vivek Narayan Marathe Mr. Sanjaykumar Sinha Mrs. Charulata Rakesh Nimje Mr. Pravin Madhukar Kalsekar Mrs. Sandhya Ravindra Joshi Mr. Manoj Sadashiv Chavan



The Information Technology (IT) department had developed a comprehensive integrated Hospital Information System (HIS) and effectively managed clinical, financial and administrative aspects of the hospital. The HIS was userfriendly with ease of use and, most of the modules were web-enabled. New features and functionalities were continuously added to cater for ever changing user requirements. The HIS ran 24x7 on IBM power Server with DB2/400 Relational Database Management System. The patient Electronic Medical Records was available on intranet as well as on the internet. The HIS enabled modules were to be implemented in a phased manner, providing for greater flexibility to meet the user needs while protecting investment and minimizing the impact of change.

The department of Information Technology (IT) was instrumental in making this institution an almost paperless, cashless and a filmless one.

## Service

During 2017, 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. Recently, the TMH software was integrated with the Radiation Medical Centre, so that there was seamless bidirectional flow of clinical information.

The new mobile application called TMH-Disha was launched successfully and benefitted the patients in locating and navigating to various service areas within the hospital campus with ease.

The newer innovations included the new Website, the Web based CIS for breast disease management group, Implementation of web based modules at TMH, ACTREC, Vizag and Sangrur, tracking system for Molecular pathology department, implementation of tube scanner for Tumor Tissue Repository System, DICOM images interfacing for Radiation Oncology Information System etc.

#### **Education**

Training was given to nurses on computer concepts, Hospital Information System, Microsoft office and IT related topics. Laboratory staff was trained to use Diagnostic Information System effectively.

#### Research

Data analysis was regularly done for Clinical Information System, Patient Administration, Billing & Receipting system, Diagnostic Information System, Radiology Information system, Operation Theatre module etc. that provided data for clinical research.

# **Medical Graphics**

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



The department of Medical Graphics comprised of two main divisions; the Medical Illustration and Medical Photography, and Videography. The departmental team worked with medical professionals to document the disease and kept a record of it.

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 distant learning. The department procured a High-end 2400 DPI film scanner for the digitization of radiographic images.

In the year 2017, the Medical Graphics department clicked **13356** Clinical photographs and **21646** non-medical photographs. They extended their support in form of **715** Artworks / Desktop publishing, **123** medical posters making, and created **46** medical illustrations. For the surgeons, they video recorded **64** surgeries.

The medical artist, photographer, videographer and layout artists formed the backbone of the department. As an important part of healthcare system, they obtained clear and accurate photoimages / videos of the disease. This helped the clinicians in the analysis and treatment of the disease and, also for educational and research purposes.

Using high-end 4K video cameras, the department helped in live broadcasts of various surgical procedures, workshops and conferences to audiences across the country.

Various specialized techniques such as, macro photography of the lesion, thermal imaging, endoscopic cameras (to record internal organs) and infrared photography (to record outside of the visual spectrum), were also used for the benefit of the clinicians.

The department extended support to the entire hospital during conduction of their conferences, and CME programs, from designing to audiovisual support.

Photography of visiting dignitaries, of social functions, press conferences, etc. were also performed.

The department archived all the images for the future.

Dr. DD Deshpande, Head

#### Mr. RA Kinhikar Mr. Rituraj Upreti Mr. Yogesh Ghadi Mr. Shrikant Kale Mr. Ritesh Mhatre Mrs. Udita Upreti Mrs. Dheera A Mr. Libin Scaria Mrs. Priyadarshini Sahoo Mr. Avdhoot Sutar

#### ACTREC

Ms. SV Jamema Mrs. Ph. Reena Devi Mrs. Siji Nojin Paul Mr. Kishor Joshi

# **Medical Physics**



The department of Medical Physics looked into all aspects of the various radiotherapy machines, their maintenance and the implementation of radiation safety protocols in the hospital. Their primary function included Calibration, Quality Assurance, maintenance of teletherapy and brachytherapy machines, treatment planning & dosimetry for treatment of radiotherapy patients, procurements of radioactive sources and overlooking the radiation safety measures for the staff.

The department was actively involved in dosimetry, data acquisition of various Telecobalt machines, Linear Accelerators and brachytherapy machines. The planning & execution of sophisticated techniques like 3D Conformal treatment with Multi-leaf collimator (MLC), Stereotactic (SRT/ SRS) and Intensity Modulated Radiotherapy (IMRT), Image Guided Radiotherapy (IGRT) treatments were some of the advanced & skilled jobs carried out by department staff.

The department also advised other departments like Diagnostic Radiology, Transfusion Medicine, Tissue Bank, Bioimaging and ACTREC for their requirements of radiation protection, Q & A, source procurement and disposal as per AERB guidelines. The department was also involved in planning of RT rooms, equipment specifications etc for new peripheral centres in Vizag, Mullanpur and Varanasi.

#### Service

The departmental work and execution was done in sync with the department of Radiation Oncology. There were 6 Linear Accelerators, 4 Telecobalt machines for RT treatment and 2 simulators (conventional and CT simulator) for treatment and planning of teletherapy. Brachytherapy patients were treated with Ir-192 HDR after-loading machine. 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), 3-D Dosimetry System (Octavius), TLD reader (Rexon), Film Dosimetry System (Omnipro), Gafchromic Film dosimetry system etc.

The department had kept up with the international standards of dosimetry by participating in International IAEA / WHO / BARC dose inter-comparison and many other clinical trial protocols like RTOG / ESTRO etc.

The department planned **6423** cases of external therapy with **2379** TPS plans for complex techniques, like 3DCRT, IMR etc. and **1530** cases of brachytherapy (2722 applications) in 2017.

#### Education

The first candidate successfully completed Ph. D in Medical physics under HBNI. The staff members imparted education and training in the radiation physics to physicists, doctors, nurses, technologists and many visiting national and international (IAEA) trainees. The department conducted a 2 - year Diploma of Radiotherapy Technologist's that was recognized by MSBTE.

#### Research

Many research projects were carried out by the department. In 2017, the department focused on "Code of practices for small field dosimetry".

# **Medical Oncology**

Dr. Shripad D. Banavali, Head



Dr. Sudeep Gupta Dr. Kumar Prabhash Dr. Navin Khattry Dr. Manju Sengar Dr. Anuradha Chougule Dr. Amit Joshi Dr. Jaya Ghosh Dr. Tushar Vora Dr. Vanita Naronha Dr. Jyoti Bajpai Dr. Bhausaheb Bagal Dr. Girish Chinnaswami Dr. Gaurav Narula 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 (From August 2017) Dr. Nirmalya Roy Maulik (From December 2017)

The department of Medical Oncology dealt with systemic cancer 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 cutting-edge clinical research to both adult and pediatric patients with cancer, and at the same time, provided outstanding training opportunities to medical students from across the country and other Low and Middle Income Countries (LMICs).

Unlike surgery and radiation therapy, cancer patients needing systemic therapy not only got multiple cycles (4 to 6 cycles and up to 3 years of therapy, as in Acute Lymphoblastic Leukemia) of therapy upfront, but could also receive multiple (up to 6 or even 8) lines of treatment in presence of resistant / progressive or relapsed disease. These systemic therapies were not only given before local therapies (neo-adjuvant setting), but also along with surgery / radiation therapy, after local therapies (adjuvant setting), as maintenance therapies in curative settings, and also as palliative therapies in advanced cancers to improve quality of life. Considering the limitation of in-patient beds, most of the treatment were now executed on outpatient basis in the injection room or in the Day-Care ward. Also, wherever expertise was available, patients were referred back to their place of residence to take chemotherapy cycles.

#### Service

The work - load on the department could be gauged by the fact that members of the department attended to **31,924** new patients in 2017. There were **13359** in-patient admissions and **172662** day-care admissions; **310295** patients were attended in the OPDs and **38145** in the casualty. Twenty five thousand fifty three (**25053**) procedures were performed in the Minor OT that included bone marrow aspirations and biopsies; lumbar punctures and intrathecal injections, and tapings (pleural, ascetic, etc.). All this was executed by only 23 faculty members who were organized into 11 different management groups along with the help of nearly 80 efficient and hardworking residents and fellows. Because of development and availability of various immunohistochemistry, flow-cytometric, cytogenetic and molecular tests

at TMH, the department offered risk stratified and personalized therapies that helped not only to decrease sideeffects and costs of treatment, but also helped improve outcomes of the patients.

The Paediatric division provided comprehensive medical diagnostic, counselling, management, follow-up and palliative services to children below 15 years of age having cancer. Two thousand one hundred and sixty four (2164) patients of less than 15 years of age were registered at TMH in 2017 and, another 2433 children were attended to as second opinion or for investigations. The high costs of curative therapies along with the severe socio-economic constraints that the majority of the families had, coupled with the highly curative nature of most paediatric malignancies, the group recognized 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 170 Million Indian Rupees to provide financial aid, accommodation, nutrition, continued education, sporting and fun activities, outings and cultural programs, to these paediatric cancer patients as part of its service program. All this helped to keep the Treatment Refusal & Abandonment (TR & A) rate below 4% and at the same time improved 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**

There were nearly 100 doctors being trained in medical oncology annually at TMH, and they included 64 DM (Med-Onc), 12 DM (Ped-onc), 3 Fellows in Hem-Onc/BMT/ Molecular Oncology, 4 PhD students and many observers / fellows from across the country and especially from African and SAARC countries.

### Research

The departmental members were Principal Investigators of 32 new projects approved by the Institutional Ethics Committee in 2017 and were co-investigators of many more. They were part of 107 pub-med indexed publications in 2017. The department members were also Principal Investigators of 2 practice changing papers in the field of Head & Neck and cervical cancers that were presented in international meetings and later published in prestigious journals.

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, would be offered to patients' across the country at a very reasonable and affordable rate.

# **Medical Oncology Molecular Laboratory**

**Dr. Shripad Banavali,** Head



Dr. Kumar Prabhash Dr. Anuradha Choughule

Medical Oncology Molecular laboratory was started in 2005 and was the first diagnostic molecular laboratory at Tata Memorial Hospital using conventional as well as real time Polymerase Chain Reaction (PCR) techniques. It subsequently added sequencing and Next Generation Sequencing (NGS) as part of its diagnostic and research work. This laboratory was involved in 70 % diagnostic and 30 % of research work.

## Service

The laboratory provided molecular tests for predictive marker in cancer management. Many tests developed by the laboratory were standardized and proved to be cost effective to the patients. Single or multiple genomic tests were offered. The report provided included mutations in Epidermal Growth Factor Receptor (EGFR), Kirsten Rat Sarcoma viral oncogene homolog (KRAS), Epstein - Barr virus (EBV), Dihydro-Pyrimidine Dehydrogenase (DPD), c-kit, Human Epidermal growth factor Receptor 2 (Her-2/neu), Phosphoinositide 3-Kinase (PI3K) and Mesenchymal-Epithelial Transition factor (MET). Quality assurance was performed using the College of American Pathologists (CAP) testing with the in-house Tagman primer probes to check the specificity of quantitative PCR. There had been participation in the National Accreditation Board for Testing and Calibration Laboratories (NABL) control program. Liquid biopsy and NGS platform formed a part of the diagnostic tests performed.

Newer tests included:

• A multigene limited panel of 15 genes on *Formalin-Fixed Paraffin-Embedded* (*FFPE*) samples had been stratified on Next Generation Sequencing (MiSeq NGS) • Liquid biopsy was offered for EGFR testing on patients without adequate biopsy for molecular testing.

More than **2200** samples had been examined in 2017.

## **Education**

Twenty five (25) persons were trained on molecular techniques in 2017. The DM Medical Oncology students were rotated through the laboratory every year. There had been active joint collaboration with the various research laboratories at ACTREC for cancers of lung, gall bladder and thyroid gland.

#### Research

Molecular profiling of adenocarcinoma in Lung cancer (400 patients) was completed. Clinical validation of EGFR and DPD mutations were done.

Some of the ongoing research projects included:

- Molecular profiling of squamous cell cancer and small cell lung cancer (approximately 600 patients)
- Genomic profiling in Thyroid carcinoma (approximately 1000 patients)
- Beta Adrenergic receptor in Bone and soft tissue
- Study to evaluate the prevalence of EGFR mutation status in Small cell lung cancer in India
- Study to evaluate the prevalence of EGFR mutation status in esophageal cancer.

**Dr. Rohini S Kelkar,** Head

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

# Microbiology



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 haematolymphoid 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 210373.

The number of tests performed by the department showed an overall increase of 9.3 % in this 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 (for 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.

# **Molecular Pathology**

**Dr. Sangeeta Desai,** Officer in Charge



The Molecular Pathology department performed various molecular techniques for the diagnosis, prognostication and prediction of solid tumors. Clinically relevant 6 new molecular diagnostic assays were introduced in the year 2017 using diverse testing platforms.

As per the WHO 2016 molecular classification of CNS tumors, Medulloblastoma molecular profiling Panel (12 genes and 10 miRNAs) were introduced along with *TERT* and histone mutation analysis for Gliomas. *IRF4* gene rearrangement assay and *RHOA* mutation analysis were introduced to resolve differential diagnosis of Lymphomas. Dual Color Dual Hapten in situ Hybridization assay (DDISH) for *HER2/neu* gene amplification was standardized and introduced for routine diagnostic use as well.

# Service

The molecular pathology laboratory was the most preferred referral laboratory for PCR, FISH, Gene sequencing and MLPA



Dr. Omshree Shetty

in oncology in India. A total of **4672** requisitions were received in the year 2017. There was a 19.5% increase in the requisitions as compared to the previous year. All the molecular diagnostic tests were performed as per the NABL norms. The laboratory also participated in the College of American Pathologists (CAP) Proficiency Testing program and UK NEQUAS proficiency testing.



PCR: Polymerase Chain Reaction; FISH: Fluorescent In Situ Hybridization. MLPA: Multiplex Ligation-dependent Probe Amplification; GEP: Gene Expression Profile.

# **Education**

The department continued to offer its one-year fellowship under the molecular pathology academic program. The department conducted a week long "Hands on training course" in Molecular Diagnostics in June 2017.

#### Research

Gene expression profiling and Taqman Low Density Arrays (TLDA) were being performed to explore the NFkB, PI3K pathways in Lymphoma. FlexiFISH was being standardized to reduce the time required to complete the FISH run from two days to 8 hrs in order to improve turnaround time. Similarly, multigene FISH was also being validated.

**Dr. Venkatesh Rangarajan,** Head

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

# **Nuclear Medicine & Molecular Imaging**



The department performed the largest number of PET/CT scans in India and in South Asia. The department had two PET/CT scanners and one SPECT/CT scanner. A hospital radiopharmacy and the medical cyclotron facility of BRIT supplied the radiopharmaceuticals for its use. The department proposed the creation of radioisotope therapy ward facility, in liaison with the Atomic Energy Regulatory Board and included setting up of a state - of - the - art radiopharmacy, meeting the regulatory requirements for therapeutic radiopharmaceuticals.

## Service

The department performed **16081** PET/CT scans using various radiopharmaceuticals. It performed **3947** SPECT and general nuclear medicine studies. Thirty eight (**38**) therapeutic procedures were performed for thyroid and liver cancer.

The department also managed the PET/CT scanner at ACTREC on time share basis and performed **1315** FDG PET/CT scans there.

## **Education**

The department conducted MD in Nuclear Medicine with 6 seats and post graduate diploma in Fusion Imaging Techniques with 10 seats. It offered observership and apprenticeship programmes for physicians and technologists. There were four such observers in 2017.

#### Research

The project "Standardizing interpretation criteria for early response evaluation with 18F-FDG PET/CT in PAEDIATRIC LYMPHOMA", a coordinated research project under International Atomic Energy Agency was completed in 2017.

The department joined the Coordinated Research Project on use of PET–CT with Gallium-68 Labeled Prostrate Specific Membrane Antigen in the diagnosis and follow-up of patients with prostate cancer (E13046).

Besides collaborating with Bhabha Atomic Research Centre (BARC) in radiopharmacy, the department also entered in an agreement with Netherland on Bionics under the IndoDutch collaboration.

# Nursing

**Ms. Swapna Joshi,** Superintendent



Ms. Anita D'Souza, Principal Ms. Manisha Pawar, Vice-Principal Ms. Carmine Lasarado, Deputy Nursing Superintendent

Assistant Nursing Superintendents Ms. Pathepa Jagdish Ms. Manorama Anilkumar Ms. Sindhu Nair Ms. Shweta Ghag

The Nursing department included 600 nurses, 21 nursing - in charges, nurse specialist such as Enterostomal therapist, pain nurse, infection control nurse, Central Venous Access Device (CVAD) nurses, 3 nursing academicians and 5 nursing administrators. They were responsible for delivering highest quality cancer care to patients of all ages across the continuum of care that included prevention, symptom management, survivor ship and, end - of - life care in clinical settings including outpatient and inpatient areas.

The departmental infrastructure supported nurse driven research, educational initiatives, mentoring and development of clinical nurses, administrators and trainees. With 81 newly recruited nurses, the department took a step forward in delivering compassionate and evidence based care for cancer patients.

#### Service

The dimensions of patient safety remained important with special focus on prevention of medication errors and prevention of accidental falls of patients. Better signage's and the provision of safety belt to patient transfer system succeeded in prevention of falls. Double verification of high risk medication was initiated to prevent medication errors.

The Nursing-led Clinics included:

**CVAD Clinic:** With specialist nurses in CVAD Clinic, two thousand seven hundred forty three (2743) PICC line

insertions were performed and a total of **32174** patients were counseled and, patients educated in dressing and flushing of central line catheters.

**Stoma Clinic:** A total of **6469** patients were educated in stoma management. The education involved demonstration and taking return demonstration to equip them better for stoma care at home.

#### **Education**

The department conducted 15 days train the trainer programme in Indian National training Programme in Pediatric oncology nursing from 2nd January to 14<sup>th</sup> January, 2017.

In collaboration with National Cancer Grid, Oncology Association of India headed by Ms. Prathepa Jagdish as President and Ms. Anita D'Souza as secretary of ONAI were involved in training programme of 155 nurses in Guwahati, Assam.

The palliative nurses were involved in training 90 nurses from various institutions and the BARC hospital in teaching symptom management for palliative care cancer patients.

#### Research

Nurses were encouraged to conduct studies with focus on improving patient care.

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

# **Occupational Therapy**

The Occupational Therapy department enabled individuals to achieve personal productivity, wellbeing and quality of life through assessment, goal setting, interventions and partici-pation 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 Outand In- patients at TMH. In the year 2017, department treated **9452** Out- and **3009** In- patients (12461) with **4589** new patients and **7872** patients on follow up. In addition to regular rehabilitation, the department fabricated 27 low temperature thermoplastic splints, provided **203** Orthosis, 240 Taylors braces, 15 Temporary above knee and below knee prosthesis and 26 Limb prosthesis to TMH patients on OPD and IPD basis.

The extension of occupational therapy department "the Rehabilitation and Research Centre" (RRC) at Dr. Ernest Borges Memorial Home (EBMH), Bandra manufactured and supplied 810 Jaw stretcher keys, 36 Lymphedema kits to TMH dispensary. A total of 208 patients received occupational therapy and 811 follow-up visits were recorded for occupational therapy services at RRC, EBMH, Bandra in the year 2017.

## **Education**

The occupational therapy interns from L.T.M.C. Sion Hospital, Maharashtra University of Health Sciences, received regularly trained in Oncologic rehabilitation on their rotation posting at TMH.

The 5<sup>th</sup> Educational Program in honour of late Mrs. A. P. Tole was held in December 2017.

The department facilitated and hosted first time ever in India, the Certification in Lymphedema management (Vodder

Technique) of 135 hrs (9 days of classroom and hands-on training and 45 hrs home study) that complied with the educational standards set by Lymphology Association of North America (LANA).

The department facilitated the education of occupational therapy students from Mumbai's three prestigious institutes (Seth G.S. Medical College and K.E.M Hospital, T.N.M.C & Nair Hospital, L.T.M.M.C.& Sion Hospital). Students received education on principals of oncology practice and rehabilitation through special lectures taken for them by various departments at TMH.

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 entitled "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 also initiated an innovative project in collaboration with Indian Cancer Society on fabrication of vaginal dilators with measure for objective assessment of vaginal patency and visual feedback for patients for better compliance.

# **Palliative Medicine**

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



Dr. Mary Ann Muckaden Dr. Naveen Salins 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 Raighad District. There was augmentation of the home care model team to collaborate with local general practitioners in northern suburbs of Mumbai from Dahisar to Virar.

## Service

The department saw a total of **6858** new registrations, had **6376** follow-up patients and, home care was offered to **2121** patients.

There were a total of 3133 ward consultations and 438 respite palliative care admissions. The Hospice referrals numbered 213.

## **Education**

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

## Research

Research was focused on the early palliative care in head and neck and paediatric oncology, geriatric palliative care, palliative care needs survey in National Cancer Grid (NCG) centres and communication in oncology. Dr. Shubhada Kane, Head

# Pathology

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. Uma Sakhadeo Dr. Trupti Pai Dr. Subhash Yadav Dr. Katha Kante Dr. Aekta Shah

#### **ACTREC Staff**

Dr. Asawari Patil, Officer in Charge (OIC), Pathology Dr. E. Sridhar Dr. Swapnil Rane

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

## **Service**

The department performed **64914** histopathological examination in the year 2017 that included small biopsy, big specimen and referral material. Overall there was a rise in total number of TMH cases, approximately by 10% in 2017. Total number of frozen section cases reported was **5766**. The total number of immunohistochemistry cases reported was **52738** cases with the aid of **122242** immunostained slides.

#### Quality initiative

• External Quality Assurance (EQAS) program in Histopathology was continued in the year 2017 with 52 participants across India. A digital EQAS cycle was carried



Dr. P.G. Subramanian, OIC, Hematology Dr. Nitin Inamdar, OIC, Biochemistry, Mrs. U.A. Joshi, OIC, Surgical Pathology Laboratory Mrs. Manisha Kulkarni, OIC, Pathology Academic Program

out successfully in January 2017 with rapid turnaround time and great response from all the participants

 The EQAS for immunohistochemistry was successfully initiated and was ongoing for the laboratories under the aegis of the National Cancer Grid (NCG).

#### Education

The department had generated a system-wise catalogued teaching sets as learning modules that comprised of 8685 glass slides, 1425 gross specimens (Mounted and unmounted), lectures in digital format and the 344 books in departmental library. This facilitated enhanced learning for students / trainee / observers immensely.

## Research

Almost all medical staff members were Principal Investigators and co-investigators for the projects based on histopathology and molecular pathology related to their system subspecialty. The department published more than 50 original articles/ case reports in the peer reviewed indexed medical journals during the year.

# Physiotherapy

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



The Physiotherapy department interacted with the various DMGs and ensured optimum rehabilitation for better outcomes and increased patient satisfaction, through individualized therapeutic exercise program and with a wide range of state - of - the - art techniques.

#### Service

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.

A total of **18422** patients were offered physiotherapy services in the year 2017.

# **Education**

The department, in conjunction with six other disciplines was instrumental in organizing the 1<sup>st</sup> International Conference on Cancer Rehabilitation, CAN REHAB 2017 – A Multidisciplinary approach, at Tata Memorial Hospital. 250 delegates, 07 International speakers and 26 National speakers participated in the conference.

A six-month training program in Onco- Physiotherapy was conducted. Orientation program and training was imparted round the year to the students from various physiotherapy colleges and observers from other institutions.

## Research

The ongoing studies included a cross cultural adaptation of the Breast Cancer and Lymphedema Symptom Experience Index (BCLE-SEI) in three Indian languages; Hindi, Marathi and Bengali, and comparison of bio-impedance spectroscopy devices; and, effectiveness of compression garment in preventing breast cancer-related lymphedema: A randomized controlled trial. **Dr. Jayita Deodhar,** Officer in Charge

# **Psychiatry**



The multidisciplinary mental health professional Psychiatric department 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 the hospital staff. A liaison input was provided in specialized clinics like Survivors Clinic (After Completion of Therapy) and Palliative Care. Individual and group psychotherapeutic sessions were conducted and, the department worked to involve the patient and their care-givers by arranging psycho-educational and support activities for all, including the survivors.

## **Service**

A total number of **3141** patients were seen in 2017, including **1757** new referrals and **1384 on** followup. Twelve mentoring and capacity building group sessions were conducted for survivors of childhood cancer. Monthly support group meetings were facilitated by psychiatric unit for brain tumor patients. As per an intradepartmental audit conducted, improvement was seen on review in 100% of the patients with psychooncological interventions, as assessed by Clinical Global Impression-Improvement scale. The number of reviews ranged from 1 to 13, and the average number of reviews per patient was 3.

#### Education

Psychiatric unit undertook lectures in 29 training programs for the various departments of the hospital.

The World Mental Health Day on 10<sup>th</sup> October 2017 was celebrated with lectures and discussions on betterment of mental health and stress management.

#### Research

The current research projects of psychiatric department focused on the neurocognitive functioning in cancer patients undergoing treatment, spiritual/religious well being in cancer patients, pediatric psycho-oncology, interventions for adolescent and young adult patients with bone tumors, psychological concerns in adolescents and young adults with acute leukemia and collaborative projects with other departments.

# **Pulmonary Medicine**

Dr Sandeep Tandon, Head



The Pulmonary Medicine department, a part also of the Thoracic DMG, assessed patients referred for respiratory evaluation. The department saw a progressively rising trend every year in references over the past 10 years since its inception.

The addition of two ad-hoc physicians and a senior medical registrar augmented the services.

#### Service

The total numbers of patient consultations in 2017 were more than **6600**. In the year 2017, the team members formed an essential part of the newly introduced service i.e. the Endobronchial Ultrasonography (EBUS) guided Fine Needle Aspiration Cytology (FNAC) for lung cancer staging, in conjunction with Interventional Radiology and Thoracic Surgery since April 2017. Sixty five (**65**) procedures were performed during this time frame with excellent results and the coming years would see this being stepped up to further benefit larger volumes of patients. The future would be to introduce paediatric bronchoscopy to evaluate pediatric patients, and for other patients with pulmonary sepsis.

# **Education**

The department created an increasing awareness of diagnosing and treating respiratory co-morbidity in cancer patients, resulting in a steady increase in referrals from across all DMGs. The team members delivered lectures and conducted training workshops for chest physicians.

## Research

The department focused on increasing its contribution to the Thoracic DMG clinical research activities through joint research projects. Dr. Jai Prakash Agarwal, Head

#### Dr. Rajiv Sarin Dr. Rakesh Jalali 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. Lavanva G Dr. Rima Pathak Dr. Monali Swain Dr. Anil Tibdewal

# **Radiation Oncology**



The department of Radiation Oncology worked with six Linear Accelerators (LA) with multiple photon electron energies and four Telecobalt Units. In addition, there was one indegenous Conventional Simulator and 2 HDR brachytherapy units. At ACTREC, there was one linear accelerator, a Tomotherapy HiArt Image Guided radiation Therapy (IGRT) LA, the indegenous Bhabhatron II Cobalt Unit and an Integrated Brachytherapy Unit with high dose rate Brachytherapy facilites. The LA were fully capable and commissioned for executing rotational Image Modulated Radiation Therapy (IMRT) using Image Guided Radiation Therapy (IGRT) and Stereotactic Radiotherapy / Surgery (SRT / SRS) and other high precision complex radiotherapy procedures. With the Aria Networking System, it was possible to transfer data digitally from CT Scan / MRI / PET scans and Treatment Planning System (TPS) to the LA. This ensured accurate and quick data transfer for conformal radiotherapy, SRT / SRS and IMRT / IMRS with complete verification and accuracy. In addition, the department had 4D CT simulator for planning Gated Radiotherapy along with advanced linear accelerators. Radiosurgery was delivered using the "Brain-Lab" system comprising of micro-multileaf collimator (mMLC). In 2017, extracranial Stereotactic Body radiation Therapy (SBRT) facilities were expanded for virtual visual biofeedback to further improve precision of treatment delivery.

Brachytherapy formed an integral part of many treatment protocols in the department. The brachytherapy techniques were continuously evolving from the conventional 2D X-ray based, to on - table fluoroscopy, to on - table ultrasound guided, to 3D CT / MRI Image based brachytherapy planning for gynaecological, breast, head and neck, pediatric, soft tissue sarcomas and urological cancers.

#### Service

The department had 30 beds at TMH and 5 beds at ACTREC for patient admission.

In the year 2017, **6684 patients** underwent radical or palliative radiotherapy treatment at the hospital. **3431** brachytherapy procedures were performed.

Dedicated measures were being taken to improve patient throughput by extending the departmental working hours from the year 2017 onwards, with an aim to improve patient throughput in the coming years. To improve the workflow and patient safety, a dedicated TMC Radiation Oncology Incident Program (TRIP) was initiated in 2017 and chaired by the departmental head. Detailed workflow SOPs was prepared for all sites and the program followed voluntrary online reporting of minor and major errors followed by root cause analysis of error and recommendation of corrective actions.

1. External Beam Therapy		Total No. external radiotherapy	
Total new patients treated	6423	Private patients	2036
Total No. of patients treated	6684	General patients	4387
Total No. referred outside	6508	Private : General ratio	1:2.5
	1	UNITS	
Telecobalt		Linear Accelerator	
Theratron 780	388	Tomotherapy TMH	196
Theratron 780C	429	True Beam TMH	692
Elite-80	689	LA - Clinac 6EX	849
Equinox-80	631	LA - Clinac Trilogy	928
Bhabhatron-II	138	LA - NovalisTx	838
		LA - Unique	912
		Tomotherapy ACTREC	257
		True Beam ACTREC	505
2. Brachytherapy	•	-	-1
Brachytherapy (No. of Pts)	773	No. of Brachytherapy applications	3431
HDR-Intracavitary		HDR-Interstitial	
ICA Selectron + Ring applicator	1139	Iridium Implants (Nylon tube)	795
ICA MRI Vienna applicators	140	Template MUPIT	84
CVS Selectron	59	Template Syed-Neblett Prostate	0
Houdek	15	Template TMH	25
CVS / SIVA	311/34	Template Gynae	10
ACTREC (ICA+CVS)	502	Template Anal Canal	04
Endobiliary	2	ACTREC (Interstitial)	207
Intraluminal (ILRT)	11	III HDR Surface Applicator	
		Surface Moulds	93
3. Treatment Planning			•
	Simulato	r & Mould Room	
CT-Simulator 4D (Lightspeed)	5732	Oncentra / PLATO (Nucletron)	1530
CT-Simulator without V Sim	119	Eclipse (Varian)	2079
Conventional Simulator Imagin	823	iPlan (Brain Lab)	07
Tissue Compensators	490	Tomoplan	293
Surface mould	05	C - Arm	490
Wax Bolus	12		
Conformal Block	04		
Electron Cut out	06		

## **Education**

The department had initiated a 2 year "Fellowship in Image Guided Radiation Therapy". Along with the department medical physics, the formal "Training Course for Radiation Therapy Technologists" recognized by the Maharashtra State Board for Technical Education (MSBTE) was continued. The department hosted training programmes in Stereotactic Radiation for Lung and Liver Cancer under the aegis of International Atomic Energy Association (IAEA). The department also hosted a training programme on Image Guided Brachytherapy for Cervical Cancer under the aegis of Association of Gynecologic Oncologists of India (AGOI) and the Women's Cancer Initiative (AGOI - WCI) in 2017. The departmental staff members lent their expertise for site based discussion on the digital platform "Chartrounds India" and were also involved in online teaching courses developed by European SocieTy for Radiotherapy and Oncology (ESTRO). The theme for the 2017 Annual Radiotherapy practicum was "Adaptive Radiotherapy".

#### Research

The research areas ranged from clinical, translational to basic research. There was focus on Indigenous Technology Development & Technology Evaluation and, the indigenization of various aspects of radiation therapy equipment & accessories was expected to have a significant impact in reducing recurring cost to the institute.

The department and institution received approval as an international site for **NRG** / *Radiation Therapy Oncology Group* (RTOG) multicentric international trials and is only one of the 11 international sites of **NRG**. The department was accredited as an international site for IAEA, Cervix Cancer Research Network (CCRN), Image guided intensity modulated **E**xternal beam radiochemotherapy and **M**RI based adaptive **BRA**chytherapy in locally advanced **CE**rvical cancer (EMBRACE), European Society for *Radiotherapy* & Oncology (ESTRO) research studies.

The clinical biology Lab was working on various aspects of radiation biology and developing newer formulations as part of US- India consortium on repositioning of drugs for radiation modification. A patent had been filed through Clinical Biology Lab into Liposomal in-gel composition for regional delivery of radiosensitizers.

# Radiodiagnosis

**Dr. M H Thakur,** Head

Dr. S S Kulkarni



Dr. N S Shetty Dr. Abhishek Mahajan Dr. Nilesh P. Sable Dr. Palak Popat Dr. Ashita Rastogi Dr. Kunal B. Gala Dr. Akshay Baheti Dr. Amrita Guha Dr. Suman Kumar Ankathi Dr. Suman Kumar Ankathi Dr. Arpita Sahu ACTREC Dr. SA Kembhavi Dr. Amit Janu Honorary Consultant Dr. SM Desai

The department of Radiodiagnosis was fully digitalized and had all the latest modality equipments. The department had become almost filmless and paperless. The year also saw reduction in waiting period for the radiologic procedures. Sonographic examinations were performed within 2 days of the request and mammography on the same day itself. There was also routine administration of general anesthesia for patients requiring the same for Interventional radiology and for Magnetic Resonance (MR) imaging. Within the department, a 6-bed room was created to observe patients after interventional radiological procedures.



# Service

The routine department timings were from 8am to 8pm to accommodate the huge number of patients for Computed Tomography (CT) and MR imaging. Emergency services were available round the clock. There was facility for bedside sonography guided interventional procedures.

## **Education**

The department conducted regular teaching programs for doctors and radiographers. The department conducted an Advance Diploma in Medical Imaging Technology of 2 years duration.

#### Research

The department was involved in determining the Role of 3T multiparametric - MRI with Blood-Oxygen-Level Dependent (BOLD) imaging for diagnosis and post therapy response evaluation of postoperative recurrent cervical cancers.

The department was also involved in the Automatic Detection and Characterization of Suspicious Lesions on Full Field Digital Mammograms. Mr. Arun Balaji KD, Officer in Charge

# Speech & Swallowing Therapy



The Speech therapy services offered comprehensive speech and swallowing rehabilitation to patients with Head and Neck Cancer (HNC) and as well as for other cancer sites too. There was progress in Dysphagia Rehabilitation using Digital Swallowing Workstation to perform Fiberoptic Endoscopic Evaluation of Swallowing (FEES). Pre-treatment baseline swallowing function was evaluated very effectively using FEES.



In addition to FEES, a new service was jointly initiated with Interventional Radiology, the Videofluroscopic Swallowing Evaluation/Modified Barium Swallowing from May 2017. It provided dynamic swallowing function and objective swallowing evaluation was the key for successful dysphagia rehabilitation.

## Service

The department treated **10775** patients in the year 2017, of which, **5520** were new patients. Total laryngectomy rehabilitation was provided very effectively for patients with Tracheoesophageal Voice (TEP) and with Electrolarynx (45). The clinicial speech and swallowing outcome measurement ratings were effectively used.

#### Education

Four speech therapists from different cities came for observational learning and there were also internship students from Nair Hospital to learn speech and swallowing rehabilitation.

#### Research

The department initiated  $1^{st}$  International Cancer Rehabilitation Conference in 2017 – a joint effort by oncologists and allied health members.

# Surgical Oncology

Dr. Ajay Puri, Head



- Dr. Indraneel Mittra, Professor Emeritus Dr. RA Badwe, Director TMC Dr. AK Dcruz, 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. CS Pramesh Dr. Sajid Qureshi Dr. Aliasgar Moiyadi Dr. Vinay Kant Shankhdhar Dr. Gouri Pantvaidya

The department of Surgical Oncology continued to provide state - of - the - art surgical care with minimal access surgeries, skull-base procedures, major vascular replacements, limb salvage, microvascular surgery and robotic surgeries.

# Service

The department conducted around **26000** (twenty six thousand) major and minor surgeries at TMH and more than **1600** (one thousand six hundred) at ACTREC in 2017. Over **250** Robotic surgeries were performed. The neurosurgery unit established a dedicated intraoperative neurophysiologic mapping and monitoring programme. The department offered an extended outreach program in Sangrur, Visakhapatnam, Ratnagiri and Aurangabad providing surgical oncology expertise in under-served areas. A Memorandum of Understanding (MoU) with the government of Maharashtra offered basic oncology facilities in 28 district hospitals with a team of TMH alumni (**Maharashtra Cancer Warriors**). Under the MoU with **Lifeline Express**, the department offered preventive and basic surgical services on the

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

world's first hospital on a train. The department also led the effort and launched India's first Online Oncology Tutorial as an innovative way of conducting online CME.

## Education

Besides the "in house training" the residents were exposed to basic and advanced laparoscopic hands on courses in collaboration with external clinical labs. In an effort to encourage feedback and further enhance the training activities of residents, the department implemented an interactive work based assessment of residents and an assessment of teachers. The mentorship program for residents was reorganized.

#### Research

The department continued to conduct investigator-initiated and sponsored research studies. The Head Neck service received the National Institute of Health (NIH) R01 grant for research on carcinogenesis of smokeless tobacco. **Dr. Astrid Lobo Gajiwala,** Head

# **Tissue Bank**

Ms. Urmila Samant Ms. Cynthia D'Lima



The Tissue Bank department strived to provide safe and effective human allograft for transplantation and, expanded the volume and range of grafts produced.

## Service

The total number of tissue donors was **3093** and, the number of grafts produced was **11009**. In this hospital, 231 patients benefited from the grafts produced in the tissue bank. One hundred (100) bone allograft and 06 chorion membrane were used in reconstruction following tumor excision and dental procedures in 45 patients. Over **1500** amnion dressings were used for patients with moist skin desquamation (ulceration) subsequent to radiotherapy, bed sores, and as a surgical wound cover and as a barrier membrane in dental procedures.

These grafts were also used for patients in 376 hospitals and nursing homes in Mumbai and 315 hospitals in other States in India.

## **Education**

Lecture series were held for hospitals in Mumbai on organ transplantation and the working of Tissue banks.

During the year, 271 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 allografts. This included 10 doctors, 52 pharmacy students, 202 nursing students and 7 technicians and transplant coordinators.

Hands-on training in basic tissue processing procedures was provided to orthopaedic and general surgeons in the state of Haryana.

The department assisted in the development of new tissue banks, and, raising public and professional awareness of tissue donation and transplantation.

#### Research

The ongoing research projects included the "Clinical Use of Irradiated Amnion Dressings in the Management of Moist Desquamation following Radiotherapy in cancer patients", with department of radiation oncology and the International Atomic Energy Agency (IAEA) and, "A Clinical and Radiographic Evaluation of Tooth as Auto Graft with Chorion Membrane Versus Demineralized Freeze Dried bone Allograft with Chorion Membrane in treatment of Intrabony defects".



# **Transfusion Medicine**

**Dr. SB Rajadhyaksha,** Head



Dr. PD Desai Dr. Meenakshi Singh Dr. Anita Tendulkar (Till July 2017)

The department of Transfusion Medicine maintained high standards of service excellence and, quality improvement in its mandate for providing specialized transfusion requirements of cancer patients. It had state - of - the - art technology and its services were availed off by various institutions in the city.

## Service

Focus was laid on more blood donation camps and, outdoor blood donors increased from 12904 to 13951. Specialized procedures including, irradiation and granulocyte transfusion

also increased by 15%. Advanced diagnostic tests in HLA and Immunogenetics viz., PRA, DSA and SBT, which facilitate improved outcomes in Stem Cell Transplants, were introduced and were also offered to other institutions. Red cell antibody identification techniques were standardized. The Red Cell Serology Laboratory performed **59176** blood groupings and **36439** crossmatches.

One hundred and sixty six (166) blood and 08 platelet donation camps were organized in year 2017. There were 20075 blood units available.





#### Details of Blood Processing

# **Education**

The department was selected as one of the few training centres in India by Ministry of Health and Family Welfare, Government of India to conduct training in Quality Management Systems besides other basic training courses being held for several years for blood bank Medical Officers, Technologists, Nurses and Food & Drug Administration (FDA) officials. The department conducted two Quality Management System (QMS) training programmes for 47 blood bank quality managers / technical managers and orientation training programme in blood transfusion services for 21 FDA officials.

#### Research

Research focused on improving outcomes in patients and donor practices. An assessment of platelet crossmatch by Solid Phase Red Cell Adherence Assay (SPRCA) project to evaluate response to platelet transfusions and a project on Non-HLA genes associated with Stem Cell Transplantations were carried out. A Knowledge Attitude & Practice (KAP) study on first time voluntary blood donors and, a study on serial monitoring of ionized calcium levels in platelet donors during apheresis procedure were ongoing.

# Disease Management Groups (DMG)

Atoms for Cancer Care

Convener: **Dr. Navin Khattry** (Medical Oncology) Secretary: **Dr. Sumeet Gujral** (Pathology)

#### **ACTREC Scientists**

Dr. Shubhada Chiplunkar Dr. Jyoyti Kode Dr. Shilpee Dutt Dr. Rukmini Goverkar Dr. Syed Hasan

**Clinical Pharmacology** Dr. Vikram Gota Dr. Manjunath K.

**Cytogenetics** Dr. Dhanashree Shetty Ms. Hemani Jain

**Hemato- Pathology** Dr. PG Subramanian Dr. Prashant Tembhare Dr. Nikhil Patkar

## Medical Oncology

Dr. Manju Sengar Dr. Bhausaheb Bagal Dr. Hasmukh Jain Dr. Sachin Punatar Dr. Anant Gokarn Dr. Avinash Bonda

#### Medical Social Worker Mrs. Sunita Jadhav - TMH

Ms. Aarti Tillu - ACTREC

Adult Hematolymphoid - DMG



Nuclear Medicine & Molecular Imaging Dr. V Rangarajan Dr. Archi Agarwal

**Pathology** Dr. Tanuja Shet Dr. Sridhar Epari

**Psychiatry** Dr. J Deodhar Radiation Oncology Dr. Siddhartha Laskar Dr. Nehal Khanna Dr. Jayant Sastri Goda

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

The Adult Hemato-Lymphoid (AHL) DMG multidisciplinary group catered to the management of variety of hematological malignancies in a comprehensive manner.

The DMG was involved in structured management of hematological malignancies that was evidence and protocol based, with emphasis on personalized therapy based on the cytogenetic and molecular profiling of hematolymphoid malignancies.

The emphasis was on early diagnosis with quick initiation of therapy to immediately alleviate symptoms and life threatening problems at presentation; and, to identify curable hematological malignancies and ensuring completion of therapy, by providing assistance through various assistance programs within and outside the institution.

The comprehensive diagnosis was feasible through a dedicated hematopathological and molecular hematology laboratory facilities.

# **Volume Indicators**

The AHL group registered a total of **4737** patients in 2017. Of these, 395 patients with hematolymphoid malignancy were not treated at TMH; 30 patients expired before treatment, 312 patients were lost to follow up before starting treatment, 32 patients were referred back to local place and, 21 patients refused treatment at TMH.

#### New Registration & follow-ups

Total Registration	General	Private	Total
New Case	2832	1258 + 647 Second Opinion	4737
Out-Patient (OPD) Follow ups	33192	20286	53478

#### **Disease - wise distribution**

Diagnosis	Number of Patients
Acute Lymphocytic Leukemia	410
Acute Myelogenous Leukemia	422
Acute Promyelocytic Leukemia	82
Multiple Myeloma	321
Chronic Myelogenous Leukemia	472
Chronic Myeloproliferative Disorders	21
Non Hodgkins Lymphoma	1076
Hodgkins Lymphoma	238
Myelodysplastic Syndromes	37
Acute Leukemia-unclassified	38
Other Hematological Malignancy	69
Other Cancer	102
No Malignancy	90
No Diagnose at TMH	712
Second Opinion	647
Total	4737

The DMG maintained an ongoing quality improvement measures with continuous audits of all protocols, chemotherapy regimens, their morbidity and mortality, treatment compliance in long-term therapy and, implementation of modifications derived from such audits.

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

Stable patients were followed up in the OPD till the diagnosis and staging workup was complete.

The treatment for all stable lymphoma, myeloma and certain leukemia patients was initiated in the Day Care. Patients needing admission for supportive care such as those with uncontrolled co-morbid conditions or complications of the disease were admitted for initiation of therapy.

Patients of acute leukemia were seen in the Leukemia Clinic. They were evaluated for financial feasibility of completing the treatment planned and were then admitted to the ward for treatment.

The remaining patients were given an opinion and encouraged to take treatment at or close to their native place with a referral letter to a trained hemato-oncologist in their neighborhood.

Post completion of chemotherapy (and, radiation if indicated) patients were followed up in afternoon clinics with specific days allocated to follow up for lymphomas, myeloma, and leukemias. They were evaluated for recurrence of disease, long term side effects and other psycho-social problems that they may face from day to day.

Diagnosis	TMH Place	Local	Palliation	Observation Opinion	Second Treatment	No
Acute Lymphocytic Leukemia	305	24	34	0	0	47
Acute Myelogenous Leukemia	168	114	81	0	01	58
Acute Promyelocytic Leukemia	73	01	02	0	0	06
Multiple Myeloma	197	76	06	08	02	32
Chronic Myelogenous Leukemia	436	0	08	0	01	27
Chronic Myeloproliferative Disorders	14	01	0	02	0	04
Non Hodgkins Lymphoma	606	164	52	94	01	159
Hodgkins Lymphoma	151	54	04	04	01	24
Myelodysplastic Syndromes	22	04	04	0	0	07
Acute Leukemia	08	03	12	0	0	15
Other Hematological Malignancy	38	05	05	05	0	16
Total	2018	446	208	113	06	395

#### Patients Treated with Diagnosis

Patients requiring high dose chemotherapy and rescue with autologous Hematopoietic Stem Cell Transplantation (HSCT) or allogenic HSCT are referred to ACTREC for these procedures.

#### New Registration and follow ups in ACTREC BMT unit

#### ACTREC Registration 2017

New Case registered	124
Bone Marrow Transplant (BMT) referrals; from outside TMH	219
Out Patients Department (OPD) Follow ups	9726
BMT OPD Follow Up	4930
Autologous Transplant	21
Allogenic Transplants	35

# Research

Investigator	Sponsored	Investigator	Sponsored	Investigator	Sponsored	Sponsored
Initiated	trials	Initiated	trials	Initiated	trials	Trials
Total	Total	Completed	Completed	Ongoing	Ongoing	Accrued
34	08	06	02	28	06	5786

The departmental staff had 27 publications in national (20) and international (07) indexed journals.

# Bone & Soft Tissue - DMG

Convener: **Dr. Bharat Rekhi** (Pathology) Secretary: **Dr. Ashish Gulia** (Surgical Oncology)



Medical Oncology Dr. Girish Chinnaswamy Dr. Jaya Ghosh Dr. Jyoti Bajpai 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 Dr. Naveen Salins

**Pathology** Dr. Mukta Ramadwar

**Physiotherapy** Dr. Anuradha Daptardar Dr. Vincent P.

**Radiation Oncology** Dr. Nehal Khanna Dr. Siddhartha Laskar

#### Radiodiagnosis

Dr. Amit Janu Dr. Arpita Sahu Dr. Kunal Gala Dr. Sashikant Juvekar Dr. Subhash Desai

Surgical Oncology Dr. Ajay Puri Dr. Ashish Gulia 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 and the same day. The entire team met every Tuesday and decided upon an integrated management plan for all patients. The Thursday clinico-pathological meeting was conducted to discuss 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.

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; 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.

# **Volume Indicators**

In the year 2017, there were a total of **2553** registrations that included 1638 general and 558 private patients, and 357 referral cases.

Two hundred and fifty two (252) patients were referred to Palliative Medicine department.

Radio Diagnosis	Pathology	Surgery	Radiation Oncology	Medical Oncology	Occupational & Physiotherapy
Diagnostic radiological procedures	Biopsies, specimens, slides,	Major surgeries: <b>567</b>	Radical Radiotherapy: <b>180 / 415 (44%)</b>	Chemotherapy planned: <b>377</b>	Occupational therapy: <b>2249</b>
(conventional, CT, MRI, USG): <b>9202</b> Intervention	paraffin blocks, cytopathology: <b>3563</b>		Palliative Radiotherapy: 235 / 415 (56%)	Chemotherapy planned and referred outside: <b>226</b>	Physiotherapy: <b>1894</b>
Radiological procedures: <b>166</b>			Patients referred outside for Radiotherapy: <b>320</b>	Day care visits for supportive care: <b>5028</b>	

#### **Mortality & Complication Rates**

Surgical Oncology	Radiation Oncology	Medical Oncology
Mortality (30 days) = 02	Mortality (30 days) = Nil	Total Mortality = 04
Morbidity:	Morbidity:	Osteosarcoma = Total = 189
Vascular injury = 05	Acute toxicity:	Grade 3/4 Toxicity:
Neural Complications = 12	Grade I = 84 / 415 (20%)	Neutropenia (including FN) - 65 (56.5%)
Infection requiring wound wash	Grade II = 24 / 415 (6%)	Febrile Neutropenia (FN) - 49 (42.6%)
(Bone) = 11	Grade III = 02 / 415 (0.4%)	Anemia - 32 (27.82%)
Flap related complications		Thrombocytopenia - 40 (34.72%)
(flap failure, flap necrosis) = 08		Ewing Sarcoma; total = 185
Wound dehiscence requiring		Grade 3 / 4 Toxicity:
debridement = 07		Neutropenia (including FN) - 33 (31%)
Urethral injury = 02		Anemia - 29 (27%)
		Thrombocytopenia - 27 (25%)
		Soft Tissue sarcoma = 47 / 88 cases;
		54% for Chemotherapy
		Neutropenia (including FN) - 09 (10%)
		Anemia - 09 (10%)
		Melanoma: 16 / 87 received palliative
		chemotherapy.
		Grade 3 / 4 toxicity:
		Anemia = 01
		Transaminitis = 02
		Skin infection = 01

# **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 %.

# Compliance

Overall compliance was referred to the percentage of patients who were recommended treatment and undertook the same. This included patients, who were lost to follow-up, as noncompliant. This was calculated for the first 6 months of year 2017.

Compliance Data		BST DMG	Referred to Other DMG's
Total no. of patients	1072		
Lost to follow-up	137		
Total number	935	754	181
Total number	935	754	181

Total	Benign	Malignant	Others - non tumorous lesions
754	186	493	75

# **Compliance in malignant tumors**

		Malignant (493)
	Observation	31
	Lost to follow up	35
Treatment taken	Curative	322
	Palliative	105
Current Status	No disease	228
	Lost to follow up	39
	Palliative Care	41
	Dead	14
Overall	Yes	414 / 493 (84%)
Compliance	No	79

Reasons for non-compliance (n = 79): The most common reason was lost to follow up; followed by unwilling for recommended medical treatment and amputation; but preferring alternative, including homeopathic treatment, etc.

# Research

Total No. of	Trial - 19	Completed trials - 07		Ongoing Trials - 12		Overall patients accrued
Investigator Initiated	Thesis	Investigator Initiated	Thesis	Investigator Initiated	Thesis	Investigator Initiated
09	10	01	06	08	04	740+

The DMG published 09 original articles, 04 reviews and 06 case reports in indexed journals.

Convener: **Dr. Tanuja Shet** (Pathology) Secretary: **Dr. Ashwini Budrukkar** (Radiation Oncology)

# **Breast Oncology - DMG**

ACTREC Scientists Dr. Abhijit De Dr. Ujjwala Warawdekar

**General Medicine** Dr. Aruna Alahari Dr. Sheela Sawant

Medical Oncology Dr. Jaya Ghosh Dr. Jyoti Bajpai Dr. Seema Gulia Dr. Sudeep Gupta

Nuclear Medicine & Molecular Imaging Dr. Sneha Shah Dr. Venkatesh Rangarajan

Occupational Therapy Dr. Manjusha Vagal

**Pathology** Dr. Asawari Patil Dr. Sangeeta Desai

**Physiotherapy** Dr. Anuradha Daptardar Dr. Vincent Padmanabam

Radiation Oncology Dr. Rajiv Sarin Dr. Rakesh Jalali Dr. Rima Pathak Dr. Tabbasum Wadasadawala

# Radiodiagnosis

Dr. Ashita Rastogi Dr. Kunal Gala Dr. Meenakshi Thakur Dr. Palak Popat Dr. Seema Kembhavi

#### **Surgical Oncology**

Dr. Garvit Chitkara Dr. Indraneel Mittra Dr. Nita Nair Dr. Prabha Yadav Dr. Purvi Thakkar Dr. Rajendra Badwe Dr. Shalaka Joshi Dr. Vani Parmar

**TMC research Administrative Council (TRAC)** Ms. Rohini Hawaldar

The Beast DMG conducted regular joint clinics at TMH, Parel and at ACTREC in Kharghar. The Breast Cancer Working Group (BCWG) had been in forefront of starting several patient friendly management systems, innovations and assistance. It worked with NGO's and trial coordinators, breast nurses and counselors to offer financial assistance, psychosocial counseling and the functioning of the survivor's and lymphedema care clinic. Some of the ongoing clinical trials like neoadjuvant hormone therapy and other innovative drugs in different types of breast cancer seek to impact patient survival in long term.

The Navya patient preference tool study was a decision aid designed by BCWG jointly with the Harvard School of Business to help women make a decision between mastectomy and breast conservation surgery in early breast cancer surgery.

#### **Volume Indicators**

	TN	ЛН	ACTREC		
	2016	2017	2016	2017	
Private	1803 (44.36%)	2046 (45.94%)	62 (17.92%)	72 (17.22%)	
General	2261 (55.63%)	2408 (54.06%)	284 (82.08%)	346 (82.78%)	
Total	4064	4454	346	418	



RF Card registration	ТМН	ACTREC	Total	
	1103	62	1165	

# Surgical Data

	ТМН		ACTREC		TOTAL	
Type of surgery	2016	2017	2016	2017	2016	2017
Breast conserving surgery - BCT/ BCT + LD/BCT + Oncoplasty / BCT with HDR + Axilla alone surgery	745	831	200	194	945	1025
Mastectomy - MRM/SMAC/SMAC +LD/SM/ Completion mastectomy/Revision mastectomy	742	669	411	368	1153	1037
Others (wide excisions)	30	27	39	18	69	45
TOTAL	1517	1527	689	580	2203	2107

# Radiotherapy data

	20	916	20	)17
	TMH ACTREC		ТМН	ACTREC
Total	1174	238	1233	199
Telecobalt			963	29
Linear accelerator			261	131
Tomotherapy			09	39
Palliative	508	NA	649	43
Adjuvant	666	NA	584	156
Telecobalt	161		105	13
Linear accelerator	492		470	104
Tomotherapy	13		09	39
Brachytherapy	22	27	24	24

# **Chemotherapy Data**

	2016	2017
Adjuvant and neoadjuvant Chemotherapy	1931	1924
Palliative Chemotherapy	1344	1217
Total	3275	3141
Referred outside	1461	1681 ( private) + 1032 ( general)

# **Occupational Therapy**

	New Patients	Follow up Patients	Total Patients
Shoulder rehab , Breast prosthesis & MRM Bra	598	518	1116
Breast Cancer related Lymphedema	379	1449	1828
Total	977	1967	2944

#### **Mortality & Complication Rates**

- Surgical mortality 02 (0 palliative mastectomy and 01 recurrent LABC with chest wall resection)
- Surgical morbidity 16%
- Positive margin and re-excision rates 0.03%
- Average hospital stay 2.5 days
- Nodal dissection: Node number in node positive patients was 01 32 nodes with a median of 3 and mean of 5.4. Axillary sampling was done in 53 cases. Among the sampling patients, a range of 3 29 nodes were harvested with a median of 10 and mean of 12.

#### **Survival Rates**

The BCWG published the survival data on 2201 patients of breast cancer. Of these 1155 (52.5%) were operable, 575 (26.1%) were locally advanced and 471 (21.4) were metastatic or local recurrences at presentation. The 5 - year Disease

Free Survival (DFS) in Operable Breast Cancer (OBC) patients was 82.1% (95% CI 83.4 to 86.4%) and for Locally Advanced Breast cancer (LABC) it was 61.4% (see Graph below). This analysis will serve as a benchmark for future studies. (CI: Confidence Interval)

#### **Process Indicators**

The overall adherence to procedures was:

- Surgical compliance (Planned and completed surgery) -88%
- Radiation Therapy (RT) to all Breast Conserving Therapy (BCT) patients: 100%
- RT to all post mastectomy patients with nodes > 3 and/ or pT > 5 cm: 100%
- Adjuvant chemo planned for node positive patients: 100%
- Appropriate hormonal adjuvant tamoxifen /AI to all HR+ pts: 100%.



#### Research

	Total Completed		Ongoing			Patients accrued			
Investigator initiated	Sponsored	Colla- borative	Investigator initiated	Sponsored	Colla- borative	Investigator initiated	Sponsored	Colla- borative	Year 2017
79	17	14	13	03	02	66	14	12	450
## **Gastrointestinal - DMG**

Convener: **Dr. Mukta Ramadwar** (Pathology) Secretary: **Dr. Reena Engineer** (Radiation Oncology)



ACTREC Scientists Dr. Amit Dutt Dr. Sanjay Gupta Anaesthesiology, Critical Care &Pain Dr. P.N. Jain Cancer Epidemiology Dr. Rajesh Dixit Digestive Diseases & Clinical Nutrition Dr. Prachi Patil

Dr. Shaesta Mehta

Medical Oncology Dr. Ananth Ramaswamy Dr. Vikas Ostwal

Nuclear Medicine & Molecular Imaging Dr. Archi Agrawal Dr. Nilendu Purandare Dr. Rangarajan Venkatesh

**Pathology** Dr. Kedar Deodhar Dr. Munita Bal Dr. Rajiv Kumar **Physiotherapy** Dr. Ajeeta Kulkarni Dr. Vincent Singh P.

**Radiation Oncology** Dr. Shirley Lewis Dr. Supriya Chopra

Radiodiagnosis Dr. Nitin Shetty Dr. Suyash Kulkarni

Surgical Oncology Dr. Ashwin Desouza Dr. Avanish Saklani Dr. Mahesh Goel Dr. Manish Bhandare Dr. Shailesh Shrikhande Dr. Shraddha Patkar Dr. Vikram Chaudhari

The Gastrointestinal (GI) disease management group (DMG) delivered comprehensive care to patients with gastrointestinal cancers in a multi-disciplinary approach.

For efficient and optimal resource utilization, the surgical services were structured into three separate units; (GI A – Gastric and Pancreatic cancers, Neuroendocrine and Gastrointestinal stromal tumors, GI B – Liver tumors, Gall bladder cancers and Retroperitoneal tumors, GI C – Colorectal cancers. This also led to better patient care and improved patient outcomes. The group members were geared towards ensuring faster initiation of therapy and improved quality of service, alongside education and research.

Cytoreductive and Hyperthermic Intraperitoneal Chemotherapy (HIPEC) surgery for colorectal cancers was further standardized and Pressurized Intraperitoneal Aerosol Chemotherapy (PIPAC) program was initiated. The Radiation Oncology section maintained a complete database of all patients receiving radiotherapy with contact details and the patients were contacted telephonically once every month to check on their compliance to radiotherapy.

A Survivor clinic specifically looking at the fertility of patients, sexual quality of life and long term toxicities was proposed to be started every Friday.

The Interventional Radiological facilities were complete in ACTREC, working on all days and performed procedures requiring general anesthesia on a routine basis.

#### **Volume Indicators**

There were a total of **9591** new patients under the GI - DMG in the year 2017.

#### **Surgical**

Year	Reg.	Adm.		тмн		At ACTREC	Mortality
			Elective	Emergency	Total		
2016	9108	1948	1023	349	1372	375	43
2017	9591	1964	1113	280	1393	265	19

Total admissions in the GI Surgery Services: 1964

The service performed a total of 1658 surgeries at TMH, including 265 at ACTREC.

Elective: Emergency = 1378:280

General: Private = 901:757

Theatre Utilization: TMH: 1.8, ACTREC: 2.3



One thousand and four (1004) patients were referred for radiation. A total of 658 patients received Radiotherapy and 346 patients were referred to other Radiotherapy centres due to non-availability of Radiotherapy slots.

#### **Surgical Outcomes**

Overall Mortality: 19 (1.14%) Mortalities in Elective Surgeries: 10 / 1378 (0.72%) Mortalities in Emergency surgery: 09 / 280 (3.21%)

#### **Medical Oncology Outcomes**

- Grade 1 toxicities (46.87 %) 18781
- Grade 2 toxicities (10.97 %) 4297
- Grade 3 toxicities (3.3 %) 1339
- Grade 4 toxicities (0.34 %) 13

#### **Radiation Oncology Outcomes**



#### Research

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

Total Num (Ongoing, Com	ber of Clinical , Approved no pleted, submit	Trials: 80 t started, :ted)	Cor (withdrav Not appro	npleted Trials: Other: 19 wn by PI, close oved, submitt discontinued)	ed by IEC, red to EC,	Ongoing (Recruitment completed/ Approved not started: 52		Overall Patients accrued	
Investigator initiated	Industry Sponsored	Thesis	Investigator initiated	Industry Sponsored	Thesis	Investigator initiated	Industry Sponsored	Thesis	Ongoing Trials No of Patients to be accrued: 10,736 No patients accrued: 6971 64.93%
53	05	22	Completed: 09		36	02	14	Completed Trials	
			05	01	03				No of Patients to be accrued: 1600
				Others: 19					No patients
			12	02	05				1407 87.93%

Convener: **Dr. Amita Maheshwari** (Surgical Oncology) Secretary: **Dr. Supriya Sastri Chopra** (Radiation Oncology)

## **Gynaecology - DMG**



#### **ACTREC Scientists**

Dr. Murali Krishna Chilakapati Dr. Pritha Ray Dr. Shubhada Chiplunkar Dr. Tanuja Teni

## Cytology

Ms. Swati Dighe

### General Medicine

Dr. Anuprita Daddi Dr. Aruna Alahari Dhir Dr. Sheela Sawant

#### **Medical Oncology**

Dr. Jaya Ghosh Dr. Jyoti Bajpai Dr. Seema Gulia Dr. Sudeep Gupta

Microbiology

Dr. Rohini Kelkar

#### Nuclear Medicine & Molecular Imaging Dr. Sneha Shah Dr. Venkatesh Rangarajan

#### Occupational Therapy

Dr. Manjusha Vagal Ms. Rebeka Marri Ms. Shruti Velaskar

#### Pathology

Dr. Bharat Rekhi Dr. Kedar Deodhar Dr. Santosh Menon **Preventive Oncology** Dr. Gauravi Mishra Dr. Sharmila Pimple

Radiation Oncology Dr. Lavanya G. Dr. Umesh Mahantshetty

Radiodiagnosis Dr. Akshay Baheti Dr. Meenakshi Thakur Dr. Nilesh Sable Dr. Palak Popat

Surgical Oncology Dr. Rajendra Kerkar Dr. TS Shylasree

The Gynaecology Disease Management Group (DMG) catered to female patients with reproductive tract cancers. Various NGOs also constituted an integral part of this DMG.

The joint clinics were conducted twice a week and the overall adherence to evidence based management was above 90%.

In 2017, 19% (22 out of 114) of endometrial cancer and 35% (17 out of 48) cervical cancer patients underwent robotic surgery. Along with the 'Gynaec Cancer Patient Support Group', the DMG also started a separate financial account to assist financially challenged patients with gynaecological malignancies.

#### **Volume Indicators**

A total of three thousand eight hundred sixty one (**3861**) new patients were registered under Gynaecologic Oncology DMG in the year 2017, of which 2517 were in general category and 1344 were in private category. Second opinion was offered to 732 patients.

Diagnosis	General	Private	Total
Cancer of Cervix	1146	386	1532
Cancer of Endometrium	177	175	352
Cancer of Ovary	569	467	1036
Uterine Sarcoma	20	13	33
Cancer of Vagina	20	15	35
Cancer of Vulva	35	14	49
Cancer of Vault	72	20	92
Others	158	118	276
No Malignancy	50	54	104
Unknown	270	82	352
Total	2517	1344	3861

Diagnosis details

**Surgery:** A total of 689 major surgeries were performed (659 at TMH & 30 at ACTREC). The percentage general: private ratio was 52:48.

#### Major Surgeries at TMH

Disease sites	No of surgeries
Cervix	48
Ovary	360
Endometrium	114
Uterine Sarcomas	08
Vulva	11
Vagina	01
Miscellaneous	117
Total	659

**Chemotherapy:** Frontline chemotherapy with paclitaxelcarboplatin was delivered to 350 newly diagnosed epithelial ovarian cancer patients whereas frontline chemotherapy with single agent carboplatin was delivered to 80 patients. A total of 200 patients from private & 120 patients from general site were referred outside for receiving chemotherapy.

**Radiation therapy:** A total of 1257 patients were eligible for radiation therapy, of which 760 (60%) received radiation at TMH & 497 (39.5%) were referred outside. Of the patients treated at TMH, 556 (73.15%) patients received radical radiotherapy, and 204 (26.8%) patients received palliative radiotherapy.

**Occupational Therapy:** A total of 1968 patients were provided therapy for vaginal dilatation, sexual counselling and lymphedema.

## **Mortality & Complication Rates**

Surgery: Thirty day surgical mortality was 0.91% (6 / 659). Major surgical morbidity was 10.47% (69 / 659) that included 6.9% (46 / 659) intra-operative and 3.5% (23 / 659) post-operative complications.

#### **Chemotherapy:**

#### Paclitaxel + Cardoplatin Toxicities

Toxicity	Grade I / II	Grade III / IV
Myelosuppression	20 %	12 %
Diarrhoea	8 %	-
Peripheral neuropathy	33 %	9 %
Fatigue	6 %	-

**Radiotherapy:** Thirty day radiation mortality was 0.40% (03 patients died out of 760 treated).

#### **Survival rates**

For patients with cancer of the uterine cervix, the 5-year Disease Free Survival (DFS) was 50%.

For patients with advanced ovarian cancer, the 3-year Progression Free Survival (PFS) was 22.6% and 3-year Overall Survival (OS) was 59.4%.

#### Compliance

Out of all patients of cervical cancer treated with curative intent, 85% received concurrent chemoradiation. Eighty seven (87) percent could receive 4 or more cycles of concurrent chemotherapy.

## Research

Total N	umber of	Completed Trials		Ongoing Trials		Overall Patients
Clinical T	rials (N=97)	(N = 43)		(N = 46)		Accrued
Investigator	Sponsored	Investigator	Sponsored	Investigator	Sponsored	
Initiated	Trials	Initiated	Trials	Initiated	Trials	
87	10	39	04	46	0	~ 23405

## Head & Neck - DMG

Convener: **Dr. Prathamesh Pai** (Surgical Oncology) Secretary: **Dr. Kumar Prabhash** (Medical Oncology)



ACTREC Scientists Dr. Manoj Mahimkar Dr. Murali Chilakapati Dr. Sanjiv Waghmare Dr. Shubhada Chiplunkar Dr. Sharada Sawant Dr. Tanuja Teni Dental & Prosthetic Surgery Dr. Kanchan P. Dholam Dr. Sandeep Gurav

Ear, Nose & Throat Surgeon (Consultant) Dr. Chris Desouza Medical Oncology Dr. Amit Joshi Dr. Vanita Noronha Dr. Vijay Patil

Nuclear Medicine & Molecular Imaging Dr. Archi Agarwal Dr. Nilendru Purandare Dr. Sneha Shah Dr. Venkatesh Rangarajan

**Pathology** Dr. Asawari Patil Dr. Munita Bal Dr. Shubhada Kane **Plastic & Reconstructive Surgery** Dr. Dushyant Jaiswal Dr. Prabha Yadav Dr. Vinay Shankhadar

Radiation Oncology Dr. Ashwini Budrukkar Dr. Monali Swain Dr. Sarbani Ghosh Laskar

Radiodiagnosis Dr. Abhishek Mahajan Dr. Nilesh Sable Dr. Suman Ankathi

**Speech Therapy** Mr. Arun Balaji

Surgical Oncology Dr. Anil D'cruz Dr. Anuja Deshmukh Dr. Deepa Nair Dr. Devendra Chaukar Dr. Gouri Pantvaidya Dr. Pankaj Chaturvedi Dr. Shiva Kumar Thiagarajan Dr. Sudhir Nair (ACTREC)

The Head & Neck (HN) DMG with about 10, 000 new cancer cases every year, provided service based on latest standards,

encouraged maintenance of healthy environment and discouraged the use of tobacco.





Modality	Procedures	No of patients
Surgery	Minor	6562
	Major	2157
Radiotherapy	Radical (Definitive + Adjuvant)	1189
	Palliative	152
Chemotherapy	Neoadjuvant Chemotherapy (NACT)	511
	Concurrent Chemoradiotherapy (CTRT)	740
	Palliative Systematic Therapy	42
	Palliative systemic therapy: Oral & Intravenous (first-line, Second Line & Third Line)	773
	Palliative: Counseled for chemotherapy and opted for best supportive care	172
Dental / Prosthetic	Consultation	13285
	Prosthesis	816
	Fluoride Gel Application	3237
	Extractions	4843
	Oral Prophylaxis (Total two sitting)	1183
	Implant	369
Speech / Rehabilitation	New Patients	5520
	No. of sittings	10775
	Laryngectomy Rehabilitation	490
	Audiometry	3109
	Dysphagia Rehabilitation	7670

Procedures Done under Speech Department	Total
Fiberoptic Endoscopic Evaluation of Swallowing (FEES)	396
Videofluoroscopic Swallowing Evaluation/Modified Barium Swallow	56
Voice Evaluation (acoustic)	185
Videostroboscopy	05

	(UNIT A)	(UNIT B)	(UNIT C)	ACTREC	Total Surgery 2017	
Total cases	567	576	681	353	2157	
Site: Oral	312	305	422	325	1364	
Larynx/hypo	47	36	34	01	118	
Thyroid	133	117	122	11	383	
Salivary gland	18	24	28	03	73	
Maxilla	14	08	08	02	32	
Skull base	18	45	17	0	60	
Robotic Surgery	05	11	11	0	27	
Misc	25	41	50	09	114	

#### **Surgical Procedures**

	(UNIT A)	(UNIT B)	(UNIT C)	ACTREC	Total Surgery 2017
Recon: Yes	263	328	289	248	1128
Free flaps	150	137	130	16	433
Pedicled	77	88	108	215	488
local	36	103	51	17	207
Morbidity:	74	159	124	88	445 (20.44%)
Major	22	62	36	14	134 (6.16%)
Minor	52	97	88	50	287 (13.04%)
Infection	34	39	30	24	127 (5.88%)
No of OTs	432	445	431	294	1507
OT utilization	1.31		1.58	1.2	1.36
Mortality	03	01	05	0	09 (0.41%)
Laser resections	78	169	42	0	289
Minor OT	2401	1806	2252	103	6562
Wide excision <sup>*</sup>	39	99	17	0	155

#### Radiotherapy Data

Treatment	No of Patients
Radical: Definitive	712
Adjuvant	444
Re Radiotherapy	7 %
Brachytherapy	17 (1.4%)
Palliative	152
ACTREC	109

#### Chemotherapy data

Admission for chemotherapy	269
Admission for supportive care	263
Total number	532

## Mortality, Complications & Compliance

Modality	Morbidity / Mortality	No of patients (%)
Surgery at TMH (n = 2177)	Morbidity	20.44% Major - 6.16% Minor - 13.04%
	Mortality	0.41%
Radiotherapy (1189)	Completed Dermatitis (Grade 0-2) (Grade 3)	97% 87.9% 1.8%
	Mucositis (Grade 0-2) (Grade3)	84.8% 4.2%
	Gastric tube placement (%)	29%
	Weight loss (Avg. in Kg)	2-6kg
	Hospitalization (%)	5%
	Not completed (%)	3%
	Mortality (%)	1.8%

Modality	Morbidity / Mortality	No of patients (%)
Chemotherapy		
NACT (n = 495)	Compliance	96.9%
	Toxicity	0.6%
	30 day Mortality	0%
CTRT (n = 667)	Compliance	90.1%
	Toxicity	7%
	Mortality	0.41%
Palliative systemic therapy: Cetuximab (n = 42)	Compliance	76.2%
Palliative systemic therapy: Oral & Intravenous (first-line) n = 467	Compliance	90.3%
	Mortality	0.19%
Palliative systemic therapy: Second line n = 163	Compliance	77.3%

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

#### **Survival Rates**

#### Nasopharyngeal malignancies by Radiotherapy

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%

## Research

	Total number of clinical trials		Total number of Completed Trials On clinical trials		Ongoir	ng Trials	Overall Patients Accrued
	Investigator Initiated	Sponsored Initiated	Investigator Initiated	Sponsored Initiated	Investigator Initiated	Sponsored Initiated	
ТМН	20	01	25	0	29	01	2123
ACTREC	02	0	06	0	07	0	444
Total	22	01	31	0	36	01	2567
Grand Total		23		31		37	

## **Neuro-Oncology - DMG**

Convener: **Dr. Tejpal Gupta** (Radiation Oncology) Secretary: **Dr. Epari Sridhar** (Pathology)



ACTREC Scientists Dr. Neelam Shirsat

Medical Oncology Dr. Girish Chinnaswamy Dr. Maya Prasad Dr. Tushar Vora Dr. Vijay Patil Nuclear medicine & Molecular Imaging Dr. Ameya Puranik Dr. Nilendu Purandare Dr. Venkatesh Rangarajan

**Occupational Therapy** Dr. Saima Wasti Dr. Sheetal Gupta **Pathology** Dr. Ayushi Sahay Dr. Shubhada Kane

**Psychiatry** Dr. Joyita Deodhar Mrs. Savita Goswami

Radiation Oncology Dr. Goda Jayant Sastri Dr. Rakesh Jalali

Radiodiagnosis Dr. Abhishek Mahajan Dr. Amit Janu Dr. Amrita Guha Dr. Ashita Rastogi

Surgical Oncology Dr. Aliasgar Moiyadi Dr. Prakash Shetty Dr. Venkatesh Madhugiri

The Neuro-oncology DMG provided comprehensive care to patients with brain and spine tumors. This included outpatient as well as inpatient services (both elective and emergency care). The entire clinical team along with the DMG coordinators and other trial staff ensured smooth coordination between the different clinical specialities and supporting departments.

The DMG had been at the forefront and introduced molecular markers of diagnostic, prognostic, predictive and of therapeutic relevance, for testing in clinical practice to enhance quality of patient care. The highlight of the year had been introduction of gene expression based molecular classification for medulloblastoma and expanded the sequencing evaluation for histone (3.1 &3.3) mutations and TERT promoter mutations. These services were being offered as routine diagnostic service by the molecular pathology laboratory, and were used for better risk stratification for medulloblastomas, diagnosing diffuse mid-line glioma, K27M as an entity and prognostication for glioblastoma multiforme (and also meningiomas). The state-of-the-art intra-operative electrophysiological monitoring service for operating tumors in eloquent areas of brain had been introduced and was now routinely used along with awake surgeries. It helped to reduce the morbidity related to the procedure and better tumour resection. In addition, advanced neurosurgical adjuncts like navigation, frameless stereotaxy, intra-operative 3D ultrasound and 5-aminolevulinic acid (ALA) guided surgeries were also offered. Besides, the service also began providing expanded endonasal procedures to various skull base tumors in collaboration with the Skull Base team.

#### Inter-institutional collaboration:

In collaboration with the Indian Institute of Technology (IIT-Mumbai), the DMG was involved with projects on proteomics, and 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 which were pursued for future projects. 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 undergoing validated through multiple centres across the country; a dedicated operating theatre for the same was being set up at ACTREC.

#### **Volume Indicators**

There were a total of **1688** new patients in addition to 55 referred for second opinion.

Gender	% of patients
Male	62.09%
Female	37.90%

Age (years)	% of patients
01 - 20	21.7%
21 - 40	30.2%
41 - 60	36.4%
> 61	11.6%





	Surgical Details	TMH + ACTREC
Total no. of surgeries	Primary procedures	337
	Additional procedures	38 (11.3%)
	Re-exploration	23 (6.9%)
	Total no of procedures	398
Primary Surgical procedures	Craniotomy (supratentorial)	235 (68.8%)
	Posterior fossa	31 (9.2%)
	Retro-mastoid	11 (3.3%)
	Trans-sphenoidal	10 (3.0%)
	Others	10 (3.0%)
	Shunt	20 (5.9%)
	Burr hole evacuation	17 (5.0%)
	NA	03 (0.89%)
Nature of Surgery	Elective	306 (90.8%)
	Emergency	31 (9.19%)

Over half the patients registered annually received radiation therapy as part of their treatment. Nearly two-thirds of them were treated with radiation therapy within the institute; about one third were referred outside (patient choice, long waiting-times, and logistics) for radiation therapy. Vast majority of them subsequently followed-up with Radiation Oncology services and completed their further adjuvant chemotherapy (if needed) at the institution.

Technique of RT	тмн	ACTREC	Total
Conventional RT	52	07	59
3D-CRT	175	55	230
IMRT/IGRT	136	68	204
Stereotactic Radiosurgery	07	Nil	07
Total	370	130	500
Referred outside for radiation therapy	317	00	317
Grand Total	687	130	817

#### **Mortality & Complications Rates**

#### **Mortality & Morbidity Rates in Elective Cases**

	Morbidity (Minor)	Morbidity (Major)	Mortality	
TMH + ACTREC	39 (13.0%)	27 (8.8%)	06 (2.0%)	

Medical Oncology Toxicity	Toxicity 3 / 4 (CTCAE)
Adjuvant temozolomide	15% (35 patients)
CCNU Chemotherapy regime	33.3% (11 patients)
Bevacizumab	11.1% (05 patients)

CTCAE: Common Terminology Criteria for Adverse Effects.

#### Mortality due to toxicity: 05 patients altogether (<1%)

#### **Research**

Totalnumber of clinical trials currently in 2017			Completed trials in 2017			Ongoing trials before 2017		Overall patients accrued in 2017	
Investigator initiated	Retro- spective/ Audit trials	<b>Sponsored</b> trials	Investigator initiated	Retro- spective/ Audit trials	Sponsored trials	Investigator initiated	Retro- spective/ Audit trials	Sponsored trials	512 (31.35%) of 1633 patients
29	08	00	07	03	00	24	01	00	

The DMG had a total of 34 publications in the year 2017.

Convener: **Dr. (Surg.Cdr) Gaurav Narula** (Medical Oncology) Secretary: **Dr. Papagudi Subramanian** (Hematopathology)

## Pediatric Hematolymphoid - DMG



ACTREC Scientists Dr. Shubhada Chiplunkar

Anesthesiology, Critical Care & Pain Dr. Vijaya Patil

**Cytogenetics** Dr. Pratibha Amare Kadam (Retired in 2017) Dr. Dhanlaxmi Shetty

**Clinical Pharmacology** Dr. Vikram Gota

Hematopathology Dr. Prashant Tembhare Dr. Nikhil Patkar **Medical Oncology** Dr. Shripad Banavali Dr. Brijesh Arora (Till April 2017) Dr. Navin Khattry

Microbiology Dr. Rohini Kelkar

Nuclear Medicine & Molecular Imaging Dr. V. Rangarajan Dr. Sneha Shah

#### **Occupational Therapy** Ms. Shruti Velaskar

**Pathology** Dr. Tanuja Seth Dr. Sumeet Gujral Dr. Sridhar Epari **Psychiatry** Dr. Joyita Deodhar Ms. Savita Goswami

Radiation Oncology Dr. Siddharth Laskar Dr. Nehal Khanna

Radiodiagnosis Dr. Seema Medhi Dr. Ashita Rastogi Dr. Amrita Guha

**Surgical Oncology** Dr. Sajid Qureshi

**Transfusion Medicine** Dr. Anita Tendulkar (Till July 2017)

The Pediatric Hematolymphoid DMG provided extensive care to their patients with childhood cancers that went beyond offering the latest medical management. Knowing the high curative rates of most childhood malignancies that affect the economically challenged population, the DMG members developed an extensive support system and offered economic, dietary, logistic and educational help to the patients and their families. More than INR 17, 00, 00, 000/was received from a combination of Government Organization, Non - Government Organizations (NGOs), Charitable Trusts, Individual Donors and Corporate Social Responsibility (CSR) funds of corporate. The funds were used directly and entirely for economic support of patients.

#### **Volume Indicators**

The Acute Lymphocytic Leukemia cases crossed 600 for the first time in history of TMH.

Almost 50, 000 patients were seen this year by the DMG.

Disease	New Patients 2017			
	General	Private	Total	(%)
Acute Lymphoblastic Leukemia (ALL)	524	103	627	62.0
Acute Myeloid Leukemia (AML)	126	24	150	14.8
Chronic Myeloid Leukemia (CML)	15	02	17	1.7
Non Hodgkins Lymphoma (NHL)	93	19	112	11.1
Hodgkin's Lymphoma (HL)	65	15	80	7.8
Langer Cell Histiocytosis (LCH)	14	02	16	1.6
Juvenile Myelo Monocytic Leukemia (JMML)	06	02	08	0.8
Myelo Proliferative Disorders (MPD)	03	0	03	0.3
Total	846	166	1012	100

## **Mortality Rates**

Disease	Total Registered	Total Expired	Mortality in 2017					
			Before Tre	eatment	Within 45 Days		After 45 Days	
			No.	(%)	No.	(%)	No.	(%)
ALL	627	50	08	1.27	31	4.94	11	1.75
AML	150	30	05	3.33	11	7.33	14	9.33
CML	17	0	0	0	0	0.00	0	0.00
NHL	112	12	03	2.67	0	0.00	11	9.28
HL	79	01	0	0.00	01	1.26	0	0.00
LCH	16	01	01	6.25	0	0.00	0	0.00
JMML	08	0	0	0.00	0	0.00	0	0.00
MPS	03	0	0	0.00	0	0.00	0	0.00
Total	1012	94	16	1.58	43	4.24	36	3.55

#### **Treatment details**

Disease	2017										
	Treated at TMH		Treated under TMH guidance elsewhere		Second Opinion		TR&A		Palliative & Expired		
	Total	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
ALL	627	486	76.3	52	8.3	74	11.8	15	2.79	63	10.0
AML	150	112	77.4	18	12.0	17	11.3	03	2.0	39	26.0
CML	17	16	84.2	01	5.9	0	0	0	0	0	0
NHL	112	93	68.4	07	6.2	10	8.9	02	1.8	20	17.8
HL	79	56	73.4	03	3.8	18	22.8	02	1.8	01	1.2
LCH	16	10	50.0	03	18.8	03	18.8	0	0.00	02	12.5
JMML	08	06	50.0	0	0.00	01	12.5	02	1.8	03	37.5
MPD	03	03	100	0	50.00	0	0.00	0	0.00	0	0.00
Total	1012	782	77.3	84	8.3	123	12.2	25	2.5	128	12.6





#### Compliance

The patients on treatment in the DMG were more than 97% compliant with treatment due to the social support and patient tracking systems in place.

The completion of entire therapy at expected time for malignancy and stage was 90%.

#### Treatment Refusal & Abandonment (TR&A)

	Treatment Compliance in 2017				
Disease	Refused	Abandoned	Total	(%)	
ALL	13	03	15	2.6	
AML	0	03	3	2.0	
CML	0	0	0	0	
NHL	01	01	02	1.8	
HL	01	01	02	1.8	
LCH	0	0	0	0.00	
JMML	01	01	02	1.8	
MPD	0	0	0	0.00	
Total	16	09	25	2.5	

The extensive social support system for needy patients, who formed the bulk of clientele, had brought the TR&A rate to a historic low of 3.2% in 2016. This decreased to 2.5% in 2017 and reflected the success of the social support team, and infrastructure created. Historically, TR&A rates were close to 30% till 2009.

#### Research

Total N Clinic	umber of al Trials	Completed Trials		Ongoin	Overall Patients Accrued	
Investigator Initiated	Sponsored Trials	Investigator Initiated	Sponsored Trials	Investigator Initiated	Sponsored Trials	
13	02	02	0	09	03	666

Convener: **Dr. Seema Kembhavi** (Radiodiagnosis) Secretary: **Dr. Tushar Vora** (Medical Oncology)

## **Pediatric Solid Tumor - DMG**

#### Anaesthesiology, Critical Care & Pain

Dr. Bhakti Trivedi Dr. Jeson Doctor Dr. Madhavi Desai Dr. Nayana Amin Dr. Shilpushp Bhosale

**Medical Oncology** Dr. Girish Chinnaswamy Dr. Maya Prasad

Nuclear Medicine & Molecular Imaging Dr. Sneha Shah Dr. Venkatesh Rangarajan

**Ophthalmology (Honorary)** Dr. Nandan Shetye

**Pathology** Dr. Bharat Rekhi Dr. Mukta Ramadwar

Palliative Medicine Dr. Maryann Muckaden Dr. Naveen Salins



**Physiotherapy** Dr Ajeeta Kulkarni Dr. Sarika Mahajan

**Radiation Oncology** Dr. Nehal Khanna Dr. Siddharth Laskar **Radiodiagnosis** Dr. Akshay Baheti Dr. Kunal Gala

Surgical Oncology Dr. Sajid Qureshi

The Pediatric Solid Tumor DMG managed children under the age of 15 years who harbored any specific organ or tissue related tumors. The DMG was supported by allied members from social service groups and various Non Governmental Organizations, for logistic and socioeconomic related issues.

#### **Volume Indicators**

Diagnosis	Total (2016)	Total (2017)
Neuroblastoma	98	98
Renal Tumor	59	64
Germ Cell Tumor	48	50
Liver tumors	25	36
Retinoblastoma	52	52
Soft Tissue Sarcomas	115	135
Miscellaneous	95	72
No malignancy	29	33
Not investigated	15	36
Total	536	576

- a) Dropout rate : 6% ( 36 out of 576)
- b) Time to first Joint Clinic : 0-4 days
- c) Time for decision making : 7-14 days

#### Surgeries performed

	ТМН	ACTREC	Total (2017)
Major	199	35	234
Minor	142	1	143
Pediatric vascular access	59	0	59
Total	400	36	436

#### Radiotherapy (RT) Data

Treatment		No of Patients
RT Intent (Ext. RT)	Radical	129 / 187 (70%)
	Palliative	58 / 187 (30%)
	Ketlar	45 / 187 (24%)
Ext. RT	187 / 201 (93%)	
Brachytherapy	14 / 201 (07%)	
Conventional		101 / 187 (54%)
3D-CRT/ IMRT		86 / 187 (46%)
Did not come for RT		05 / 187 (0.03%)
after Appointment		
Did not complete planned RT	03 / 187 (0.02%)	
Referred outside for RT	20	

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

	2016	2017
Follow-up	794	550
New registration	60	200
Total	854	750

#### **Mortality & Morbidity Rates**

Treatment	Morbidity	Mortality
Surgery	30 – 16.2 % (38 / 234)	0.4 % (01 / 234)
Chemotherapy	Need for admission for Febrile neutropenia 5.4% (26 / 476 )	1.2 % (06 / 476 )
Radiotherapy (n = 187)	Grade 0: 129 / 187 (69%) Grade I: 51 / 187 (27%) Grade II: 06 / 187 (0.03%) Grade III: 01 / 187 (0.005%)	0 %

#### Cancer survival (%) Survival (%) Published тмс TMC data (%) Wilms 84 89 90 (OS) Best - 95 Germ cell tumors 81 93 (extracranial) OS 79 95 OS Retinoblastoma 81 Soft tissue 61 77 89 OS sarcomas (nonrhabdomyosarcoma) Neuroblastoma 54 - 100 75 (Low/Intermediate) 68 (04 year EFS) Neuroblastoma 40 30 - 50 22 (High risk) (03 year EFS) 69 - 77 & Extraskeletal Ewing's Sarcoma 68 77 58 - 67 EFS & OS

Survival rates Event-free O

Overall

From

OS: Overall Survival; EFS: Event-Free Survival

70

88

100, 83, 56 and 46 -

stage wise OS

#### Compliance

Hepatoblastoma

Compliance to time lines in patients who have completed entire therapy (a range given as multiple tumor types are considered)

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

#### Research

Total N Clinic	umber of al Trials	Completed Trials		Ongoin	Overall Patients Accrued	
Investigator Initiated	Sponsored Trials	Investigator Initiated	Sponsored Trials	Investigator Initiated	Sponsored Trials	
15	0	06	0	08	0	> 600

Convener: **Dr. Sarbani Ghosh Laskar** (Radiation Oncology) Secretary: **Dr. Nilendu Purandare** Nuclear Medicine & Molecular Imaging)

## **Thoracic - DMG**



Anaesthesia, Critical Care & Pain Dr. Priya Ranganathan Dr. Swapnil Parab

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

Nuclear Medicine & Molecular Imaging Dr. V. Rangarajan Palliative care Dr. Jayita Deodhar Pathology Dr. SV Kane

Dr. Rajeev Kaushal Dr. Anuradha Chougule

**Physiotherapy** Ms Anuradha Daptardar Dr. Vincent P

#### **Pulmonary Medicine**

Dr. Sandeep Tandon Dr. Maheema Bhaskar Dr. Aparna Iyer Radiation Oncology Dr. JP Agarwal Dr. Naveen Mummudi Dr. Anil Tibdewal

Radiodiagnosis Dr. Abhishek Mahajan Dr. Amit Kumar Janu

Surgical Oncology Dr. CS Pramesh Dr. George Karimundackal Dr. Sabita Jiwnani

The Thoracic Oncology Disease Management Group (DMG), a multidisciplinary team, comprised of specialized surgeons, medical and radiation oncologists with the active support from a pulmonary physician, specialized pathologists, radiologists, palliative care physicians and physiotherapists. The service of the DMG also involved participation of cardiovascular surgeons, endocrine specialists, basic scientists and technology experts. In addition, the DMG had a vibrant teaching / training programme and was involved in several relevant research activities.

The initiation of the "high-risk" multidisciplinary meeting with thoracic surgeons, anesthesiologists, critical care specialists and pulmonary physicians, a unique feature of the DMG, led to increasing numbers of high-risk patients being considered for surgery, optimizing the care of patients with multiple co-morbidities prior to surgery. Active participation from the physiotherapy department on postoperative rounds ensured individualized attention necessary in the intensive rehabilitation after these complex surgeries.

The recent and meaningful addition had been the initiation of an active EBUS (Endo Bronchial Ultra Sonography) programme and 65 procedures were performed; a notable feature being the utilization of ROSE (Rapid On Site Evaluation) cytology to ascertain adequacy of the cytology smear during the procedure. The strengthening of this service would reduce the number of mediastinoscopies.

#### **Volume indicators**

The DMG was amongst the highest volume thoracic centres in the world. A total of **4494** new patients were registered in the DMG in 2017 and lung cancers formed more than 50 % of all cancers. All cancers in the thorax showed an increase over last year.

Cancers	Lung	Esophagus	Others	Total
Year 2016	2432	1111	403	3946
Year 2017	2449	1136	909	4494

#### Surgical Data with Morbidity & Mortality Rates

Early post-operative outcomes were comparable with most high volume centres in the world. A large number of patients were operated by minimally invasive surgery including thoracoscopy, laparoscopy and robotic surgery.

	Esophageal Cancers	Lung Cancers	Metastasectomy	Mediastinal Masses	Chest wall Tumors	Port Inseertion	Others	Mediastinoscopy
Total number	180	132	92	31	37	27	135	80
Mortality	04 (2%)	13 (10%)	0	0	0	-	-	-
Major morbidity	20 (11%)	05 (4%)	01 (1%)	03 (10%)	03 (8%)	-	-	-
VATS	37 (20.5%)	27 (20%)	45 (49%)	07 (22.5%)	-	-	-	-
Robotic	07 (4%)	11 (8%)	-	06 (19.5%)	-	-	-	
Open	117 (65%)	94 (71%)	45 (49%)	18 (58%)	-	-	-	-
Inoperable	19 (10.5%)	08 (6%)	02 (2%)	-	-	-	-	-

Minor procedures (including bronchoscopy) = 2735

Bronchoscopy = 1788

#### **Compliance to Radiotherapy**

- In lung cancer, 97% of patients completed their planned treatment.
- In esophageal cancer, 98% patients completed their treatment.

#### **Newer initiatives**

- Robotic surgery for thoracic cancers
- Stereotactic radiotherapy for lung cancers
- Lung and esophagus cancer patient support group
- Management of complex airway problems including tracheobronchial stenting and laser therapy
- Evidence based management of advanced lung and esophageal cancers with molecular- based personalized targeted therapy and chemotherapy.

#### Research

Total Number of Completed Trials Clinical Trials		Ongoing Trials		Overall Patients Accrued		
Investigator Initiated	Sponsored	Investigator Initiated	Sponsored	Investigator Initiated	Sponsored	
49	03	11	01	26	0	> 3000

Members from the DMG published over 40 articles in peer reviewed journals in 2017. These articles covered topics not only related to thoracic oncology but also other aspects of oncology like cancer control, biostatistics, diagnostics and others.

Convener: **Dr. Ganesh Bakshi** (Surgical Oncology) Secretary: **Dr. Amit Joshi** (Medical Oncology)

## **Uro-Oncology - DMG**



#### **ACTREC Scientists**

Dr. Mrs. Chiplunkar Dr. Ashok Verma 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. Vedang Murthy Dr. Rahul Krishnatry Radiodiagnosis

Dr. Meenakshi Thakur Dr. Suyash Kulkarni Dr. Nilesh Sable Dr. Palak Popat

Surgical Oncology Dr. Gagan Prakash Dr. Mahendra Pal

The surgical team of Uro-Oncology DMG performed over 200 robotic surgeries in 2017. More than 200 cystoscopic examinations were performed monthly. The medical oncology members offered newest immunotherapy regimes to advanced kidney and urinary bladder cancer patients. Stereotactic Body Radiation Therapy (SBRT) had been introduced that significantly reduced treatment time by 5-7 days and reduced toxicity to the minimum. A unique adaptive technique known as 'Plan of the day' approach was being used in bladder preservation radiotherapy.

#### **Volume Indicators**

A total of **3230** new patients with genitourinary tract cancers were seen in the year 2017.

Patients	Numbers
New registration	2563
Follow ups	16000
Preventive Oncology	667

The ratio of general to private category of patients was 1373:1190 = 54%:46%.

Total Number of Major Surgeries	TMH + ACTREC	666 (591 + 75)
Renal Tumors (106)	Open Radical Nephrectomy	27
	Nephron sparing surgery (Open)	29
	Nephron sparing surgery (Robotic)	25
	Excision of renal fossa recurrence	02
	Nephroureterectomy	08
	Cytoreductive nephrectomy	09
	Laparoscopic Radical Nephrectomy	14
	Robotic Radical Nephrectomy	01
Bladder tumors (324)	Radical Cystectomy (Open)	53
	Robotic	09
	Laparoscopic	01
	lleal conduit	49
	Neobladder	05
	Exenteration	03
	Cutaneous Ureterostomy	02
	Partial Cystectomy	06
	Transurethral Resection of Bladder Tumor (TURBT) & Clot evacuation	242 + 34
Prostate Cancers (134)	Radical prostatectomy (open)	01
	Robotic Assisted Radical prostatectomy	37
	Channel Transurethral Resection of the Prostate (TURP)	07
	Scrotal orchidectomy	60
Penile Cancers (115)	Partial penectomy	44
	Total penectomy	10
	Groin Node Dissection (GND)	43
Testicular tumors (79)	High inguinal orchidectomy	41
	Retroperitoneal Lymph node Dissection (RPLND)	44
Laparoscopic Urology		22
Robotic Urology		76

A total of 3436 minor procedures were performed.

The medical Oncology team saw 780 new patients.

#### Radiotherapy (RT) with Intent of Treatment

Type of cancer	Number o	Total	
	Radical RT	Palliative RT	
Renal Cancer	07	40	47
Urinary Bladder Cancer	33	25	58
Prostate Cancer	135	91	226
Penile Cancer	12	04	16
Testicular cancer	15	11	26
Others	12	15	27
Total	214	186	400

#### **Mortality & Complication rates**

Surgical complication rates: (As per Clavien Dindo system)

- Grade 1 0.6%
- Grade 2 5.5%
- Grade 3 4.8%
- Grade 4 1.5%
- Grade 5 0.1%

#### Medical Oncology 30-day morbidity

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

30 days mortality: Cancer Testis = 03%

#### **Survival Rates**

Surgical						
Organ	5-Year Overall Survival (OS)		Disea Sur	se Free vival		
	Early Advanced disease disease (T1,T2,M0) (T3,T4,M0)		Early disease	Advanced disease		
Cystectomy	77%	55%	72%	46%		
Nephrectomy	90%	46%	84%	55%		
Testicular	93%	85%	91%	82%		

#### Medical Oncology

Organ	Survival (in months)		
MetastaticPenile cancer patients receiving palliative chemotherapy	Median OS	10.6	
Metastatic Renal Cell Cancer patients receiving Tyrosine Kinase Inhibitors (TKIs) in first line	Median OS	22.6	
Metastatic Renal Cell Cancer patients receiving TKIs in Second line	Median OS	6.2	

#### **Radiation Oncology**

Type of cancer	5 year overall survival		
Prostate cancer	High risk	85%	
	Intermediate risk	90%	
Bladder cancer with ChemoRadiation (CT+RT)		65%	

#### Compliance

The DMG maintained over 95% compliance with evidence based guidelines with respect to patient treatment.

For radiotherapy, the compliance was 94.5% (Incomplete RT: only 04 patients) and the drop outs were 10 patients (2%).

#### Research

	Investigator Initiated	Sponsored	Overall patients accrued
Total Clinical Trials	22	04	
Completed	08	01	
Ongoing / Approved but not initiated	09	02	1425
Submitted to ethics committee (IEC)	05	01	

# Education

Atoms for Cancer Care



Dr. Kailash Sharma, Director Academics

## Academia



Director Academics, Dr. KS Sharma with his administrative staff (from left: Ms. Asmita Vichare, Ms. Ramadevi Shetty, Ms. KK Samant, Ms. VS Kashikar and Ms. Lata Salian)

Prof. K.S. Sharma, Director (Academics) was in-charge of all educational activities at TMC. Tata Memorial Centre was affiliated to Homi Bhabha National Institute (HBNI) Mumbai, a Deemed University, under Department of Atomic Energy (DAE), Govt. of India for imparting PG training in oncology and other broad specialties, and all these courses were recognized by Medical Council of India, New Delhi. Tata Memorial Centre (TMC) comprised of the Tata Memorial Hospital (TMH), the Advanced Centre for Treatment, Research and Education in Cancer (ACTREC), and Centre for Cancer Epidemiology (CCE).

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



ACTREC



**Tata Memorial Hospital** 

#### **Academic Activities**

Tata Memorial Center was a recognized training center in cancer Education and Research by several National and International organizations, including WHO, IAEA and INCTR. The Hospital offered education through various activities like PG courses, and training through short term observer ship and various training programs. About 151 Post graduate Medical students were registered in 2017 for PG courses in various disciplines.

Tata Memorial Centre in collaboration with Kings College, London organized " A summer school in Oncology - 2017" training program for two weeks for the Under graduate and Post graduate Medical students. One hundred and nineteen (119) students selected from Govt. Medical colleges participated from all over India. After successful completion of this program five (5) participants were given a 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 took training at TMC for 06 Months (twice in a year). Twenty six (26) Trainee Technology students underwent training at TMC for 06 Months (twice in a year).

#### **Observer ship program at Tata Memorial Centre**

Approximately 481 specialists including dental surgeons have visited Tata Memorial Centre as Observer from all over India in the year 2017.

#### Overseas trainees and observers at Tata Memorial Centre

In the year 2017, thirty one (31) overseas specialists visited Tata Memorial Centre as observer for a period ranging between 1 to 3 months.

Tata Memorial Centre had taken the initiative in training of African, sub-Saharan country doctors, nurses under Indo-African Forum Summit III, in the field of Oncology for period ranging from 1 month to 6 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.

Observe	ers from Foreign Cou	Intries

Bangladesh	Saudi Arabia	UK	Korea	South Africa
Malaysia	Canada	Iraq	Kenya	Yemen
Nepal	Myanmar	USA	Maldives	Oman
Germany	Ethiopia	East Africa	Qatar	



## **Academic Activities**

The First International Course in Stereotactic Body Radiotherapy in India by International Atomic Energy Agency



Delegates at the Regional Training Course (RTC) under the aegis of the International Atomic Energy Agency (IAEA) on Clinical Applications of Stereotactic Body Radiotherapy (SBRT) in lung and liver cancers.

Tata Memorial Centre (TMC) conducted a 5-day (22<sup>nd</sup> – 26<sup>th</sup> May 2017) International workshop cum conference for the International Atomic Energy Agency (IAEA) project C7-RAS-6085-002. This project was under the Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology for Asia and the Pacific (RCA). The course director was Dr. JP Agarwal who thanked the IAEA for providing TMC the opportunity to conduct this international workshop. This was the first workshop on Stereotactic Radiotherapy held here in the history of this institute. Dr. Kailash Sharma, Director Academics, Tata Memorial Centre welcomed all national and international participants and emphasized on the need of having dedicated training workshops in advanced techniques such that advanced radiation techniques like SBRT can be uniformly implemented within the RCA region.

A total of 27 delegates (22 from abroad and 5 from host country) attended this RTC training workshop; Bangladesh (2), China (2), Indonesia (2), Korea (2), Malaysia (2), Mongolia (2), Philippines (2), Singapore (2), Sri Lanka (2), Thailand (2), Vietnam (2) and India (5).

Two sessions were dedicated to basic principles of SBRT with special focus on the various anatomical sites in consideration. This was followed by one and half days training for lung and two days training for liver SBRT. The future advances and horizons in SBRT for lung and liver cancers were deliberated on the last day. The first day was dedicated to radiological anatomy, radiobiology of extreme hypo fractionation and rationale for SBRT. Motion management issues were also discussed. There were deliberations on setting up high quality SBRT programmes in Low and Middle Income Countries (LMIC) within their available resources.

The second day focused on dose prescription and constraints for lung target, Organs at Risk (OAR) and toxicity of lung SBRT and its management. Hands-on lung contouring was also demonstrated.





Session at Advanced Centre for Treatment Research and Education in Cancer, Tata Memorial Centre, Kharghar, Navi Mumbai.

The day three focused on the multidisciplinary management of liver tumours with details on radiology of liver tumours, other nonsurgical treatments like Transcatheter Arterial Chemoembolization (TACE) and Transarterial Radioembolization (TARE).

Tips and tricks for interpreting post treatment imaging were discussed on day four along with hands-on session focusing on immobilization and 4DCT acquisition for free breathing or Deep-Inhalation-Breath Hold (DIBH) SBRT. The last day was dedicated to hepatic SBRT, Quality Assurances (QA) in SBRT and discussions about the newer horizons for lung and liver SBRT with the IAEA experts sharing the emerging data of latest innovations and directions for clinical implementation.

In the end, all countries presented their own facilities and their protocols to the audience. The Head of TMC Radiation Oncology department, Dr. JP Agarwal concluded that courses like these along with future collaborative studies in the countries under RCA would help build capacity and promote academic excellence in Radiotherapy.

## **Academic Meets**

	January	
Master class in Gynecology	6th	Gynecology DMG
MD Anesthesiology teaching program	12th & 19th	Anesthesiology
	February	
MD Anesthesiology teaching program	2nd, 9th, 16th & 23rd	Anesthesiology
Master class in Gynecology	3rd	Gynecology DMG
1st Thyroid Preceptorship progress	13th - 17th	Head & Neck DMG
Multiple Myeloma seminar	27th	Nursing
	March	
MD Anesthesiology teaching program	2nd, 9th, 16th, 23rd & 30th	Anesthesiology
Master class in Gynecology	3rd	Gynecology DMG
Frontiers in Epidemiology	6th - 7th	Cancer Epidemiology
Post Operative Pain Management	8th	Anesthesiology
8th Global Postlaryngectomy Rehabilitation Academy	11th - 12th	Head & Neck DMG
Lecture on Craniofacial trauma & other disorders	25th	Surgical Oncology
Update on Radionuclear practises	25th - 26th	Nuclear Medicine
Immunohistochemistry (IHC) Markers in Gynecological Oncology	29th	Surgical Oncology
Add Aspirin Sudy Site Initiation visit	29th	Ethics
	May	
Brain storming session for research projects	12th	Ethics
National Cancer Grid (NCG) Breakout Session	20th	Dr. CS Pramesh
7th Mational Cancer Grid (NCG) Meeting	20th - 21st	Dr. CS Pramesh
NCG meeting	21st - 27th	Dr. Manju Sengar
Adult Oncology	24th & 31st	Dr. Manju Sengar
	June	
Urological cancer cases series	10th	Uro-Oncology DMG
Adult Oncology	7th, 14th & 28th	Dr. Manju Sengar
	July	
Good Clinical Practice (GCP) Update	1st	Ethics
Eclipse Treatment planning discussion	3rd	Medical Physics
Adult Oncology	12th, 19th & 26th	Dr. Manju Sengar
	August	
Pressurized Intraperitoneal Aerosol Chemotherapy (PIPAC) in peritoneal metastases from colorectal cancer	15th	Gastrointestinal DMG
6th Education in Acute Pain in Cancer	19th - 20th	Anesthesiology
Seminar on Principles of Radiation Oncology	29th	Radiation Oncology
Seminar on SRS / SBRT of Lung Tumor	31st	Radiation Oncology

	September	
16th Annual Radiotherapy Practicum	1st - 2nd	Radiation Oncology
11th Annual Clinical Research Methodology (CRM), 2017	9th - 10th	Ethics
Annual Laser meet & thyroid preceptorship	15th	Head & Neck DMG
The Foundation for Head and Neck Oncology – FHNO 2017	15th - 17th	Head & Neck DMG
	October	
Educational seminar	17th - 18th	Psychiatry & Palliative Medicine
Radiology symposium	26th	Radiodiagnosis
	November	
Lecture on Adenosquamous Carcinoma (ASCC) & Urology	14th	Pathology
WEBINAR NCG	15th - 28th	Dr. CS Pramesh
Thyroid Preceptorship	20th - 24th	Head & Neck DMG
	December	
Annual Lymphoma-Leukemia	5th - 7th	Cytogenetic
Skull Base	6th	Head & Neck DMG
5th Educational program	15th - 16th	Occupational Therapy
Brain storming session for research projects	16th	Ethics
Lecture on Adenosquamous carcinoma (ASCC) & Urology	19th	Pathology
Skull Base	20th	Head & Neck DMG

## Conferences

	January	
TMC Platinum Jubilee Conference,	27th - 29th	TMC
"Healthcare: A Commodity or Basic Human Need?"		
	February	
Evidence Based Medicine (EBM) 2017, "From Controversy to Consensus Shaping Indian National Cancer Policy"	24th - 26th	ТМС
	April	
1st International Conference on Cancer Rehabilitation	7th - 9th	Occupational Therapy
Teaching Tissue Procurement Core (TPC) conference	21st	Pathology
Genomic Oncology Conference	22nd	Radiation Oncology
Pediatric Solid Tumor Conference-2017	29th - 30th	Pediatric Solid Tumor DMG
	July	
Annual cancer R & D conference	13th	Radiaton Oncology
CONCORECON 2017 (Plastic Surgery)	17th - 20th	Plastic Surgery
	September	
5-Day Certificate course in Lymphedema management	6th - 10th	Physiotherapy
	October	
Lymphoma conference	14th - 15th	Pathology
Oncology Nurses Association of India (ONAI) Conference	20th	Nursing
15th Women's Cancer Initiative (WCI)-Imaging in Gynecological Cancer	27th-29th	ТМС
	November	
National conference on Oncology	3rd	Nursing
Oncosurg 2017	17th - 19th	Surgical Oncology
	December	
Difficult Airway conference	1st - 3rd	Anesthesiology
13th Oncosurg 2017	8th - 10th	Surgical Oncology

## **Continuing Medical Education (CME)**

	January	
Update in Pathology	27th - 28th	Pathology
	March	
Oncoradiology	19th	Radiodiagnosis
Radiology CME	26th	Radiodiagnosis
Cancer control, prevention, screening & early detection	30th	Preventive Oncology
	April	
Cancer prevention, education & detection for Paramedical & non-medical personnel	18th	Preventive Oncology
Thoracic Oncology	21th	Thoracic DMG
	May	
CME For Nurses	20th	Nursing
National CME for Radiology Technology students	27th - 28th	Radiodiagnosis
	August	
Annual CME	12th	Uro-Oncology DMG
	November	
CME in Biochemistry	4th - 5th	Clinical Biochemistry
CME on Nuclear Medicine	11th - 12th	Nuclear Medicine
Annual CME	18th	Uro-Oncology DMG
7th CME for medical laboratory technicians	24th - 25th	Hematopathology
	December	
CME on Breast Cancer	15th - 16th	Occupational Therapy

## Trainings

	January	
Pediatric Oncology Traing program	6th	Nursing
Library tutorials	7th - 21st & 28th	Digital Library
International Nursing Oncology training programme	13th	Radiation Oncology
	February	
Train the Trainees	3rd - 5th	Dr. Kailash Sharma
Infection Control	20th - 24th	Nursing
	March	
Clinical Decision Support (CDS) Activity & ERCP-EUS Project training	4th - 11th	Digestive Diseases & Clinical Nutrition
Indo-American Cancer Association (IACA)-6 weeks course	6th - 16th April	Palliative Medicine
	April	
Training in Palliative Care	12th	Palliative Medicine
Anesthesia Review Course	14th - 16th	Anesthesiology
Certificate course in Preventive Oncology	18th - 20th	Preventive Oncology
Palliative Medicine Volunteer training program	21st	Palliative Medicine
Children Palliative Care for doctors & nurses	26th - 28th	Palliative Medicine
	May	
National Aids Control Organization (NACO) training program	2nd - 4th	Transfusion Medicine
International Atomic Energy Agency (IAEA) and Regional Training Courses (RTC)	21st - 27th	Radiation Oncology
	June	
Training course in Molecular Diagnostics	12th - 16th	Molecular Pathology
Certificate course in Preventive Oncology	13th - 15th	Preventive Oncology
	July	
Training on Quality Management System (QMS) of Blood bank	3rd - 6th	Transfusion Medicine
Radiophysics training	7th	Medical Physics
	August	
Onco-physiotherapy training program	8th	Physiotherapy
Training Programs	21st - 25th	Dr. Jayita Deodhar
Seminar on Priciples of Brachytherapy for Nurses	28th	Radiation Therapy
	September	
6-Week Indo-American Cancer Association (IACA) training program	4th - 11th	Palliative Medicine
5-Day Certificate course in Lymphedema Management	6th - 10th	Physiotherapy
	October	
21st Residents Review Course	5th	Radiodiagnosis
Training in Food And Drug Administration (FDA)	12th	Transfusion Medicine
	December	
Children Palliative Care training	11th - 13th	Palliative Medicine

## Workshops

	January	
Live Worshop	9th	Neurosurgery
Mortality Workshop	11th	Epidemiology
Cause of Dead (COD) certification	14th	Cancer Epidemiology
Workshop on Neuro-rehabilitation	18th	Nursing
Systematic Literature Review Workshop	21st	Palliative Medicine
EOLC APICON Preconference workshop	28th	Palliative Medicine
	February	
Collaboration for Research methods Development in Oncology (CReDO) Workshop	5th - 10th	Ethics
Preventive Oncology Workshop on Tobacco Control & Cessation	7th - 9th	Surgical Oncology & Anesthesiology
Thoracic Oncology	16th	Surgical Oncology
	March	
Neurosurgery	2nd	Neurosurgery
Endoscopy Cleaning & Disinfection	4th	Digestive Diseases
Good Clinical Practice (GCP) Workshop Advance Course Basic Course (Fresher's)	18th	Ethics
Surgical Demonstration	18th	Nobel Biocare, India Pvt. Ltd.
Therapeuitic Workshop	22nd & 29th	Medical Oncology
	April	
Therapeuitic Workshop	5th, 12th, 19th & 25th	Medical Oncology
CAN-REHAB: Preconference workshop on Dysphagia	7th	Radiation Oncology
2nd Annual Workshop on Paediatric Solid Tumour	29th - 30th	Medical Oncology
Workshop on tobacco control & cessation	26th	Preventive Oncology
	Мау	
Therapeutic Workshop	5th	Medical Oncology
	June	
Gokhale's method: Posture Workshop	9th	Dr. Nitin Inamdar
Good Clinical Practice (GCP) Workshop	17th	Ethics
Systematic Literature Review Workshop	17th	Palliative Medicine
	July	
Workshop on cancer prevention, screening and early detection	13th - 15th	Preventive Oncology
	August	
Wound management	2nd	Nursing
Cancer control, prevention, screening & early detection	17th	Preventive Oncology
	September	
Workshop on Hemodynamic monitoring (THEMATICC'17)	23rd - 24th	Anesthesiology

	October	
Workshop on tobacco control & cessation	4th	Preventive Oncology
Surgical Oncology	27th	Gynecology DMG
	November	
Workshop on Tobacco	13th - 14th	Dr. Pankaj Chaturvedi
Brain Tumor Foundation's (BTF) Adolescent and Young Adult (AYA) program	14th	Radiation Oncology
HOPE Workshop	14th - 16th	Medical Oncology
	December	
HOPE Workshop	4th - 7th	Medical Oncology
Cancer prevention, education & detection for Paramedical & non-medical personnel	18th	Preventive Oncology
# Miscellaneous

	January	
Dietetics Day – In House – Program	10th	Dietician
Art Workshop	11th	Medical Oncology
Press Conference	20th	Dr. RA Badwe
Pediatric birthday celebrations	20th	Medical Oncology
	February	
World Cancer Day	3rd	Dr. Pankaj Chaturvedi
M/S. VARIAN Presentation	9th - 10th	Medical Physics
Cancer Survivors Day	14th	V Care Foundation
BRIT / BARC Meeting for TPS evaluation	17th	Medical Physics
	March	
Pediatric birthday celebrations	1st	Medical Oncology
All India Journalist meet	3rd	Public Relations
Screening film on Grant Medical College, Mumbai	5th	Dr. RS Kelkar
International Womens Day	10th	Dr. Sudeep Gupta
Out Patients Departments Digital Health Inasurance	21st	Medical Superintendent
	Мау	
AGM - Oncology Nurses Association of India (ONAI)	6th	Nursing
Max Foundation Glivec <sup>®</sup> International Patient Assistance Program (GIPAP) Program	7th	Medical Oncology
World No Tobacco Day	30th	Dr. Pankaj Chaturvedi
	June	
UGAM Annual function	3rd - 4th	Medical Oncology
Press Conference	8th	Public Relations
	August	
Asia Pacific Climate Investment Funds (CIF)	4th	Surgical Oncology
Synergy India 2017	4th	Radiodiagnosis
Patient Navigation system - Kevat	4th	Platinum Jubilee Admin
Kevat training program	8th	Platinum Jubilee Admin
Kevat training program	10th	Platinum Jubilee Admin
Press Interaction for Kevat	28th	Platinum Jubilee Admin
	September	
TYACON 6th National conference of teenage & young adults cancer	2nd - 3rd	Radiation Oncology
Lymphoma Awareness Day	15th	ТМН
Indian Musculoskeletal Oncology Society	17th	Bone & Soft Tissue DMG
360 Degree Process Feedback Process	25th - 30th	Academics

	October	
360 Degree Feedback Process	5th	Academics
World Hospice & Palliative Care Day (WHPCD)	9th and 13th	Palliative Medicine
Brain Tumor Foundation	15th	Radiation Oncology
Practicing Cultural Activity for CME & Workshop in Clinical Biochemistry	11th - 19th	Clinical Biochemistry
Breast Cancer Awareness Art exhibition	30th	Dr. RA Badwe
	November	
Practicing Cultural Activity for CME & Workshop in Clinical Biochemistry	16th - 20th	Clinical Biochemistry
Hasya Kavi Sammelan	20th	Publib Relations Office
	December	
Global Adult Tobacco Survey (GATS), Maharashtra State	8th	Head & Neck DMG
HOPE program and mug distribution	28th	Medical Oncology

# **Certificate Courses**



Sr. No.	Training Programmes	Department	Number of Trainees
1	Certificate course in Hospital Infection control	Nursing Department	14
2	Certificate course in Preventive Oncology	Preventive Oncology	109
3	Certificate course in Biorepository Science	Pathology	01
4	One year Molecular Biology Training Program	Medical Oncology	02
5	Six months Advanced Hematology Training Course for Technologists		06
6	Six Months Molecular Haematology Training Course for Technologists	Haematology	05
7	Six months training course in Flow Cytometry		05
8	Advanced Clinical Biochemistry Technologist Training Course	Biochemistry	01
9	Advanced Cancer Cytogenetic Training Course	Cancer Cytogenetic	05
10	Six months Cyto-Pathology Technician training Course	Pathology	01
11	PB Desai / UICC Fellowship	Onco – Pathology, Surgical Oncology, Radiation Oncology	03
12	Certified Training in Oncology for Doctors	-	23
13	Post Basic Diploma in Oncology Nursing	Nursing Department	30
14	Certificate Course for Medical Secretary	M.S. Office	02
15	Library Trainees	Library Sciences, TMH	02
16	Certificate course in Intensive Care Nursing	Nursing Department	10
17	Certificate Course in Enterostomal Therapy	Nursing Department	08
18	Certificate course for CVAD	Nursing Department	18
19	6-months Onco-Physiotherapy Training Course	Physiotherapy	05
20	Apprenticeship Training (BOAT)	Pathology, Cytology	05
21	Oncology Training (Defense Doctor)	Anesthesiology	01
22	6 weeks Certificate course in Palliative Care	Palliative Medicine	08
	Total		264



# **Degree Courses**

Sr.No	Name of the Course	Approved by	Affiliation	Duration in Years	Intake Number (2017)
	Super specialty Courses (Post MD / MS)				
1	M.Ch. (Surgical Oncology)	Medical Homi B Council of Natio India, New Instit Delhi (Deer		3	16
2	M.Ch. (Gynecological Oncology)			3	02
3	M.Ch (Plastic Surgery)			3	02
4	M.Ch. (Head & Neck Oncology)			3	04
5	D.M. (Medical Oncology)			3	15
6	D.M. (Critical Care)			3	02
7	D.M. (Paediatric Oncology)	 ModicalUami Bhah		3	03
8	D.M. (Gastroenterology)	Medical	Homi Bhabha	3	02
9	D.M. (Interventional Radiology)	Council of	National	3	02
	Board Speciality Courses	Delhi	Institute (Deemed		
10	MD (Pathology )	Approved	University) (HBNI)	3	12
11	MD (Anesthesiology)			3	20
12	MD (Radiodiagnosis)			3	17
13	MD (Radiotherapy)			3	16
14	MD (Microbiology)			3	01
15	MD (Immuno Hematology & Blood Transfusion)			3	03
16	MD (Nuclear Medicine)			3	06
17	MD (Palliative Medicine)			3	04
	Technical Courses - Post Graduate Students				
18	Advance Diploma in Medical Imaging Technology (ADMIT)	Government of	Maharashtra State Board of Technical Education (MSBTE)	2	18
19	Advance Diploma in Radiotherapy Technology (ADRT)	Maharashtra	and the Directorate of Technical Education (DTE)	2	10
20	Postgraduate Diploma in Fusion Imaging technology	-	HBNI	1	10
	M.Sc. Courses				
21	Clinical Research	-	HBNI	2	10
22	Nursing (Oncology)	Maharashtra Nursing Council & Indian Nursing Council	HBNI	2	03

Sr.No	Name of the Course	Approved by	Affiliation	Duration in Years	Intake Number (2017)
	Ph.D Courses				
23	Health Sciences (Post Doctoral Fellowship)		HBNI	4-5	0
24	Medical physics - Life Science			4-5	0
	Post Postgraduate Courese				
25	2 - Year Certified HBNI Fellowship	-	HBNI	2	11
		Total number of Students			189

 Tata Memorial Hospital / Education
 147



# Research

Atoms for Cancer Care

**Dr. Manju Sengar,** Officer in Charge Clinical Research Secretariat & Department of Atomic Energy Clinical Trials Centre



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 (TMC) 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 2017 following activities were conducted in each of these domains.

#### 1. Promoting Clinical Research

#### a. Expansion of Infrastructure:

 HUB: In order to provide adequate work space for researchers and support staff, the CRS area was extended. This included a hub with 16 dedicated and fully equipped work stations (desktop with internet connections and one network printer) and space for statisticians.

Clinical research secretariat provided infrastructural support for national cancer Grid in the year 2017

 ii) Central Pharmacy: For storage of all trial related drugs at required temperature in compliance with Schedule Y (Investigator Product Management), ICH-GCP (E6) with controlled access. For storage of trial medicines under strict temperature control, a walk-in cooler along with automated alarm system for temperature cut-off was installed

- iii) Filing Storage space: To store all the clinical trial records in compliance with ICH-GCP, a dedicated storage space with controlled access to authorized trial personnel was provided
- iv) Monitoring Room: To execute the monitoring plan lay out by the sponsors and investigators of a clinical trial and to facilitate monitoring visits.

#### 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. This year, statistical support to 125 clinical trials and projects was offered in the following areas: Analysis - 119

Randomization list generated - 03

Sample size - 11

Statistical Method - 05

In addition, the CRS has supported the process of randomization on ongoing basis for 02 trials.

- c. Financial support for the clinical trials: A total of 15 Intramural trials were supported through the DAE-CTC and a total of Rs. 9062571/- were provided as financial grant.
- d. Translational support for consent forms for clinical trials: To support the increasing translation work burden, a dedicated Translator was appointed at CRS. The Translator provided their expert help to clinical researchers in Informed consent translation in both Marathi and Hindi language. A total of 69 clinical trials consent forms were translated in Hindi and Marathi languages. Translation services also helped in proof reading and error corrections for 05 clinical trial consents.



#### e. Publications of results of clinical research supported by DAE-CTC:

Sr. No.	Title of Publication	Principal Investigator
1.	Neoadjuvant Chemotherapy Followed By Radical Surgery Versus Concomitant Chemotherapy and Radiotherapy In Patients with Stage IB2, IIA Or IIB Squamous Cervical Cancer: A Randomized Controlled Trial	Dr. Sudeep Gupta
2.	Cisplatin Chemo-radiation Versus Radiation in FIGO Stage IIIB Squamous Cell Carcinoma of the Uterine Cervix (CRACx trial): A Randomized Clinical Trial	Dr. Umesh Mahantshetty

#### f. Standard Operating Procedure (SOP):

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 SOP was formulated for conducting research. The SOP's were designed to have uniform

standard, quality assurance and quality control for conducting clinical Studies/research at TMC.

The key element of the SOP included: Assessing Protocol Feasibility; clinical trial agreement with sponsors or CRO; interaction with IEC; 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; and the transfer of patients between TMH and ACTREC.

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 GCP, ICMR guidelines, ICH GCP).

SOP training and education was provided 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.

### 2. Training And Education Of Researchers

- a. Clinical Research Methodology workshop was organized on 9<sup>th</sup> and 10<sup>th</sup> September 2017 to train researchers on various aspects of trial design and analysis. A total of 147 delegates (local and national) attended the conference
- b. Good Clinical Practice Workshop was organized to train TMC Staff on ICH-GCP principles on 18<sup>th</sup> March 2017. The Advanced course module was attended by 44 participants and 67 delegates attended the basic course
- c. M. Sc Clinical Research CRS was actively involved in M. Sc Clinical Research course. At present there were a total of 30 students in the first and second year of their course. Ten (10) students were doing Internship training in various Disease Management Groups. We also provided support to the following activities:
  - Conducting 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.

### 3. Evidence Based Management Meeting 2017

The important aim of CRS / DAE-CTC had been to propagate and promote practice of evidence based medicine especially in cancer. In this regard Evidence

Based Management meetings were started about a decade 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 who were experts in their field of oncology. The deliberations which typically go on for 2-3 days included talks on a particular topic in context with the Indian scenario. These experts also gave recommendations that could be followed in many parts of this country, provided the evidence was robust enough. To conclude the 75<sup>th</sup> year of the Centre, the third scientific meeting was devoted to "From Controversy to consensus Shaping Indian National Cancer policy". The theme aligned well with the one of the goals of National Cancer Grid (NCG), an initiative funded by Government of India through the Department of Atomic Energy, of having uniform standards for management of cancers across

India. The conference focused on the six most common cancers in India namely oral, breast, lung, cervical, stomach and colorectal cancers. Leading national and international experts discussed the available evidence on various controversial issues in prevention, management and research in each of these cancers. The expert opinion based on these discussions was presented to the attendees during the conference and adopted as policy statement of the National Cancer Grid. The NCG Guidelines for Common Cancers book was issued during the meeting. A total of 698 national and international delegates (including SAARC countries) participated in the meeting.

#### 4. Support to National Conferences & Meetings

The CRS and the DAE-CTC provided active support to various conferences, workshops, CME and National Cancer Grid (NCG) meetings throughout the year.

# Data Safety Monitoring Subcommittees (DSMSC, IEC - I & II)

**Dr. Prachi Patil,** Secretary

The Data Safety Monitoring Sub-Committee (DSMSC), 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

- Assess and evaluate the Serious Adverse Event reports (SAEs) on all trials conducted at TMH
- Monitor the overall progress of institutional clinical trials and ensured adherence to clinical trial and procedural requirements
- Ensure that safety of participants, validity of data and projected accrual goals were maintained
- Provide regular reports to the Institutional Ethics Committee.

The DSMSC met on the first Tuesday of every month at 8.00 am in the Institutional Ethics Committee meeting room.

Sr. No.	Names	Affiliation	Gender	Expertise
1.	Dr. Prachi Patil, Secretary, DSMSC Member, IEC-I	Associate Professor & Assistant Gastroenterologist, Dept of Digestive diseases & Clinical Nutrition, Tata Memorial Hospital	Female	Medical Gastro- enterologist
2.	Dr. Gouri Pantvaidya, Jt. Secretary, DSMSC Member, IEC-II	Associate Professor, Dept. of Surgery, Tata Memorial Hospital	Female	Surgeon
3.	Dr. Anuja Deshmukh, Member	Associate Professor, Dept. of Surgery, Tata Memorial Hospital	Female	Surgeon
4.	Dr. Sabita Jiwnani, Member	Assistant Professor, Dept of Surgical Oncology, Tata Memorial Hospital	Female	Surgeon
5.	Dr. Ashwin Desouza, Member	Assistant Professor, Dept of Surgical Oncology, Tata Memorial Hospital		Surgeon
6.	Dr. Santosh Menon, Member	Associate Professor, Dept of Pathology, Tata Memorial Hospital	Male	Pathologist
7.	Dr. Sneha Shah, Member	Associate Professor, Dept of Nuclear Medicine, Tata Memorial Hospital	Female	Radiologist
8.	Dr. Sohan Solanki Tata Memorial Hospital	Assistant Professor, Dept. of Anaesthesia,	Male	Anesthetist
9.	Dr. Jyoti Bajpai Member	Associate Professor, Dept of Medical Oncology, Tata Memorial Hospital,	Female	Medical Oncologist
10.	Dr. Santam Chakarborty Member (From April 2016 to October 2017)	Assistant Professor, Dept of Radiation Oncology, Tata Memorial Hospital	Male	Radiation Oncologist
11.	Dr.Rahul Krishnatry, Member (From November 2017)	Assistant Professor, Dept of Radiation Oncology, Tata Memorial Hospital		Radiation Oncologist
12.	Dr. Gaurav Narula, Member	Professor, Dept. of Medical Oncology, Tata Memorial Hospital	Male	Medical Oncologist

#### The composition of the DSMSC for the year 2016 - 2018:

Sr. No.	Names	Affiliation	Gender	Expertise
13.	Dr. Hasmukh Jain, Member	Assistant Professor, Dept of Medical Oncology, N Tata Memorial Hospital		Medical Oncologist
14.	Dr. Gauravi Mishra, Member	Associate Professor, Dept. of Preventive Oncology,		Preventive Oncologist
15.	Dr. Sheela Sawant, Member	Associate Professor, Dept. of General Medicine, Fata Memorial Hospital		Physician
16.	Dr. Nitin Shetty, Member	Associate Professor, Dept. of Radiodiagnosis, Tata Memorial Hospital		Radiologist
17.	Dr. K Manjunath N, Member	Scientific Officer, Dept of Pharmacology, Advanced Centre for Treatment, Research & Education in Cancer (ACTREC)		Pharmacologist
18.	Dr. Sumitra Bakshi, Member	Professor, Dept of Anesthesia, Tata Memorial Hospital		Anesthetist
19.	Dr. Tushar Vora, Member	Associate Professor, Dept of Medical Oncology, Tata Memorial Hospital		Medical Oncologist
20.	Dr. Deepa Nair, Member	Associate Professor, Dept. of Surgery, Tata Memorial Hospital	Female	Surgeon

The committee conducted 12 meetings from Jan - Dec 2017. 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 six members consisting of the two secretaries of the IEC 1 & 2, the two lead discussants assigned to each project and the secretary and Jt-secretary of the DSMSC.

### The four principle functions of the committee

- 1. Review of Serious Adverse Event Reports
- 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 DSMSC was to review and address SAE and unexpected events involving all trials.

Every month, the committee received an average of 30 SAE reports on trials being conducted at TMC (Investigator initiated and sponsored studies). A total of 366 SAE reports on 43 clinical trials were received and reviewed by the DSMSC from Jan - Dec 2017.

In addition, the DSMSC also received 189 off site safety reports on multicentre trials ongoing at Tata Memorial Hospital in 2017.



A detailed review of the Continuing Review Application was done by DSMSC Member Secretary. The comments from the DSMSC were forwarded to the IEC.

A total of 386 status reports were received and reviewed by the DSMSC in 2017. The DSMSC monitored 13 Investigator Initiated studies out of total 91 Investigator Initiated studies.



### 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
- Maintaining a database for Internal SAEs occurring at TMH that will help in tracking of follow-up on significant events that have occurred on a trial and monitor the current status on the study events occurring on a trial
- Continuous follow up of Continuing Review Application (CRA) submission.

### **Future Plans**

- To attempt to get external trial monitors in order to make this exercise more objective and impartial
- Revision and formulation of new / updated SOPs for DSMSC
- Development of online submission of Continuing Review Application (CRA) and Serious Adverse Event (SAE) reporting forms.

**Dr. Prafulla Parikh,** Member Secretary

# Data Safety Monitoring Subcommittee DSMSC - III (ACTREC)

The Data Safety Monitoring Sub Committee (DSMSC) was a subcommittee of the IEC-III, and its primary responsibility was to review annual reports and safety issues - Serious Adverse Events (SAE), Periodic Safety Update Report (PSUR) pertaining to the projects approved by IEC-III. The DSMSC comprised of a physician, an intensivist, basic scientists and medical, surgical and radiation oncologists. The members of the DSMSC were trained in causality assessment as per WHO criteria, and routinely implemented them in assessing the relatedness of adverse events.

# **DSMSC** activities

The DSMSC conducted 12 meetings, and the minutes were forwarded to IEC for further action. The committee conducted 27 site monitoring visits, 71 SAE reports reviews and sent 130 reminders to Principle Investigators (PIs) for Continue Review Application submission as required. At every IEC meeting, the DSMSC Secretary or a representative of DSMSC discussed the minutes of DSMSC meeting. Twenty seven monitoring reports were discussed in the full board

# DSMSC (1<sup>st</sup> April 2016 to 31<sup>st</sup> March 2018)

and, based on IEC comments, recommendations and query letters were issued to PIs. In all, 19 replies were reviewed by DSMSC and their comments were forwarded to IEC.

# A comparison of SAE reviews during the period 2015-2017 is depicted below.



Sr. No.	Names	Affiliation	Gender	Expertise
1.	Dr. Prafulla Parikh Member Secretary	Assistant Professor - General Medicine, ACTREC	Female	Clinician
2	Dr. Jayant Goda Joint Secretary	Associate Professor - Radiation Oncology, ACTREC		Clinician Scientist
3	Dr. Kakoli Bose Member	Scientific Officer 'F', ACTREC		Scientist
4	Dr. Vikram Gota Member	Associate Professor, Dept of Clinical Pharmacology,		Clinical Pharmacologist
5	Dr. Sudhir Nair Member	Associate Professor, Dept of Surgical Oncology, ACTREC		Clinician Scientist
6	Dr. Bhausaheb Bagal Member	Associate Professor - Medical Oncology, Tata Memorial Hospital		Clinician
7	Dr. Reshma Ambulkar Member	Associate Professor - Anesthesia 'F', ACTREC	Female	Clinician
8	Dr. Abhishekh Mahajan Member	Assistant Professor - Radiology 'E', Dept of Radiodiagnosis, Tata Memorial Hospital		Clinician
9	Dr. Syed Hasan Member	Scientific Officer 'D', ACTREC	Male	Basic Scientist
10	Dr. Rukmini Govekar Member	Scientific Officer 'F', ACTREC	Female	Scientist

### **Training and Education**

TMC - IEC conducted an in-house training program on "Continue Review Applications (CRA) - significance and submission timelines" for TMH and ACTREC researchers, scientists, research staff, students and IEC / DSMSC members on 9<sup>th</sup> March 2017. Over 250 delegates from ACTREC and TMH participated in this program. Dr. George Karimundackal, Member Secretary, IEC - I, was the keynote speaker. The objective of this training was to strengthen the knowledge and awareness of CRA submission timelines and its significance.

### **Group** achievements

• Tata Memorial Centre, Institutional Ethics Committee III (IEC-III) had been assessed and found to comply with

National Accreditation Board for Hospitals and Healthcare providers (NABH) accreditation standards for Ethics committee (EC) under clinical trial programme and awarded recognition on 11<sup>th</sup> December 2017, valid up to 10<sup>th</sup> 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 20<sup>th</sup> March 2017, which is valid up to 20<sup>th</sup> March 2022.

#### **Regulatory Registration**

 TMC IEC-III was re-registered with DCGI under Rule 122DD vide registration no. ECR/149/Inst/MH/2013/RR-16 on 8<sup>th</sup> May 2017, valid up to 20<sup>th</sup> April 2019. Dr. George Karimundackal, Member Secretary, IEC - I Dr. Sarbani Ghosh Laskar, Member Secretary, IEC - II

# Institutional Ethics Committee (TMC IEC – I & II)

The Institutional Ethics Committees - I & II (IECs) were constituted by the Director, Tata Memorial Centre (TMC) under authority vested by the Governing Council of the TMC. The term was of two years from April 2016 – March 2018.

### The terms of reference included:

- 1. Ensuring the highest scientific and ethical standards of research at TMC
- Reviewing and approving of proposals for clinical, basic or translational research projects (Intra and Extra mural) for scientific and ethical content
- 3. To improve ethical standards and issue 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
- 5. To maintain our leadership as a national standard of reference in all fields

- 6. To issue and periodically, update and revise Standard Operating Procedures (SOPs) and guidelines for effective functioning of IEC as and when necessary
- Continuing education in clinical research, bioethics and ethical aspects of clinical practice by conducting seminars, workshops and interactive discussions for all categories of staff members including nursing and paramedical staff
- 8. To initiate and commission research studies on ethical aspects of practice in TMC.

The IEC functioned as per the Standard Operating Procedures based on the ICMR guidelines (2017), Schedule Y (Drugs and Cosmetics Act, 1940 and Rules, 1945 as amended up to the 31st December 2016), the WHO Standards and Operational Guidance for Ethics Review of Health-Related Research with Human Participants 2011 and the ICH-GCP 1996 (amended up to November 2016).

The membership for the year April 2016- March 2018 is listed below:



# Institutional Ethics Committee (IEC) - I

Sr. No.	Names	Position	Affiliation	Gender	Expertise
1.	Dr. Tapan Saikia	Chairperson	Head, Dept of Medical Oncology & Research Director, Prince Aly Khan Hospital, Mazagaon, Mumbai	Male	Medical Oncologist
2.	Dr. Nithya Gogtay	Co-chairperson	Professor, Dept of Clinical Pharmacology, KEM Hospital	Female	Basic Medical Scientist (Clinical Pharmacologist)
3.	Dr. George Karimundackal	Member Secretary	Professor, Dept. of Surgical Oncology, Tata Memorial Hospital	Male	Surgeon
4.	Dr. Prachi Patil	Member & DSMSC Secretary	Associate Professor, Dept. of Digestive Diseases & Clinical Nutrition, Tata Memorial Hospital	Female	Gastro- enterologist
5.	Ms. Manisha Naikdalal	Member	Member of Ethics Committees at Hinduja Hospital, Global Hospital, Nair Hospital, IIT Bombay	Female	Lay Person
6.	Prof. Bindhulakshmi P	Member	Associate Professor, Advanced Centre for Women's Studies, School of Development Studies, Tata Institute of Social Sciences	Female	Social scientist
7.	Dr. Suganthi Iyer	Member	Dy. Director (Legal & Medical) Hinduja Hospital	Female	Legal expert
8.	Dr. Sanjay Gupta	Member	Scientific Officer, CRI- Advanced Centre for Treatment, Research and Education in Cancer (ACTREC)	Male	Basic Scientist
9.	Dr. JP Agarwal	Member	Professor & Head Dept. of Radiation Oncology, Tata Memorial Hospital	Male	Radiation Oncologist
10.	Dr. Vijaya Patil	Member	Professor, Dept. of Anesthesia Critical Care and pain, Tata Memorial Hospital	Female	Anesthetist
11.	Dr. Devendra Chaukar	Member	Professor, Dept. of Surgical Oncology, Tata Memorial Hospital	Male	Surgeon
12.	Dr. Amit Joshi	Member	Professor, Dept. of Medical Oncology, Tata Memorial Hospital	Male	Medical Oncologist
13.	Dr. Tanuja Shet	Member	Professor, Dept of Pathology, Tata Memorial Hospital	Female	Pathologist
14.	Dr. Seema Kembhavi	Member	Associate Professor, Dept of Radiodiagnosis, Tata Memorial Hospital	Female	Radiologist
15.	Mr. Sanjay Talole	Member	Scientific Officer, Dept of Medical records, Tata Memorial Hospital	Male	Statistician

# Institutional Ethics Committee (IEC) - II



Sr. No.	Names	Position	Affiliation	Gender	Expertise
1.	Dr. UrmilaThatte	Chairperson	Professor & Head, Dept. of Clinical Pharmacology, KEM Hospital	Female	Clinical Pharmacologist
2.	Dr. Rajesh C. Mistry	Co-Chairperson	Director, Dept. of Oncology, Centre for Cancer, Kokilaben Dhirubhai Ambani Hospital	Male	Surgeon
3.	Dr. Sarbani Ghosh Laskar	Member Secretary	Professor, Dept. of Radiation Oncology, Tata Memorial Hospital	Female	Radiation Oncologist
4.	Dr. Yashashri Shetty	Basic Medical Scientist	Associate Professor, Department of Pharmacology & Therapeutics, Seth GS Medical College & KEM Hospital	Female	Clinical Pharmacologist
5.	Mr. K.V. Ganpathy	Layperson	CEO, JASCAP, Jeet Association for Support to Cancer Patients since 1996	Male	Human Resource Management
6.	Dr. Mrunal Marathe	Social Scientist	Freelance Counselor and Trainer associated with NGO - St.Jude's Childcare Centre and Adoption Group, Asha Sadan Orphanage, Byculla	Female	Counselor for pediatric cancer patients/ Adoption counselor

Sr. No.	Names	Position	Affiliation	Gender	Expertise
7.	Dr. Leena Gangolli	Legal expert	Member, Institutional Ethics Committee, Nirmala Niketan College of Home Science, Consultant, Children's Palliative Care Program, Consultant, Silver Innings Foundation	Female	Medico-Legal expert
8.	Dr. Ashok K Varma	Scientific Member	Scientific Officer 'F', Advanced Centre for Treatment, Research and Education in Cancer (ACTREC)	Male	Basic Scientist
9.	Dr. Umesh Mahantshetty	Clinician	Professor, Dept. of Radiation Oncology, Tata Memorial Hospital	Male	Radiation Oncologist
10.	Dr. Priya Ranganathan	Member	Professor & Anesthetist F, Dept. of Anaesthesia, Tata Memorial Hospital	Female	Anesthetist
11.	Dr. Gouri Pantvaidya	Member & Joint Secretary, DSMSC	Prof & Surgeon F, Head and Neck Oncology, Tata Memorial Hospital	Female	Surgeon
12.	Dr. Girish Chinnaswamy	Member	Professor And Medical Oncology (Paediatric) E, Dept. of Medical Oncology, Tata Memorial Hospital	Male	Medical Oncologist
13.	Dr. Kedar Deodhar	Member	Professor, Dept. of Pathology, Tata Memorial Hospital	Male	Pathologist
14.	Dr. Suyash Kulkarni	Member	Professor & Head, Division of Interventional Radiology, Tata Memorial Hospital	Male	Radiologist
15.	Ms. Rohini Hawaldar	Scientific Member	Scientific Officer, Tata Memorial Hospital	Female	Statistician

# Other staff members

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, DSMSC co-ordinator

### The types of projects reviewed by the IEC included:

- 1. Investigator initiated projects or trials, soliciting funding from national funding agencies
- 2. Investigator initiated projects or trials, soliciting funding from international funding agencies
- 3. Investigator initiated projects without specific funding
- 4. Multicentric academic trials with national collaborators
- 5. Multicentric academic trials with international collaborators
- 6. Pharmaceutical/ Industry sponsored trials

- 7. Intramural projects: Funding is provided for institutional projects (TMH & ACTREC) after a process of review and competitive scoring by the IEC
- 8. Thesis.

Tata Memorial Centre - IECs are registered with the Drug Controller General of India (DGCI) in 2013. The DCGI Reregistration was completed in 2017.

- IEC-I has Ethics Committee Registration No. ECR/170/Inst/ MH/2013/RR-16 issued under Rule 122DD of the Drugs & Cosmetic Rules 1945
- IEC-II Ethics Committee Registration No. ECR/414/Inst/ MH/2013/RR-16 issued under Rule 122DD of the Drugs & Cosmetic Rules 1945
- 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 had IORG Nos. IRB00003414, IRB00007802 for IEC-I & IEC-II respectively. This was periodically renewed as required.

# **IEC Performance in 2017**

The IEC received 193 projects in 2017 out of which 177 were reviewed by the IEC and 16 projects are awaiting review.





### No. of Meetings Conducted

	Committees		
	IEC I	IEC II	Total
Full Board	12	12	24
Expedited	02	02	04

Research Projects	IEC-I	IEC-II	Total
Received before 2017 and approved in 2017	23	31	54
Received & Approved in 2017	64	54	118
Total Projects Approved in 2017	87	85	172

# **Types of Review of projects**

Types of Review Committees		es	
	IEC-I	IEC -II	Total
Full Board	81	82	163
Expedited	03	02	05
Exemption	03	01	04
Total	87	85	172

The turnaround time from date of submission to final decision was 13 weeks.

### **Financial Support Requested**

Source of funding	No of projects	
Extra Mural	11	
Pharma	08	
IM + EM	14	
Intra Mural	25	
No funding	114	
Total	172	
Thesis	*84	
*includes thesis with or without financial support.		

208 projects were completed in 2017.



# **Approved Projects DMG/Dept. Wise**

### **Achievements**

- Tata Memorial Centre, Institutional Ethics Committees was accredited by the National Accreditation Board for Hospitals and Healthcare Providers (NABH), a constituent board of Quality Council of India (QCI) and awarded recognition on 11th December 2017 valid till 10th December 2020
- Tata Memorial Centre was re-accreditated by the Association for the Accreditation of Human Research Protection Programs (AAHRPP) in March 2017.

#### **IEC software**

Released web portal (https://iecportal.org) for online submission, review and tracking status of research projects.

# **Education / Trainings**

- Ethics of Biosimilars use
- Informed Consent & waiver of Informed Consent
- Expedited Review process
- Continuing Review Application
- Nomenclature of MAbs (Monoclonal Antibodies)
- Ethical dilemmas in Genetic Research
- Risk Benefit Assessment
- New ICMR guidelines.

#### **Future steps**

- Introduction of regular, mandatory updates for all post graduate students involved in clinical research as a step towards improving awareness and standards in the ethical conduct of trials in the future generation
- Further decrease in the carbon footprint by becoming more paperless for all kinds of communication to and from the IECs.

# Institutional Ethics Committee TMC IEC - III (ACTREC)

**Dr. Vedang Murthy,** Member Secretary, IEC - III (ACTREC)

The TMC-ACTREC Institutional Ethics Committee (IEC-III) was established in December 2009 (reconstituted in 2012, 2014 & 2016) as per the ICMR and ICH-GCP guidelines for Ethics Committees, with a mandate for combined scientific and ethics review of research projects being conducted at ACTREC and Tata Memorial Hospital. In addition, the IEC-III seekd help of domain experts to deliberate on projects where in-house expertise was not available. The committee was well rounded with representation from clinical faculty, basic sciences, lay community, and legal profession. The committee met 74 times in the past eight years and 276 projects had been discussed so far. The entire spectrum of studies involving human subjects including epidemiological studies, biological studies on human tissues, audits and human clinical trials using drugs or additional invasive intervention had been discussed and were approved by the committee.

The IEC-III, constituted by the Director, TMC, under the authority vested upon him by the Governing Council of TMC, monitored projects carried out predominantly at ACTREC. The term of the present committee was from 1<sup>st</sup> April 2016 to 31<sup>st</sup> March 2018. The Member Secretary of IEC-III was also a member of Tata Memorial Centre Research Administrative Council (TRAC).

The membership details of the present IEC-III are as follows:



Sr. No.	Names	Position	Affiliation	Gender	Expertise
1.	Dr. Rita Mulherkar	Chairperson	A / 103, Park-Dew, Plot no. 73, Sector 20, Kharghar, Navi Mumbai 410210	Female	Basic Scientist
2.	Dr. Shyam Kishore Shrivastava	Co-Chairperson	Director, Radiation Oncology, Apollo Hospitals, Parsik Hill Road, Sector-23, Belapur, Navi Mumbai 400614	Male	Radiation Oncologist
3.	Dr. Vedang Murthy	Member Secretary	Professor, Dept. of Radiation Oncology, ACTREC	Male	Radiation Oncologist
4.	Dr. Padmaja Marathe	Member	Professor, Dept. of Pharmacology and Therapeutics, Seth GS Medical College and KEM Hospital, Parel, Mumbai 400012	Female	Clinical Pharmacologist (Basic Medical Scientist)
5.	Mrs. Deepa Ramani	Member	Ex-play group teacher, Stores 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. Sanjeev Waghmare	Member	Scientific Officer 'E' & Principal Investigator, ACTREC	Male	Basic Scientist
9.	Dr. Tejpal Gupta	Member	Professor, Dept. of Radiation Oncology, ACTREC	Male	Radiation Oncologist
10.	Dr. Prafulla Parikh	Member	Assistant Professor, General Medicine, ACTREC Secretary, DSMSC, ACTREC	Female	Physician
11.	Dr. Amita Maheshwari	Member	Associate Professor, Dept. Of Gynecology, Tata Memorial Hospital	Female	Surgeon
12.	Dr. Gaurav Narula	Member	Professor, Pediatric Oncology; Convener, Pediatric Hematolymphoid Group, Tata Memorial Hospital	Male	Medical Oncologist
13.	Dr. Bharat Rekhi	Member	Professor, Dept of Pathology, Tata Memorial Hospital	Male	Pathologist
14.	Dr. Pritha Ray	Member	Scientific Officer 'F' & Principal Investigator, ACTREC	Female	Basic Scientist
15.	Dr. Navin Khattry	Member	Professor, Dept. of Medical Oncology, ACTREC	Male	Medical Oncologist

# **IEC-III Performance 2017**

The committee conducted 12 full board committee meetings in 2017 for a meticulous scrutiny of the scientific and ethical content of submitted projects, during which a total of 36 new projects and eight projects carried forward from 2016-2017 were examined.

### Table 1: Review type

Review type	2016	2017
Full Board	36	30
Expedited	06	06
Exempted	01	0
Total	43	36

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

Full board review	2016	2017
Approved	27	17
Approved with modification	0	05
Asked to resubmit	07	05
Not approved	01	03
Withdrawn by Pl	0	0
Deferred	01	0
Under review process	0	0
Review exempted	01	0
Total	37	30

# Table 3: IEC decision on expedited review projects

Expedited projects	2016	2017
Approved	06	06
Total	06	06

# Table 4: IEC decision on projects carried forwardfrom previous years

Projects carried forward	2016	2017
Approved	07	06
Resubmitted	0	01
Closed by IEC	02	01
Withdrawn by PI	0	0
Deferred due to incomplete submission	0	0
Exempted from review	0	0
Total	09	08

### Table 5: Summary of the source of funding

Source of funding	2016	2017
IM	14	16
EM	01	06
IM + EM	14	03
Pharma	02	05
Others	09	01
Non funded projects	01	05
Total	41	36

Overall summary of project status (n = 276)

# Research Projects Approved by IEC - I & II

Principal Investigator (PI)	Project Title
Mrs. Achrekar, Meera	A study to assess the satisfaction related to nursing care received by patients who have undergone surgery for head and neck cancer in a tertiary care cancer hospital, Mumbai.
Dr. Agarwal, Jai Prakash	Correlation of haematological markers of inflammation and clinical outcomes in head and neck cancer patients treated with radical (chemo) radiotherapy.
Dr. Agarwal, Jai Prakash	Prognostic value of Neutrophil-to-Lymphocyte Ratio (NLR), Platelet-to-Lymphocyte Ratio (PLR) and Lymphocyte-to-Monocyte Ratio (LMR) in Lung Cancer patients treated with Radiation therapy.
Dr. Agarwal, Vandana	Incidence and factors associated with PONV following Major Gastrointestinal Cancer Surgery: A Prospective Observational Study.
Dr. Agrawal, Archi	Retrospective audit to evaluate the role of 18F FDG PET/CT in anorectal melanoma.
Dr. Ambulkar, Reshma	A survey on patient satisfaction with anesthesia services in a tertiary care cancer Centre.
Dr. Amin, Nayana	Prospective observational study of equipment problems during anaesthesia and its impact on quality of patient care.
Dr. Badwe, Rajendra	Biological effect of low and high doses of medical exposures in human peripheral blood mononuclear cells of cancer patients: a prospective in-vivo study.
Dr. Badwe, Rajendra	Patient navigation: Survey to understand patients journey through Tata Memorial Centre.
Dr. Baheti, Akshay	A retrospective study of pretreatment MRI in rectal cancer to evaluate features that could predict local recurrence and distant metastases.
Dr. Bajpai, Jyoti	Pregnancy associated breast Cancer (PABC) Registry to collate data on epidemiology and treatment patterns & outcomes of PABC.
Dr. Bajpai, Jyoti	"Outcomes in metastatic extremity osteosarcoma patients treated with non-high dose methotrexate based, dose dense combination chemotherapy in a tertiary care cancer center".
Dr. Bajpai, Jyoti	Pazopanib in metastatic soft tissue sarcoma- experience from a tertiary cancer centre in India.
Dr. Bajpai, Jyoti	Outcomes of gemcitabine-docetaxel combination in patients of recurrent or metastatic soft tissue sarcoma: a retrospective analysis.
Dr. Bakshi, Ganesh	Protocol No 000201 : An Open-label, Single-arm, Multicenter, Phase IV Trial to Evaluate the Safety of Firmagon® (Degarelix) in Androgen Deprivation Therapy in Indian Patients Diagnosed with Advanced Hormone-dependent Prostate Cancer.
Dr. Bakshi, Sumitra	Intraoperative Ketamine for perioperative pain management following Total Knee Replacement in oncology(Inkk trial): a double blinded randomized control trial.
Dr. Bakshi, Sumitra	Influence of interpretation of pain scores on patient's perception of pain: a prospective study.
Dr. Bal, Munita	A comparative study of clinicopathologic features of differentiated papillary thyroid carcinoma with distant metastasis and differentiated papillary thyroid carcinoma without metastasis.
Dr. Biswas, Sanjay	Antifungal susceptibility testing of yeasts by the microdilution broth method using Phenol red as an indicator.

Principal Investigator (PI)	Project Title
Dr. Budrukkar, Ashwini	ENTCOBRA: Standardized Data Collection (SDC) for head neck cancer patients treated with brachytherapy.
Dr. Budrukkar, Ashwini	Localisation of tumor bed and its impact on dosimetry for tumor bed boost irradiation in patients treated with breast conserving surgery using different techniques.
Dr. Chatterjee, Aparna	Post Mastectomy Pain Syndrome at an Indian Tertiary Cancer Centre : Incidence, Severity , Impact On Daily Function And Quality Of Life.
Dr. Chaturvedi, Pankaj	Protocol No SPI-EOQ-OL-101 : An open label, phase I/II study of topical Apaziquone for the treatment of oral leukoplakia.
Dr. Chaturvedi, Pankaj	A clinical trial to test the number of circulating tumor cells (CTCs) captured by the OncoDiscover Liquid Biopsy Technology in peripheral blood samples of Head and Neck cancer patients.
Dr. Chopra, Supriya	A Phase III randomized clinical trial to study the radiosensitizing effect of Nelfinavir in Advanced Carcinoma of Cervix. (NELCER Trial).
Dr. Chopra, Supriya	Retrospective Analysis of outcomes of patients treated with Extended Field IMRT +/- chemotherapy for cervical cancer.
Dr. D Cruz, Anil	Mathematical Modeling and Subsequent Interactive Visualization to Reveal Underlying Patterns in Metastases from Head &Neck and Breast Cancers in India.
Mrs. D Souza, Anita	A study to assess the fatigue experienced and the coping strategies adopted by patients receiving chemotherapy for GI Cancer at TMH, Mumbai.
Dr. Deodhar, Kedar	Serous adenocarcinoma of the Endometrium- A study of histomorphological spectrum and clinicopathological correlation.
Dr. Desai, Priti	Assessment of platelet crossmatch results by solid phase red cell adherence assay among adult hematooncology patients and its feasibility in a tertiary care oncology centre.
Dr. Desai, Priti	Knowledge, Attitude and Practices (KAP) Of Blood Donation In First Time Voluntary Blood Donors.
Dr. Desai, Sangeeta	Validation of Whole Slide Imaging (WSI) for primary surgical pathology diagnosis of prostate core biopsies.
Dr. Dholam, Kanchan	Effect of Leucocyte platelet rich fibrin on healing of medicine induced osteonecrosis of jaw- pilot study.
Dr. Dholam, Kanchan	Evaluation of quality of life in head and neck cancer patients following implant supported dental rehabilitation.
Dr. Divatia, Jigeeshu	Evaluation Of Accuracy Of Haemoglobin Estimation By Pulse-Oximetry In Patients Undergoing Major Intra-Operative Blood Loss.
Dr. Divatia, Jigeeshu	A Prospective Observational Pilot Study To Determine The Correlation And Agreement Between Arterial Pulse Pressure Variation And Digital Plethysmographic Variability Index In Patients Undergoing Major Surgery Under General Anaesthesia.
Dr. Engineer, Reena	A retrospective study on the Dosimetric parameters and Clinical Evaluation of Duodenal toxicity in patients who have underwent radiation therapy for cancers of the Upper Gastrointestinal Tract and Gynaecological cancers who have received extended field radiotherapy.
Dr. Engineer, Reena	Retrospective analysis of outcomes in Locally advanced Carcinoma Cervix Stage IV A treated with Radiotherapy with or without chemotherapy.
Dr. Engineer, Reena	Cross Sectional Analysis of Quality of Life in long term survivors of Carcinoma Cervix treated with Chemoradiation /Neo-adjuvant chemotherapy followed by surgery.
Dr. Epari, Sridhar	Intracranial ependymomas: Can histomorphological features identify the clinically relevant molecular subtypes?

Principal Investigator (PI)	Project Title
Dr. Epari, Sridhar	Audit of pineal parenchymal tumours.
Dr. Ghosh-laskar, Sarbani	Intensity modulated radiotherapy with IGRT for Post cricoid and upper esophageal cancer: prospective observational study.
Dr. Ghosh-laskar, Sarbani	A Situation Analysis of National Radiotherapy Resources and Patterns of Care for Patients with Nasopharyngeal Carcinoma in Low-Middle Income Countries: Can Enhancing the Quality of Radiotherapy Planning Improve Outcomes.
Dr. Ghosh-laskar, Sarbani	Quality of life and swallowing outcomes after re-irradiation for recurrent and second primary head and neck cancers.
Dr. Ghosh-laskar, Sarbani	Analysis of nutritional outcomes in patients of locally advanced oral Cavity cancer undergoing adjuvant (chemo)radiotherapy under Randomized Controlled trial.
Dr. Goel, Mahesh	Retrospective study evaluating outcomes with neoadjuvant chemotherapy in locally advanced gall bladder cancers.
Dr. Goel, Mahesh	Outcomes following all consecutive resections for gall bladder cancer treated with Curative intent in a tertiary referral centre.
Dr. Goel, Mahesh	Liver resection for hepatic neoplasms, a Tata memorial experience.
Dr. Gulia, Ashish	A retrospective audit to assess the oncological outcomes of osteosarcoma in patients above 40 years.
Dr. Gulia, Ashish	A retrospective audit to assess the oncological outcomes of surgically treated extraskeletal osteosarcoma.
Dr. Gulia, Ashish	A retrospective audit to assess the oncological outcomes of surgically treated Extraskeletal Ewing's sarcoma.
Dr. Gulia, Seema	Pazopanib and oral Cyclophosphamide in women with Platinum Resistant Epithelial Ovarian Cancers.
Dr. Gupta, Sudeep	Developing a simple outpatient prognostic score for prediction of survival in patients with advanced cancer.
Dr. Gupta, Sudeep	To study Demographic profile and Outcomes of Her2 positive breast cancer patients with brain metastasis.
Dr. Gupta, Tejpal	Satisfaction in Patients on Outpatient Radiation Therapy (SPORT study).
Dr. Gupta, Tejpal	Patterns of failure and correlation of molecular markers with sub ventricular zone dosimetry in patients with newly diagnosed Glioblastoma treated with conventional adjuvant therapy.
Dr. Gupta, Tejpal	Focal Radiotherapy and chemotherapy avoiding craniospinal irradiation in WNT subgroup medulloblastoma (FOR-WNT) Study.
Dr. Gupta, Tejpal	Extraneuraxial metastases in medulloblastoma: a retrospective audit.
Dr. Gupta, Tejpal	Clinico-radiological characteristics, histopathological features, and outcomes in extraventrivular and central neurocytoma (EXCENTstudy).
Dr. Gupta, Tejpal	Impact of timing of radiotherapy on outcomes in atypical meningioma: a clinical audit.
Dr. Gupta, Tejpal	A retrospective audit to assess the impact of adverse radiological and histopathologic characteristics on clinical outcomes of aggressive adult low grade gliomas treated uniformly with radiotherapy and concurrent and adjuvant Temozolomide.
Dr. Gupta, Tejpal	Anti-Epileptic Drugs in Neuro-Oncology Practice Survey.
Mrs. Jagdish, Prathepa	A Study To Assess Effectiveness Of Structured Teaching Programme On Knowledge And Attitude Of Non-Medical Staff Regarding Cervical Cancer In A Tertiary Cancer Centre, Mumbai.
Dr. Jain, Hasmukh	Role of IL-9 and Th9 cells in T cell lymphoma with cutaneous involvement.

Principal Investigator (PI)	Project Title
Dr. Jain, Hasmukh	A phase II non-randomized study to evaluate the efficacy of single dose rasburicase (1.5mg) in adult acute leukemia and high grade lymphomas with established tumor lysis syndrome.
Dr. Jain, Parmanand	An Audit of bone metastasis presenting to pain clinic.
Dr. Jain, Parmanand	Prevalence of Chemotherapy Induced Peripheral Neuropathy (CIPN) in Indian Patients seen at Chronic Pain Clinic in a Tertiary Cancer Centre : A Retrospective Observational Study.
Dr. Jalali, Rakesh	An online questionnaire based survey amongst healthcare professionals to assess the current practices of prescribing corticosteroids in brain tumor patients.
Dr. Jiwnani, Sabita	The "weekday effect" - does it impact esophageal cancer surgery outcomes?
Dr. Joshi, Amit	An Open Label, Single Arm, Multicenter, Safety Study of Atezolizumab in Locally Advanced or Metastatic Urothelial or Non-Urothelial Carcinoma of the Urinary Tract.
Dr. Joshi, Malini	To determine whether Pulse Pressure Variation correlates with 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.
Dr. Joshi, Shalaka	Protocol No GBR 200-301 : A Prospective, Multicenter, Randomized, Double-blind, Parallel group Study to Compare the Efficacy and Safety of GBR 200 (similar biologic of Trastuzumab) versus Innovator Trastuzumab both when Given in Combination with Paclitaxel in Patients Diagnosed with HER2 Positive Metastatic Breast Cancer.
Dr. Joshi, Shalaka	Measuring electrochemical response of cancerous and non-cancerous human tissue samples using indigenously developed polyaniline coated interdigitated electrodes.
Dr. K, Manjunath	Development of a mathematical model to predict the occurrence of recurrent grade 2 or grade 3 Hand Foot Skin Reaction requiring dose modification in patients with either metastatic Renal Cell Carcinoma or unresectableHepato Cellular Carcinoma receiving standard dose of Sorafenib.
Dr. Kane, Shubhada	Expression of MAGED4B and FJX1 in Oral Squamous Cell Carcinoma (OSCC) and oral potentially malignant disorder (OPMD).
Dr. Kane, Shubhada	Retrospective analysis of morphological spectrum of pleural malignant mesothelioma, a great masquerader.
Dr. Kane, Shubhada	Is Lung Adenocarcinoma truly represented in small biopsies? - A retrospective study of paired resections and biopsies.
Dr. Kelkar, Rohini	Co-relation between blood culture and biomarkers of sepsis - A retrospective study.
Dr. Kembhavi, Seema	Positive Predictive Value Of Objective Mammographic Criteria For Assessment Of Breast Masses In Predicting Malignancy With Histopathology As Reference Standard (PPVMC).
Dr. Khanna, Nehal	Primary disseminated multifocal Ewing sarcoma: Analysis of outcome in patients treated with curative intent.
Dr. Khanna, Nehal	Pleuropulmonary Blastoma (PPB)- A Retrospective Single Institution Experience.
Dr. Kulkarni, Atul	Accuracy of identification of cricothyroid membrane by clinical palpation and ultrasound.
Dr. Kulkarni, Suyash	Safety and Efficacy Evaluation of Superselective Ophthalmic Artery Chemoinfusion (SOAC) for Intraocular Retinoblastoma with a short term follow up.
Dr. Kulkarni, Suyash	Role of radiofrequency ablation as a salvage treatment for recurrent fibromatosis: retrospective analysis.
Dr. Kulkarni, Suyash	Role Of Yttrium-90 Transarterial Radioembolization In Inoperable Hepatocellular Carcinoma: A Retrospective Analysis.

Principal Investigator (PI)	Project Title
Dr. Laskar, Siddhartha	Radiation therapy for mediastinal Hodgkin Lymphoma: A Retrospective Audit.
Dr. Laskar, Siddhartha	Involved Node Radiation Therapy (INRT), Involved Site Radiation Therapy (ISRT) & Involved Field Radiation Therapy (IFRT) in Early Hodgkin's Disease: A Comparative Dosimetric Study.
Dr. Laskar, Siddhartha	Study Evaluating Outcomes of Myeloablative Total Body Irradiation (TBI) as Conditioning for Hematopoietic Stem Cell Transplantation (HSCT) using a Novel Technique.
Dr. Mahajan, Abhishek	Significance of TSTC Pulmonary Nodules In Known Extrapulmonary Malignancies: An audit.
Dr. Mahantshetty, Umesh	A Feasibility and Safety Study of Single Application Multifractionated High Dose Rate Brachytherapy in Locally Advanced Cervical Cancer.
Dr. Mahantshetty, Umesh	Clinical outcome of prostatic cancer patients treated with Intensity Modulated Radiation Therapy (IMRT) and moderate hypo-fractionation - A retrospective analysis.
Dr. Mahantshetty, Umesh	Clinical Outcome of Endometrial cancer patients treated with surgery and adjuvant radiation - A Retrospective Analyses.
Dr. Mahantshetty, Umesh	Clinical outcomes of patients treated with Template based high dose rate interstitial brachytherapy boost for gynaecological cancers - A retrospective analyses.
Dr. Mahantshetty, Umesh	Retrospective Analysis of Outcomes in Patients with Locally Advanced Carcinoma of Cervix Treated With Image Based Combined Intracavitary and Interstitial Brachytherapy.
Dr. Maheshwari, Amita	Immunogenetics of Natural Killer cell receptors in HPV infected women with or without cervical cancer.
Dr. Mehta, Shaesta	Optimizing Topical Pharyngeal Anesthesia in Unsedated Upper Endoscopy Practice.
Dr. Mishra, Gauravi	Acceptability and validity of self sampiling for high risk HPV detection among women in Maharashtra.
Dr. Mishra, Gauravi	A Pilot Study on HPV and Cervical Cancer Screening in India.
Dr. Muckaden, Mary	Validation of 'FAMCARE-2' for advanced paediatric cancer patients in a tertiary cancer centre.
Dr. Muckaden, Mary	Validation of 'PediQUEST Memorial Symptom assessment scale' for paediatric oncology patients in a tertiary cancer care centre.
Dr. Myatra, Sheila	Evaluation of prevalence and intensity of pain in sedated and ventilated adult patients using Critical Care Pain Observation Tool (CPOT) in a mixed medical-surgical ICU in a tertiary cancer care centre.
Dr. Myatra, Sheila	To determine whether "Tidal volume challenge" can improve the reliability of pulse pressure variation and stroke volume variation in patients having low respiratory system compliance and also that of inferior vena cava distensibility index in predicting fluid responsiveness in patients ventilated using low tidal volume.
Dr. Myatra, Sheila	Comparison of real time ultrasound guidance versus palpation technique in radial artery catheterization among critically ill patients presenting with hypotension: A randomized controlled trial.
Dr. Myatra, Sheila	Can "tidal volume challenge" test improve the reliability of changes in Pulse Pressure Variation, Stroke Volume Variation and Stroke Volume in predicting fluid responsiveness in patients undergoing surgery receiving low tidal ventilation?
Dr. Nair, Deepa	A study to translate and validate self reported swallowing scales into Hindi and Marathi in patients of head and neck cancers.
Dr. Nair, Nita	Awareness of impact of cancer directed therapy on fertility and available options for fertility preservation in young women diagnosed of breast cancer.

Principal Investigator (PI)	Project Title
Dr. Narula, Gaurav	Outcome of Langerhans Cell Histiocytosis (LCH) with a Modified Protocol using Intensified High Risk Induction, and Augmented Prolonged Maintenance - A Single Institution Experience.
Dr. Ostwal, Vikas	Do patient-derived organoids predict therapeutic response in pancreatic cancer patients with advanced disease?
Dr. Ostwal, Vikas	Calculation of a clinical Predictive score identifying Peritoneal disease on a Staging laparoscopy in gastric cancers- an exploratory study (CAPPS).
Dr. Parab, Swapnil	A prospective interventional study to detect the efficacy of bronchial cuff pressure monitoring to detect the displacement of lung isolation device during elective thoracic surgeries.
Dr. Paramanandam, Vincent Singh	Cross cultural adaptation of the Breast Cancer and Lymphedema Symptom Experience Index (BCLE-SEI) in three Indian language; Hindi, Marathi and Bengali and comparison of bio-impedance spectroscopy devices.
Dr. Paramanandam, Vincent Singh	Effectiveness of compression garment in preventing breast cancer-related lymphedema: a randomized controlled trial.
Dr. Patil, Asawari	Clinicopathologic Study of Sarcomatoid Carcinoma of Head and Neck Region.
Dr. Patil, Prachi	A comparison of clinicopathological profile of non-B non-C hepatocellular cancer (HCC) and Hepatitis B or C related HCC.
Dr. Patil, Vijay	DHANUSH : Docetaxel as radiosensitizer in Head And Neck cancer patients, Unsuitable for ciSplatin based cHemoradiation.
Dr. Patil, Vijay	Reverse swing-M : Repurposing of Mebendazole in recurrent glioblastoma.
Dr. Patil, Vijaya	Post-operative cognitive dysfunction in patients after major oncosurgery: A prospective clinical study.
Dr. Patil, Vijaya	Evaluation Of Preoperative Anaethesiologist Visit In Reducing Preoperative Anxiety And Postoperative Pain In Gynaecological Cancer Patients.
Dr. Patil, Vijaya	Perioperative care pathway in Gynaecological Oncology: A Prospective Audit of current practice in a tertiary care hospital.
Dr. Prabhash, Kumar	TRISUL: Randomized evaluation of TPF in Resectable oral cancers as Induction followed by SUrgery in Locally advanced stage.
Dr. Prabhash, Kumar	A Randomized study to evaluate the efficacy and safety of Aprepitant (NK-1 inhibitor) for cough suppression in Lung cancer patient.
Dr. Prabhash, Kumar	Profiling the incidence of ROS1 alteration discovered in human Non Small Cell Lung Cancer.
Dr. Prabhash, Kumar	Protocol No CA209887: Safety Study of Nivolumab for Selected Advanced Malignancies in India.
Dr. Prabhash, Kumar	Protocol No MO29872: A Phase III, Open-Label, Multicenter, Randomized Study to Investigate the Efficacy and Safety of Atezolizumab compared with Chemotherapy in Patients with Treatment-Naïve Advanced or Recurrent (Stage IIIB not amenable for multimodality treatment) or Metastatic(Stage IV) Non-Small Cell Lung Cancer who are deemed unsuitable for Platinum-Containing therapy.
Dr. Prasad, Maya	A Restrospective Analysis of Paediatric Nodular Lymphocyte Predominant Hodgkin Lymphoma.
Dr. Purandare, Nilendu	Prognostic value of metabolic parameters measured by 18 F FDG PET CT in surgically resected oesophageal carcinoma.
Dr. Ramadwar, Mukta	Retrospective analysis of tumor morphology and molecular characterization in patients with Rhabdomyosarcoma.

Principal Investigator (PI)	Project Title
Dr. Ramaswamy, Anant	Second-line irinotecan plus 5-FU or irinotecan alone based chemotherapy as second line chemotherapy in advanced gastric cancer: a retrospective analysis.
Dr. Ramaswamy, Anant	A two arm randomized open label prospective parallel design superiority Phase II multicentric clinical trial to evaluate the efficacy of a doublet second line chemotherapy versus monotherapy in advanced unresectable or metastatic gall bladder cancer progressing on first line chemotherapy (GB-SELECT).
Dr. Ranganathan, Priya	Complications of arterial cannulation during the perioperative period in patients undergoing major cancer surgery: A prospective study.
Dr. Rangarajan, Venkatesh	Risk stratification of thyroid cancer patients post total thyroidectomy based on ATA 2009 and 2015 and their compliance with the actual radioiodine dose administered to the patient.
Dr. Rangarajan, Venkatesh	Audit of radiation exposure from patients injected with 18F-FDG.
Dr. Rangarajan, Venkatesh	A technical and radiation safety audit of transarterial radioembolization (TARE) by Y-90 microsphere.
Dr. Rangarajan, Venkatesh	BIONIC: Big Imaging Data Approach For Oncology in a Netherlands India Collaboration.
Dr. Rekhi, Bharat	Clinicopathologic Features of Undifferentiated Round CellSarcomas of Bone and Soft Tissues.
Dr. Sable, Nilesh	Retrospective audit of Ultrasound guided pelvic mass biopsies in females.
Dr. Sable, Nilesh	Mineralisation patterns of Laryngeal cartilages: normal variations.
Dr. Salins, Naveen	Evaluation of the prescription pattern of drugs and adherence of physicians to NeuPSIG guidelines in treatment of cancer related neuropathic pain.
Dr. Salins, Naveen	Provision of Palliative Care in National Cancer Grid Cancer Treatment Centers: A Descriptive Cross Sectional Gap Analysis Survey.
Dr. Salins, Naveen	Experiences of the Indian Parents and Caregivers about Caring for a Child with Retinoblastoma: An interpretative phenomenological analysis.
Dr. Salins, Naveen	Exploring the lived experiences of the adult family caregivers caring for patients with malignant fungating wounds in head and neck cancer in India: An Interpretative Phenomenological analysis.
Dr. Sarin, Rajiv	A prospective COhort study of breast cancer patients with New bone metastases to estimate QUality of life, health Economics & Risk of skeletal complications (CONQUER).
Dr. Sengar, Manju	Efficacy of Bortezomib and Rituximab in newly diagnosed adolescent and adult CD20 positive Philadelphia (Ph) negative Precursor B-cell acute lymphoblastic leukemia: Phase II study.
Dr. Sengar, Manju	Single arm, single centre prospective study to assess the effect of therapeutic drug monitoring (TDM) based dosage adjustment of posaconazole on the incidence of invasive fungal infections (IFIs) in AML patients on induction chemotherapy on posaconazole prophylaxis.
Dr. Sengar, Manju	Tata Precision Oncology Program - Precision ETP - ALL Study.
Dr. Shah, Sneha	Prognostic implication of the metabolic parameters measured by 18F-FDG PET in patients with Uterine Cervical Cancer.
Dr. Shanmugham, Pramesh	Awareness on tobacco among cancer patients.
Dr. Shanmugham, Pramesh	Cancer Care in India: Accessibility, Affordability, Innovation (CCI Study).
Dr. Sharma, Kailash	Randomized controlled study to evaluate the effectiveness of pectoral nerve block for post operative analgesia in patients undergoing mastectomy.
Dr. Sharma, Sudivya	"Frequency of positive cuff leak test in Robotic surgeries done in Trendelenberg position."

Principal Investigator (PI)	Project Title
Dr. Shet, Tanuja	Peripheral TCell Lymphoma: Impact of Immunophenotypic subsets, cytogenetic abnormalities, microenvironment and PI3K/NFKB on behavior.
Dr. Shet, Tanuja	Folate receptor alpha expression in triple negative breast cancer- incidence and prognostic significance.
Dr. Shet, Tanuja	Histologic spectrum and its association with clinical/genetic features in extramedullary myeloid tumor or myeloid sarcoma.
Dr. Shet, Tanuja	Role of TERT and MED12 mutations in the diagnosis of phyllodes tumor in young women <20 years of age.
Dr. Shet, Tanuja	Exploring the role of TERT mutations in defining encapsulated papillary carcinoma of breast.
Dr. Shetmahajan, Madhavi	Perioperative Anaesthesia Management And Outcomes In Patients With Pre induction Hypertension For Elective Cancer Surgery.
Dr. Shetty, Omshree	Quality Assurance (QA) Program for Molecular Diagnostic testing in Solid Tumors.
Dr. Shrikhande, Shailesh	Role of surgery induced hypoxia in resectable periampullary and pancreatic adenocarcinoma undergoing pancreaticoduodenectomy and its correlation with changes in cell biology.
Dr. Shrikhande, Shailesh	Multicentre study to analyze outcomes of surgical treatment of cystic pancreatic tumors across India.
Dr. Solanki, Sohan	Comparison of Continuous Epidural Analgesia and IV PCA with opioids in terms of Postoperative Pain and their complication in Total Knee replacement surgery.
Dr. Solanki, Sohan	Perioperative predictors of morbidity and mortality after hepatic resections: A retrospective analysis.
Dr. Solanki, Sohan	Knowledge and attitude of Indian anaesthesiologist toward obstructive sleep apnea.
Dr. Thakur, Meenakshi	Retrospective audit of opportunistic mammographic screening.
Dr. Thakur, Meenakshi	The Utility And Role Of Cardiac Magnetic Resonance Imaging (CMR) As A Problem Solving Tool In A Tertiary Care Centre For Oncology: An Observational Study.
Dr. Thiagarajan, Shiva Kumar	Assessment of quality of life in thyroid cancer patients using the EORTC-thyroid specific questionnaire.
Dr. Thiagarajan, Shiva Kumar	Head and Neck Squamous Cell Carcinoma in Seropositive Patients- Prognosis and it's predictors.
Dr. Thota, Raghu	Prospective observational study of prevalence of ipsilateral shoulder pain in patients after thoracic surgeries.
Dr. Thota, Raghu	Retrospective Study on use of Brief Pain Inventory in Chronic Cancer Pain Management in Pain Clinic.
Dr. Vasudevan Nair, Sudhir	A prospective observational study to evaluate the value of nurse led telephone based questionnaire in detecting recurrences in patients who have completed curative-intent treatment for oral cancers.
Dr. Wadasadawala, Tabassum	Cross-sectional study of objective assessment of cosmetic outcomes of breast conservation therapy using BCCT.core software.
Dr. Wadasadawala, Tabassum	Predicting recurrence risk in T1,T2 breast cancer with 1-3 positive axillary nodes post mastectomy: nomogram based approach.
Dr. Wadasadawala, Tabassum	Assessment of patient satisfaction of outpatient care in the multi-disciplinary breast clinic -Linguistic Validation Study.

# Research Projects Approved by IEC - III (ACTREC)

Principal Investigator	Project Title
Dr. Manjunath Nookala	A comparative study to evaluate the effect of administering whole versus crushed solid oral dosage forms on PK of drugs in cancer patients.
Dr. Vedang Murthy	Reducing salivary toxicity with adaptive radiotherapy (ReSTART): a randomised controlled trial.
Dr. Kumar Prabhash	Phase I clinical trial to establish maximum tolerated dose (MTD), safety and pharmacokinetic profile of oral Paclitaxel.
Dr. Vijay Patil	Establishing cell free nucleic acid as diagnostic and monitoring tool in non-small cell carcinoma (NSCLC).
Dr. Indraneel Mittra	A study to assess the effect of resveratrol-copper (R-Cu) on levels of inflammatory cytokines in blood and tumour tissue in patients with operable stage IV squamous cell carcinoma of buccal mucosa.
Dr. Sudeep Gupta	Study of patient reported outcomes in breast and gynecologic cancer patients undergoing systemic chemotherapy.
Dr. Sudeep Gupta	Multi-omics analysis to decipher mechanisms of hormone resistance in breast cancer.
Dr. Pritha Ray	Investigating therapeutic potential of PIK3CA inhibitors for ovarian cancer carrying gain of function mutant p53.
Dr. Jyoti Kode	CD26 and adenosine signaling pathway molecules as regulators of immune reconstitution in human hematopoietic stem cell transplantation.
Mr. Bhavesh Bandekar	Compliance with serious adverse events (SAE) reporting timelines and management of SAE reports in IEC-III, Tata Memorial Centre: an audit.
Dr. Shalaka Joshi	To evaluate the effects of progesterone on the alterations in transcriptomic profile in operable breast cancer patients.
Dr. Pritha Ray	Identification of deregulated adhesion molecules in chemoresistant ovarian cancer cells and their role in cellular invasion and metastasis.
Dr. Rajiv Sarin	Association of vitamin D receptor gene polymorphisms and risk of developing bone metastases in patients with breast cancer.
Dr. Vikram Gota	Phase I clinical trial of an oral therapeutic agent bioplatin in patients with solid tumours refractory to conventional therapies and advanced metastatic tumours.
Dr. Vikram Gota	A multicenter, open label, randomized, two-treatment, two-period, two-sequence, single dose, cross-over bioequivalence study of doxorubicin hydrochloride (pegylated liposomal) concentrate for solution for infusion 20 mg/10mL (2 mg/ml) of Dr. Reddy's Laboratories Ltd, India, with that of Caelyx <sup>®</sup> 2 mg/mL [doxorubicin hydrochloride (pegylated liposomal) concentrate for solution for infusion (20 mg/10mL)] of Janssen-Cilag International NV, Turnhoutseweg 30, B-2340 Beerse, Belgium in advanced ovarian cancer and/or metastatic breast cancer patients under fed condition.
Dr. Mohua Chatterjee	To evaluate the effect of intermittent pneumatic compression pump with multiple layer inelastic lymphoedema bandaging in post surgery upper limb lymphedema of breast cancer patients: a randomized controlled trial.
Dr. Vani Parmar	Prognostic significance of tumor-related inflammation and circulating inflammatory markers in early breast cancer.

Dr. Rajendra Badwe	A prospective evaluation of the peri-operative hypoxia in breast cancer.
Dr. Prafulla Parikh	Retrospective analysis of protocol deviation and violation reports submitted to Institutional Ethics Committee, ACTREC.
Dr. Kakoli Bose	HtrA3 serine protease: elucidating the complex regulatory mechanisms of a unique cell death regulator and potential therapeutic target.
Dr. Prasanna Venkatraman	Structure, domain architecture and interactions of PSMD9, a proteasomal chaperone and NF-kB activator.
Dr. Prasanna Venkatraman	Regulation of ribosome biogenesis by PSMD9.
Dr. Vanita Noronha	An exploratory study evaluating the utility of circulating tumour DNA in monitoring response to therapy and in aiding the follow-up of prostate cancer patients using the palliative systemic therapy in hormone sensitive prostate cancer setting as a model.
Dr. Bharat Rekhi	Merkel cell polyomavirus in Indian cases of Merkel cell carcinoma.
Dr. Pankaj Chaturvedi	Analytical capacity building for the study of tobacco carcinogen exposures in India.
Dr. Gaurav Narula	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 transplantations - 1st stage of a multi-stage project.
Dr. Manjunath K	A study to characterize the relation between pharmacokinetic parameters and clinical response to colistin therapy in BMT patients.
Dr. Vedang Murthy	Retrospective analysis of outcomes in patients of prostate cancer treated with stereotactic body radiation therapy.
Dr. Shashank Ojha	Analysis of transfusion practices in hematopoietic stem cell transplant patients.
Dr. Tejpal Gupta	Intensity-modulated radiation therapy (IMRT) for craniospinal irradiation (CSI) on helical tomotherapy: effect of low-dose bath on acute hematologic toxicity.

**Ms. Rohini Hawaldar,** Administrator

# TMC Research Administrative Council (TRAC)



Ms. Rohini Hawaldar with her research council team members

The TMC Research Administrative Council (TRAC) was constituted in the year 2008. TRAC had the 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 pet 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.



### Meeting

TRAC invited proposals from staff members in all disciplines, which would be of potential of practice changing and that could make a worldwide impact and would provide implementable solutions for cancer management in the Indian context. This was in the interest of better service and excellence in research, and education in the centre. Thirty two (32) proposals were received. A review committee of
external experts was formed and meeting (Brain storming session) was held on Dec 16-17, 2017. The investigators presented their projects and assessments were done by committee members. Fourteen projects were selected on scientific merit for financial grants.

A presentation about the research projects supported by institutional funds was given by Dr Sudeep Gupta, Dy. Director (ACTREC) on June 29, 2017.

#### Achievements

- Tata Memorial Centre, Institutional Ethics Committee was accredited by National Accreditation Board for Hospitals and Healthcare Providers (NABH), a constituent board of Quality Council of India (QCI) in 2017
- Tata Memorial Centre was re-accreditation by the Association for the Accreditation of Human Research Protection Programs (AAHRPP) in 2017
- IRB Portal WEB based application:
  - Project management
  - Clinical Research Association (CRA) management
  - □ Serious Adverse Event (SAE) management
  - User Management
  - □ RBAC (Role Based Access Control)
  - Master Management.

#### Activities

- Implementation of systematic and comprehensive Human Research Protection Program that affords protections for all research participants. Individuals within the Organization are knowledgeable about and follow the policies and procedures of the Human Research Protection Program with AAHRPP
- Quality Improvement plans Audits of functioning of IEC - I, II & III and of research projects at regular intervals
- Financial support was granted for 71 research projects in this year
- Timely assistance extended to accounts department on queries for non functional research accounts
- 25 publications in peer review journals of the research studies supported through institutional grants.

#### **Future Goals**

- The quality control program for research projects
- To monitor the progress of research studies supported by institutional funds.
- To develop online education model for researchers and staff.





# Advanced Centre for Treatment, Research and Education in Cancer

(ACTREC)



# **ACTREC, Overview**

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 120bed Research Hospital that focus on clinical and translational research and on the treatment of cancer patients, and the Cancer Research Institute that focuses on 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 multicentric 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 such as DST, DBT, ICMR, etc. During the year 2017, a total of 217 projects were on-going at the Centre. A sum of Rs. 6.92 crore was received from governmental agencies such as DBT, DST and ICMR, to meet the expenditure on 171 of these on-going projects. In addition, 11 new extramurally funded projects to the tune of Rs. 11.00 crore for a three year period were sanctioned by the above mentioned funding agencies, of which Rs.2.18 crore were received during the calendar year. Research carried out by faculty of the Centre resulted in 123 PubMedindexed publications during 2017, of which 50 articles accrued from basic/ applied research studies and 73 from studies based on clinical/ translational research or medical technology. During 2017, 46 regular staff members were appointed at the Centre in the scientific, technical, nursing and administrative cadres, while three employees superannuated, five employees voluntarily retired, six resigned and one expired.

The **Clinical Research Centre (CRC) and its Hospital** are integral, vital constituents of ACTREC that are making considerable headway into clinical research while focusing on advanced modes of cancer therapy. At present, the hospital in CRC has a total of 120 beds comprising of 88 functional ward beds, 10 ICU and recovery beds, six bone marrow transplant beds, and 16 day care beds. During 2017, the total registration figures showed a 15% increase. A new Sanger sequencer and Next Generation sequencer were installed in the Hematopathology (Molecular lab) during 2017 for diagnostic and research use. A new Endoscopy machine system was successfully installed and inaugurated for patient use in May 2017, and four ventilators were installed in November 2017 to upgrade the Intensive Care Unit. The ACTREC diagnostic services - Clinical Biochemistry, Microbiology, Surgical Pathology, Cancer Cytogenetics and Hematopathology (Molecular and Flow Cytometry) underwent successful reassessment audit by NABL during March 2017 and were granted continuation of NABL accreditation. Being empaneled with 'A' grade under the MJPJAY scheme, ACTREC provided treatment to 1695 beneficiaries during 2017 for patient care as well as various procedures.

The department of Medical Oncology 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. The department of Radiation **Oncology** at ACTREC treats cancers of the brain, head-neck, breast, cervix, genito-urinary tract and hematolymphoid malignancies using advanced radiotherapy technology (IMRT, IGRT and SBRT). External beam therapy is provided using TrueBeam and Helical Tomotherapy Hi-ART-II linear accelerators, and the indigenously developed Bhabhatron-II TeleCobalt Unit. Brachytherapy too forms an integral part of many treatment protocols at ACTREC. The department of Surgical Oncology runs four regular operating theatres five days a week, 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 exentration are also performed. The department of Anesthesia, Critical Care and Pain provides Anesthesia services for the four 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 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 strives 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 nursing care for adult and pediactric cancer patients. Due attention is also paid to implementation of patient safety goals, continuing education, and research. New initiatives during 2017 included proper use of thrombo-embolic deterrent stockings, and pictorial communication cards for patients.

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 lab at ACTREC provides diagnostic services of histopathology, frozen section and immunohistochemistry for patients treated at ACTREC as well as for referral cases from outside hospitals. The **Composite lab** provides 24 hours' services to the hospital for sample collection, hematology, routine biochemistry, immunoassays, and cytology slide preparation and staining. The lab also processes murine and canine blood samples for research. The Hematopathology lab provides services for the diagnosis of hematological malignancies, monitoring of patients on therapy preoperative/ postoperative hematological workup of surgical patients, minimal residual disease testing, post treatment monitoring of patients with chronic myeloid leukemia, B-cell acute lymphoblastic leukemia in children, T cell acute lymphoblastic leukemia, acute myeloid leukemia, and multiple myeloma, as well as post allogeneic stem cell transplant monitoring. The lab also does molecular testing for initial risk stratification and to identify targets for targeted therapy. The Microbiology Lab provides patient services for processing and reporting of bacteriology, serology, mycobacteriology, mycology and other clinical microbiological samples at ACTREC. The lab also

performs sterility testing for Blood Bank, and supports the environmental surveillance, infection control and waste management programs of the Centre.

The **Clinical Pharmacology** group at ACTREC focuses on drug development, biomarker discovery and therapeutic drug monitoring. Their research findings have identified the best dosing practices of paclitaxel in overweight/ obese women with early breast cancer, and the right dose of meropenem to be administered in patients being treated for sepsis. A murine model of acute graft versus host disease (aGvHD) developed in-house is being used to identify and develop naturally occurring herbal agents for aGvHD prophylaxis and treatment. The Hypoxia and Clinical Genomics group focuses on studying the effects of acute hypoxia on tumor biology and clinical genomics. Use of circulating tumor DNA in monitoring response to therapy and clonal evolution of breast cancer are other areas of interest. Utility of MiSeq NGS platform in cancer diagnostics has been initiated by the group. 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, apoptotis 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 newly established 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, Cell and Molecular Imaging; Epigenetics and Genomics; Hemato-Oncology; Protein Biochemistry, Biophysics and Structural Biology; Stem Cell Biology and Cell Signaling; and Tumor Immunology.

Within the Cancer Cell Biology group, Dr. Teni's team focuses on gaining insights into the molecular basis of oral tumorigenesis. On-going studies aim to identify the differential interacting partners of mutant versus wild type p53, the role of Mcl-1 in DNA damage repair, autophagy and mitochondrial homeostasis and of CLU in nucleolus and centrosome maintenance, the regulation and identification of  $\Delta$ Np63 binding sites on survivin, activin A and Notch promoters, and the contribution of TCTP and moesin to radioresistance in oral cancers. 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 colorectal tumors. Dr. Vaidya's team investigates the functions of keratin, vimentin and their associated proteins in epithelial homeostasis and cancer; these show utility as biomarkers of oral cancer. The group has successfully generated transgenic mice expressing K8 wild type and K8 serine 73/ serine 433 mutants in the epidermis, and has developed a nomogram to predict nodal metastasis in node negative oral squamous cell carcinoma patients. 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.

In the Cancer Genetics, Epigenetics and Genomics group, molecular classification of 293 medulloblastomas using a microRNA based real time RT-PCR assay developed in-house by Dr. Shirsat's team has revealed a higher proportion of WNT subgroup patients, higher male: female ratio, and lower incidence of group 4 among adult patients in the Indian cohort. Functional studies of several differentially expressed microRNAs suggest that autophagy may play a role in the pathogenesis of medulloblastoma, and thus autophagy inhibition has potential in medulloblastoma therapy. 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 tobaccorelated 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. 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. 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. Dr. Amit Dutt's team focuses on the somatic genetics of human cancer and aims to develop Next Generation effective targeted therapies for cancer. The three major foci of research are cancer genomics, functional genomics and pathogen discovery. A major focus has been on the genomic features of genetic alterations underlying oncogenesis and cancer progression in lung, breast, cervical, gall bladder, and headneck cancers. 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 group is also involved in developing cancer nanomedicines. Dr. Bhattacharyya's team focuses on intracellular 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 and nucleus are being examined. Yeast, cell lines and cultured neurons are being used as model systems. The group also aims to develop novel microscopic tools. 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 microspectroscopic 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 examine the effects of small molecule inhibitors on primary patient-derived AML blasts, and the anti-tumor activity in patient-derived AML xenograft models. A prospective study on the evaluation of

molecular prognostic markers and minimal residual disease to potentiate therapy for AML patients was completed. 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. A PSMD9 sub network built from patient data suggests that the protein orchestrates a cell signaling program involved in cytoskeletal changes and cell migration; the domain architecture and fold are intimately linked to defining the interactions of PSMD9. New evidence about the structural constraints defining phosphorylation confirm the earlier prediction about the existence of an expanded 'druggable' genome space. 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. 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 vital information for use in therapeutic intervention. Recent research findings of Dr. Ray's team have 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. An innovative role of IGF-1R as a prognostic factor has been found in a small cohort of high grade serous ovarian carcinoma patients. Mechanobiological properties associated with migratory behavior of chemoresistant cancer cells are also being investigated in a collaborative study.

Dr. Chiplunkar's team in the Tumour Immunology group focuses on understanding the factors underlying immune dysfunction in cancer patients and also on the development of immunotherapy for cancer. The mechanism regulating tumor directed cytotoxicity of gamma delta T cells ( $\gamma\delta$  T cells) are being investigated. Histone acetylation/ methylation of the promoter region of perforin and granzyme B, Notch and TCR signaling, and presence of regulatory T cells and myeloid derived suppressor cells have all been shown to modulate the anti-tumor functions of  $\gamma\delta$  T cells. The pro tumor subset - Ty $\delta$ 17 cells are found to increase under hypoxic conditions. Mesenchymal stem cells (MSC) from oral tumors contribute to immune evasion while AML MSC support survival of AML blasts, and contribute to chemoresistance. During 2017, Dr. Joshi acquired and processed additional normal and tumor specimens from breast cancer patients in continuation of his work on immunogenetic and phenotypic aspects of IL17 expression in breast tumors, and prepared a manuscript on the validation and identification of housekeeping genes in head and neck cancers.

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.

#### Academics

ACTREC continued its emphasis and focus on its academic programs, prime amongst which is the doctoral program. In August 2017, the Centre accepted a new batch of 21 students for Ph.D. (Life Sciences) affiliated to the Homi Bhabha National Institute – a deemed university recognized by the University Grants Commission. In all, 114 graduate students at different stages of their doctoral research were working at the Centre during January and December 2017. In its training program, the Centre accepted 299 trainees this year - 112 worked for their dissertation, 144 trainees came for research experience (two of them were postdocs), 23 were observers, and 20 were summer trainees. 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, two students of the first batch served their bond period until November 2017 after completing their year long coursework, while two students of the second batch completed their coursework in December 2017. In all, 23 local, national or international conferences, workshops, training courses, etc. were organized at the Centre, beginning with the Indo-US Conference & Workshop on 'Advances in Enzymology: Implications in Health, Diseases and Therapeutics' in January 2017, and ending with the Biotechnology/ Bioinformatics Training to Teachers and Research Scholars from the North East Region and other regions of India in December 2017. Research seminars on different topics in the life sciences and cancer were delivered by 20 national and international experts who visited the Centre during 2017. In all, 480 students and 32 faculty members from science degree colleges of Mumbai and Navi Mumbai area visited ACTREC during its Open Day in December 2017. The Centre accepted nine educational visits, organized four cancer awareness programs and a number of cancer patient support and entertainment programs during the year.

# Annual Events & Distinguished Visitors

#### Meeting of the HBNI Board of Studies in Life Sciences



A meeting of the Board of Studies in Life Sciences, Homi Bhabha National Institute (HBNI) was held at ACTREC on 14<sup>th</sup> September 2017. The chairperson of the Board, Dr. Shubhada Chiplunkar (Director, ACTREC) and member representatives from each constituent institute (CI) of HBNI reviewed applications for recognition as PhD guides or as faculty members. They also reviewed all the submitted synopses and appointed examiners for theses. They evaluated the syllabus for postgraduate programs of different CIs, taking cognizance of the credit hours, elective courses, etc.

#### Visit of UGC Team



On 28<sup>th</sup> November 2017, an Expert Team from the University Grants Commission (UGC) visited ACTREC, which is one of the constituent institutes (CIs) of the Homi Bhabha National Institute (HBNI). The mandate of the team was to go over the functional aspects of the academic programs of various CIs of HBNI. The UGC team comprised of Dr. Jayarani Premkumar and Dr. Rakesh Vyas. During the meeting with the UGC team, the Director, ACTREC, made a presentation covering various vital aspects of the ACTREC doctoral program covering the intake, coursework, student and faculty profile, etc. The team was later led around some of the research facilities of the Centre. In separate meetings, the team also interacted with the research guides and also with the research scholars of ACTREC who are doing their Ph.D. in Life Sciences.

#### **ACTREC Oration 2017**



The ACTREC Oration for the year 2017 was delivered on 3<sup>rd</sup> March 2017 by Prof. Stefan Kaufmann, Director, Max Planck Institute for Infection Biology, Germany, who is a renowned German immunologist and microbiologist. Prof. Kaufmann is distinguished for his outstanding contributions to the immune response against intracellular bacterial pathogens. The welcome address was delivered by Dr. Shubhada Chiplunkar, Director, ACTREC. In his oration lecture entitled 'Immunity to tuberculosis: from bench to bed and back again', Prof. Kaufmann went through the entire gamut of what we know about TB today, and the vital role played by the immune response in this disease. He also spoke about the initial findings made in the laboratories that were of great utility in the clinic towards TB treatment. He also highlighted how more recent data from the clinics over the past several years has led to a radical rethink about the disease that has led to further work in the labs. His talk was interspersed with a liberal amount of data that enthralled the audience. The vote of thanks was delivered by Dr. Sudeep Gupta, Deputy Director, CRC-ACTREC.

#### Science & Society Oration 2017



Dr. Chittaranjan Yagnik, Director, Diabetes Unit, King Edward Memorial Hospital and Research Centre, Pune, was invited to deliver the Science & Society Oration 2017 at ACTREC on 31<sup>st</sup> March 2017. Dr. Shubhada Chiplunkar, Director, ACTREC, delivered the welcome address. In his oration entitled 'Diabetes in Indians: practice and research', Dr. Yajnik touched upon his special interest in investigating the high susceptibility of Indians to diabetes and related disorders, his thoughts on the intrauterine programming of diabetes that suggests a possible role for maternal micronutrient nutrition in its etiology. Through his talk, members of the audience learnt of the many nuances of this chronic disease, the role played by fetal environment and micronutrients, and how by the new knowledge brought out by his research, we can look forward to better control of diabetes in the future. An interactive discussion session followed after the talk. In the felicitation ceremony the Oration Plaque was presented to Dr. Yajnik by the Director, ACTREC.

#### **ACTREC Annual Day 2017**

The much awaited ACTREC Annual Day 2017 celebrations took place on 12<sup>th</sup> April 2017 with full enthusiasm 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 an enthralling array of group songs, dances and entertaining and topical themed skits, in which the Centre's employees and students gave impeccable 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. This was followed by a variety entertainment program by a professional orchestra 'Awaz Ki Duniya' led by the renowned artist Mr. Ashok Hande and his talented team; this program replete with mesmerising songs and dances by members of his orchestra was appreciated by everyone.





# International Yoga Day



International Yoga Day was celebrated at ACTREC on 21<sup>st</sup> June 2017. A large number of doctors, administrators, other staff and patients attended this event and took part in the yoga sessions conducted on this day. Both practitioners and non-practitioners of yoga participated 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 Kaivalyadham 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 the mental stress and anxiety of cancer patients and their attendants has indeed proven to be not just beneficial but also very popular amongst the patients undergoing treatment at ACTREC.

### Selection Trials of Athletics Events for XXXIII DAE Annual Sports & Cultural Events-2017



On 10<sup>th</sup> November 2017, the selection trials of Athletics events were successfully conducted at ACTREC for the XXXIII DAE Annual Sports and Cultural Events 2017.

#### **Cancer Awareness Programs 2017**



CAP at Malavni, Mumbai



CAP at a Housing Society, New Mumbai

Cancer is a leading cause of death in our country. What is also known is that cancer can be prevented by modifying lifestyle or minimizing exposure to risk factors. Most cancers can be treated if 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 public when requests are received from organizations, housing societies, etc and has sent out a team comprising of a lead clinician to deliver a talk on cancer, accompanied by a scientist, and Dr. Achrekar with a small team of nurses. Over



CAP at ACTREC, Navi Mumbai

the past five years, a series of talks have been delivered on cancer prevention and early detection of breast, cervical, oral and inherited cancers to name just a few. A large number of people have benefited from these CAP events, including school and college students, housing societies, etc 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 because of family history or if a suspicious lump is detected during clinical breast examination. During the year 2017, the ACTREC's CAP reached out to 255 beneficiaries, through four lecture series conducted in response to requests from various organizations.

Date	Requesting organization; site of CAP	Beneficiaries
22 <sup>nd</sup> March 2017	Morgan Stanley; Partner NGO Sneha, Malavni, Mumbai	65
8 <sup>th</sup> April 2017	Hyde Park Society, Kharghar, Navi Mumbai	36
26 <sup>th</sup> July 2017	Central Jail, Taloja, Navi Mumbai	102
23 <sup>rd</sup> October 2017	ACTREC, Kharghar, Navi Mumbai; Program Sponsor Fujifilm	52

#### **General Seminars**

During 2017, a few enlightening and beneficial seminars on topics of general interest to all the ACTREC employees were organized by General Administration. The details are given below:

3 <sup>rd</sup> March 2017	Awareness campaign on the cashless digital economy Mr. Parag Modi, Dy. Director & Mr. Manas Ray, Jt. Director Software Technology Parks of India, Ministry of Electronics & Information Technology, Mumbai
8 <sup>th</sup> March 2017	A step towards healthy living Dr. Sandeep Jadhav, Consultant Neuro Psychiatrist
13 <sup>th</sup> April 2017	Respect and dignity at the workplace - everybody's right Dr. Nasreen Rustomfram, Tata Institute of Social Sciences, Mumbai, and Outside Expert, Internal Complaint Committee, ACTREC
4 <sup>th</sup> August 2017	Government E-marketplace (GeM) Mr. S.K. Gupta, Director, Directorate General of Supplies and Disposals ( <i>DGS&amp;D</i> ), Mumbai
28 <sup>th</sup> August 2017	Symposium on Goods and Service Tax (GST) Mr. Vijendra Tiwari, CA and Dy. Controller of Accounts, TMH, TMC

# Augmentation of Resources





Next Generation Sequencer was installed in the Hematopathology Lab in January 2017.

Sanger Sequencer was installed in the Hematopathology Lab in September 2017.



Ventilators were installed in the Intensive Care Unit in November 2017.

# **TRENDS – ACTREC**







# **Performance Statistics - ACTREC**

	2016	2017
Patient Chart Files - General	4972	5762
Patient Chart Files - Private	1149	1359
Patient Chart Files - Total (A)	6121	7121
Referrals for Investigations/ Second Opinion (B)	516	795
Preventive Oncology (C)	SNA	SNA
Total Registrations (A+B+C)	6637	7916
INPATIENT SERVICES		
Admissions		
No. of Admissions	4659	4476
Average Length of Stay (Days)	5.43	4.91
Bed Occupancy %	76	68
SURGICAL ONCOLOGY		
Major OT Procedures	2333	1645
Minor OT Procedures	1093	1611
MEDICAL ONCOLOGY		
Day Care		
Day Care - General	15192	16966
Day Care - Private	2598	3295
Bone Marrow Transplants at ACTREC	67	55
DIGESTIVE DISEASES AND CLINICAL NUTRITION		
Endoscopies [To be included in Minor O.T.]	SNA	SNA
Nutrition Clinic	SNA	SNA
No. of ICU Admissions	284	186
Patients in Recovery Ward	2067	1396
Pain Clinic	225	176
RADIATION ONCOLOGY		
External Beam Therapy	901	944
Brachytherapy	362	415
Treatment Planning / Beam Modification	1844	1737
Special Radiotherapy Techniques (IGRT, IMRT, SRS, SRT, TSET, etc.)	381	451

	2016	2017
IMAGING SERVICES		
Radiology		
Conventional Radiography	2121	2449
Ultrasonography / colour Doppler	984	1373
Mammography	499	792
C.T. Scan	1947	3659
M.R.I. Scan	3057	3389
Interventional Radiology	2043	2023
NUCLEAR MEDICINE		
PET-CT	30	1398
SPECT-CT	SNA	SNA
C.T. Scan	SNA	SNA
GENERAL MEDICINE		
ECG	1604	2318
Echo Cardiography	755	1188
Pulmonary Function Tests	SNA	SNA
LABORATORY DIAGNOSTICS		
Pathology	9132	8669
Hemato Pathology	45394	48462
Biochemistry	45694	49113
Cyto Pathology	334	404
Molecular Pathology	SNA	SNA
Microbiology	9420	10852
TRANSFUSION MEDICINE		
Blood and Platelet Units Collected	3328	3097
Other Services	19856	18172
CYTOGENETICS	11775	11809
OTHER CLINICAL SERVICES		
Stoma care	SNA	SNA
Occupational Therapy	SNA	SNA
Physiotherapy	6627	7620
Speech Therapy	SNA	SNA
Psychiatry and Clinical Psychology	SNA	SNA
DENTAL SERVICES		
Prosthetics Services	SNA	SNA
Other Services	1542	2219
TISSUE BANK		
Allografts Produced	SNA	SNA

	2016	2017
PALLIATIVE MEDICINE		
No. of Patients	SNA	SNA
Home Care Visits	SNA	SNA
MEDICAL SOCIAL WORK		
Guidance	2935	3393
Counseling	2317	2819
EDUCATION		
Residents & Others	27	27
Fellows	4	3
Medical Observers	0	0
Nursing Trainees	2	1
Paramedical Students	0	0
*MLT Trainees	2	2
Medical Physicist Trainees	0	2
RESEARCH PROFILE		
Extramural Projects	100	110
Institutional (Intramural / No Funding Required)	87	107
Intramural + Extramural Projects	1	3
P.G. Thesis (Dissertation)	0	7
PUBLICATIONS		
International	107	135
National	25	26
Book Chapters	11	8
Conferences, Workshops and Seminars	41	41
SNA = Service Not Available		
DNA = Data Not Available		

Note: Pathology Included: IHC, Frozen & Main lab

	2016	2017
Patient Chart Files- General (TMH New Transfer)	4203	4881
Patient Chart Files- Private (TMH New Transfer)	1048	1243
Patient Chart Files- General (Actrec New Registrations)	769	881
Patient Chart Files- Private (Actrec New Registrations)	101	116

# CLINICAL RESEARCH CENTRE

Dr. Shubhada Chiplunkar (Director, ACTREC) Dr. H. K. V. Narayan (Dy. Director, ACTREC) Dr. Sudeep Gupta (Dy. Director, CRC-ACTREC)

#### 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 Mrs. Sharayu Kabre\* 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 **Hypoxia & Clinical Genomics** Dr. Sudeep Gupta **Medical Administration** Dr. Prashant Bhat (Medical Suptdt) Mrs. Chital Naresh **Medical Physics** Ms. Jamema SV Ms. Reena Phurailatpam Mrs. Siji N. Paul\*

\*Resigned during 2017

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) Nuclear Medicine Mrs. Sneha Mithun<sup>#</sup> 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. Ashwin Polnaya\* Dr. Amit Kumar Janu Surgical Oncology Dr. Vani Parmar Dr. MS Qureshi Dr. Aliasgar Moiyadi (OIC) Dr. Vinaykant Shankhdhar Dr. Sudhir Nair (Clinician Scientist) Dr. Deepa Nair Dr. Prakash Shetty Dr. Parthiban Velavutham **Transfusion Medicine** Dr. Shashank Ojha (OIC) Dr. Minal Poojary

Mrs. Manda Kamble

#Transferred to TMH

# Anesthesiology, Critical Care and Pain Department

**Dr. Reshma Ambulkar,** Officer-in-Charge



Anesthesiologists: Dr. Raghu Thota, Dr. Bhakti Trivedi, Dr. Malini Joshi Intensivist: Dr. Amol Kothekar

#### **Overview**

The department provides Anesthesia, Critical Care and Pain management services. 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 provides its value towards Anesthesia for the four OTs, 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. It also renders Acute Pain services. During 2017, the department provided Anesthesia services for 1502 major OT procedures, 329 procedures in the Radiotherapy OT, 383 MRI, 266 Interventional Radiology procedures and 1321 new + follow-up Pre Anesthesia check-ups; Critical care services for 1396 Recovery room admissions, 186 ICU admissions (47 of which were ventilated) and 26 ICU admissions for procedures; as well as 176 Acute Pain Services. Renovation of the OTs was taken up during 2017 and two of the four OTs were nonoperational from 1<sup>st</sup> May to 15<sup>th</sup> December 2017, and all the four OTs were non-operational from 16<sup>th</sup> to 31<sup>st</sup> December 2017.

#### Research

The departmental faculty members are engaged in over 40 clinical studies (completed/ on-going) during 2017. These include a prospective study to evaluate the ability of anesthetists to give effective cricoid pressure using a McGrath Mac video laryngoscope as well as a survey on patient satisfaction with anesthesia services in a tertiary care cancer centre (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 of acute kidney injury in post hepatectomy patients in a tertiary cancer hospital, project on factors predicting blood transfusion in colorectal surgery and its effects on short-term outcome in a tertiary cancer centre as well as a 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 (PI, Dr. Joshi).

#### **Education**

The Anesthesia division of the department conducted a 3day annual Anaesthesia Review Course (ARC) for postgraduate students, which attracts over 300 students every year. They also organized the 'Difficult airway Conference' in December 2017. 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. In 2017, members of the department participated in several national/ international conferences.

## **Cancer Cytogenetics Department**

**Dr. Dhanlaxmi Shetty,** Officer-in-Charge:

Scientific Officer Ms. Hemani Jain

#### **Overview**

The department of Cancer Cytogenetics at ACTREC provides diagnostic services (conventional karyotyping and fluorescence *in situ* hybridization) for all hematolymphoid malignancies to in-house patients and outside referrals, thereby helping in diagnostic and prognostic evaluation of patients *vis a vis* treatment. The department is accredited by the National Accreditation Board for Laboratories, and participates in external quality assessment program with the College of American Pathologists.

#### Service

During 2017, the department received 11,809 requisitions and processed over 50,000 tests. There were 2,141 and 9,668



Figure: Services in Cancer Cytogenetics

requisitions for karytoyping and FISH respectively (Figure). The department performed conventional karyotyping in AML, MDS, CML patients and ploidy analysis by chromosome counting in ALL patients. FISH studies comprising of a panel of tests were performed at baseline in AML, ALL, CML, lymphoma, CLL and MM and also in the follow-up patients. Chimerism (XX/XY) studies were performed in post-transplant sex-mismatch patients.

#### Research

The department is actively involved in the evaluation of cytogenetic markers for hematolymphoid malignancies. Ongoing research studies include: a phase II study on the efficacy of bortezomib and rituximab in newly diagnosed adolescent and adult CD20 positive Philadelphia (Ph) negative precursor B-cell acute lymphoblastic leukaemia, and a study that investigates the value of circulating microRNAs and clonal plasma cells in the prediction of therapeutic outcome and prognosis of multiple myeloma.

#### **Education**

The OIC and two staff members received training in ISO15189:2012 Quality Management System and Internal Audit in January and May 2017. The department participated in an internal audit conducted in August 2017. A training workshop on Cancer Cytogenetics was arranged for 23 doctors/ teaching faculty in collaboration with the Moving Academy of Medicine and BioMedicine, Pune in November 2017. The department also provided orientation in cytogenetics and general laboratory culture to 50 consultants/ registrars and to students of diploma in oncology nursing. The department conducts advanced training courses in Cancer Cytogenetics twice a year; this year three students each were selected for training as technologists in March and September 2017. The OIC accepted three Master's students as dissertation trainees, two for experience and one as an observer. Departmental staff presented nine poster/oral presentations at four national conferences during the year.

# **Chromatin Biology Group**

Prof. Indraneel MittraDr Ernest Borges Chair in TranslationalResearch& Professor Emeritus Dept. of SurgicalOncology



#### Scientific Officers:

Dr. Ranjan Basak, Dr. Raguram GV, Dr. Kavita Pal

#### Overview

This group focuses on the study of the biology of cell-free DNA (cfDNA) and chromatin (cfCh) derived from the billions of cells that die in the body every day. They were the first to demonstrate that fragmented cfDNA and cfCh are biologically active molecules and 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 ageing and a variety of devastating age-related disorders

such as cancer, heart attack, stroke and Alzheimer's disease as well as acute conditions such as severe infection, sepsis and trauma.

#### Research

The group has made several novel discoveries during 2017.

(1) Findings from this group revealed that extra-nuclear cellfree chromatin is pervasively present in mouse tissues with a dramatic rise following the administration of the cytotoxic drug Adriamycin (see Figure). These findings have wide implications for human health and disease.



*Figure: Immunofluorescent detection of cfCh in normal mouse brain by confocal microscopy before and after treatment with Adriamycin. Sections were stained with anti-DNA antibodies (red) and anti-histone H4 antibodies (green).* 

- (2) It was seen that the toxic side-effects of chemotherapy are primarily due to cfCh released from the initial round of drug-induced dying cells that trigger a cascading effect whereby the dying cells release more cfCh causing further rounds of DNA damage, apoptosis and inflammation thereby amplifying or exaggerating the toxic side effects of chemotherapy.
- (3) It was also seen that treatment of NIH3T3 cells with nanogram quantities of cfCh isolated from the sera of cancer patients leads to massive deregulation of transcription by 6 hours with up-regulation of pathways related to cancer, DNA damage, inflammation, metastasis, stemness, immune response, metabolism and stress. At the 6 hour time point, activation of all known hallmarks of cancer was noted - including up-regulation of proteins responsible for sustained proliferation (TGF-â, c-Myc, PI3K, AKT, Phospho-P13K, Phospho-AKT), evasion of growth suppression (p53, ATM), replicative immortality (CCND1), resistance to cell death (BCL-2), tumor promoting inflammation (NFkB, IL-6, TNF-a, IFN-g), angiogenesis (VEGF, HIF-1A), genomic instability and mutation (gH2AX, p21, Rad50, Ku80), invasion and metastasis (MMP13, vimentin, CDH2, CDH1), deregulating cellular energetics (GLUT1, AMPK) and avoidance of immune destruction (PD-1). Activation of the cancer hallmarks could be abrogated by concurrent treatment with cfCh neutralizing/ degrading agents namely, anti-histone antibody complexed nanoparticles, DNase I and a novel DNA degrading agent resveratrolcopper.

#### **Education**

During 2017, as a part of the Centre's training program, Prof. Mittra accepted eight college students as trainees – three for their Master's dissertation, four for experience and one as a summer trainee.

# **Clinical Pharmacology Group**

**Dr. Vikram Gota** Officer-in-Charge



Scientific Officers Dr. Manjunath Nookala

#### **Overview**

The Clinical Pharmacology group at ACTREC has taken tremendous strides in the last year in areas of drug development, biomarker discovery and therapeutic drug monitoring (TDM). The group is a cornerstone in patient management with primary focus on optimizing the dose and schedule of drugs used in oncology practice. The research from this group has identified the best dosing practices of paclitaxel in overweight/ obese women with early breast cancer, as well as the right dose of meropenem to be administered in clinically ill patients being treated for sepsis. Based on this, a proposal to start TDM service of 10 oncology drugs has been put up for approval. The group is also involved in preclinical drug development and has successfully developed a murine model of acute graft versus host disease (aGvHD). This model is being used to identify and develop naturally occurring herbal agents for the prophylaxis and treatment of aGvHD. Collaboration has been initiated with BARC to develop novel formulations for safe and effective delivery of chemotherapeutic agents.

#### Services

The group presently offers TDM services for voriconazole and posaconazole. TDM services will be extended to other drugs including sunitinib, imatinib, 5-fluorouracil, l-asparginase, and mycophenolate mofetil. TDM of antimicrobials such as colistin, amikacin, vancomycin, and meropenem will also be undertaken following approval.

#### Research

The major focus of this group is early clinical development of drugs. The first in human (FIH) study of a novel EGFR inhibitor developed by an Indian pharmaceutical company was completed this year. Besides, the group's efforts at bench-to-bedside development have resulted in regulatory approval for phase I healthy volunteer study of chlorophyllin as a radioprotector. The group was a part of a successful R01 application entitled 'Analytical capacity building for the study of tobacco carcinogen exposures in India', awarded by the Fogarty Centre, NIH, USA. This multicentre study involves collaboration between the Tata Memorial Centre, Healis-Sekhsaria Institute for Public Health (an NGO based in Navi Mumbai) and the University of Minnesota, USA. The group has also obtained ICMR funding for a project on 'Pharmacogenetic study of commonly used anticancer drugs and implications of ADME gene polymorphisms in the treatment of Indian cancer patients'.

#### Education

Dr. Gota is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. Three of his graduate students, Ms Dievya Gohil, Ms Priya Sharma and Ms Megha Garg are pursuing PhD studies. A one-day concept development workshop for early career researchers was organized by this group jointly with the Asia Pacific Clinical Oncology Research Development (ACORD). Group members participated in national/ international conferences and presented their research findings during the year. The first candidate for the 'Fellowship in Oncotherapeutics' - initiated in 2016 with an aim to train young investigators in the field, completed her fellowship in August 2017. Training of students in research is another major activity of the group. The OIC accepted 14 students for training in 2017, four for dissertation, nine for experience, and one on a collaborative project. Dr. Manjunath too accepted four trainees for experience. The group also trained an international student, Mr Akinbobola Otitoju from Nigeria, who joined in December 2017 under the CV Raman Fellowship program to complete a part of his doctoral dissertation.

### **Composite Lab**

**Dr. Preeti Chavan** Officer-in-Charge



#### **Overview**

The Composite Lab is NABL accredited and provides 24 hours' services to the hospital. The lab consists of four sections: sample collection area, hematology, biochemistry (routine biochemistry and immunoassay) and cytology (slide preparation and staining). The lab also processes murine and canine blood samples for research purposes. The lab has been carrying out two IEC approved projects and five audits. The lab is conducting a one year advanced training course in Medical Laboratory Technology since November 2015. Students from the 2016 batch completed their training in November 2017 and are currently serving their bond period.

#### Service

The Composite Lab 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). The lab performed 158114 tests for routine biochemistry, 9295 immunoassays, 45744 tests for hematology, 216 for cytology and 142 for FNAC during the year 2017.

#### Research

Two IEC-approved studies are on-going in the lab: Determination of select biochemical reference intervals in Indian voluntary blood donors (PI, Dr Chavan) and Oral cavity flora in patients receiving chemo-radiotherapy for head and neck cancer (Co I, Dr Chavan). The lab is involved in five audits. The first audit is a comparison of total serum B12 values with serum active B12 values and determines the correlation between the levels of these two assays. 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 the drug tacrolimus in HSCT patients, using two different analyzers working on the same principle, namely the Architect 1000 and the Dimension EXL analyzer. The fourth audit aims to identify, establish and evaluate quality indicators in a hemato-oncology lab to implement effective procedural intervention in a bid to achieve good laboratory practice. The fifth audit examines the application of Bull's algorithm as an effective tool for monitoring systemic errors in hematology cell counters at zero cost.

#### Education

Training sessions on sample collection and interpretation of laboratory values were conducted for ACTREC nurses. The lab also accepted seven trainees in the lab this year- two students for Master's dissertation projects, one student for DMLT internship, and four individuals for research experience. **Dr. P.G. Subramanian** Officer-in-Charge

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

### Hematopathology Laboratory



#### **Overview**

Hematopathology lab provides services for the diagnosis of hematological malignancies, monitoring of patients while on therapy for all malignancies and preoperative and postoperative hematological workup of surgical patients. The lab is involved in minimal residual disease (MRD) testing and post treatment monitoring of patients of chronic myeloid leukemia, B-cell acute lymphoblastic leukemia in children, T cell acute lymphoblastic leukemia, acute myeloid leukemia, and multiple myeloma. These tests are used to tailor the treatment for individual patient based on response to initial treatment. The lab also does molecular testing for initial risk stratification and for identifying targets for targeted therapy. The lab has set up Next Generation sequencing (NGS) facilities for diagnostic and research use this year. The lab also does post allogeneic stem cell transplant monitoring.

#### Service

During 2017, the lab at ACTREC performed a total of 22585 specialized tests for hemato-oncology, which included 7591 bone marrow aspirate morphology, 6777 flow cytometric immunophenotyping, and 8217 molecular tests. Lab services include detection of MRD for acute leukemia and multiple myeloma and involvement of hematolymphoid malignancies in cerebrospinal fluid and other rare sites. The lab does post-allogeneic stem cell transplant monitoring for chimerism, and molecular testing for diagnosis, subtyping and monitoring

of hematolymphoid malignancies. In 2017 the lab provided molecular diagnostics service to a total of 8217 patients these encompassed RQ-PCR for BCR-ABL (4289), BCR-ABL transcript identification (277), ABL kinase domain mutation studies (336), RQ-PCR for PML RARA (520), acute leukemia transcript identification (46), AML gene mutation identification (636), gene mutation detection for JAK2, CALR and MPL (350), CLL IGVH mutation detection (31), IGH or TCR gene for clonality/ CLL gene mutation/ B-RAF V600E/ MYD88 L265P detection/ K RAS and N RAS mutation detection (48), and chimerism testing by STR markers for bone marrow transplantation (1684). 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.

#### Research

The lab faculty members are engaged in several research projects involving the monitoring of MRD in multiple myeloma, and childhood round cell malignancies using a sophisticated flow cytometry protocol. The lab is also a reference centre for MRD monitoring in a multi-institute clinical trial for childhood ALL. The faculty is also engaged in establishing numerous low-cost NGS assays used for prognostication of myeloid and lymphoid malignancies and guiding therapeutic decisions, evaluating MRD in AML using multicolor flow cytometry and NGS, and determining the role of kinetics serum micro-RNA at sequential time points in the prognostication of multiple myeloma

#### **Education**

The laboratory conducts 'Complete Blood Count - Bench to Clinic' and 'Immunophenotyping' 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 2017, 50 pathologists from various parts of the country came as observers for training in morphology, cytochemistry and flow cytometry. In 2017, the clinician scientists in this lab accepted seven students as trainees for their Master's dissertation and one trainee for experience.



## Hypoxia and Clinical Genomics Group

Clinician Scientists: Dr. Sudeep Gupta, Dr. Rajendra Badwe, Dr. Kumar Prabhash, Dr. Shalaka Joshi



#### **Overview**

The theme of this group is 'Translational research - turning discoveries into practice'. The group focuses on studying the effects of acute hypoxia on tumor biology and clinical genomics. Use of circulating tumor DNA (CtDNA) in monitoring response to therapy and clonal evolution of breast cancer are other areas of interest. Utility of MiSeq NGS platform in cancer diagnostics has been initiated by the group. This landmark study in locally advanced cervical cancer, funded by Department of Atomic Energy - Clinical Trials Centre, proved that chemotherapy plus radiation led to a better outcome compared to chemotherapy followed by surgery.

#### Research

The group is presently working on an IRB approved project that involves evaluating the effects of acute, peri-operative hypoxia on breast cancer biology. The data obtained in this study using clinical samples and breast cancer cell lines provides empirical proof for molecular changes that a tumor undergoes during surgical intervention, and that ischemia/ reperfusion injury can serve as a stimulus for pro tumorigenic phenotypic behavior of the remnant tumor cells. The sequencing of patient samples to study clonal evolution of TNBC has been completed and data analysis is in progress using bioinformatics tools. Under clinical genomics, a protocol for the isolation of CtDNA from clinical samples has been established while diagnosis of lung cancer using MiSeq NGS is under standardisation.

#### **Education**

Dr. Sudeep Gupta is a recognized guide for Ph.D. in Health Sciences under the Homi Bhabha National Institute. This group provides an opportunity for post-MBBS/ MD/ MS students to work as research fellows, and be initiated in the essence of basic research as well as for post-graduates/ graduates in life sciences/ other scientific areas. At present, the group has three research fellows – Mr. Rohan Chaubal, Mr. Nilesh Gardi and Ms. Vaishakhi Trivedi, working towards the Ph.D. degree. Dr. Gupta also accepted three trainees during 2017 for research experience. Staff members of this group participated in national/ international conferences and presented their research findings in 2017.

# **Medical Administration**

**Dr. Prashant Bhat** Medical Superintendent



#### Quality Manager Ms. Chital Naresh

#### **Overview**

The Medical Administration looks after all the patient-centric services at ACTREC, with a focus on comprehensive, uninterrupted, high quality collaborative management of cancer patients along with research and education. The group continues to seek high standards of excellence in guality and outcomes in cancer care for the Centre's patients, through its dedicated and highly skilled teams of doctors, nurses and allied staff and also through the incorporation of state-ofthe-art facilities and technologies. The office of the Medical Superintendent (OMS) oversees the outpatient, inpatient, diagnostic, clinical and support services, as well as quality improvement activities. Its well established quality control program, which is spearheaded by the OMS, includes quality assurance monitoring, safety, analysis of incidents and feedback, and initiation of corrective and preventive measures. The Centre is proud to continuously achieve accreditation from QCI for its diagnostic services.

The OMS also oversees the material management of drugs and surgicals, and procurement of capital equipment, coordinates large turnkey projects for installation of equipments, oversees and coordinates major and minor projects being undertaken for infrastructure development, and evaluates contracts for all the outsourced services. The office has facilitated MJPJAY scheme at ACTREC which has benefited the economically deprived patients for their cancer treatment. The office liaises and coordinates CSR support for infrastructure development, equipment donation and monetary donation towards various patient welfare funds. The office also co-ordinates health education programs towards the community in association with resource persons from various departments.

#### Service

- Currently the hospital in CRC has a total of 120 beds comprising of 88 functional ward beds, 10 ICU and recovery beds, 6 bone marrow transplant beds, and 16 day care beds.
- During 2017, a total of 7040 cases were registered, of which 997 new cases were registered directly at ACTREC. The total registration during the year has shown a 15% increase. The OPD at ACTREC has shown a significant increase with the average number of outpatients per day at 354, a challenging situation for the administration, leading to a plan for a new waiting area for patients, initiated through corporate CSR funding to manage the increase in outpatient load and the associated waiting requirement. The total number of admissions for 2017 was 4476 with 23686 inpatient days and overall inpatient bed occupancy at 68.31% and average length of stay of 5 days.
- During the report period, 1645 major surgeries and 1611 minor procedures were performed, a 29% decrease in the major surgeries as compared to the previous year; this was attributed to the fact that two out of 4 OTs were under renovation for a considerable period during the year. The PET CT machine utilized for PET CT, diagnostic CT and planning CT is well used on time slot basis with 1398 PET CT, 2315 diagnostic CT and 1344 planning CT studies done during 2017. Outside referral for investigations have shown a 33% (n=765) increase in 2017 in view of the advanced labs for flow cytometry, molecular hematopathology and cancer cytogenetics now being well established at ACTREC.

- ACTREC diagnostic services Clinical Biochemistry, Microbiology, Surgical Pathology, Cancer Cytogenetics, and Hematopathology (Molecular and Flow Cytometry)
  - underwent successful reassessment audit by NABL during March 2017 and were granted continuation of accreditation by NABL which is recognition from the Quality Council of India for technical competence and quality of testing for the diagnostic laboratories.
- The Hematopathology (Molecular lab) has initiated Next Generation sequencing facilities for diagnostic and research use in 2017. The lab also does post allogeneic stem cell transplant monitoring.
- In the ICU and OT, specific critical incident report form for safety issues and incidents reported were reviewed on a monthly basis for corrective and preventive action. New equipments including four ventilators were added to upgrade the facility.
- Being empaneled with the MJPJAY scheme, ACTREC has provided treatment to 1695 beneficiaries for patient care and procedures under this scheme.
- There is a general increase in the number of patients being referred to and getting registered at ACTREC. To cater to the increasing patient load, the OMS has improved patient management systems in OPD, Radiotherapy, Day care, Interventional Radiology and Pharmacy.
- This office also proactively seeks Patient Feedback through 'Patient Feedback Redressal' boxes that are placed at strategic and easily accessible locations at the ACTREC campus. Positive suggestions were evaluated for

implementation and appreciations were conveyed to concerned staff/ department. The OMS also analyzes Incidents through Incident Reporting system. The office were intimated about 26 reported incidents, root cause analysis was carried out for these incidents, and corrective/ preventive measures were initiated as appropriate.

- The office through the Infection Control Committee oversees the compliance of the Biomedical Waste Management according to the regional requirements and monitors infection control, antibiotic sensitivity patterns and hospital acquired infections.
- A new Endoscopy machine system was successfully installed and inaugurated for patient use on 6<sup>th</sup> May 2017.
- Renovation of the entire BMT unit has been taken up it includes repair, maintenance and painting to be handled through a planned shutdown. The OMS is coordinating with all the stake holders for the timely completion and re-commissioning of the unit by a validation process.
- The much needed OT renovation has been planned in two phases: phase-I of the OT renovation was completed by the last week of December 2017 and the OTs were readied for commissioning. The OMS was involved in firming up the renovation plan and provided necessary inputs for the project, as and when required. The office coordinated the entire renovation project that was funded through a corporate CSR initiative.
- The OMS also took part in and gave necessary inputs whenever required for various TMC projects at ACTREC under various stages of implementation.



A graphical representation of relevant statistics is provided in the following charts:





#### **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 two MHA students in 2017. The MS and his staff participated in national/ international conferences and presented their work. As per the calendar plan for 2017, several training programs were conducted for all the hospital staff, as well as for the laboratory/ nursing staff. These covered basic safety in laboratories, orientation to the revised Quality Management System, infection control and safety practices, pre-analytical errors and troubleshooting, waste management - process of implementation of new BMW rules, spill management, and several other hospital related programs.

#### **Physiotherapy Department**

The Physiotherapy department at ACTREC provides dedicated service to admitted patients and outdoor patients having disabilities and/or complications due to the disease, surgery, radiotherapy or chemotherapy, and plays an important role in the rehabilitation of bone marrow transplant patients and those with malignant hematological disorders. After performing a thorough assessment, the Physiotherapists diagnose and design individualized treatment plans that include chest physiotherapy, various manual therapy techniques like exercises and mobilization, electro therapy, swallowing therapy, cognitive therapy, vaginal dilation, incontinence management, etc. The department successfully conducts a lymphedema management program by certified lymphedema therapists. Various orthotic appliances like crutch, walker, splints, braces, etc and external breast prosthesis are provided to patients, when required. During 2017, 7620 patients availed physiotherapy services at ACTREC, as compared to 6627 patients during 2016 - a 15% increase. The department is also involved in research projects, and successfully completed and published the findings of a randomized controlled trial on head and neck cancer patients. A randomized controlled trial on lymphedema management with due approval from IEC III is presently on-going.

#### **Nutrition and Dietetics Department**

This department is manned by a qualified and trained dietician who provides nutritional intervention to admitted and outdoor patients undergoing surgery, chemotherapy and radiation therapy. The dietician conducts nutritional screening and assessment of all new patients within 24 hrs of admission, and plans medical nutrition therapy for the patients referred by various disease management groups. Planning of medical nutrition therapy is based on nutritional requirements and clinical profiles of the patients. The dietician monitors diet compliance, and initiates re planning of therapeutic diet whenever required. She also monitors the food service management of the hospital kitchen and assesses hygiene, food handling and quality of food served to the patients. In the year 2017, 1078 admitted patients and 2723 outdoor patients were provided with nutritional intervention at ACTREC. Nutritional education programs are routinely conducted by the department for patients and their care givers.

#### **Medical Social Services**

Trained Medical Social Workers provide emotional, psychological and financial support to cancer patients and their caregivers - factors that go a long way towards alleviating suffering and improving the quality of life. Counseling is offered to all the patients - including those who are unwilling to take treatment, thus ensuring that treatment is completed and drop out is minimized. Patients are informed about treatment procedures and available travel concessions, and socioeconomically challenged patients are directed towards avenues of financial support and accommodation. Close liaison with the Blood Bank ensures that blood/ components are immediately made available through voluntary donors. The social workers facilitate support for diagnosis and medicines through the Centre's supplementary funds, and make coordinated efforts towards obtaining donations for the hospital - either in cash for the supplementary funds or in kind. They organize the distribution of gifts and other material to the patients; liaise with NGOs who organize entertainment programs as a service to cancer patients, coordinate festival celebrations through the sponsorship of donors and NGOs, and conduct stress management workshops, yoga and tailoring classes for the patients and their relatives. During 2017, the department organized several entertainment programs, fun activities, magic show, picnic, arts and craft activities to keep the patients happy and relaxed; these activities were managed through the sponsorship of donors and NGOs. During the year, a total of 2819 patients were counselled and 3393 patients were provided guidance.

#### **Patient Support Services**

**St. Jude Trust** provides pediatric patients a clean, hygienic and secure place to stay in, while on treatment at the hospital. It also provides psychological and social support, rations, nutritional supplements and clean water, conducts educational and recreational activities like yoga, meditation, theatre, art therapy, music therapy.

VCARE Foundation offers counseling services and distributes cancer informative books, provides gifts to patients, and celebrates Cancer Survivors Day. It also arranges picnic, and programs on the occasion of festivals like Dassera and Diwali. It has sponsored a tailoring class for rehabilitation of cancer patients, and have sponsored the provision of daily newspapers for patients and their relatives staying in *Vasundhara* hostel.

JASCAP donates towards the supplementary fund which is being used for poor patients, and also maintains a book stall at the hospital where 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, celebrates National Cancer Rose Day, distributes gifts to patients, and arranges snacks/ lunch parties on the occasion of festivals for patients and their relatives staying in the hostel.

**Make a Wish Foundation** identifies and fulfills the wishes of pediatric patients – these encompass giving them toys of their choice, to celebrity visits; the latter are all time favorites of the children.

**Mahindra Foundation** distributes kits to post operative breast cancer patients, which have been of immense practical benefit to patients.

**Sanjivani Trust** provides counseling and guidance to patients and their relatives.

Vasantha Memorial Trust provides counseling to cancer patients and their relatives, provides financial assistance to poor patients in case of emergency/ urgent need of medicines, and organizes arts 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, extends financial assistance to cancer patients in case of emergency/ urgent need of medicines, distributes wigs to cancer patients, and assists in conducting post breast cancer surgery rehabilitation classes.

**Kaivalyadham,** Lonavala conducts Yoga classes for patients and their relatives thrice in week.
## Medical Oncology Department

**Dr. Navin Khattry,** Officer-in-Charge



#### **Medical Oncologists**

Dr. Sudeep Gupta, Dr. Kumar Prabhash, Dr. Manju Sengar, Dr. Amit Joshi, Dr. Jaya Ghosh, Dr. Bhausaheb Bagal, Dr. Tushar Vora, Dr. Hasmukh Jain, Dr. Deepa Philip, Dr. Anant Gokarn, Dr Sachin Punatar, Dr Avinash Bonda

#### **Overview**

The department of Medical Oncology started its services in ACTREC in 2006. Initially it was restricted to administering concomitant chemotherapy with radiotherapy for head and neck cancers and cancer of the cervix. Since the past six years, chemotherapy is also being administered in neoadjuvant, adjuvant and palliative setting for solid tumors. The Bone Marrow Transplant unit shifted to ACTREC in November 2007 due to the rising incidence of life threatening infections in the unit at TMH, Mumbai. Since then, ~650 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.

#### Service

Bone Marrow Transplantation Unit: In 2017, 56 transplants (35 allogeneic, 21 autologous) were performed in ACTREC. Around 5000 outpatient visits took place this year at an average of ~415 visits per month, and ~220 new referrals (non-TMC) were registered. 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 centres doing these haploidentical transplants; around 60 transplants have been performed over the past 5 years, with ~55% overall survival. Since 2009, a funding mechanism has been in place to offer free or greatly subsidized BMT as a life saving measure for poor patients, and over 130 autologous/ allogeneic transplants have been performed till date under this scheme.

Adult Hematolymphoid Unit: In the 17-bed leukemia/ lymphoma ward and adult hematolymphoid OPD, around 1000 inpatients and ~10000 outpatient visits took place during 2017. Around 150 new patient registrations were for lymphoma/ leukemia.

Adult Solid Tumor Unit: In 2017, around 11000 outpatient visits took place in this unit, and tumors of the head and neck, breast, ovary, cervix and gastrointestinal region comprised the bulk of cancers treated by the unit at ACTREC. The five inpatient beds dedicated to solid tumors had ~1700 inpatient admissions. Around 360 new patient registrations in solid tumors took place in 2017.

Pediatric Oncology Unit: In the pediatric oncology OPD and 5 bed inpatient service, around 5000 outpatient visits took place in 2017, with the five inpatient beds being always occupied.

## 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. During 2017, both consultants and students from the hematolymphoid and solid tumor units presented their research at various major national and international meetings.

## **Microbiology Laboratory**

**Dr. Vivek Bhat** Officer-in-Charge



#### **Overview**

The Microbiology Lab 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 is also provided by the lab. The lab faculty is also involved in research projects, and educational programs.

#### Service

The Microbiology lab processed around 14441 samples towards the provision of patient related and hospital services at ACTREC during 2017. This included Bacteriology: cultures of blood (3676), CSF/ body fluids (113), drain fluids (334), pus (35), urine (506), feces (843), swabs (624), respiratory samples (252) and others (173); Serology: HBsAg (916), HIV (899), HCV (906), Procalcitonin (243), rapid malaria antigen (576), dengue (558); clinical microbiology testing of urine (1085), feces (379), *Clostridium difficile* testing (115) and stool viral antigen detection (82), Mycobacteriology (acid fast staining - 101), Mycology (identification of fungi in clinical material, susceptibility testing, special staining, routine

fungal culture - 179). Additional hospital services included sterility testing for blood bank services: PBSC (203), SDP (973), RDP (49), PCS (438), FFP (44), WB (7), PCS (49) and environmental surveillance for OT/ICU/ brachytherapy/ BMT unit/ CCE and water testing. Infection control services and waste management support were also provided.

#### Research

The lab has three on-going research projects, of which two are IEC approved and involve the profiling of oral cavity flora in post operative head and neck cancer patients receiving chemo-radiotherapy, and characterization of multidrug resistant gram negative bacteria causing sepsis in cancer patients.

#### **Education**

The OIC is also a teaching faculty for the MD Microbiology subject. The faculty is closely involved, along with other diagnostic labs, in the conduct of the advanced medical laboratory technology training course at ACTREC. Three trainees were accepted in the lab in 2017, two for Master's dissertation and one for experience. During 2017, the lab staff members participated in and presented papers at one international and five national conferences.

## **Nursing Department**



#### **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 2017 included assessment of deep vein thrombosis (DVT) with an emphasis on the correct use of thrombo-embolic deterrent (TED) stockings, and pictorial communication cards for patients unable to speak due to disease/ treatment process. In August 2017, the department conducted a one year fellowship program in Bone Marrow Transplant Nursing, a Workshop on Medication safety, Essentials of Cardiopulmonary resuscitation (CPR) and hands on training for handling port and central line devices. A lot of emphasis is placed on the all-round development of nursing staff and nurses participated in educational programs on 'Lead to Change' and staff planning based on patient acuity.

### Service

The focus of 2017 was on continuous quality improvement, and the department reinforced safety goals to ensure a safe environment for the patient. Uninterrupted monitoring of patients and use of standard protocols reduced the pressure ulcer rate from 0.43% (2016) to 0.19% and needle stick injury

rate from 0.25% (2016) to 0.23%. Initial assessment and double verification of all high risk medication was done to prevent medication error. This year, the hospital experienced an increase in the number of patients. New admissions to day care were 360 with a total of 20100 sittings, 1611 patients underwent minor procedures and 1645 major surgeries were undertaken; the latter decrease was due to the renovation of OTs. Fifty-nine patients underwent hematopoietic stem cell transplant: 32 autologous and 27 allogeneic of which 10 were haploidentical and 1 was from a matched unrelated donor. Complications like GvHD, hemorrhagic cystitis and CMV infections were handled with expert medical and nursing care, and many patients recovered. There was one case of MRSA and three cases of VRE in the BMT unit this year. Patients provided a positive feedback about the care received. In 2017, training on the insertion of PICC line resulted in 169 PICC being inserted, and the nurse-led PICC clinics showed good clinical outcomes.

#### Research

Various audits for medication safety, patient identification, CAUTI, VAP, thrombophlebitis were carried out, and the complications associated with them showed a decreasing trend. The research findings were presented by four nurses at an international conference held abroad

## **Education**

Members of the department attended in-house CNEs and national/ international conferences. Four nurses attended a workshop on Nursing Management and Leadership. 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. Staff members attended sessions on 'Prevention of sexual harassment at the workplace' and 'Domestic violence and its legal aspects'. This year, six nurses from various institutes were trained in the care of patients with hematopoietic stem cell transplant. **Dr. Asawari Patil** Officer-in-Charge

**Staff Pathologists** Dr. Epari Sridhar, Dr. Swapnil Rane

## **Pathology Laboratory**



#### **Overview**

The Pathology lab at ACTREC is a part of the Department of Pathology, TMC. All the pathology consultants and resident doctors work on rotation at TMH as well as ACTREC. At any given time, the ACTREC lab has one consultant pathologist, two senior residents and one junior resident.

#### Service

The lab provides in-house diagnostic services of histopathology, frozen section and immunohistochemistry (IHC) for patients treated at ACTREC as well as for referral cases from outside hospitals. The lab is well-equipped with automated tissue processor, automated stainer, cryostat and automated immunostainer. The lab is accredited by NABL for all services except cytology and participates in External Quality Assessment Scheme offered by a national agency (Anand lab, Bangalore) and an international agency (College of American Pathologists). The cytology samples from ACTREC are sent to the TMH Cytopathology lab, which is accredited by NABL. In the year 2017, the lab processed 2659 histopathology specimens and 1843 frozen sections from 801 cases. The lab has over 37 antibodies standardized for IHC, and performed 4004 IHC tests in 1441 cases.

#### Research

The lab archives all the slides and blocks and, when required, retrieves and issues them for IEC-approved projects of pathologists, clinicians, and scientists within the Centre. The pathologists are involved as principal or co-investigators in several IEC approved Disease Management Group (DMG) projects, junior residents' thesis projects and collaborative projects with scientists at ACTREC.

#### Education

The pathologists at TMH and ACTREC regularly participate in DMG meetings, joint clinics/ multidisciplinary meetings and virtual tumor boards. They also participate in national/ international conferences as faculty or with oral/ poster presentations. Resident doctors and technical staff are encouraged to participate in conferences and continuing medical education (CME) programs. The technical staff members are also encouraged to participate in internal audit course for conferences, workshops as well as internal audit course for NABL.

## **Radiation Oncology Department**

Dr. Tejpal Gupta Officer-in-Charge



**Radiation Oncologists** 

Dr. Vedang Murthy, Dr. Supriya Sastri, Dr. Jayant Sastri Goda, Dr. Tabassum Wadasadawala

#### **Medical Physicists**

Dr. SV Jamema, Ms. Reena Phurailatpam, Ms. Siji Nojin Paul\* (\*resigned in December 2017)

### Overview

The department of Radiation Oncology at ACTREC fulfills the Centre's mandate of high-quality service, education, and research in collaboration with colleagues from TMH. 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. In 2017, successful installation, validation testing, clinical commissioning, and regulatory approval of the indigenously developed multi leaf collimator (MLC) system on Bhabhatron-II telecobalt unit was done, after which it was brought into use for field shaping, the first step towards delivery of conformal radiotherapy. To improve the workflow and patient safety, a dedicated TMC Radiation Oncology Incident Program (TRIP) was initiated this year, chaired by the departmental head. Workflow SOPs have been prepared for all sites; it requires voluntary online reporting of minor and major errors followed by root cause analysis of error and recommendation of corrective actions. External beam therapy comprises of one linear accelerator (TrueBeam), Helical Tomotherapy Hi-ART-II linear accelerator, and the indigenously developed Bhabhatron-II TeleCobalt Unit. In 2017, extracranial SBRT facilities have been expanded for virtual visual biofeedback, to further improve precision of treatment delivery. The Medical Physics section is equipped with a Radiation Field Analyzer, ionization chambers and other sophisticated modern equipment.

Accreditation is through external dosimetry audits to provide state of art and high precision treatment. Brachytherapy forms an integral part of many treatment protocols and the facility comprises of a remote-afterloading HDR (microSelectron V2) with Oncentra Brachy treatment planning system.

#### **Service**

In all, 900 patients were treated with external beam radiotherapy and around 709 brachytherapy procedures/ treatments were performed on over 200 patients at ACTREC in 2017.

#### Research

Faculty members have been actively involved in various research protocols and have initiated several research projects as principal/ co-investigators that have been approved by the Institutional Review Board. Some of the achievements are the indigenously built cobalt-60 teletherapy machine (Bhabhatron II), intracavitary brachytherapy applicators (BARC applicator, SIVA), interstitial brachytherapy catheters, special fixation device for lung shields used for total body irradiation, and low density base plates for patient positioning and fixation. The indigenization of radiation therapy equipment and accessories is expected to have a significant impact in reducing the recurring cost to the Centre.

## **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 enrol and are on rotation at ACTREC (3-month posting) as a part of the program. For the past three years, the department has also been involved in the 2-year 'Fellowship in IGRT' program, wherein six months of their 2year tenure is at ACTREC. A 2-day event - the annual 'Radiation Oncology Practicum' on 'Adaptive Radiotherapy' was organized by Dr. Vedang Murthy at ACTREC, in collaboration with other colleagues. 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 tumour boards (VTB) organised through the National Cancer Grid (NCG) and extend their expertise for site-based discussion on digital platform 'Chartrounds India.'

## **Radiobiology Group**

**Dr. Jayant Sastri Goda** Radiation Oncologist 'F'



#### **Overview**

The research focus of the Radiobiology group is on various aspects of radiation biology and cancer chemotherapy, in collaboration with in-house basic scientists and radiation oncologists and with institutes like IIT-B, BARC and Manipal University. The group aims to develop newer formulations of radiation modifiers - both radiation sensitizers and radiation protectors, besides repositioning existing drugs as radiation sensitizers. The group is a part of a US-India consortium on repositioning of drugs for radiation modification. The group is also involved in the translational aspects of a clinical trial 'NELCER trial: Nelfinavir an anti- HIV proteasome inhibitor as a radiosensitizer in advanced carcinoma cervix'.

#### Research

This newly established group in the area of Radiobiology addresses queries pertaining to the deleterious effects of radiation exposure and works towards improving the efficacy of therapeutic radiation. In 2017, work was initiated on the biological effect of low and high dose radiation exposure on human peripheral blood mononuclear cells of cancer patients. Investigations also examine adjuvant therapeutic strategies for treating malignant glioma by gamma radiation in combination with newer anti-angiogenic inhibitors. Other research studies examine the role of Curcumin in blocking p53 in the reduction of severity of gamma-irradiation induced apoptosis of alveolar epithelial cells and modulation of late lung tissue response of pneumonitis or fibrosis brought about by high doses of throracic irradiation by the oral supplemenation with 3'-3' diselenodipropionic acid (DSePA), evaluation of novel and low cost formulation of chemotherapeutic drugs in mouse models, evaluation of a mucosal nanoparticle-in-gel system for regional delivery of radio-sensitizing agents in an oral cancer xenograft, evaluation of nanobubble mediated enhancement in the efficacy of liposomal formulation in orthotropic breast cancer xenograft model in the presence of ultrasound, and evaluation of local drug concentration and therapeutic efficacy of Temozolomide loaded novel lipid nanovesicles in orthotopic mouse models of GBM after intranasal instillation.

#### Education

The senior faculty of this group accepted three trainees during 2017, one for Master's dissertation and two for research experience.

**Dr. Seema Kembhavi** Officer-in-Charge

## **Radiodiagnosis Department**

Medical Officer Dr. Amit Kumar Janu



#### **Overview**

The department is equipped to provide all the diagnostic imaging services required at ACTREC. These include: computed radiography (CR), ultrasonography (USG), color Doppler, computed tomography (CT), magnetic resonance imaging (MRI), mammography (MG) and interventional radiology (IR). The CT services are shared between PET-CT, RT and diagnostic department. In the MRI service, routine MR imaging of the brain, paranasal sinuses, neck, whole spine, abdomen, pelvis, and all joints/ extremities scanning are carried out. In addition, advanced MR imaging including perfusion imaging, diffusion weighted imaging, MR angiography, diffusion tractography (diffusion tensor imaging) and functional MR imaging are also carried out. MRI scans are also performed 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 Interventional Radiology procedures are being successfully managed, with a steady increase in the spectrum and number of cases during 2017 at the ACTREC Interventional Radiology Suite. Emergency services such as urgent x rays, sonography, Doppler studies and CT are available round the clock. Besides these, USG, CT and MRI examination of animals is also done as a part of approved animal research projects.

#### Service

During the report period, the group performed 2449 CR procedures (1971 routine/ 478 portable; average 204 X-rays/ month), 1373 USGs (average 114 scans/month), 2315 diagnostic CT scans (average 192 patients/month), 1344 RT planning CT scans (average 112 patients/month), 3389 MRIs (average 282 patients/month) and 792 MGs (average 66 patients/month). The department also performed 2023 IR procedures (average 168 patients/month).

#### Research

The departmental faculty members are involved in clinical research projects as PIs and also nurture the research of other clinical colleagues by providing support in imaging services. For example, the members designed a flow chart for assigning an assessment category to the mammographic findings of a mass and tested its PPV and reliability index.

#### Education

The Officer-in-Charge and other members of the department participated and presented their research findings at several national/ international conferences in 2017.



#### **Dr. Aliasgar Moiyadi** Officer-in-Charge

Surgical Oncologists Dr. Vani Parmar, Dr. MS Qureshi, Dr. Vinay Shankhdhar, Dr. Deepa Nair, Dr. Sudhir Nair, Dr. Prakash Shetty

Neurophysiologist Dr. Parthiban Velayutham

# **Surgical Oncology Department**



## **Overview**

The department of Surgical Oncology has been providing continued care to a wide range of cancer patients. This includes in-patient care as well as regular outpatient followup clinics. The service runs four regular operating theatres five days a week. The department also conducts regular OPDs (newly registered as well as pre- and postoperative care and follow-up OPDs). Breast surgical services is fully established at ACTREC with regular OPDs 5 days a week and offers advanced surgical procedures including oncoplasty, reconstruction, reduction mammoplasty and implant surgery with postoperative in-house physiotherapy and rehabilitation. 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 cancer offered one-stop at ACTREC. The neurosurgical services offer intra-operative neurophysiologic monitoring and image guided surgeries, which help to perform safer surgeries in patients with tumors in eloquent areas. The brain mapping and monitoring facilities are not available at many leading centres in the country. Minimally invasive



Figure: DMG wise data about Surgeries at ACTREC

laparoscopic GI surgery has been consolidated during the year and is being implemented regularly with plans for further expansion. More complex surgeries like exentration have been performed over the year

## Service

Over 1600 major procedures have been performed in 2017. This includes major surgeries in pediatrics (28), head-neck (459), breast (591), gastro-intestinal (285), gynecology (29), urology (65) and neurosurgery (107). The OTs at ACTREC were partially closed since mid-2017, and are in the process of renovation and capacity augmentation.

## Research

Faculty members of the department at ACTREC 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-B and BARC.

## **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 2017.

**Dr. Shashank Ojha** Officer-in-Charge

Scientific Officer Mrs. Manda Kamble Blood Bank Officer Dr. Minal Poojary

# **Transfusion Medicine Department**



## **Overview**

The department of Transfusion Medicine (DTM) consistently strives 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.

## Service

DTM provides the following services: blood donation and apheresis, red cell serology, blood component preparation, TTI testing, storage and issue. Specialized services include peripheral blood stem cell (PBSC) harvest, cryopreservation and storage, leukodepletion and gamma irradiation of blood for bone marrow transplantation (BMT) patients. During the period January to December 2017, DTM collected a total of 2108 blood units, prepared 3949 blood components, and



Figure: DTM data - 2017

issued 3817 blood components (figure). In addition, 989 plateletpheresis and 121 leukapheresis (83 PBSC and 38 granulocyte concentrates) procedures were performed. Under specialized blood components requirement, 1512 units were leucodepleted and 1875 gamma irradiated. Blood grouping and cross-matching was done on 4492 and 5234 samples respectively (figure). The department also organized 35 outdoor blood donation camps and three platelet donation awareness camps.

## Research

Departmental faculty members are involved in four on-going projects in collaboration with other departments at ACTREC and TMH. These include: analysis of transfusion practices in hematopoietic stem cell transplant patients (PI, Dr Shashank Ojha), a preclinical study to evaluate the efficacy of scfv-CD28-CD3 $\zeta$  CAR T-Cells manufactured from healthy volunteers and patients with relapsed/ refractory acute lymphoblastic leukemia in *ex vivo* setting and determination of select biochemical reference intervals in Indian voluntary blood donors (Co-Is, Dr Shashank Ojha, Dr Minal Poojary).

## **Education**

The department imparted training in PBSC harvest and other transplant-related activities to eight MD students from other centres as a part of their curriculum. Nine doctors and one technologist from other hospitals underwent training in plateletpheresis and PBSC harvest. Faculty and staff members presented scientific papers at five 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)

#### **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
- 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. Narendra Joshi\*
- 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. Milind Vaidya\*
- Dr. Ashok Varma
- Dr. Prasanna Venkatraman
- Dr. Sanjeev Waghmare
- Dr. Ujjwala Warawdekar

Principal Investigators (PIs) are shown in bold

\*superannuated during 2017

## **Cancer Cell Biology Group**

Dr. Tanuja Teni Principal Investigator



## **Overview**

This group aims at gaining insights into the molecular basis of oral tumorigenesis. Since p53 and p63 are frequently altered in oral cancers, on-going studies aim at identifying the differential interacting partners of mutant p53 versus wild type (WT) p53. The regulation and identification of  $\Delta$ Np63 binding sites on survivin, activin A and Notch promoters are under study. The current studies of p53 target genes - Mcl-1 and CLU assess the role of Mcl-1 in DNA damage repair (DDR), autophagy and mitochondrial homeostasis and of CLU in nucleolus and centrosome maintenance. The contribution of TCTP and Moesin to radioresistance in oral cancers and the underlying mechanisms involved are also being examined.

#### Research

TP53 is a tumor suppressor gene frequently (>50%) mutated in human cancers including oral cancers. Mutation analysis of p53 gene in AW8507 and AW13516 oral cancer cell lines revealed hot-spot missense mutation at codon R273 while SCC-40 showed deletion of exon 2, 3 and 4. Studies to overexpress WT/ mutant p53 in p53-deficient oral cancer cell lines and identify the differential interactome of mutant p53 and WT p53 are on-going. Knockdown of  $\Delta$ Np63 reduced the levels of EMT transcription factors - Slug and Twist-1, and the migratory capacity of AW8507 tongue cancer cells, however the levels of Snail were increased. Studies to decipher the  $\Delta$ Np63 pathway via activin  $\beta$  A and of the factors contributing to migration of oral cancer cells are ongoing. Elevated p63 protein expression was noted in well and moderately differentiated tumors (p<0.05) in oral cancer patients. Radiation induced autophagy was pro survival in oral cancer cell lines and positively correlated with the increased expression of Mcl-1. Mcl-1 co-localized with yH2A.X foci in the nucleus, implying a possible role in DNA damage repair response. CLU protein localized to the nucleolus during interphase and

to the centrosome when arrested at M-phase, indicating its possible role in centrosome maintenance; this aspect is presently under investigation. SiRNA based knockdown of TCTP and Moesin exhibited radio-sensitization of radioresistant oral cancer cells in the clonogenic assay. A significant correlation of high TCTP expression with poor disease free survival (p<0.05) and overall survival (p<0.05) was observed in 50 oral cancer patients studied.

## **Education**

The Principal Investigator is a recognized guide for the Ph.D. degree in Life Sciences of the Homi Bhabha National Institute. Presently six doctoral students - Ms. Rajashree Kadam, Ms. Dhanashree Mundhe, Mr. Abhay Uthale, Ms. Dipti Sharma, Mr. Swapnil Oak and Ms. Alekhya Kilambi, are working on their thesis. The group accepted nine trainees this year – two for the Masters dissertation, four for research experience, two as summer trainees and one as observer. Besides these, five and seven students from two dental colleges were assigned to the lab as observers for three and two days each. Group members also participate in an in-house weekly program of data presentations and journal club every week. Faculty and students of the group attended various local/ national conferences and presented their research findings as oral or poster presentations.

**Dr. Sorab Dalal** Principal Investigator

## **Cancer Cell Biology Group**

#### **Overview**

The two major areas of research of this group are the regulation of cellular pathways by 14-3-3-proteins and the mechanisms underlying how loss of desmosome function lead to neoplastic progression. Recent work has identified additional mechanisms underlying desmosome bio-synthesis, demonstrating that the formation of a desmosome is a highly regulated process. Further studies have identified mechanisms by which 14-3-3-ligand complexes form and dissociate, and have shown how this mechanism regulates centrosome duplication. Increased levels of 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 tumors of the colorectal cavity.

#### Research

Previous work had demonstrated that loss of 14-3-3  $\epsilon$  and 14-3-3 y resulted in an increase in centrosome duplication. In collaboration with Dr. Prasanna, a novel process has been identified by which 14-3-3 ligand complexes are regulated, and the mechanism by which this process regulates centrosome duplication has been unraveled. It is also seen that, though loss of both 14-3-3 $\epsilon$  and 14-3-3 $\gamma$  lead to an increase in centrosome duplication, it has very different consequences for cellular transformation; the reasons for this difference are presently being explored. Epithelial cells contain multiple cell-cell junctions that regulate tissue morphogenesis and also allow communication between different cells in a tissue. One major junction that is required for epithelial cell function is the desmosome, and loss of desmosomal proteins is often observed in metastasizing tumor cells. Previous findings have demonstrated that the initiation of desmosome formation is dependent on the plaque protein - plakophilin3, that loss of plakophilin3 leads to increased neoplastic progression, metastasis, and also interestingly to chemo and radio resistance. The increase in



radio and chemo resistance observed upon Plakophilin 3 loss is found to be dependent on the expression of the siderophore binding protein LCN2, both *in vitro* and *in vivo*. In addition, the work on tumor samples from patients with colon cancer reveals that over 60% of the patients show increased LCN2 expression. The group plans to extend this study to rectal cancer patients to determine whether patients that do not respond to chemo or radiotherapy have high LCN2 expression, which would establish LCN2 as a marker for predicting response to chemo and radio therapy and as a target for therapeutic intervention.

#### Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute, and seven students (Ms. Sonali Vishal, Ms. Arunabha Bose, Ms. Sarika Tilwani, Ms. Nazia Chaudhary, Mr. Amol Lonare, Ms. Monika Jaiswal and Ms. Bhagya Shree) are presently working on their doctoral thesis. Under the training program, 11 trainees were accepted this year - six for Master's/ Bachelor's dissertation, four for experience and one as a summer trainee. Group members participate routinely in weekly inhouse seminars and journal club. During 2017, research findings were presented at three conferences/ meetings.

## **Cancer Cell Biology Group**

Dr. Milind Vaidya\* Principal Investigator \*superannuated in July 2017



**Co-Investigator** Mrs. Sharada Sawant

## **Overview**

The research focus of this group is to investigate the functions of keratin, vimentin and their associated proteins in epithelial homeostasis and cancer, and further to use them as biomarkers of oral cancer. Transgenic mice that express K8 wild type and K8 serine 73/ serine 433 mutants in the epidermis have been successfully generated in-house. A nomogram for the prediction of nodal metastasis in node negative oral squamous cell carcinoma (OSCC) patients has also been developed.

## Research

Tandem Mass Tag-based global quantitative phosphoproteomic analysis of K8 wild type and its sitespecific phosphodead and phosphomimic mutants expressed in skin SCC-derived cells reveal differential expression of many phospho proteins. Tissue specific transgenic mice expressing K8 wild type - K8 Ser73 ala phosphomutant and ser431 ala phosphomutant, were developed. Preliminary carcinogenesis study using DMBA protocol revealed that K8 wild type transgenic mice developed tumors much earlier (4-6 weeks) than both the phosphomutants (10-14 weeks). Data shows that plectin and BPAG1e regulate the tumorigenic potential of OSCC cells, possibly through the tumor suppressor gene NDRG1. Further, down regulation of TAp63 in both immortalized and transformed squamous epithelial cells leads to a less differentiated phenotype. Data suggests that alterations in desmosomal assembly set in at early hyperplastic stage and the severity of alterations gradually increases as the disease progresses. A nomogram was constructed on post surgical tumor samples for the prediction of node metastasis in pathologically node negative patients. A new study investigates the prognostic value of keratins, vimentin and their associated proteins, and evaluates postsurgery TPA levels as a prognostic indicator. In all, 332 patients and 50 normal volunteers have been enrolled. TPA analysis has been completed in 108 patients and IHC in 70 tissue samples. TPA levels are being correlated with clinicopathological parameters in oral cancer patients.

## **Education**

The Principal Investigator (PI) is a recognized guide for Ph.D. in Life Sciences of the Homi Bhabha National Institute. Of his three graduate students, Ms. Crismita Dmello and Ms. Richa Tiwari obtained the Ph.D. degree in 2017, while Mr. Pratik Chaudhari submitted his thesis. Training was provided to 10 trainees during 2017 – six with the PI (two for dissertation and four for experience), and four for experience with the Co-Investigator. Besides these, six students from a dental college were assigned as observers for three days. Group members meet regularly for data presentation and journal club. Research findings were presented at one international conference held in India in 2017.

## **Cancer Cell Biology Group – Other Projects**

**Dr. Ujjwala Warawdekar** Scientific Officer 'F'



## **Overview**

The research focus of Dr. Warawdekar is to understand minimal residual disease (MRD) in solid tumors to assist in evaluating the efficacy of therapy and disease prognosis. Assessment of circulating tumour cells (CTCs) from the peripheral blood of patients diagnosed with cancer is emerging as a valuable biomarker for prognostication and tailoring therapy. CTCs can be defined as a population of cells that has escaped into circulation by cell shedding either due to increased tumor burden or the aggressive nature of the primary tumor. The accuracy of prediction of disease prognosis can be facilitated with robust markers, and numerous clinical studies have provided evidence that circulating tumor cells in peripheral blood are an important prognostic marker for cancer. Some studies demonstrate the presence of CTCs in the peripheral blood of patients and their association with tumor progression and metastasis, while others show that a change in CTC number predicts response to therapy and can be used to evaluate residual disease. Attempts at in vitro CTC culture and CTC xenograft models for personalized cancer medicine are recent developments.

#### Research

The prognosis of cancer patients is largely determined by the blood borne dissemination of tumor cells from the primary site to distant organs like bone and lung, and their

subsequent proliferation in the new microenvironment. Ongoing studies in breast cancer include: (a) use of progesterone as an intervention prior to surgery and analysis of variations in the levels of CTCs during surgery and their molecular characterization, and (b) CTC culture from treatment naïve patients with either metastatic or locally advanced breast cancer, using two methodologies exploiting tumor cell size and cell surface antigen expression. Tumor heterogeneity and a metastatic setting can, in some tumor cells, lead to lowered expression of EpCAM, a common epithelial cell surface antigen. Such CTCs (EpCAM or CD45 - - CTCs) have been isolated and imaged using staining techniques to identify characteristics of cellular organelles as well as specific markers. Tumor core biopsies are being assessed for various markers using IHC and expression analysis to examine similarities or differences between the CTCs and the primary tumor. A clinical correlation of CTC-biopsy analysis, patient characteristics and the outcome of therapy could help understand, define and design future treatment strategy.

#### Education

The faculty participated in one international and one national conference in 2017. Five trainees were accepted during the year - three for Master's dissertation and two for research experience.

# Cancer Genetics, Epigenetics & Genomics Group

Dr. Neelam Shirsat Principal Investigator



## **Overview**

Molecular classification of 293 medulloblastomas was carried out using an in-house developed microRNA based real time RT-PCR assay. The Indian cohort shows distinct features like higher proportion of the WNT subgroup patients, higher male: female ratio and lower incidence of group 4 in adult patients. The real time RT-PCR assay has been introduced into routine clinical practice for molecular classification at the Tata Memorial Hospital. A clinical trial is on-going for the WNT subgroup of medulloblastomas in pediatric patients, which could indicate if radiation related side effects can be minimized in this group, as their survival rates are expected to be excellent. Studies on the functional role of several differentially expressed microRNAs suggest the role of autophagy in pathogenesis of medulloblastoma. Autophagy inhibition in combination with HDAC inhibitors has potential in the therapy of medulloblastoma.

## Research

Medulloblastoma is a single most common, highly malignant brain tumor in children. Till date the group has done molecular classification of 293 medulloblastoma tumor tissues has been done into four subgroups - WNT, SHH, group 3, and group 4, using a real time RT-PCR assay that is based on differential microRNA profile. Distinctive features of the Indian cohort compared to those in the west are higher male: female ratio (12:1), much lower incidence (10% vs ~ 30%) of adults in group 4, and overall higher incidence (17%) and higher representation (21%) of the WNT tumors in adults. Differential microRNA expression in the four molecular subgroups reported earlier is also validated in the extended cohort. In another study, the functional role of various differentially expressed microRNAs in medulloblastoma pathogenesis is being examined by expressing them in at least 3 medulloblastoma cell lines. Restoration of miR-30a expression led to inhibition of growth, clonogenic potential and tumorigenicity of medulloblastoma cells. Low miR-204 expression in group

3/ group 4 medulloblastomas was associated with higher incidence of metastasis (57.6%) and poor overall survival (hazard ratio = 4.3, p < 0.0001), consistent with the effects of miR-204 expression on invasion potential and radiation sensitivity. MiR-204 expression inhibited autophagy which is primarily responsible for inhibition of invasion potential. MiR-204 is a valuable marker for risk stratification with therapeutic potential in medulloblastoma. Role of autophagy inhibition in the tumor suppressive activity of miR-204 and miR-30a suggests that autophagy inhibitors could reduce metastatic potential and increase the efficacy of therapy in medulloblastoma.

## **Education**

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences of the Homi Bhabha National Institute. In 2017, one of her eight students - Mr. Vijay Padul obtained his doctorate, while Mr. Satishkumar Singh, Ms. Shalaka Masurkar, Ms. Raikamal Paul, Mr. Harish Bharambe, Mr. Akash Deogharkar, Ms. Shweta Gopalakrishnan, and Ms. Purna Bapat worked on their thesis. Students in the group participated in six national and one international conference in 2017. During the year, training was imparted to seven trainees - one for dissertation, five for experience and one as collaborative trainee. Dr. Manoj Mahimkar Principal Investigator Cancer Genetics, Epigenetics & Genomics Group



## **Overview**

This group focusses 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 chemopreventive efficacy of polymeric black tea polyphenols (PBPs) 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 alongside carcinogen treatment significantly decreases the multiplicity of surface tumors and microscopic lung lesions, including adenomas.

## Research

Genomic instability may cause cancer progression through the accumulation of genetic and epigenetic changes. The group addresses two major aspects of oral cancer biology: genomic alterations at the level of copy number across the genome, and identification of genes/ gene clusters underlying these altered genomic loci. 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. Positive correlation has been noted between 11g22 amplification and lymph node metastasis, reduced survival, increased cancer recurrence and poor response to radiotherapy. Functional analysis of genes at the 11q22 locus reveals association of BIRC2 and BIRC3 with lymph node metastasis. The group continued its examination of the chemopreventive efficacy of PBPs from black tea in inhibiting carcinogen induced lung adenomas in A/J mice, which revealed involvement of xenobiotic metabolizing enzyme modulation, decreased DNA adducts (anti-initiation) and inhibition of carcinogen induced inflammation, cellular proliferation and apoptosis induction possibly by modulation of signaling kinases (anti-promotion). The group is currently working on early molecular changes linked to PBP treatment.

#### Education

The Principal Investigator is a recognized guide for Ph.D. in Life Science under the Homi Bhabha National Institute. One of his five graduate students - Ms. Priyanka Bhosale completed her doctorate in 2017, while Ms. Rasika Hudlikar, Ms. Usha Patel, Ms. Mayuri Inchanalkar and Ms. Vaishnavi Nimbalkar are presently engaged in doctoral research. During 2017, nine trainees worked on their Master's dissertation and four for experience; in addition, four students from a Dental College were accepted as observers.

# Cancer Genetics, Epigenetics & Genomics Group

**Dr. Sanjay Gupta** Principal Investigator



## **Overview**

The replacement of canonical histones with histone variants or isoforms, as well as their multiple targeting by posttranslational modifications regulates processes like gene expression, DNA repair, and is thus emerging as a key player in cancer. On-going studies of this group have shown that changes in H2A isoforms and H3 variants, their site-specific post-translational modifi-cations and deposition machineries of histones affect the process of tumorigenesis. The group has also identified 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 of acetylation in the DNA damage response in human cell lines and gastric cancer tissues. Recent developments suggest that these variations can favor cancer development through changes in epigenetic plasticity, by activating or repressing gene expression. Most importantly, the reversal of epigenetic modifiers using specific inhibitors prior to chemo/ radio therapy could lead to better cancer management.

## Research

On-going research demonstrates differential kinetics of histone H3 serine 10 phosphorylation (a post translational modification) in G1 and M phase of the cell cycle, in response to DNA damage induced by ionizing radiation. The group is also working towards understanding epigenetic changes in

acquired radio-resistance and chemoresistance in breast, gastric and liver cancer cells. The findings have demonstrated the importance of global histone H3 acetylation status and histone modifying enzymes - HDAC and HAT, during transformation. Taking in view the translational perspective, the group has already developed a liquid biopsy based 'real time' monitoring method for sub-grouping of patients for HDAC inhibitor treatment. The group has also recently found alterations in histone H2A isoforms and H3 variants in various human cancer cell lines and human tumor samples. On-going research suggests differential tissue, lineage and cancer type specific

expression of histone H2A genes. In chemical carcinogen transformed gastric cells, increased expression of histone genes - HIST2H3C and HIST2H3D, has also been observed. Recently the group has reported that H2A.1 and H3.2 containing nucleosomes are more stable, and are associated with increased cellular proliferation. Also, the cancer epigenome has condensed chromatin organization with aberrant expression profile of tumor suppressors genes compared to normal counterparts. Current focus is on changes in 3' tail of canonical histone mRNAs from stem-loop structure to a poly (A) tail in association with stem-loop binding proteins that may also promote cell transformation.

## **Education**

The Principal Investigator is a mentor for Ph.D. in Life Sciences of the Homi Bhabha National Institute. One of his students -Ms. Divya Reddy was awarded the Ph.D. degree in 2017, and six students - Ms. Asmita Sharda, Mr. Ramchandra Amnekar, Mr. Sanket Shah, Mr. Mudasir Rashid, Ms. Tripti Verma and Mr. Abhiram Natu are working on their doctoral theses. In 2017, the faculty accepted two students for their Master's dissertation, nine students and one post-doc for experience, and one as observer. Group members meet twice a week for in house data presentation, abstract and journal club, and participate in national/ international conferences to present their research findings through invited, oral or poster presentations. **Dr. Amit Dutt** Principal Investigator

# Cancer Genetics, Epigenetics & Genomics Group

#### **Overview**

The goal of this group 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 lung, breast, cervical, gallbladder, head and neck, and other cancers. The major aspect of research involves: (a) Cancer Genomics using computational genomic approaches to uncover somatic genetic alterations in cancers, and development of computational tools such as HPVDetector, TMC-SNPdb, as a resource

for the community; (b) Functional Genomics, where the genome discovery efforts are paired with biochemical and molecular experimental approaches, using tumor derived cell lines and transgenic mouse models; and (c) Pathogen Discovery, wherein the group has developed a computational pipeline to detect pathogens in cancer, and is involved in exploring a possible pathogenic basis for cancer.

## Research

In head and neck cancer, using an in-house developed HPVDetector, the group has established that unlike Caucasian populations, tongue tumors of Indian origin display significantly low HPV infectivity, suggesting an alternative mode underlying the disease. Their study reveals a classical tobacco mutational signature C:G>A:T transversion in 53% tongue cancer patients of Indian origin. Furthermore, the group has established that unlike TCGA HNSCC data set, NOTCH1 is somatically amplified and over expressed in 31% and 37% of early stage TSCC patients, suggesting NOTCH1 as a therapeutic target in tongue cancer. More recently, based on an integrated gene-expression analysis of 253 tongue tumors, the group has identified up regulation of metastasis related pathways and over expression of MMP10 in 48% early stage tongue tumors. Overall, the group presents the first descriptive portrait of somatic alterations underlying the genome of tobacco/ nut chewing HPV-negative early tongue cancer. In gallbladder cancer, 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. In summary, this study implicates ERBB2 as an important therapeutic target in early-stage gallbladder cancer, and presents 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 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. Their 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 in breast cancer.

## Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences of the Homi Bhabha National Institute. Presently eight research scholars – Mr. Mukul Godbole, Ms. Trupti Togar, Mr. Sanket Desai, Mr. Asim Joshi, Mr. Bhasker Dharavath, Ms. Neelima Yadav, Mr. Suhail Ahmad, and Ms. Supriya Hait, are working towards their doctoral thesis. During 2017, the group presented their research findings as invited oral presentations at three international and 17 national meetings, and as 10 poster presentations at national/ international conferences.

# Cancer Genetics, Epigenetics & Genomics Group

**Dr. Rajiv Sarin** Principal Investigator



**Co-Investigator** Dr. Pradnya Kowtal

sequencing or NGS and MLPA followed by haplotyping of carriers of recurrent mutation for diverse syndromes. 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 16. One new founder mutation in mismatch repair genes was identified in a Lynch syndrome family. Whole exome and transcriptome sequencing was done for thyroid cancer and oral

cancer cell lines. Matched tumor and blood samples from medullary thyroid cancer were studied to understand 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. Under the ICGC project, four new oral cancer cell lines were established and characterized, and they are being used for functional studies with stable knockouts that inhibit the arachidonic acid pathway - whose role in head and neck cancers had earlier been identified 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 ICGC cases and correlated with the clinical outcome.

## **Education**

The Principal Investigator (PI) is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. Four doctoral students – Ms Nikhat Khan, Mr Md. Moquitul Haque, Ms. Vasudha Mishra and Ms. Anuja Lipsa are presently working on their thesis. During 2017, the PI provided training to 20 students - eight for Master's dissertation, five for experience, five as summer trainees and two as observers; the Co-Investigator accepted three trainees for dissertation and two for experience. The group has an active weekly academic program for updates in lab work and seminal research paper presentation. Group members participated in an International Conference on Founder Populations held in India in 2017.

## **Overview**

The group 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 through: a) Large cohort of 6000 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 360 osteosarcoma cases/ matched controls enrolled from TMC, and d) International Cancer Genome Consortium (ICGCC) project covering 373 gingivo-buccal squamous cell carcinoma (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 2017, the clinic enrolled 1220 new hereditary cancer families and conducted counseling for ~2000 previously/ newly enrolled families. Follow up counseling and risk management guidance was provided to ~3000 new and previously enrolled families.

## Research

In inherited cancer syndromes, the group performed genetic analyses of mutational hotspot or full gene using Sanger

**Dr. Abhijit De** Principal Investigator

## **Cell & Molecular Imaging Group**



## **Overview**

Imaging of molecular functions provides real-time visualization and quantitative measurement of cellular or physiological processes, thus adding great value towards clinical translation. The mandate of this group is to develop and apply molecular imaging methodologies to test diverse experimental therapeutics in vivo, with the ultimate aim of bench to bedside transition of the concept therapeutics for breast and oral cancers common to India. Using a multidisciplinary approach, the group is also involved in developing cancer nanomedicines.

#### Research

A major focus of the group is to exploit the therapeutic potential of human sodium iodide symporter (hNIS) gene which is over-expressed in a majority of breast cancers (BC) across all subtypes. Transcriptional regulation approaches for modulating NIS expression, especially the use of HDAC inhibitors (HDACi) was found promising in amplifying endogenous NIS expression. However, elevating NIS expression in cancer cells with minimal off-target effect on other cell types is debatable. The research findings of this year showed that differential induction of NIS expression in BC is possible using benzamide class of HDACi over other HDACi candidates, thus bringing the potential of NIS based targeted radio-ablation procedure closer to a future clinical trial. The group is also examining the role of the key stem cell marker protein - EpCAM, which triggers important signaling cascades in radioresistant BC cells after being cleaved by g-secretase - a membrane protease. The group is engaged in a collaborative study to develop synthetic, biocompatible gold nanospheres (Au-NS) for NIR lighttriggered hyperthermia called photothermal therapy. Localized exposure of laser light on palpable tumors with accumulated nano-sized particles yields excellent tumor mass reduction while keeping the surrounding tissue safe. Indian patent applications have been filed on these materials. Furthermore, the group is engaged in molecular imaging sensor development and has made significant advancements this year in validating a STAT3 phosphorylation sensor based on resonance energy transfer (RET) principle to detect STAT3 activation in vivo.

#### **Education**

The Principal Investigator is affiliated with HBNI as a guide for Ph.D. degree in Life Sciences. In 2017, one of his students Ms. Madhura Kelkar was awarded the doctorate, and seven others - Ms. Shalini Dimri, Mr. Arijit Mal, Ms. Maitreyi Rathod, Ms. Sukanya, Mr. Sumit Mishra, Mr. Pranay Dey and Mr. Aaiyas Abdulhamid Mujawar are working towards the Ph.D. degree. The faculty accepted five trainees this year - two students for Master's dissertation, and one each for experience, as summer trainee and as observer. The group members presented their findings in five national/ international conferences/ workshops this year.

## Cell & Molecular Imaging Group

**Dr. Dibyendu Bhattacharyya** Principal Investigator



## **Overview**

The research focus of this group is on intracellular vesicular trafficking, organelle biogenesis and dynamics, and the size control mechanism of organelles. Organelle size and shape are significantly 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 and nucleus. Dedicated vesicle arrival sites to the endoplasmic reticulum (ER) have been discovered (ER arrival sites). How the Golgi cisternal stacks are held together was unknown to cell biologists. The group has identified the role of Golgins in maintaining these exotic stacked structures. 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.

#### Research

At present, the group is investigating several organelles including Golgi, ER, nucleus, nucleolus, and mitochondria. Previously it has been 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 group has also used computational methods for simulating Golgi size regulation. Recently the group has focused on the role of Golgins in maintaining Golgi shape. Using a combination of quantitative light microscopy and electron microscopy, the group has shown that PpImh1, a golgin in budding yeast form y shaped dimeric form. Presently the role of such Golgins in maintenance of Golgi stacking is being investigated. The vital role played by nuclear import in the size control of nucleus and nucleolus of human cells has been discovered earlier. Recently the group has identified several factors that regulate nucleolar and nuclear size in budding yeast. Functional clustering of similar proteins forms dedicated functional sites. A novel site has been discovered on the ER which is vital for the ER arrival of COPI vesicles. The group is presently working on exosome uptake in human cells, organelle dynamics and inter-organelle contact sites in neurons. The group is also optimizing photo changeable fluorescent proteins such as mEOS3 which are essential for super resolution microscopy.

#### Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. Presently, seven Ph.D. students – Ms. Prasanna Iyer, Mr. Bhawik Kumar Jain, Mr. Praveen Marathe, Ms. Sudeshna Roychowdhury, Ms. Naini Chakraborty, Ms. Shreosi Chatterjee, and Ms. Roma Dahara are working on their doctoral dissertation. The group participates in weekly data presentation sessions, and presented their findings at four local/ national conferences in 2017. **Dr. Murali Krishna Chilakapati** Principal Investigator

## **Cell & Molecular Imaging Group**



## **Overview**

Cancer is a leading cause of death accounting for around 8 million cases worldwide. It is predicted that, by the end of 2020, over 10 million people per year would die of cancer globally, with 70% of these deaths in developing countries. The high mortality, mainly due to late detection and recurrences, is ascribed to limitations of conventional diagnostics. Screening and early detection are important tools to achieve decreased morbidity and higher disease-free survival rates. Current 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 examined as candidate adjunct/ alternative approaches. Due to associated advantages, Raman is found to be best suited for non-invasive, online clinical applications. The group is actively pursuing the development of Raman based methods for the: a) development of in vivo/ in situ methods for routine screening and diagnosis, b) development of minimally invasive microspectroscopic 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. Studies on oral cancer reveal that Raman spectroscopy is capable of classifying normal, premalignant and malignant, and can also identify cancer field effects and malignancyrelated changes. The utility of Raman spectroscopy in early identification of recurrence/ second primary has been demonstrated, and validation studies are being carried out. Studies on cell smears (brush biopsies) and sera have enabled the classification of healthy subjects, habitual tobacco users, and oral premalignant subjects. Further studies have been taken up to validate these findings, especially to classify various premalignant conditions and identify recurrence. Further studies using animal models are being pursued on micro tumors attributable to mechanical irritation in control hamster buccal pouch, using Raman, histopathology and molecular markers. Raman mapping of cells and tissue sections is another avenue being used to arrive at an understanding at the organelle or layer level.

#### Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. In 2017, he has three doctoral students - Ms Bhagya Shree, Mr. Siddharth Barua and Ms Reshma Reddy. The lab accepted one trainee for experience this year. Lab members attended one national conference this year to present the research findings.

## Hemato-Oncology Group

**Dr. Rukmini Govekar** Principal Investigator



## **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 tyrosine kinase inhibitors (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 group is interested in understanding the molecular alterations associated with resistance to tyrosine kinase inhibitors in BC. Proteomic and genomic analyses of cell lines representing blast crisis, both sensitive and resistant to TKIs, have been carried out in a bid to identify the molecular alterations underlying resistance. Among the molecular alterations, those which are associated with maximum pathways altered in resistant cells are being investigated for their potential as therapeutic targets.

## 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 labelled and label-free approaches to widen the search and, in all, 319 differentiators belonging to pathways modulated by BCR/ABL were identified. Bioinformatic analysis of differentiators identified the pathways modulated by BCR/ ABL directly or indirectly as DNA synthesis as well as damage and repair, transcription machinery, splicing machinery, translational and protein degradation. The alterations included cytoskeletal modulators, those involved in spindle formation and cytokinesis during mitosis and protein transport. A key differentiator was identified to be a protein which had a direct role in ubiquitin-mediated protein degradation and p21 mediated cell cycle arrest. This protein was also identified as a key differentiator in genomic analysis and found to be lost in resistant cells. In addition to these proteins in the BCR/ABL pathway, those involved in alternate pathways were also identified by comparing imatinib sensitive and -resistant cells. A major metabolic pathway was altered in resistant cells and its role in drug resistance is being investigated. The 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. She presently has four graduate students – Ms. Mythreyi Narasimhan, Mr. Rahul Mojidra, Ms. Aneri Parekh and Ms. Smita Ghorpade-Shelke, who are working towards their doctoral degree. In 2017, five trainees were accepted – four for dissertation and one for experience; in addition, one student doing MCh at TMH served as an observer with the group.

# Hemato-Oncology Group – Other Projects

**Dr. Syed Hasan** Scientific Officer 'D'



#### **Overview**

The focus of this group is on understanding the biology of acute myeloid leukemia (AML) and triple negative breast carcinoma. One of the on-going projects examines the functional consequences of pathogenic missense mutations in hereditary breast cancer using genome editing tools such as CRISPR-Cas9. The effects of small molecule inhibitors on primary patient-derived AML blasts are also under study, along with the determination of anti-tumor activity in patientderived AML xenograft models. A prospective study on the evaluation of various molecular prognostic markers and minimal residual disease to potentiate therapy for AML patients was concluded recently. The group also collaborates with scientists from national/ international laboratories.

#### Research

AML is characterized by the uncontrolled proliferation of functionally immature hematopoietic cells; the disease shows increased incidence in adults. Although effective molecular therapies exist for chronic myeloid leukemia and acute promyelocytic leukemia, no single therapy has been identified to treat the majority of AML patients. Since the majority of AMLs are genetically diverse, development of targeted therapies is a challenge. There is a critical need to develop robust in vitro and animal models to study the complex biological processes associated with developing leukemia. To address these issues, a project on the evaluation

of in vitro effects of novel Aurigene small molecule inhibitors on primary patient-derived AML blasts and determination of anti-tumor activity in patient-derived AML xenograft models has been initiated, in collaboration with Aurigene Drug Discovery and Development Technologies, a biotech based pharma company. Another on-going project examines the miRNA-mRNA regulatory network in AML and the influence of gene mutations on this network. Besides mutations and fusion transcripts, deregulated expression of genes involved in cell proliferation, survival and differentiation (for example BAALC, WT1, MN1 and ERG) have been identified as prognostic markers in AML. The group's findings reveal association between high BAALC and ERG expression, and the clinical outcome. High ERG expression is an independent predictor of shorter disease free survival and overall survival, pointing to the utility of ERG expression as a target to monitor minimal residual disease in AML.

#### Education

Dr. Hasan is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. Presently he has one graduate student - Ms. Tarang Gaur, who is working on her doctoral thesis. One student underwent training for experience in this lab in 2017. Group members participated in weekly journal club and data presentation sessions with the BMT and Hematopathology groups. During 2017, the faculty presented his research findings at one international and three national conferences.

# Protein Biochemistry, Biophysics & Structural Biology Group

**Dr. Prasanna Venkatraman** Principal Investigator



## **Overview**

The group aims to build protein interaction networks using PSMD9 and PSMD10/Gankyrin as central nodes, and to identify vulnerable nodes and edges that can be manipulated in diseases such as cancer. In this regard, Gankyrin-CLIC1 interaction is recognized as one such vulnerable edge and the group is developing strategies to inhibit this interaction. A PSMD9 sub network built from patient data suggests that the protein orchestrates a cell signaling program involved in cytoskeletal changes and cell migration. The group has also found that the domain architecture and fold are intimately linked to defining the interactions of PSMD9. New lines of investigation on the structural constraints that define phosphorylation confirm the earlier prediction about the existence of an expanded 'druggable' genome space.

## Research

The group's examination of the Gankyrin interaction network revealed that the hot spot site interface peptide EEVD seems to interact with the same residues as the full length protein validating the efforts to find inhibitors that can block this interaction. The group is using mass spectrometry to characterize the functions, interactions and regulatory role of PSMD9 and PSMD10. Here, SWATH and iTRAQ based quantitation of deregulated proteins and affinity purification mass spectrometry (AP-MS) followed by gene ontology and pathway enrichment analysis indicate enrichment of splicing machinery, metabolic pathways, and ribosomal machinery. Studies on the role of protein structure and domain stability on PSMD9 interaction have revealed that, among the two domains in PSMD9, the N domain seems to achieve a stable folded structure while the PDZ domain is unstable requiring peptide binding or N-domain interaction. Another interesting finding is the dichotomy of NF $\kappa$ B activation by PSMD9 and PSMD10. PSMD10 over expression leads to faster exclusion of NFkB from the nucleus, resulting in down-regulation of early and late NF $\kappa$ B target genes in the presence of TNF $\alpha$ , including the pro-survival genes that lead to cell death. In the project that examines novel ATPase activity of 14-3-3 proteins, crystallization screens have identified few conditions that provide needle like crystals. The determination of binding and dissociation kinetics of ATP to 14-3-3 is being attempted using SPR. With respect to the PSMD9 subnetwork in cancer, multiple lines of evidence converge on the cytoskeletal and Akt signaling pathway with a role in cell migration.

## **Education**

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. She presently has four students engaged in doctoral research – Mr. Sheikh Burhan Ud Din Farooqee, Ms. Mahalakshmi Harish, Mr. Mukund Sudharsan, Mr. Saim Mulla, and Mr. Joel Christie. Five members of this group participated in an international conference held in ACTREC in 2017. The PI accepted three trainees for dissertation, eight for experience (one of whom was a post doc), and four summer trainees during 2017. **Dr. Ashok Varma** Principal Investigator Protein Biochemistry, Biophysics & Structural Biology Group



#### **Overview**

The group 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 has been characterized. Furthermore, a set of proteomics based predictive and prognostic biomarkers in head and neck squamous cell carcinomas (HNSCC) treated with radiotherapy has been explored. On-going national and international collaborative projects are being undertaken on proteins including BRCA, CStF, FANCI, and MAPK.

#### Research

One of the mandates of this group is translational research. The group is engaged in the crystallization of different functional domains of BRCA1/2, MAPK, Fanconi proteins, and PML-RARA. The group is also focusing on proteomics based biomarker discovery. Different functional domains of BRCA1 with cellular partners have been crystallized. Protein-protein interactions important for domains motions of BARD1 have been evaluated. Furthermore, mutations identified in BRCA1/ 2 and FANCI-FANCD2 have been explored for their pathogenicity. Atomic model and amino acids involved in Fanconi anemia pathway have been examined using a multidisciplinary approach, to unravel the DNA inter-strand crosslink repair mechanisms. The group is focusing on structure determination of different domains of BRCA1/2 and its associated cellular partners. The secondary/ tertiary structures and thermal stability of wild type protein and mutants are being assessed by circular dichroism and fluorescence spectroscopy. Furthermore, binding affinity with cellular partners has been identified using surface plasmon resonance. In the proteomics based biomarker discovery program, different pools of serum proteins have been explored for their quantitative expression, and correlated with the clinical data. Different proteins have been identified in HNSCC treated with radiotherapy, whose utility as predictive/ prognostic biomarkers is being examined.

#### Education

The Principal Investigator is a recognized guide for Ph.D. in Life Sciences under the Homi Bhabha National Institute. In 2017 one of his seven students, Mr. Md. Quadir Siddiqui was awarded the Ph.D. degree, and Mr. Pankaj Thapa, Ms. Suchita Dubey, Ms. Lipi Das, Ms. Kuheli Banerjee, Mr. Mudassar Ali Khan, and Ms. Neha Mishra are presently conducting doctoral research. The PI organized two training workshops targeting faculty and research scholars of the North-East region and other parts of the country. The faculty accepted five trainees for dissertation projects, four for experience and four on collaborative projects in 2017 and attended one international conference to present the research findings this year.

# Protein Biochemistry, Biophysics & Structural Biology Group

Dr. Kakoli Bose Principal Investigator



## **Overview**

The research focus of this group is on the study of macromolecules involved in the apoptotic pathway, and their implications in normal cellular functions and pathogenesis. The group works on the high temperature requirement family of serine proteases (HtrA), the interaction between 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 2017 include elucidation 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 seven graduate students - Ms. Saujanya Acharya, Mr. Ajay Wagh, Mr. K. Raghupati, Ms. Rashmi Puja, Ms. Aasna Parui, Ms. Sucheta Chopra and Ms. Rucha Kulkarni, are working on their doctoral dissertation. Fourteen trainees were taken up during 2017 - 11 for Master's dissertation and three for experience. Lab members meet once a week for data presentation and journal club. Dr. Bose organized an Indo-US conference on Advances in Enzymology in January 2017. The faculty and students presented their research findings at two international conferences/ meetings (one in Canada and the other in ACTREC).

Dr. Sanjeev Waghmare Principal Investigator Stem Cell Biology & Cell Signalling Group



## **Overview**

The focus of this group is on delineating the molecular and cellular mechanisms that control adult stem cells and cancer stem-like regulation in human epithelial cancers. Developmental signaling pathways such as Wnt/Notch/Sonichedgehog and others regulate stem-cell renewal and differentiation of stem cells. The group is investigating these aspects using skin model and human epithelial cancers such as head and neck cancer as experimental models.

#### Research

In experimental studies, mice over expressing sPLA2-IIA (K14sPLA2-IIA) showed enlargement of interfollicular epidermis and sebaceous gland. The findings have for the first time revealed depletion of hair follicle stem cells pool with age mediated through enhanced activation of c-Jun. In addition, the sPLA2-IIA over expressing homozygous mice showed pronounced depletion of stem cells along with cyclic alopecia (hair loss) mediated through aberrant hair shafts and matrix cells differentiation. Down regulation of SFRP1, a Wnt inhibitor is seen in various human cancers such as breast, cervix, etc. The group's findings revealed that loss of Sfrp1 leads to increased sensitivity to chemical carcinogenesis in skin with an increased formation of tumors by four weeks in Sfrp1 knock out mice, as compared to wild type. Moreover, the cancer stem cells isolated from the Sfrp1 knock out tumors showed a higher tumorigenic potential. The group has isolated CD44+/ALDH+ cancer stem cells (CSCs) from oral cancer cell lines and characterized them *in vitro* and *in vivo*. Expression profiling revealed that there is a deregulation in the Wnt signaling pathway in these CSCs. Further studies could discern the molecular mechanism underlying their maintenance. More importantly, the molecular signatures obtained will be utilized to stratify chemotherapy responders and non-responders, which could have future clinical implications.

#### Education

The Principal Investigator is recognized as a guide for the Ph.D. degree in Life Sciences under the Homi Bhabha National Institute. In 2017, one of his graduate students - Mr. Rahul Sarate, was awarded the PhD degree, and five students - Mr. Gopal Chovatiya, Mr. Raghava Reddy Sunkara, Mr. Sushant Navrange, Ms. Sayoni Roy and Ms. Bidita Bagchi were working on their doctoral dissertation. The PI accepted two trainees for the Master's dissertation, three for experience and one as observer during the year. The group engages in weekly inhouse presentations and journal club. The PI and one of his students presented their research findings at an international conference in Italy in May 2017.

# Stem Cell Biology & Cell Signalling Group

Dr. Shilpee Dutt Principal Investigator



## **Overview**

This group is working towards understanding the molecular mechanisms that govern radiation and chemo resistance in cancer using glioblastoma (GBM) and leukemia as model systems. For these studies, 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 that are relevant to resistance, which would provide the critical information necessary for therapeutic intervention.

#### Research

The group has recapitulated the clinical scenario of glioma resistance in a cellular model developed from fresh, naïve primary tumors from GBM patients and in preclinical orthotopic mouse model developed by intracranial injections of luciferase labeled glioblastoma cells. Analogous to patients, the cultures and mice were subjected to therapy regimen of radiation and temozolomide. These models permit the capture of inherently resistant residual (RR) cells and further to understand their survival mechanisms. Mechanistically, the group has demonstrated that, following radiation, RR cells upregulate p21, DUSP5/6 and Cdk1 (Y15) leading to cell cycle arrest and homotypic cell fusions forming multinucleated and giant cells (MNGCs). Interestingly, fusion induces senescence in MNGCs. However, the MNGCs reverse the senescence, overcome mitotic catastrophe and resume growth forming aggressive recurrent tumor. MNGCs survival

could be mediated by over expression of SETMAR that demethylates H3K36, inducing euchromatisation that in turn facilitates Ku80 recruitment at DNA double strand breaks and preferentially activates the NHEJ repair pathway. Knockdown of SETMAR in RR cells significantly reduces H3K36me2 and Ku80 recruitment leading to irreversible senescence. Whereas H3.3K36A mutation or pharmacological inhibition of NHEJ repair pathway results in apoptosis of RR cells in vitro and in vivo. This is the first report demonstrating the existence and capture of residual resistant cells of GBM, which are virtually inaccessible in patients. Furthermore, the group has identified

homotypic cell fusions as novel non-genetic mechanism used by RR cells to sustain survival, and SETMAR and NHEJ pathway as molecular targets for selective elimination of these cells, thus preventing relapse in GBM. In leukemia, using the cellular models, the group has found the dependency of early drug resistant cells on DNA double strand break repair (DSBR) - the first drug resistance mechanism acquired during the onset of resistance in leukemia. Mechanistically, it has been shown to be achieved by modulation of ATM activity by up regulated GCN5 in MRD-positive AML patients, and it correlates significantly with poor survival of patients. However, at later stages of resistance, these cells evolve to acquire multiple bona fide mechanisms of drug resistance. Accordingly, it has been demonstrated that clinical utility of ATM kinase and GCN5 inhibitors in effectively eliminating leukemic resistant cells is only when used during early but not late stages of drug resistance.

#### Education

The Principal Investigator is recognized as a PhD Life Sciences guide of the Homi Bhabha National Institute. Presently she has eight research scholars – Mr. Sameer Salunkhe, Ms. Jacinth Rajendra, Ms. Jyothi Nair, Ms. Anagha Acharekar, Mr. Saket Vatsa Mishra, Ms. Poorvaja Muley, Ms. Shraddha Thakkar, and Ms. Tejashree Mahaddalkar. Nine trainees were accepted during the year – five for dissertation, three for experience and one as summer trainee. The group conducts regular in-house data presentation and journal club sessions. During the year, the PI and students attended 14 conferences, and made eight oral and six poster presentations. **Dr. Pritha Ray** Principal Investigator Stem Cell Biology & Cell Signalling Group



## **Overview**

The research findings of the group in 2017 have 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. The innovative role of IGF-1R as a prognostic factor was found in a small cohort of high grade serous ovarian carcinoma (HGSOC) patients. Additionally, mechanobiological properties associated with migratory behavior of chemoresistant cancer cells were investigated in a collaborative study with IIT-B.

#### Research

Using a transcription factor-promoter DNA pull down assay, the group has identified NF- $\kappa$ B as a critical positive regulator of PI3KCA-Akt signaling, which leads to maintenance and renewal of cancer stem cell fraction in cisplatin treated platinum resistant cells. This finding indicates the subtle deleterious effect exerted by repeated exposure of cisplatin in cancer tissues. 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, role of autophagy in chemoresistance initiation, and the degree of Notch signaling activation in EOC subtypes and its role in stroma-cancer cell cross talk. Identification of a cooperative role of FOXO3A and RUNX1 in IGF1R transcriptional regulation in the early phase of resistance development led the PI to propose a mechanistic model of IGF1R modulation during the development of chemoresistance in ovarian cancer cells (Figure). The group has also identified a novel peptide binder to cisplatin resistant cells by screening phage peptide display library. In a 3-year long prospective study, the innovative role of IGF-1R as a prognostic factor was detected in a small cohort of Indian patients suffering from advanced stage HGSOC. The findings of an exciting collaborative study on the mechanobiological properties of chemoresistant cells revealed that, irrespective of nature of drug, chemoresistant cells are more contractile and softer than chemosensitive cells, and Myosin IIA and IIB are critical molecules in driving contractility and proteolytic activity.

#### Education

The Principal Investigator is recognized as a PhD Life Sciences guide of the Homi Bhabha National Institute. One of her graduate students, Mr. Bhushan Thakur successfully defended his thesis in 2017, and five students – Mr. Ajit Dhadve, Mr. Aniketh Bishnu, Mr. Abhilash Deo, Mr. Souvik Mukherjee and Ms. Sakshi Sharma are working towards their Ph.D. degree. During the year, six trainees were taken up – three 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.


Figure: Mechanistic insight of transcriptional regulation of IGF1R expression during development of chemoresistance (early & late phase) in ovarian cancer cells

**Dr. ShubhadaChiplunkar** Principal Investigator

## Tumor Immunology Group

**Co-Investigator** Dr. Jyoti Kode

### **Overview**

This group focuses on understanding the reasons for immune dysfunction in cancer patients and on the development of immunotherapy for cancer. The mechanism that regulates tumor directed cytotoxicity of gamma delta T cells ( $\gamma\delta$  T cells) were investigated. The histone acetylation/ methylation of the promoter region of perforin and granzyme B, Notch and TCR signaling, and presence of regulatory T cells and myeloid derived suppressor cells were shown to modulate the antitumor functions of  $\gamma\delta$  T cells. The pro

tumor subset - Ty $\delta$ 17 cells were found to be increased in hypoxic conditions. Mesenchymal stem cells (MSC) from oral tumors contributed to immune evasion while AML MSC supported survival of AML blasts and contributed to chemoresistance.

## Research

In human  $\gamma\delta T$  cells, effector genes perforin and granzyme B were epigenetically regulated by histone acetylation and histone methylation of their promoter regions. In colorectal cancer  $\gamma\delta$  T cells, CD4 and CD8 T cells were severely exhausted with increased expression of inhibitory receptors in the tumor environment. Accumulation of regulatory T cells and MDSCs highlights the strategy adopted by tumor cells to escape immunosurveillance. Ty $\delta$ 17 cells were found to be increased in hypoxia, and PDL1 expressing  $\gamma\delta T$  cells induced cell death in PD1 expressing CD8+ T cells in a hypoxic microenvironment. Oral tumor-derived mesenchymal stem cells (MSC) were found to contribute to immune evasion by affecting the proliferation of lymphocytes in a dose dependent manner, and induced the expansion of regulatory T cells. MSC isolated from acute myeloid leukemia (AML) bone marrow were found to support AML blast survival through the transfer of mitochondria and MSC bodies/ exosomes. AML MSC exhibited distinct gene expression profiles compared to those seen in normal MSC, contributing to the chemoresistance observed in AML. CD26 expression on mobilized PBSC harvest from allograft transplant donors demonstrated significant negative correlation with GvHD and viral reactivation suggesting that CD26 expression may serve as potential predictors of risk of developing aGvHD and



infection post - stem cell transplant. The hexane fraction of marine mollusk Turbo brunneus extract caused increased percentages of T<sub>reg</sub> and CD8<sup>+</sup> IFN- $\gamma$  cells, with a marked decrease in pro-osteoclastic cytokines IL6 and TNF- $\alpha$  in ovariectomized (OVX) mice indicating its role in the reversal of bone loss in OVX mice. This observation highlights the significant role of the hexane fraction of Turbo brunneus extract in the reversal of bone loss in OVX mice loss in OVX mice. A randomized parallel group clinical trial on the effectiveness of ayurvedic medicines in reducing the adverse effects of radiotherapy in oral and breast cancer patients has been initiated, and systemic immune response is being assessed in these patients.

## Education

The Principal Investigator (PI) and the Co-Investigator (Co-I) are recognized PhD Life Sciences guides of the Homi Bhabha National Institute. During 2017, the PI's graduate student Ms. Gauri Mirji obtained her Ph.D. degree while Mr. Sajad Bhat and Ms. Shalini KS continued working on their Ph.D. dissertation. The Co-I has two graduate students - Ms. Shruti Kandekar and Ms. Manasi Nagare who are working on their Ph.D. dissertation. During 2017, the PI accepted two students for dissertation and four for experience - including Ms. Tankeu Nzufo Francine from Cameroon under a fellowship from the Centre for Science and Technology of the Non-aligned and other Development Countries (NAM S&T Centre); the Co-I accepted one trainee for experience. Group members participated in two international and 20 national conferences during 2017.

# Tumor Immunology Group – Other Projects



Dr. Narendra Joshi\* Scientific Officer 'F' \*superannuated in May 2017

## **Overview**

Study of immunogenetic and phenotypic aspects of IL17 expression in breast tumors was pursued with acquisition and processing of normal and tumor specimens from breast cancer patients. Alongside this, a manuscript describing the validation and identification of housekeeping genes for studies in head and neck cancers was prepared.

## Research

Paired breast-tumor and normal tissue specimens were procured from the tumor tissue repository of the Tata Memorial Hospital, and they were examined for quality in terms of tumor cell content. The analysis of IL17 gene associated SNPs using DNA from normal tissues and expression of IL17A, IL17F and relevant pathway related genes was carried out using corresponding tumor derived RNA (cDNA) for specimens from two hundred patients that qualified for analyses.

# **CRI Research Support Facilities**

## CRI - Lab 1

**Dr. Sonam Mehrotra** Wellcome DBT – IA Intermediate Fellow



## **Overview**

Dr. Mehrota focusses on investigating the role of the 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 (HR) mediated DNA repair, such as BRCA2 and RAD51, are involved in the response to replication-stress where their functions are mechanistically different from their roles during HR-dependent DNA repair. The roles of many other repair proteins during replication stress response remain poorly understood. This knowledge will be etiologically important for BCCIP deficient cancers.

## Research

In a bid to investigate the role of BCCIP in replication stress response, the role of BCCIP in regulation of Rad51 and BRCA2 functions at stalled replication forks is under study. For this purpose, genome wide perturbations of replication at the single molecule level are monitored after treatment with replication inhibitors (such as hydroxyurea) in wild type and BCCIP deficient cells by DNA fibre analysis. Transient BCCIP knock down has been achieved using siRNA mediated RNAi. Initial findings from the group reveal that isoform specific knockdown of BCCIP leads to higher sensitivity to replication stress and defects in recovery of stalled replication forks.

## Education

In 2017, Dr. Mehrotra attended three conferences and, jointly with Dr. Kakoli Bose, organized the ACTREC Monsoon Retreat on 5<sup>th</sup> October 2017. She accepted one student trainee for Master's dissertation during the year.

# **Anti-Cancer Drug Screening Facility**

**Dr. Jyoti Kode** Officer-in-Charge



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* anti-cancer drug screening assays that have been developed in-house. ACDSF has 53 human tumor cell lines, 10 murine tumor models and 38 xenograft models for carrying out drug screening. During 2017, 1345 compounds were received from 161 clients including eight corporate R&D organizations from 13 states across India. In all, 1287 compounds were tested for their *in vitro* activity and 58 compounds were examined for MTD (n=14) and *in vivo* efficacy assays (n=44). Two new xenografts namely KG-1 (leukemia) and HCC1954 (breast cancer) were developed

during the report year. The facility has successfully completed XII-plan CSIR funded project 'Affordable cancer therapeutics' in collaboration with IICT, Hyderabad (2012-17). Of the second set of 300 compounds, 11 compounds were found to be active against four cancer cell lines (Hep-G2, HT-29, SCC-29B and PLC-Prf-5). Three of these compounds that were most active against oral cancer spheroids (CSC) were further tested for their *in vivo* efficacy against oral cancer xenograft AW13516. Only one of these (AKL-JA) was found to be strongly active against the AW13516 xenograft. Corroborative evidence was obtained through PET-CT imaging of tumor bearing animals and histopathology of tumor sections.

Dr. Ashok Varma Officer-in-Charge

## **Bioinformatics Facility**

Scientific Officer 'E' Mr. Nikhil Gadewal

The Bioinformatics facility of ACTREC provides infrastructural and technical support to scientists, clinicians and research scholars of the Centre to fulfil the bioinformatics requirements of their on-going research projects. Scientists of the Centre also use the facility's infrastructure to explore microarray, next generation sequence data analysis, database development, molecular modelling and data mining for their on-going projects. This facility receives strong funding support from DBT and is established as a BTIS-net centre of this region. It is well equipped with one nVIDIA Tesla GPU workstation, 5 workstations, 1 webserver and seven PCs. The facility also focuses on database development such as Histome: the human infobase; this database is presently being updated. In the domain of gene expression studies, projects related to TGCA database mining and analysis are under progress. *In silico* molecular modelling, dynamics and protein-protein interactions have been performed using BARC's supercomputing facility. The facility hosted a national 28<sup>th</sup> BTISnet Coordinators Meeting on 3<sup>rd</sup> and 4<sup>th</sup> February 2017. The facility also organized its annual 2-day Workshop on 'Basics of Bioinformatics' targeting college teachers and research scholars of institutions in the Mumbai and neighboring areas on 2<sup>nd</sup> and 3<sup>rd</sup> March 2017. The facility staff also provided training to six trainees during the year, three for Bachelor's/ Master's dissertation and three for experience.

# **Biophysics Facility**



**Dr. Kakoli Bose** Scientific Officer 'F'

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, BIAcore T200 for automated surface plasmon resonance (SPR), and MicroCal iTC200 isothermal titration calorimeter (ITC). Along with technically sound instrumentation, the facility also provides expertise to assist users in experimental design and data interpretation, if required. Depending on individual requirements, either an experiment can be 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 2017, besides in-house users, facility services were also used by investigators and students from BARC, Bharathidasan University, Goa University, University of Mumbai, Bharath Serums Pvt Ltd, Premas Biotech Pvt Ltd, etc. **Dr. Poonam Gera** Officer-in-Charge

## **Biorepository**



The ACTREC Biorepository is the custodian of stored biological samples that can be shared, under a tightly regulated and strictly monitored mechanism, with researchers having approved projects that aim to study the biology of cancer, find biomarkers for a more refined molecular classification, or for targeted therapy. In all, tissue samples from 630 cases were accrued in the Biorepository during 2017. As always the majority were head and neck tumors, followed by breast tumors. Other tumor types included neurological, gastrointestinal, genitourinary, gynecological, etc. This year, the collection of bio specimens was extended to the Breast OPD wherein core biopsies are now being cryo preserved for future research; this is in addition to collection from the OTs, Frozen room and Surgical Pathology. Cryopreserved tissue samples (470) were provided to eight Principal Investigators with approved projects under various protocols at the Tata Memorial Centre. In the International Cancer Genome Consortium (ICGC) project, gingivo buccal mucosa tumour and blood samples were collected from 30 patients accrued this year, and their extracted genomic DNA samples were sent to NIBMG, Kalyani for whole genome scan and sequence capture-based flow cell sequencing. The Biorepository itself initiated a project on quality monitoring of in-house cryo preserved tissues. The OIC contributed her Pathology expertise involving the evaluation of Hematoxylin & Eosin as well as immunohistochemistry slides to eight ACTREC projects.

# **Common Facilities**

**Dr. Sanjay Gupta** Officer-in-Charge



The Common Facilities (CF) operates and maintains support 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. In addition, maintenance of all the autoclaves and ovens belonging to different research groups is handled by the CF technicians. All the major equipment under common facility is covered under annual maintenance contract in order to provide safe, sustainable, efficient and reliable facilities. **Mr. Uday Dandekar** Officer-in-Charge

## **Common Instrument Room**



Over the past 40 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 procured on a regular basis and kept in stock in the facility to reduce downtime of the equipment. In all, 94 equipments are currently housed in this facility. During 2017, a multimode microplate reader was procured and installed in the CIR.

# **Digital Imaging Facility**

**Dr. Dibyendu Bhattacharyya** Officer-in-Charge



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 high end 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 confocal platforms listed above, to the ACTREC faculty and students, and also to outsider users.

**Dr. Pradnya Kowtal** Officer-in-Charge

# **DNA Sequencing Facility**



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 and fragment analysis. The average turnaround time to give out data is one working day after receiving samples. During the year 2017, the facility carried out a total of 25,459 reactions of which 13,718 were for sequencing and 11,741 were for fragment analysis. The facility also provided demonstration of Sanger sequencing to students and other visitors.

# **Electron Microscopy Facility**

Mrs. Sharada Sawant Officer-in-Charge



The mandate of the Electron Microscopy facility is to promote, support and initiate research and training in the applications of transmission electron microscopy (TEM). The facility boasts of a JEOL JEM 1400Plus TEM that works at 80-120 kV with 0.2 nm resolution and magnification up to x12,00,000, which is suitable for biological, polymer, nanogold and material science applications. The 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 etc), semi-thin sectioning followed by ultrathin sectioning, staining, scanning and imaging. During 2017, the facility processed EM samples for 11 working groups from ACTREC and 4 working groups from BARC/ Mumbai Colleges. In all, 155 tissue and monolayer cell culture specimens were prepared for araldite/ epon block making, 105 specimens for semi-thin sectioning, 117 specimens for ultrathin sectioning. Moreover, 234 grids were contrasted with uranyl acetate and lead citrate, scanned under EM and over 7000 microphotographs were captured at 120 kV. Besides this, the facility also processed 38 samples for negative staining. Further quantitative analysis of EM images was done using iTEM software for eight working groups. Interpretation of the results on the basis of ultrastructural observations and quantitative analysis was done for all the users. Three-day EM training was provided to two clinicians from TMH. EM demonstration was also provided during facility visits from national/ international visitors. **Dr. Shubhada Chiplunkar** Officer-in-Charge

## **Flow Cytometry Facility**



The Flow Cytometry (FCM) facility is a centralized facility used by scientists/ clinicians from ACTREC for a wide range of research applications including immunophenotyping, multicolor analysis, DNA content and cell cycle analysis, apoptosis and proliferation studies, detection of mitochondrial membrane potential, stem cell analysis - side cell population, dermal stem cell analysis, detection of circulating tumor cells, functional assays like intracellular calcium influx, oxidative burst analysis, intracellular cytokine analysis, cytometric bead array assay for the detection of cytokines, and 4-way live cell and single cell sorting. The facility provides technical expertise in experiment design and data interpretation to researchers whenever required, and also provides training in data analysis. The facility has four flow cytometers: FACSAria-I which is equipped with 3 lasers (407 nm, 488 nm, 633 nm), can perform 11-color analysis and 4 way-sorting, FACSCalibur which is equipped with one laser (488 nm) and can perform 3-color analysis; in 2017, it acquired FACSAria-III which is equipped with 5 lasers (407 nm, 488 nm, 633 nm, 561 nm and UV- 355 nm) which can perform 18 color analysis with 4 way sorting, and Attune NxT which is equipped with 4 lasers (407 nm, 488 nm, 633 nm, 561 nm) and can perform 14 color analysis. The software used for data analysis include FACSDiva, CellQuest Pro, Attune NxT, FlowJo, FCAP Array and Modfit. The facility also offers its services to outside investigators on payment basis. Demonstrations and training were provided to staff and students on request.

# **Histology Facility**

**Dr. Arvind Ingle** Officer-in-Charge



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 2017,

the facility received 3471 tissue samples in fixative and 1231 human tissue paraffin blocks and, after processing, supplied 6869 stained and 17681 unstained slides to 20 research labs. In addition, 3397 tissues were processed for cryo-sectioning, and 1318 H&E stained and 1318 unstained slides were supplied to 12 research labs.

**Dr. Arvind Ingle** Officer-in-Charge

Scientific Officer 'D' Dr. Rahul Thorat

## **Laboratory Animal Facility**



The main objective of the Laboratory Animal facility (LAF) is to breed, maintain and supply laboratory animals to the institute's scientists. During the year 2017, LAF undertook planned breeding of 11 normal strains of mice, 39 Tg KO mice strains, one strain of rat and two hamster strains, and supplied 3835 normal mice, 587 Nude mice, 1641 NOD SCID mice, 297 rats, 53 hamsters and seven rabbit to 25 in-house researchers against 85 IAEC-sanctioned research proposals. Towards quality control, LAF examined 93 stool/ animal samples and 310 food, water, bedding material and room air samples for routine microbiological testing, 353 hair/ stool/ cellophane samples for clinico-pathology, 36 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 34 mice from seven strains, and PCR based tests for 19 microsatellite markers on 26 DNA samples from 13 mouse strains. LAF examined the genotypes of 23 ptch KO mice, and used flow cytometry to assess the T- and B- cell profile in 15 blood samples of Nude/ SCID mice, as also control BALB/c and Swiss mice. As a part of its embryo freezing program, LAF collected 1462 embryos at the 8-cell to morula stage from 228 mice of 17 strains and froze the embryos in 80 cryo-vials under liquid nitrogen. During the report period, LAF also supplied 10204 normal mice, 175 nude mice and 213 SCID mice as breeding nuclei/ experimental animals to 16 CPCSEA registered organizations, and performed genetic and microbiological status testing for three organizations. The senior faculty participated in four local and national conferences/ meetings and one international conference in 2017. The facility accepted six observers during the year.

# Macromolecular Crystallography and X-Ray Diffraction Facility

**Dr. Ashok Varma** Officer-in-Charge



The Macromolecular Crystallography and X-Ray Diffraction facility provides support in crystallization as well as X-ray diffraction data collection of macromolecules such as proteins or protein complexes. Furthermore, the facility also provides training in crystallization, crystal picking and mounting on X-ray diffractometer to scientists and research scholars of ACTREC and those from other national laboratories. The equipment in the facility includes: (1) Crystallization unit: vibration free incubator for setting up the crystallization using hanging and sitting drop vapor diffusion methods, (2) Microscope: to visualize the crystals, (2) Microstar Microfocus Rotating Anode, (3) Integrated computer controller motorized image plate detector, and (4) computers. At present, three research labs of ACTREC (Bose Lab, Prasanna Lab and Varma Lab) are active users of the facility. In 2017, Prasanna lab has collected high resolution data. This year, ~ 15 crystals of different proteins were mounted for X-ray diffraction analysis. **Dr. Rukmini Govekar** Officer-in-Charge

## **Mass Spectrometry Facility**



The Mass Spectrometry facility at ACTREC houses two stateof-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 second one is MALDI-TOF/TOF (Bruker Daltonics, Ultraflex II) equipped with an Agilent 1200 series micro LC system and a spotter (Bruker Daltonics, Proteineer). After achieving skill and experience of various trials and trouble shooting of sample preparation, sample purification, method development techniques, data analysis parameter settings on the nanoLC-ESI-Q-TOF, the Mass Spectrometry team successfully carried out sample analysis and began accepting samples for study from users. Besides profiling 258 complex protein mixtures, 107 samples were analyzed for the identification of enriched proteins. The team also successfully performed label free quantification (SWATH analysis) of 90 complex protein samples. Further, 14 samples were analyzed for i-TRAQ label quantification and 20 samples for PTM determination. Demonstration of MALDI TOF-TOF was conducted as and when required for visiting faculty and students.

# **Molecular Imaging Facility**

**Dr. Abhijit De** Officer-in-Charge



Established in 2013, this facility provides preclinical in vivo molecular imaging services to the ACTREC researchers. Molecular imaging, which provides real-time visualization and quantitative measurement of cellular processes at the molecular/genetic level, adds value for translating the basic research findings to the clinic. Several in house research laboratories are using this facility for cancer therapeutic applications. The facility has also supported researchers from neighboring institutions like IIT-Bombay. Instrumentation in this facility procured through various extramural grants include an IVIS Lumina II and IVIS Spectrum imaging system (both from Perkin Elmer, USA), a data server, two computer terminals to store and analyse imaging data, and additional gas anesthesia systems for optimal operation and use of 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. Salient features of these systems 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. The filters can distinguish reporters with different wavelengths coming out from the same animal. Another 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**

Dr. Rajiv Sarin Chairperson



The Next Generation Sequencing (NGS) facility at ACTREC has a HiSeq 1500 from Illumina and an Ion Torrent Personal Genome Machine from Thermofisher. The machines were used by in house scientists as well as those from BARC and IISER, Pune during 2017. Transcriptome analysis was carried out on the Hiseq 1500 to understand the expression of genes in oral cancer cell lines, in human samples exposed to low dose radiation, and in medullary thyroid cancer. Exome sequencing was carried out to profile mutations in individuals exposed to radiation, for *de novo* sequencing of an insect

exome, and to find differences in the penetrance and disease aggression of germline mutations in inherited cancers. After DNA/ RNA sample quality checks, exome and transcriptome libraries for 55 samples were prepared in house and sequenced on the HiSeq 1500. Good quality data was obtained and downstream bioinformatics analysis was done with open resource tools by the users. Ion Torrent PGM libraries for targeted resequencing of BRCA1 and BRCA2 genes were prepared in 108 cases of hereditary breast and ovarian cancer syndrome. Pathogenic mutations were identified in 45 families.

# **Small Animal Imaging Facility**



**Dr. Pradip Chaudhari** Scientific Officer 'G'

This facility focusses on preclinical animal imaging and research on radiopharmaceuticals. The diagnostic radionuclides - technetium-99m and fluorine-18 complexes are being evaluated for their utility in imaging and monitoring cancer xenografts in mouse models. In 2017, the facility supported 17 preclinical PET, SPECT and CT imaging studies on rodents for basic and translational research projects from ACTREC, other DAE units, academic institutes and pharmaceutical industries. A majority of the studies were proof-of-concept studies, normal tracer uptake studies and in vivo tumor uptake studies - some involving validation of liver and brain xenograft and orthotopic models. The facility also designs imaging protocols for ex vivo bone imaging and analysis utilizing high resolution microCT, development of animal models, data quantitation, and analysis. During 2017, the facility conducted a major imaging study for the pharmaceutical industry. The facility also runs a complete

cancer care program for the diagnosis and treatment of pet animals suffering from spontaneous cancer through its animal oncology clinic. During 2017, 122 referral cases underwent major/ minor surgeries, single or combination drug chemotherapy, radiation therapy or a combination of these, based on clinical requirement. The animal cancer biorepository maintains biological material (blood, freshfrozen/ formalin-fixed/ FFPE tissues) obtained during diagnosis and treatment, and utilizes them for research on comparative aspects of animal and human cancers. The senior faculty organized a CME on 'Preclinical imaging and drug discovery' at ACTREC from 20<sup>th</sup> to 22<sup>nd</sup> September 2017. The facility accepted six trainees during the year - one for Bachelor's and four for Master's dissertation, one for research experience, and one observer. Orientation tours of the facility were conducted during the year for visiting students and other visitors.

**Mr. Umeshkumar Mote** Sr. Administrative Officer

# Administrative & Core Infrastructure Groups

## Administration

Mr. Mushtaq Shaikh Admin. Officer (EM) Mrs. Malti Sharma Dy. Admin. Officer (HRD) Mr. Vilas Pimpalkhare Dy. Admin. Officer (EM) Accounts Mr. Vihar Pawar DCA, ACTREC

Engineering Mr. Pallayil Baburaj OIC (ES) **Purchase** Mr. Sharad Kirkase Purchase Officer

**Stores** Mrs. Premlata Kotenkar Dy. Stores Officer

Security Mr. Rajan Chavan Dy. C.S.O. (Gr. I), ACTREC

## **General Administration Department**

The General Administration's Human Resource Development section carries out the functions of manpower planning, performance management, recruitment of staff (regular as well as temporary), training and development of employees, and maintenance of discipline. In 2017, 46 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, and 21 Junior Research Fellows were selected for Ph.D. studies. Staff members were also appointed on contract, under technical, non-technical and nursing categories, to distribute the increased work load caused by an increase in cancer patient numbers at the Centre. At present 41 technical, 69 nontechnical and 53 nursing staff members are working under an outsourced contract at ACTREC. Besides these, 86 staff members have also been recruited on various extramural projects to assist in research work. The payrolls of the Hematopathology laboratory and the department of Cancer Cytogenetics (~21 permanent and 4 project staff) were

shifted from TMH to ACTREC during 2017. The department also takes care of career planning through merit based review and promotions of employees by holding yearly DPC for all the employees.

Upon implementation of the 7<sup>th</sup> Central Pay Commission recommendations, pay fixation of employees and pension fixation of retired employees were carried out for timely payment of dues. Day to day administrative functions encompassed e-attendance control, maintenance of leave records, updating of staff records with regard to pay fixation/ re-fixation, settlement of personal claims, release of retirement/ terminal benefits becoming due 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, etc. It has provided timely welfare measures and facilities necessary for maintaining an excellent work environment, and imparted training by deputing 13 staff within and outside Mumbai. The Computer Programmer has



developed and implemented various new HRD software/ programs such as On-line Recruitment web-application program, 7<sup>th</sup> CPC Pay Fixation program, Contract Staff Management System. Some of the well-developed on-going software/ programs are Retirement Benefits Information System (RBIS), Telephone Bill reimbursement system, Attendance Processing system, etc. The programs under development are: Children Education Allowance, Project Employee System, etc. The timely payment of PRIS and update allowance to eligible employees, providing duplicate Service Book to staff, and service verification of staff who have completed 18 years of service, are other activities carried out by HRD. Implementation of the Reservation Policy of the Govt. of India duly adopted by TMC in respect of SC/ ST/ OBC/ PWD/ Ex-Servicemen is carried out regularly and systematically, and all efforts have been made to ensure and achieve the prescribed percentage of reserved posts. TMC merit scholarships were awarded to children of ACTREC staff members. During 2017, three staff members achieved superannuation and seven staff members opted for voluntarily retirement.

The General Administration's Estate Management section controls and manages all the outsourced activities aimed at the effective functioning of various activities, such as Students and Patients Hostels, Guest House and Faculty Club, other recreation facilities such as the Gymnasium and sport activities like the ACTREC premier league cricket matches, carrom and chess competitions, staff and patient Canteens, the Retreat Cafeteria, Housekeeping, Transportation, Horticulture, Pest Control Services, Photocopier Machines, Courier/ Post & Telegraph services, clearing of service bills of various contracts as well as CCE cancer registry projects, Refilling of gas cylinders in laboratories/ BMT/ patient Hostels, Guest House at Faculty Club, and other buildings in the campus. The provision of accommodation for patient's families at Lords & Melbourne Hostel, and smooth functioning of Railway reservations system for cancer patients is also effectively handled by the department. Through consistent follow-up with concerned departments in CIDCO, the collection of dry waste from the campus has been organized more effectively, thereby maintaining a pollutionfree atmosphere on the campus.

Housekeeping services at all the buildings on the campus such as Khanolkar Shodhika, Paymaster Shodhika, Jussawalla Shodhika, Vasundhara Patients Hostel, 3 Students Hostels, Retreat, Faculty Club Guest House and newly started departments in the Centre for Cancer Epidemiology (CCE) Building (Biomedical Records, Cancer Cytogenetics, Cancer Epidemiology and Hematopathology), besides the roads, nullahs, car parking areas, etc, are also managed by the General Administration. Housekeeping services maintain cleanliness, good sanitation and hygienic conditions on the campus. Condemnation process of obsolete/ scrap material and clearing of junk material is also being done routinely, thus ensuring the maintenance of cleanliness and hygiene on the ACTREC campus. During the year, a number of training sessions were organized for housekeeping workers.

The Centre takes pride in the large variety of flora on its campus. A garden covering an area of ~1500 sq. mtrs, a plant nursery for in-house needs, and lawns at different locations on the campus are well maintained by a professionally trained horticulturist supported by a team of gardeners. A separate garden has now been developed at the newly constructed CCE. Drip irrigation and sprinkler systems are being installed on the campus for watering the gardens, plants, etc. Horticulture waste like dry leaves, residual waste, grass, etc, are being cleared through compost pits. Propagation of various on campus trees such as Gulmohar, Copper pod, Samudra phal, Ashoka, Neem, etc, is being done in the ACTREC nursery through natural methods such as cuttings/ seed propagation.

Disposal of biodegradable or organic waste as well as biomedical waste is being done in compliance with highest standards set, as per the government norms. A '*Nisarg-Runa* Biogas Plant' is being successfully run on the campus; it ensures the disposal of organic/ kitchen waste in an ecofriendly manner. The Biogas produced from the plant is used in the Paymaster Shodhika Kitchen and the other byproduct - manure is used in the garden.

In 2017, the Centre purchased a 27 seater Force Tempo Traveler for the transport of Clinicians from ACTREC to TMH, and back.

The section also manages the distribution of post. Outward and inward post (around 7500 pa and 8750 pa respectively) are sent through speed post and courier services apart from internal distribution of post to various departments, laboratories and other groups.

A number of MOU's were signed this year for the benefit of cancer patients. These include:

- MOU between M/s Kaivalydhama Ashram and ACTREC: Certified Yoga Trainer/ Instructor who conducts Yoga Classes (thrice a week, on Mondays, Wednesdays, Fridays, between 4 and 6 pm) for cancer patients and their attendants residing at ACTREC. Most of the patients have benefitted greatly from it.
- 2. MOU with authorised dealers of two PSU Indian Oil companies to provide fuel and service for conveyances at two cancer registries located at Kota and Karwar.
- 3. Yearly General Insurance coverage for fire and other perils has been sought to ensure that ACTREC's immovable and movable properties are risk free.
- 4. This year's biggest achievement has been the exemption from payment of Non-Agriculture Tax. The Hon'ble District Collector, Alibag, Raigad has issued an order to the effect that, being a Government Cancer Hospital, ACTREC is exempted from payment of Non-Agriculture Tax.

## **Accounts Department**

The main focus of the Finance and Accounts department has been funds flow management by prudential and judicious budgetary controls, and financial outflow. review of Maintenance of requisite documentation and other relevant records in conformity with the instructions issued by the Department of Atomic Energy, Govt. of India was ensured. The procurement of various supplies and materials and equipment required for the Centre was undertaken by following the prescribed purchase procedure.

During the year 2017, hospital and other income to the extent of Rs. 15.73 crore has been generated. In all, there were a total of 217 on-going projects at ACTREC during the year 2017. A sum of Rs. 6.92 Crore was received from governmental agencies such as DBT, DST and ICMR, to meet



the expenditure on 171 of these on-going projects. In addition, 11 new extramurally funded projects to the tune of Rs. 11.00 crore for a three year period were sanctioned by the above mentioned funding agencies, of which Rs.2.18 crore were received during the calendar year.

## **Engineering Services**

The Engineering services at ACTREC encompasses a strong team of six welltrained electrical, mechanical and civil engineers, two supervisors, 18 technicians and one auxiliary support staff. The team is responsible for the operation and maintenance of various critical engineering systems on a round-the-clock basis, to create a sound, safe, and smoothly functioning work environment that supports patient treatment, research and educational activities of the Centre. The key engineering works include: (1) Air conditioning system with chilling

plants, cooling towers, package units, water coolers, refrigerators, deep freezers, medical oxygen system, LPG distribution network, mechanical and fabrication work; (2) In-house repair and maintenance of almost 500 window/ split air conditioners; (3) 33 KV high tension switch gears, transformers, LT panels, lighting and power distribution, DG sets, cabling, lifts, communication, PA system, and patient calling system; (4) Maintenance of water supply and fire hydrant systems, as well as sanitary and drainage systems; (5) Civil work that includes all alterations, additions, masonry, plumbing, painting, carpentry, maintenance of buildings,

roads and compound wall of the 60 acre campus; (6) Coordination with Architects/ Planners for construction of five new buildings on the campus; (7) Liaison with local bodies for obtaining various NOCs and permissions; (8) Distribution of liquid nitrogen on a regular basis to research labs; (9) Maintenance of laboratory equipment, furniture and various hospital utilities; (10) Planning and implementing the upgradation/ replacement of facilities, carrying out preventive, corrective and deferred maintenance of the buildings, as well as making short-term and long-term recommendations for financial allocation.

## **Purchase Department**

Purchase department aims to provide efficient services to the Centre by way of arranging and delivering goods as per the approved quality and quantity within minimal supply time. All the procurement processes such as indenting, comparative statements, generation of purchase orders, reminders, etc., are done using the Material Management System (MMS) software developed in-house by the Information Technology department. Implementation of MMS resulted in efficient functioning of procurement activities and obtaining the materials



with ease. During the report year, Purchase department floated 46 E-Tenders through Tenderwizards.com/DAE to maintain more transparency in the procurement system; the response from the vendors was satisfactory. This is also important and requisite protocol as per DAE and CVC norms.

As per rule 149 of GFR 2017 – 12 purchase orders were processed through the Government e-marketplace (GeM). During 2017-18, goods and equipments worth Rs. 12.96 crore, consumables worth Rs. 17 crore and contracts for the supply of spares/AMC worth Rs. 3.86 crore have been procured/ lined up by the department.

### **Stores Department**

Stores department has now converted to a paperless mandate and most of its documentation and work processes are carried out online. These include: receiving stock/ nonstock indents, generating/ sending PSNs to Purchase section, receiving purchase orders by email, ticking GRINs confirming receipt and inspection of the material directly into the system (after satisfactory physical inspection of materials by the inspectors), generating and approving GRINs, generating issue notes into the system by the users after receipt of material, sending delivery notes to users in PDF format, online acknowledgement of material receipt by users, online generation of asset numbers, system generated installation reports in case of assets, and provision of system generated asset list as Excel sheets - though physical asset register is also maintained for assets. Through these changes, the cost towards stationery and cupboard space has been reduced considerably. Government E Market (GeM) has been introduced for procurement. Goods received through GeM are promptly handled and, after following all the GeM purchase procedures, GRINs for release of payment are sent



within the set time limit of 7 days. The department ensures complete safety and security of all the supplied material. During 2017, Stores smoothly handled the extra work load due to additional departments such as Cancer Cytogenetics, Hematopathology, TMH Medical Records, Registries, as well as wards. The department successfully carried out both stock and asset verification for the year 2016-17. Discrepancies in material were minimized by immediate attention and continuous follow up. There were no pending GRINs (total nos. 6475), and the equipment list was updated (total 745, including uninstalled) into the system through constant follow-up for submission of installation reports. In the greater interest of the Centre, Stores department accepts partial supplies of material, material delivered on Saturdays/ holidays, and material after office hours and beyond the set time limit, even when opposed to the Purchase Order conditions. Though the department is under- staffed, due care is taken to ensure that the pace of work is not affected/ hampered when staff members proceed on long leave and replacements are not provided.

## **Security Section**

The prime responsibility of this section is to maintain strict access control and regulation of men, material and vehicles on the campus, round the clock, to ensure the safety and security of ACTREC property, personnel, students and patients. During 2017, the prime priority was enhancing and improving the peripheral security measures, and imparting on the job training to the security staff, in a bid to combat unforeseen situations/ threats. An improved surveillance system was inducted into the prevailing security measures that cover all the building and facilities, vital areas and the main gate, to prevent unauthorized access and to detect objectionable activities on the

campus. Installation of an improved fire alarm detection and firefighting system is in progress to tackle any kind of fire exigencies. The prime mandate of this section is to instill a fear free atmosphere on the ACTREC campus. A security audit of ACTREC was carried out by officials of the Subsidiary Intelligence Bureau, National Security Guard, and State Intelligence Bureau. Certain additional security measures recommended by the Subsidiary Intelligence Bureau were inducted into the prevailing security system, and a compliance report has been forwarded to the Bureau. Vigilance Awareness Week was observed at ACTREC from 30<sup>th</sup> October to 4<sup>th</sup> November 2017. Mr. S.B. Bose, Dy. Secretary (IM), DAE, was the Chief Guest at the function, and he shared his thoughts and expertise on 'My vision of a corruption-free India'. Ceremonial parades were performed by the Security staff of ACTREC during the Republic Day and Independence Day celebrations on the ACTREC campus. Proper liaison was maintained with the local Police, RTO, CIDCO, Municipal authorities, and other outside agencies. The Security section also efficiently manages the Centre's departmental transport activities, that include the efficient running of its shuttle bus services, vehicle for Doctors, patient transport facilities, condemnation of old vehicles, and obtaining RTO permits / licenses for newly procured vehicles.

# Information Technology Department

**Mr. Prasad Kanvinde** IT Co-ordinator



The Information Technology (IT) department provides computational facilities, infrastructure and support for information access, processing, printing, archiving, dissemination, etc., to the Centre, in fulfillment of its mandate. ACTREC has a campus wide 1 Gbps LAN with copper/ fiber cables, embellished with ~600 LAN nodes and eight servers; it is also equipped with a secured wifi network. The campus is connected to the Internet through a 1 Gbps shared NKN information gateway with redundant 50 Mbps Reliance connectivity. The Centre has a live mail server that holds over 350 email accounts of staff and students. The ACTREC website is hosted on an in-house server. Redundant/ fail safe configuration on the firewall ensures 99% uptime of internet and mail facilities. A dedicated point to point leased circuit of 12 Mbps between ACTREC and TMH facilitates sharing of patient information, PACS images, etc. Under the National Knowledge Network (NKN) project, the Centre has successfully established seamless connectivity to the NKN grid at gigabit per second speed. Under ANUNET network, the Centre has established successful voice connectivity with TMH and other DAE units. ANUNET network is also used to access UTKARSH - a high end cluster of servers for bioinformatics data processing. The hospital information system (HIS) is maintained on an enterprise class state of the art IBM I-series power 7 server class machine that runs on 24x7 mode, and provides information processing facility to various user departments.

#### Officers:

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

A summation of the activities of the IT department during 2017 is provided below.

Networking: Day-to-day support, upkeep, administration and maintenance of the passive and active network components constitute the vital networking activities. The Centre has scaled up network back bone connectivity on 10 Gbps. Multiple

buildings are now connected in mesh topology through optical fiber for redundancy and zero downtime purpose. In accordance, various networking devices including firewall, switches and routers are configured with redundancy protocols. The Centre has also acquired the latest, state of the art wireless network devices on new standards with 600 Mbps bandwidth with high availability configuration of wireless controller, ensuring 99.9% uptime of the network. The department has already extended gigabit wired network connectivity and wireless network to the CCE building, and will be extending wired network connectivity to the newly constructed Archival building.

Hardware: The major activities during 2017 included initiation of procurement of new IBM Domino mailing solution, procurement of 250 TB of scale out NAS storage system, upgradation of intranet platform, installation of audio-visual equipment for the Board Room of CCE, revamping of the ACTREC website, and procurement of PCs and matching accessories.

<u>Software:</u> Patient information processing at the Centre is essentially online, multi-location and round-the-clock. In 2017, updates were made available for PABR, DIS, RIS, ROIS, OT, Accounts, Pharmacy, Stores and Purchase sections. All these programs were developed in line with the Centre's mandate of paperless online transactions; wherever necessary, seamless transactions were made on the remote server of TMH. Engineering projects and ARC work orders were the major achievements under the software category. **Dr. Satish Munnolli** Librarian

## Library



The ACTREC library, the hub of scientific knowledge, proactively engages in the acquisition, organization and delivery of scientific and clinical information resources, and provides services to its users to support and enhance research, patient care, and on-going educational programs of the Centre. During 2017, the library has subscribed to 83 journals in cancer and allied areas of the domain to satisfy and augment user needs. The library has a collection of 5882 books, 12595 bound volumes of journals, 610 theses, 3299 staff publications, 395 reports and 20 videos. Unlimited access to ScienceDirect under the DAE - Elsevier consortium covers over 2485 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, etc. Under the National Cancer Grid, 10 online clinical journals were enabled for campus wide access. To provide seamless access to journals and online resources at remote locations of users, EzProxy application has been renewed. The library has enabled trial access to 'Grammarly', 'MedicineComplete' and 'Mary Ann Liebert Inc' publisher's journals and contents during the reporting year. The library continues to maintain staff publications records, and publishes 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 828 articles against 919 requests during 2017. It has also provided 87 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. Remote access system - EzProxy has been revamped with more features. The library conducts an information literacy program for new students; this is a regular and popular program. Apart from users' orientation, one-on-one discussions on searching authentic information sources, group discussions on search strategies, research metrics, Impact Factor, h-Index, bibliography management tools are organised in the library; 72 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

**Mr. Shivner Sawant** Officer-in-Charge



The Photography section provides support to the Centre's scientific/ medical staff and students for the photo-recording of their experimental results - including gels, animal experiments, patient material, etc. This state of the art section has high end digital cameras that are required to record high resolution images that provide visual clues to the research activities. This year, a Nikon digital camera model D-7000 with a 55 - 200 mm lens has been procured for the section. Using advanced computing and desk top publishing equipment and software, this section handles design, printing and display of announcement brochures/ flyers, banners, program schedules, letterheads, invitation cards, envelopes, badges, certificates, posters, workshop protocols/ abstract books and other material for all the scientific meetings, conferences, workshops as well as cultural events organized at ACTREC. The section also assists in the preparation of poster/ slide presentations for the scientific community, and handles printing of identity cards on the data card printer for the security and administrative services. Staff of the section also take photographs of the campus, functional groups, and infrastructure of the Centre, carefully archives all the images, and provides them for use in the Centre's print publications and reports, audiovisual presentations and the website, as well as to the management for administrative and presentation purpose. The section assists users in handling the presentation equipment in the seminar/ conference/ meeting/ board rooms and mini auditorium. During 2017, the section undertook lamination, scanning, art work and photo printing, provided photographic support for 41 events (33 national and eight international meetings) held at the Centre, and provided 9164 digital photographs and 8573 color laser prints to various users/ groups.

**Dr. Aparna Bagwe** Officer-in-Charge

# Science Communication and Professional Education (SCOPE) Cell



SCOPE Cell, set up in 2005, manages the science communication and professional education programs of the Centre.

Science Communication: During the period January to December 2017, the OIC of the Cell responsibly handled the editing, compilation, and proof reading of ACTREC's 2016 annual report as well as its executive summary for the 2017 DAE report - supported by ACTREC's newly formed Annual Reports Committee, ensured the timely provision of vital data and reports about the Centre to governmental and other agencies when required, was closely involved in editing and compilation of the abstract book for the Indo US Enzymology Conference (Jan 2017), and collated material and provided support for the ACTREC Oration and Science Day celebrations. She 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, oversaw venue bookings and dissemination of information about in-house meetings and seminars through emails/ print circulars. Staff of the Cell handled routine maintenance and updates of PI webpages, scientific meeting webpages, JRF intake related uploads and routine uploads of tenders/ advertisements on to the Centre's website.

<u>Professional Education</u>: In support of the Centre's doctoral program, the Cell handled the intake of JRF 2017 batch of doctoral students which involved finalization of the advertisement, call for projects, pre-screening of applications

with support from the Steno Pool (1595 online applications against 21 projects), conduct of written entrance exam and interviews, up to JRF selection. Staff of the Cell also ensured the smooth conduct of the academic coursework for the fresh recruits, 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, 1<sup>st</sup> year seminar presentation, correcting papers, collating marks and preparing final mark sheets/ transcripts. Based on guidelines from the Academic Committee, the OIC of the Cell planned and conducted Friday Seminars delivered by the research scholars of ACTREC. In support of the Centre's training program, staff of the Cell 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 2017, 304 trainees were allocated to senior and mid-level faculty/ staff of the Centre (114 for Master's dissertation, 138 for research experience, six on collaborative projects, two research associates, 20 summer trainees and 24 observers). The OIC of the Cell delivered lectures on 'Laboratory Safety at ACTREC' to new trainees thrice this year. The Cell also provided logistic support for the educational visit from 23 finalists of DAE's All India Essay Competition (Oct 2017). The Cell, supported by the ACTREC Events Committee, conducted the Centre's Open Day (Dec 2017) that drew ~ 500 students and accompanying faculty from 32 colleges / research institutions of Mumbai and Navi Mumbai.

# 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 2017, 114 graduate students were enrolled into the Centre's Ph.D. program; these included the new batch of 21 students of the JRF 2017 batch (see photograph).



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

During the year 2017, 17 students completed research towards their doctoral dissertation and were awarded the Ph.D. degree (see the tabulation that follows).

#### Mr. Piyush Kumar

Guide: Dr. Murali Chilakapati

Comparative evaluation of diagnostic efficacy of laser Raman spectroscopy and histopathology in an animal model of oral carcinogenesis

#### Mr. Pratik Chandrani

Guide: Dr. Amit Dutt

Discovery of potential therapeutic targets in human cancer: a functional genomics approach

#### Ms. Priyanka Bhosale

Guide: Dr. Manoj Mahimkar

Genomic profiling of oral precancerouos lesions and early stages of oral cancer

#### Ms. Ekjot Kaur

Guide: Dr. Shilpee Dutt

Role of chromatin and DNA damage repair pathway in glioblastoma multiforme

#### Ms. Gauri Mirji

Guide: Dr. Shubhada Chiplunkar

Genomic and functional studies in leukemia patients exhibiting TCR  $\gamma\delta$  gene rearrangement

#### Mr. Prasad Sulkshane

Guide: Dr. Tanuja Teni

Regulation and targeting of MCL-1 in human oral cancers

#### Ms. Crismita Dmello

Guide: Dr. Milind Vaidya

Role of aberrant vimentin expression in human oral precancer and cancer

#### Ms. Madhura Kelkar

Guide: Dr. Abhijit De

Imaging human sodium iodide symporter (hNIS) gene regulation in breast cancer animal model

## Mr. Pawan Kumar Upadhyay

Guide: Dr. Amit Dutt

Integrated analysis of head and neck squamous cell carcinoma: a genomics approach

#### Ms. Richa Tiwari

Guide: Dr. Milind Vaidya

Role of keratin 8 phosphorylation in neoplastic progression of squamous cell carcinoma

#### Ms. Divya Reddy Velga

Guide: Dr. Sanjay Gupta

Binding partners of histone H2A variant and their molecular implications in carcinogenesis

#### Mr. Vijay Padul

Guide: Dr. Neelam Shirsat

Identification of genes instrumental in pathogenesis of oligodendroglioma

#### Mr. Prajish Iyer

Guide: Dr. Amit Dutt

Genetic approaches to discover novel oncogenes in human cancer

#### Mr. Mohd Quadir Siddiqui

Guide: Dr. Ashok Varma

Structural and functional basis of Fanconi anemia (FANCI-FANCD2) pathway: studies of protein-protein interactions required for DNA crosslink repair

#### Mr. Rahul Sarate

Guide: Dr. Sanjeev Waghmare

Dissecting the molecular mechanism: normal stem cell and cancer stem cell regulation

#### Mr. Bhushan Laxman Thakur

Guide: Dr. Pritha Ray

Identification of potential regulators of PIK3CA promoter in chemoresistant ovarian cancer cells

## **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 299 participants during 2017, of which 112 trainees worked for their dissertation, 144 trainees came for research experience (two of them were postdocs), 23 were observers, and 20 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 second batch of two students joined in December 2016, completed coursework in December 2017, and has started serving the bond period. The third batch of AMLT comprising of four students will start

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, crossmatching, 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. Nine educational visits took place during 2017. Six groups of nursing students were shown around the Nursing department of ACTREC: School of Nursing, Raigad - Alibag, Florence Nightingale Institute of Nursing Education, Kamothe, ITM-HIS College of Nursing, New Panvel (all in January 2017), Laxmi Memorial College of Nursing, Mangaluru (May 2017), MGM College of Nursing, Vashi (June 2017), and MGM's Florence Nightingale Institute of Nursing Education, Vashi (December 2017). A group of MUHS MSc Pharmaceutical Medicine students of Seth GS Medical College, Mumbai, visited the Clinical Pharmacology Group in April 2017. Educational visits of the finalists of DAE's All India Essay Contest (October 2017) and faculty/ students of the Moving Academy of Medicine and Biomedicine (November 2017) covered several ACTREC facilities.

## Open Day 2017

ACTREC's Open Day 2017 was conducted on the 7<sup>th</sup> and 8<sup>th</sup> December 2017. Close to 480 students and 32 faculty members from science degree colleges of Mumbai and Navi Mumbai visited the Centre over this two day period. On each day, in the morning and afternoon session, batches of fifteen students and one faculty member from eight colleges visited ACTREC. The program included a poster session in the entrance foyer, which was followed by an introductory talk about ACTREC delivered by members of the Events

Committee. After this, each college group along with an ACTREC student volunteer was taken around eight departments, facilities or research labs of CRI and CRC, where varied aspects of cancer research, diagnosis and treatment were highlighted. The following groups conducted demonstrations this year: Mass Spectrometry Facility, Rukmini Lab, Clinical Pharmacology Lab, NextGen Sequencing Facility, Students Council of ACTREC, Common Instrument Room, Waghmare Lab, and Department of Transfusion Medicine. The visiting college groups provided feedback appreciating this educational program.



## 13<sup>th</sup> National Research Scholars Meet (NRSM 2017)

The National Research Scholars Meet in Life Sciences is an annual event organized by the graduate student fraternity of ACTREC. The success of the NRSM model is clearly evident from the enthusiastic participation of young researchers from across the country over the past twelve years. The 13<sup>th</sup> NRSM was held at ACTREC on 14<sup>th</sup> and 15<sup>th</sup> December 2017. The meet began with a welcome address by Prof. Shubhada Chiplunkar, Director, ACTREC. In his inaugural address, Prof. Vasudeva Rao, Vice-Chancellor, HBNI, appreciated the concept of this unique meet in bringing together players from different disciplines of the life sciences on one platform to discuss latest advances. In a Plenary talk, the Chief Guest Prof. Jayant Udgaonkar, Director, IISER-Pune, stressed on the importance of reading, planning, improvising experiments and focusing on quality data for a successful research career. Dr. Sudeep Gupta, Dy Director, CRC-ACTREC was a distinguished guest at the function, where the abstract book of the 13<sup>th</sup> NRSM was released. The first keynote address was delivered by Dr. Chaitanya Athale, IISER-Pune, who spoke about the basis of self-organization as a mechanism to understand cell biology. Research scholars presented their findings in two sessions of oral presentations on Cancer biology and on Toxicology, with an intervening poster session. The second keynote address was delivered by Dr. Amit Awasthi, THSTI, who spoke about immunotherapy strategy as a therapeutic regime. Dr. Amit Gokhale of ThermoFischer delivered the first Tech Talk on the fundamentals and applications of RNA flow technique. The Scientifia quiz, replete with intriguing questions on basic biology, was

appreciated by all the participants. The evening's cultural program included song and dance performances by the talented ACTREC research scholars; these were followed by folk performances by Samaskritika Kalamanch, and a dinner banquet. Day two of the meet began with a keynote address by Dr. Sandhya Kaushika, TIFR, who provided insights into the understanding of the biology of cells and organisms. The second keynote address was by Dr. Jacinta D'Souza, CEBS, who spoke about bioenergetics through protein-protein interaction in the flagella of the Chlamydomonas model. In an Alumni Talk, Dr. Srikanth Budnar, Institute for Molecular Bioscience, Australia, shared his experiences as a post-doc and presented his work on Rho-GTPase signaling. The second Tech Talk was by Mr. Ravishankar Kasturi, Reliance Life Sciences, who spoke about biosimilars and their characterization. Research scholars presented their findings in two sessions of oral presentations on Basic cell biology and on Cell and cancer biology, with an intervening poster session. Motivational speaker Mr. Vinay Kanchan liberally interspersed his talk on 'Creative thinking' with examples from real life. Mr. Kanchan also judged the short stories and poems submitted by the participants. The last Tech Talk by Mr. Pardha Sarathi, Sandor Life Sciences, was on the advances, data analysis and applications of NextGen sequencing. 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 13<sup>th</sup> NRSM proved to be a grail filled with the nectar of knowledge wrapped in a zest of art.



# Conferences, Scientific Meetings & Seminars at ACTREC

15-19 January	Indo-US Conference & Workshop on 'Advances in Enzymology: Implications in Health, Diseases and Therapeutics' Jt. Organizers: Dr. Kakoli Bose, ACTREC & Prof. Clay Clark, UTA, USA
23-28 January & 13-18 February	DBT-NER Workshop on 'Stem Cell Biology' Organizer: Dr. Sanjeev Waghmare, ACTREC
3-4 February	28 <sup>th</sup> Annual BTISnet Bioinformatics Coordinators Review Meeting Coordinator: Dr. Ashok Varma, ACTREC
2-3 March	DBT-BTIS Workshop on 'Applications in Bioinformatics' Organizer: Dr. Ashok Varma, ACTREC
19 April	Certificate Course in Preventive Oncology (lectures held at ACTREC) Organizer: Dr. Sharmila Pimple, TMH
10-12 May	Advanced Clinical Cytometry Course & Minimal Residual Disease Workshop Organizer: Dr. Prashant Tembhare, ACTREC
16 May	Nurses Day program Organizer: Dr. Meera Achrekar, ACTREC
25 May	IAEA Regional Training Course on 'Clinical applications of stereotactic body radiotherapy (SBRT) in lung and liver cancers' ACTREC Coordinator: Dr. Supriya Sastri, ACTREC
25-26 May	Workshop on Central Venous Access Devices (CVAD): care and maintenance Organizer: Dr. Meera Achrekar, ACTREC
31 July	Mini Symposium to honor Dr. Milind Vaidya superannuating from ACTREC Coordinators: Dr. Sorab Dalal & Dr. Sanjay Gupta, ACTREC
12 August	ACTREC BOSLA annual lecture series 2017 - MakerSpace Organizer: Dr. Satish Munnolli, ACTREC
1-2 September	XV <sup>th</sup> Annual Practicum on 'Adaptive Radiotherapy in Practice' Organizer: Dr. Vedang Murthy, ACTREC
10 September	Asia-Pacific Clinical Oncology Research Development (ACORD) Concept Development Workshop Convenor: Dr. Vikram Gota, ACTREC; Secretary: Dr. Navin Khattry, ACTREC
20–22 September	Hands on Workshop on 'In vivo preclinical imaging and drug discovery' Organizer: Dr. Pradip Chaudhari, ACTREC
5 October	ACTREC Retreat 2017 – Theme 'Cancer cell signaling: current prospects and translational advances' Joint Organizers: Dr. Kakoli Bose & Dr. Sonam Mehrotra, ACTREC
13 & 27 October 24 November 15 & 29 December	CNE Workshop on 'Medication Safety' for nursing staff of ACTREC, TMH and BARC Organizer: Dr. Meera Achrekar, ACTREC
November 2016 to November 2017	One-year Advanced Training Course in Medical Laboratory Technology Coordinators: Dr. Preeti Chavan, Dr. Vivek Bhat, Dr. Shashank Ojha
10-11 November	Workshop on 'Central venous access device (CVAD): care and maintenance' Organizer: Dr. Meera Achrekar, ACTREC
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7-8 December	Open Day 2017 Coordinator: Dr. Aparna Bagwe, ACTREC
14-15 December	NRSM 2017 Organizers: JRF 2014 batch, ACTREC
4-15 December 18-29 December	Biotechnology/ Bioinformatics Training to Teachers and Research Scholars from the North East Region and other regions of India: Coordinator: Dr. Ashok Varma, ACTREC

## Orations

3 March	ACTREC Oration: 'Immunity to tuberculosis: from bench to bed and back again' Dr. S.H.E. Kaufmann, Director, Max Planck Institute for Infection Biology, Germany
31 March	Science and Society Oration: 'Diabetes in Indians: practice and research' Dr. Chittaranjan Yajnik, Director, Diabetes Unit, KEM Hospital & Research Centre, Pune

### **Guest Seminars**

6 January	BIRAC big scheme: 10 <sup>th</sup> call; C-CAMP: a big partner Dr. Papri Banerjee, C-CAMP, Bengaluru	
6 February	Pathways of double strand break repair in higher eukaryotes - implication in cancer radiotherapy Prof. George Iliakis, Director, Institute of Medical Radiation Biology, University of Duisburg- Essen Medical School, Essen, Germany	
7 February	Emerging connections between mechanisms of metastasis suppression and telomerase function Dr. Shantanu Chowdhury, Academy of Scientific and Innovative Research, CSIR-Institute of Genomics and Integrative Biology, New Delhi	
20 February	Harnessing the power of precision medicine to enhance responsiveness to cancer immunotherapy Dr. Akash Patnaik, The University of Chicago, Knapp Center for Biomedical Discovery, Chicago, USA	
5 May	Genetic landscape of glioma: loss-of-function mutations in Calcitonin receptor (CALCR) identify highly aggressive glioblastoma with poor outcome Prof. K. Somasundaram, Department of Microbiology and Cell Biology, Indian Institute of Science, Bengaluru	
18 May	Investigating the interplay between cell cycle and gene expression Dr. Kedar Nath Natarajan, Wellcome Trust Sanger Institute; European Bioinformatics Institute, UK	
15 June	Exploiting systems based approaches for drug target discovery Dr. Kanury V.S. Rao, THSTI – National Chair, Head, Drug Discovery Research Centre, Translational Health Science and Technology Institute, Faridabad	
29 June	Illuminating Actionable Biology in TNBC: Research, 5Resources and Global Initiatives Dr. Ritu Aneja, Professor of Cancer Biology and Distinguished University Professor; Director, Graduate Studies in Biology; Director, The MBD (Molecular Basis of Disease) Program, Department of Biology; Georgia State University, Atlanta, USA	
12 July	Building scientific startups in the Bio Space by leveraging BIRAC's biotech ignition grant Dr. Priya Nagaraj, Manager – Bioincubator, Venture Center, Pune	

30 August	Structural characterization by small angle scattering suggests models for monomeric and dimeric forms of full-length ezrin Dr. Anthony Duff, National Deuteration Facility, Australian Nuclear Science & Technology Organization, Lucas Heights Campus, Australia
25 September	Drug Development: Oncology: ImmunoOncology Dr. Narendra Chirmule, Senior Vice President and Head of Research & Development, Biocon Research Labs, Bangalore
2 November	Novel pancreatic cancer suppressors regulate chromatin remodeling and epithelial cell apico- basal polarity Dr. Murali Bashyam, Chief, Laboratory of Molecular Oncology, Centre for DNA Fingerprinting and Diagnostics, Hyderabad
7 November	In search of new cancer drugs and relevant drug testing model system Dr. Sougat Misra, Assistant Professor, Karolinska Institute, Stockholm, Sweden
13 November	Searching for the new genes of hereditary breast cancer: from the exome sequencing efforts to the multidisciplinary evaluation Dr. Ekaterina Kuligina, N.N. Petrov Institute of Oncology, St. Petersburg, Russia
15 November	Inflammation-metabolism crosstalk in glioma: deconstructing the network Dr. Ellora Sen, Scientist, National Brain Research Centre, Manesar, Haryana
20 November	Targeting deregulated stem cells in cancer Dr. Sejuti Sengupta, Boston Children's Hospital / DFCI / Harvard Medical School, Boston, USA
30 November	Selection of proteasome substrates from the ubiquitin signal to the intracellular localization Prof. Michael Glickman, Technion- Israel Institute of Technology, Haifa, Israel
19 December	Keeping the T cells out of the game: Galectin-1 mediated immune evasion in Head and Neck cancers Dr. Dhanya Nambiar, Post Doctoral Research Fellow, Department of Radiation Oncology, Stanford University, USA

## **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

Members

Dr. Shubhada Chiplunkar, Director, ACTREC 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. DD Deshpande,
	Head, Medical Physics Div., TMH
	Dr. JP Agarwal,
	Dept. of Radiation Oncology, TMH
	Dr. Ashwin Polnaya,
	Dept. of Radiodiagnosis, ACTREC
	Dr. Shashank Ojha,
	Dept. of Transfusion Medicine, ACTREC
	Ms. Reena Devi, CRC, ACTREC
	Ms. Siji Nojin Paul, 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.

Convenor	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. 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. Abira Ganguly
	Mr. Raja Reddy Kuppili

#### **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. Ashok Varma, PI & Sc. Officer 'F'

Dr. Sorab Dalal, PI & Sc. Officer 'G'

Mr. Mushtaq Shaikh, Admin. Officer (EM)

Dr. Arvind Ingle, OIC, LAF & Sc. Officer 'G' (Representative of SC/ST)

Dr. Rukmini Govekar, PI & Sc. Officer 'F'

Dr. Vikram Gota, Assoc. Prof. & Clin. Pharmacol. 'F'

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 5<sup>th</sup> 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)

### **Conference Reports**

Jt. Organizers: Dr. Kakoli Bose, ACTREC & Prof. Clay Clark, UTA, USA

Indo-US Conference & Workshop on 'Advances in Enzymology: implications in health, disease and therapeutics'



The Indo US Conference & Workshop on 'Advances in enzymology: implications in health, disease and therapeutics' held at ACTREC between 15<sup>th</sup> and 19<sup>th</sup> January 2017 was organized jointly by Dr. Kakoli Bose of ACTREC and Prof. Clay Clark of the University of Texas at Arlington, USA with funding support from the Indo US Science and Technology Forum, Board of Research in Nuclear Sciences, and Indian Council of Medical Research. Twenty three participants from across the country participated in the pre-conference workshop that was held on 15<sup>th</sup> and 16<sup>th</sup> January 2017 at ACTREC. The workshop comprised of lectures and hands-on sessions on enzyme kinetics, x-ray crystallography and surface plasmon resonance (SPR). On 15<sup>th</sup> January, after brief welcome remarks by Dr. Bose, the first lecture on Enzymology was delivered by Dr. Clark. A day-long hands-on session on enzymology using fluorescence spectroscopy by Dr. Bose and Dr. Lalith Chaganti (ACTREC) followed, accompanied by data analysis and problem-solving. On 16<sup>th</sup> January, lectures on X-ray Crystallography and SPR were delivered by Dr. Carla Mattos (NEU, USA) and Dr. Prasanna Venkatraman (ACTREC) respectively. These were followed by hands-on data analysis and problem solving sessions led by Dr. Ruchi Anand (IITB), Dr. MV Hosur (ex-BARC) and Dr. Shubhendu Seal (GE). The Conference was conducted from 17<sup>th</sup> to 19<sup>th</sup> January 2017. During the inaugural function on 17<sup>th</sup> January, Dr. Shubhada Chiplunkar (Director, ACTREC), Dr. Clark and Dr. Bose lit the ceremonial lamp, and Dr. Clark released the abstract book.

The plenary lecture by Prof. Amnon Horovitz (Weismann Institute, Israel) followed. The conference program was organized into ten sessions with 23 national/ international speakers delivering lectures on recent advances in enzymology from basic research to therapeutics; in addition, there were two plenary lectures and three keynote presentations. Ample opportunity was provided for scientiststudent interaction through poster presentations and panel discussions. The panel discussion on 'Targeting enzymes for therapeutics-how close are we?' was engaging and intellectually stimulating, and provided a platform to the students to ask guestions and participate in the debate. The work of senior students and postdoctoral fellows was highlighted in a short oral presentation session, and the best three speakers were given oral presentation awards sponsored by the Biochemical Journal; the poster awards were sponsored by Springer-Nature. A round table group discussion, between nine groups that were pre-formed based on participant preferences, was conducted over lunch on 19<sup>th</sup> January with the aim to foster and strengthen bilateral ties. It gave students, researchers and post doctoral fellows an opportunity to interact directly with PIs from India and USA. The students got a feel of the research endeavors in the USA, the US participants were impressed with the diverse, good quality work being done in India, and discussions about initiating collaborations also took place between PIs. Overall, it was a very successful and fruitful meeting.

## DBT-NER hands-on Training Workshop on Stem Cell Biology

Organizer: Dr. Sanjeev Waghmare, ACTREC



A DBT-NER hands on Training Workshop on 'Stem Cell Biology' to provide training to faculty and research scholars from the North East region and other parts of India was organized by Dr. Sanjeev Waghmare at ACTREC early this year. Sixteen faculty members (Professor /Associate Professor/ Assistant Professor level) participated in the session held from 23<sup>rd</sup> and 28<sup>th</sup> January 2017, and 16 research scholars (students working towards the Ph.D. degree) participated in the session held from 13<sup>th</sup> to 18<sup>th</sup> February 2017. The training program focused not just on stem cell biology but also covered various aspects of cancer biology. In the morning sessions, talks were delivered by the eminent stem cell experts from national institutions of repute (Instem, Bengaluru; AIIMS, Delhi; NCCS Pune; CMC, Vellore) as well as by ACTREC faculty. The hands-

on-training in the afternoon sessions included: separation of epidermal cells from adult mice skin, FACS analysis of epidermal stem cells, isolation and culture of new born mice keratinocytes, colony forming assay, isolation and culture of cancer stem cells by performing FACS on human cancer cell lines, *in vitro* sphere forming assay, *in vivo* tumorigenesis assay on cancer stem cells, and immunofluorescence assay using stem cell markers on OCT/ paraffin tissue samples. Lab protocols/ manuals as well as soft copies of all the lectures were provided to each participant. The program provided a platform to the scientist participants of the NER region/ other parts of the country to discuss their research projects with ACTREC faculty as well as experts in the stem cell domain, fostering the possibility of inter institutional collaboration. Organizer: Dr. Ashok Varma, ACTREC

## DBT – BTIS Workshop on 'Applications in Bioinformatics'



Every year, the DBT-BTIS Bioinformatics Centre at ACTREC organizes a 2-day hands-on training workshop that targets faculty and research scholars from institutions of Mumbai and nearby area. This year's workshop was organized on 2<sup>nd</sup> and 3<sup>rd</sup> March 2017. The workshop began with welcome remarks by Dr. Ashok Varma, Workshop Coordinator. Dr. D. Sundar of IIT-Delhi delivered the plenary lecture on 'Precision genome engineering with programmable DNA-binding proteins'. Fifteen participants received exposure to lectures and hands-on training in structural bioinformatics, molecular modeling and dynamics, NextGen sequence analysis, and proteomics. The workshop was divided into two sessions – the morning session comprised lectures on theoretical

aspects and the afternoon sessions focused on hands-on training in homology modelling, protein structure visualization, docking, and Next Generation sequence analysis of exome data. The lectures were delivered by ACTREC scientists - Dr. Kakoli Bose, Dr. Prasanna Venkatraman, Dr. Rukmini Govekar, Dr. Amit Dutt, Dr. Neelam Shirsat, Dr. Ashok Varma and Mr. Nikhil Gadewal, who have considerable expertise in these areas. Participants were also taken around some of the state-of-art research support facilities at ACTREC such as Genomics, Proteomics and X-ray Crystallography. The valedictory function began with the concluding remarks by Dr. Ashok Varma; it was followed by distribution of certificates.

## XV Annual Practicum on 'Adaptive Radiotherapy in Practice'

Organizer: Dr. Vedang Murthy, ACTREC



The advent of new technologies and integration of the imaging modalities for radiotherapy planning and delivery have led to the concept of adaptive radiotherapy, which has the potential to improve the therapeutic ratio by modulating radiotherapy planning and delivery according to the changing relation of target volumes with normal tissue. There is a great interest in its application at different cancer sites particularly pelvic tumors (prostate/ bladder cancers) and head-neck cancers. While image guided radiotherapy is now available in increasing numbers of centres across India and forms the cornerstone of adaptive radiotherapy, routine use of adaptive radiotherapy is limited by the uncertainties in understanding of the workflow and challenges in methods of implementation. The XV Annual Radiotherapy Conference entitled 'Adaptive Radiotherapy in Practice' was held on 1<sup>st</sup>

and 2<sup>nd</sup> September 2017 at ACTREC to educate peers across the country about this topic. Out of the numerous applicants from across the country and South Asia, 52 applicants were shortlisted for the practicum; they included Radiation Oncologists, Medical Physicists, and Radiotherapy Technologists. National and international faculty with vast experience helped the delegates understand the practical aspects of this new and exciting technology. The highlight of the workshop was the hands-on practical demonstration in planning cases of head-neck, lung and pelvic malignancies. Teams of three delegates were guided through the adaptive radiotherapy process as a hands-on experience. As evident from their feedback, the delegates particularly appreciated this demonstration as unique and much needed for understanding the process of adaptive radiotherapy. Convenor: Dr. Vikram Gota, ACTREC; Secretary: Dr. Navin Khattry, TMC

## Asia-Pacific Clinical Oncology Research Development (ACORD) Concept Development Workshop 2017

A 1-day ACORD Concept Development Workshop was conducted at ACTREC on 10<sup>th</sup> September 2017. The workshop was funded by MSD Limited. The aim of this workshop was to help early career researchers turn their new ideas for cancer clinical research studies into persuasive 1-page concept outlines. The workshop was open to junior clinicians/ scientists from a broad range of disciplines involved in cancer care including medical, radiation, surgical, hematologic and pediatric oncology, supportive care, palliative medicine, imaging, and psycho-oncology. Junior clinicians had completed their oncology training within the last 7 years, or would do so within the next 2 years. Junior scientists had completed a Ph.D. within the last 5 years. Participants in this workshop were asked to come with an idea for a clinical research study, and the workshop faculty members helped the participants leave with a persuasive 1-page concept outline, which is a vital starting point for writing study

protocols, letters of intent to industry, or grant applications to funding bodies. The workshop program included short presentations, written exercises, and small group discussions. Participants were then asked to discuss their idea for a proposed clinical cancer research study. The workshop faculty comprised of renowned statisticians from Australia and USA, in addition to oncologists from the Tata Memorial Hospital, Mumbai. Thirteen participants took part in the workshop and converted their ideas into persuasive concept notes. Workshop participants were encouraged to submit their completed concept outlines as a part of their application to the next 7-day ACORD Protocol Development Workshop scheduled to be held in Queensland, Australia in September 2018, where selection is highly competitive and the best 70 out of over 120 applications get selected. Applicants from India will be eligible to apply for travel fellowships that cover their cost of attending the 7-day workshop.

## Hands on Workshop on 'In vivo Preclinical Imaging and Drug Discovery'

Organizer: Dr. Pradip Chaudhari, ACTREC



A Hands-on Workshop on 'In vivo Preclinical Imaging and Drug Discovery' was held at ACTREC, during 20<sup>th</sup> to 22<sup>nd</sup> September 2017. The workshop aimed to provide insights into the drug development process as well as the utility of non-invasive preclinical imaging modalities in the discovery of new drugs for clinical application. The workshop had eight national and six international faculty (UK, USA, France and Australia), who delivered talks/webinars on various aspects of translational imaging and drug discovery. Thirty one participants from across the country representing pharmacy colleges, academic universities, R&D organizations of the government and pharmaceutical industry attended the workshop. Dr. Shubhada Chiplunkar, Director, ACTREC, inaugurated the workshop. The workshop comprised of a series of lectures by stalwarts from different fields. On the first day of the workshop, various speakers provided an overview of translational imaging modalities in the first half

of the day, followed by demonstrations on animal handling, preparation of animals for imaging, and administration of radiopharmaceuticals. On the second day, a webinar was organized in which Sebastian Eigner from Germany and Dr. Karlheinz Peter from Australia gave details on advances in preclinical imaging modalities and FLECT imaging for cancer, and unstable atherosclerotic plaques respectively. Eminent speakers from the pharmaceutical industry (Johnson & Johnson, SAFORD Inc) gave in-depth details on drug discovery and preclinical toxicology. Demonstrations on image acquisition, processing and analysis using software such as PMOD, AMIRA and MicroView, etc followed. On the third day, there were webinars and talks on preclinical MRI, transgenic mouse models, animal ethics, radiation safety and regulatory issues and advanced image processing software OASIS. All the participants were given feedback forms to enable improvements in future events. The workshop ended with a valedictory function.

#### Jt. Organizers: Dr. Kakoli Bose and Dr. Sonam Mehrotra, ACTREC

## **ACTREC Retreat 2017**



The annual ACTREC treat was organized at ACTREC on 5<sup>th</sup> October 2017. The theme for this year's retreat was 'Cancer cell signaling: current prospects and translational advances'. The 1-day symposium comprised of presentations by scientists and clinicians from ACTREC and TMH as well as guest speakers from IIT-B and IISER-Pune. The presentations addressed various aspects of cell signaling relevant to cancer, and provided insights into the potential of targeting cell signaling pathways for development of newer therapeutic interventions for human cancers. The retreat was attended by clinicians, faculty, scientists and students from ACTREC and TMH. The retreat was inaugurated by Prof. Shubhada Chiplunkar, Director, ACTREC. The first talk by Dr. Sorab Dalal discussed the potential of signaling pathway components serving as good targets for cancer therapies. Dr. Shilpee Dutt presented her research findings on the mechanisms of drug resistance in AML cells mediated by modulation of DNA repair by GCN5-ATM. Dr. Prasanna Venkatraman spoke about the



role of chaperones in cell signaling, while Dr. Dibyendu Bhattacharyya discussed the mechanisms of ultrastructure regulation involved in early secretory pathways. This was followed by two clinical talks. Dr. Navin Khattry presented new insights in the pathogenesis and management of acute GvHD, and went on to describe cell signaling components that have been implicated as targets for therapeutic intervention in acute GvHD. Dr. Nikhil Patkar discussed new methods to detect minimal residual disease in acute myeloid leukemia. Dr. Pragati Tayalia, IIT-B, presented new methodologies regarding 3D hydrogel systems as platforms for manipulating cell behavior and their applications in studying cancer cells. Dr. Nagaraja Balasubramanian, IISER-Pune, discussed regulation of trafficking by cell adhesion mediated by GTPases, and their implication in cancer development. The retreat concluded with a presentation by Dr. Amit Dutt who discussed the role of FGFR family members - widespread targets for therapeutic intervention in several human cancers.

Biotechnology/ Bioinformatics Training to Teachers and Research Scholars from the North East Region and other regions of India

Co-ordinator: Dr. Ashok Varma, ACTREC



For the 3<sup>rd</sup> successive year, ACTREC organized a training program targeting faculty and research scholars from the North-East Region (NER) and other regions of India, who usually lack access to advanced training in state-of-the-art facilities. The training program received funding support from DBT. The first session targeted faculty and was conducted from 4<sup>th</sup>-15<sup>th</sup> December 2017, and the second session targeting research scholars was conducted from 18<sup>th</sup>-29<sup>th</sup> December 2017. This year's training program was on 'Gene cloning, protein purification and structure biology/ bioinformatics with an emphasis on cancer biology' and it comprised of talks by eminent experts in the morning

sessions, followed by intensive hands-on-training in the afternoon sessions. Staff members including those hired on projects were actively involved in the training and also in organizational matters. The techniques demonstrated and taught to the NER participants benefited them immensely, enabling them to perform better research and teaching in their parent institutions, thus producing skilled faculty/ scientists in our country. The program also provided a novel platform to scientists and faculty from the NER and other parts of the country to discuss their own work findings, enabling them to perform better research and initiate interinstitutional collaboration.



# **Centre for Cancer Epidemiology**

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Atoms for Cancer Care

**Dr. Rajesh Dikshit,** Officer in Charge

Dr. Atul Budukh Miss Sharayu Mhatre

## **Centre for Cancer Epidemiology**



The Centre for Cancer Epidemiology was established in the year 2009 as a part of TMC with the broad vision of Conquering Cancer by Epidemiological Research and Education.The centre is housed at ACTREC campus and the building was fully operational since 2015. The centre includes, Department of Medical Records, Department of Preventive Oncology and core unit of Epidemiology under its umbrella. Following are the major goals of the centre:

- Build a program to identify Cancer Burden, Cancer Causation and cancer prevention strategies
- Build 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 last year (2017-2018) were as follow:

#### **Cancer Registries**

- 1. Technical support for establishment of registries in Nepal (Kathmandu region) and in Myanmar (Yangon).
- 2. Established Registry in Varanasi district.
- 3. Registry is being established in Muzzfarpur.
- 4. Hospital based Cancer Registry initiated at Sangrur hospital.
- 5. Population Based Survival study conducted in four registries of Punjab.
- 6. Established first tribal population based cancer registry at Gadhchiroli.
- 7. The first year report of Population Based Cancer Registry (PBCR) at Gadhchiroli, published.
- 8. The project on improving Cause of Death (COD) certification in collaboration with Centres for Disease Control & Prevention (CDC) foundation in USA was extended to cover Maharashtra state.

#### **Bio-Bank**

Fully automated biobank was established which could store upto three million samples at -80 °C. The bio-bank was hithroughput technology for automated storage and retrival of samples. This was the first automated bio-bank in India. The biobank would be used for large scale population based studies which were ongoing with this centre (200,000 individuals in Barshi Cohort study).

#### **Population Genetics**

- The project entitled "'Elucidating differences in incidence of gall bladder cancer (GBC) by identifying etiologically distinct types of GBC through study of mutational signatures', was developed in collaboration with IARC and Sanger institute UK. The study would conduct whole genome sequencing to confirm the genetic loci and risk factors discovered by recently completed etiological study on gall bladder cancer conducted by CCE.
- The project entitled "Estimating polygenic risk score for breast cancer" was developed in collaboration with NCI, USA. This would estimate genetic risk score for development of breast cancer in Indian population. The study would conduct GWAS based on previously conducted study. The study will also develop risk prediction model for development of breast cancer.
- 3. The first Genome Wide Association Study on Buccal Mucosa cancer was being carried out in 5 different centres. The study was funded by Department of Health Research.

#### Analytical Epidemiology

- 1. Collaboration with IIT Kanpur was developed to measure pollution level (both indoor and outdoor) to study role of indoor and ambient pollution on Lung cancer among non-smokers.
- A consortium for research on gall bladder cancer was formed. The consortia is currently focussing on conducting multicentring study to identify genetic and life style risk factors of gall bladder survey, conduct population based survey to estimate prevalence of gall stone and starting up disease specific registry to collect clinical data base on gall bladder cancer.
- 3. Collaboration with NCI was built to study role of S. typhi in gall bladder cancer.
- 4. A study was conducted to assess the risk factors of head and neck cancers and prevalence of HPV (23 types) in head and neck tumours.
- 5. Methodology was being developed for use of Dry blood spot to conduct genetic and biochemical analysis which would be useful for field Epidemiological studies.
- The cohort was established at Barshi with baseline lifestyle information and collection of biological samples. This would form platform to conduct cutting edge epidemiological studies in future.

#### **Education & Training**

The education and training programme consist of short term and long term training programme and PhD in Epidemiology. One PhD student was awarded with PhD degree. Below is the list of training programme conducted in the year.

Sr. No.	Place	Date	Name of the Course
1	Mumbai	15 <sup>th</sup> March	Visit of Homi Bhabha Cancer Hospital Sangrur, Punjab, India staff for cancer registry training
2	Mumbai	16 <sup>th</sup> March	Visit of Varanasi, Uttar Pradesh, India staff for cancer registry training
3	Mumbai	16 <sup>th</sup> May	Visit Rajiv Gandhi Cancer Institute, Delhi, India staff for cancer registry training
4	Mumbai	31 <sup>st</sup> July	Cancer Registration Training was provided to Ms. Vismay, Lucknow University, Lucknow, India
5	Mumbai	7 <sup>th</sup> August	Cancer Registration Training was provided to Ms. Krisha, Yale University, New Haven, USA
6	Mumbai	2 <sup>nd</sup> September	Visit of Afghanistan participants for cancer registry training. The Candidates are from Ministry of Health.
7	Mumbai	6 <sup>th</sup> - 13 <sup>th</sup> October	Mendelian randomization and Epigenetic Epidemiology
8	Mumbai	28 <sup>th</sup> November	Visit of Nepal participants for cancer registry training. Candidates were from Nepal Medical Research Council

#### Training Programmes (2017)

In addition to these several training programme were conducted for Physicians to improve quality of death certification in Mumbai.



With the team from Nepal at the course on setting up PBCR for Nepal at TMC,  $22^{nd} - 28^{th}$  November 2017



Establishment of Automated Bio-Bank

## Medical Records, Biostatistics & Epidemiology

Dr. Ganesh B., Head



The department of Medical Records, Biostatistics & Epidemiology established in 1957, completed 61 years of continued service, research and education in Tata Memorial Centre. The following are the activities of the department in the above areas:

#### Service

- 1. The department provided case files for patients for the following purposes:
  - Patient Treatment and Follow-up: In the year 2017, an approximate of 25000 case files were issued to patients for Treatment and Follow-up purpose. This number had decreased over the years with the implementation Electronic Medical Records with the implementation of paperless records
  - Doctors / Clinicians for Research: An approximate of 10000 case-files were issued for research studies and other activities
  - As per the TMC Policy of Retention of Medical Records, scanning of case files and weeding of old records was in progress
  - 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 - 2017



#### Residential Status of Patients registered - 2017



#### **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 ICD coding of diseases.

The Doctoral Training Program started in 2013 was registered under HBNI. Three Students were enrolled under the Ph.D Program. One of the three Ph.D. (Doctoral) students completed the Ph.D. in June 2017 while the other two have submitted their thesis and are awaiting the approval of the thesis.

Dr. Ganesh was a member of the Expert Committee of Board for Research in Nuclear Science (BRNS), DAE 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.

#### Survival / End-Result Studies:

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 11450 breast cancer cases, 4211 cervix cancer cases and 12636 head & neck cancers till date. The project abstracted information on the stage of the disease, the types of treatment, details of treatment, any recurrence /metastasis, complications, periodic follow-up status which will enable to estimate the survival rates for the above stated cancers.

Hospital Based Cancer Registry 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 2017, data of the year 2014 was collated. The data compilation of the following years was in progress. The leading site of cancer was Buccal mucosa among males and Breast among females.

Males			Females		
Site	Total	%	Site	Total	%
Buccal Mucosa	1733	9.9	Female Breast	3496	26.8
Leukemia	1414	8.1	Cervix	1376	10.6
Lung	1383	7.9	Ovary	796	6.1
NHL	923	5.3	Gall Bladder	712	5.5
Anterior Tongue	810	4.6	Leukemia	647	5.0
Stomach	632	3.6	Lung	516	4.0
Oesophagus	618	3.5	Thyroid	415	3.2
Prostate	584	3.3	NHL	362	2.8
Brain & CNS	522	3.0	Oesophagus	340	2.6
Rectum	518	3.0	Buccal Mucosa	300	2.3
TOTAL	17449	100.0	TOTAL	13041	100.0

Hospital Cancer Registry – Leading Cancer















#### Trend of Patient Registration and Cancer Cases (2011-2017)



#### **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 and Karwar Cancer

#### Rawatbhata Cancer Registry:

Population	140128	Male: 72654	Female:	67474
i opulation	140120	Walc. 72034	remaie.	0/4/4

Leading Cancer Sites							
	M	ale		Female			
Site	Nos.	AAR*	Site	Nos.	AAR *		
Lung	17	8.9	Cervix	14	7.7		
Mouth	17	8.4	Breast	14	7.0		
G. Bladder	7	3.1	Ovary	8	3.9		
All Cases	122	63.4	All cases	82	42.0		

registries were published during 2017. The data for the other registries were 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 in upcoming Nuclear Power Plant locations was submitted to the authorities.

#### Karwar Cancer Registry:

Population 156133 Male: 78633

Female: 77500

Leading Cancer Sites							
	M	ale		Female			
Site	No	AAR*	Site	No	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 464238 Male: 231459

Female: 232779

Leading Cancer Sites							
	Male			Female			
Site	Nos.	AAR*	Site	Nos.	AAR*		
Tongue	16	6.5	Breast	17	7.3		
Mouth	8	4.1	Cervix	15	6.6		
Larynx	6	3.6	Tongue	5	2.2		
All cases	62	31.2	All cases	66	29.5		

#### **Tarapur Cancer Registry:**

Population	557721	Male: 292153	Female:2,65,568
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Leading Cancer Sites							
	Μ	ale		Female			
Site	Nos.	AAR*	Site	Nos.	AAR*		
Mouth	31	6.2	Breast	49	10.5		
Tongue	21	4.5	Cervix	24	5.8		
Oesophagus	20	4.8	Ovary	20	4.7		
All Cases	216	48.3	All cases	206	49.5		

#### **Ratnagiri Cancer Registry:**

#### Population 1612098 Male: 760030 Female: 852068

Leading Cancer Sites							
	Male			Fem			
Site	Nos.	AAR*	Site	Nos.	AAR*		
Mouth	70	8.2	Breast	114	11.4		
Tongue	28	3.4	Cervix	49	5.1		
Oesophagus	22	2.7	Mouth	42	4.4		
All cases	359	42.3	All cases	453	45.3		

#### Sindhudurgh Cancer Registry:

Population 849651	Male: 417332	Female: 432319
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Leading Cancer Sites							
	Male			Female			
Site	Nos.	AAR*	Site	Nos.	AAR*		
Mouth	62	6.1	Breast	103	9.7		
Tongue	37	3.7	Cervix	40	3.6		
Rectum	24	2.3	Mouth	32	2.8		
All cases	341	34.3	All cases	380	35.9		

#### Kalpakkam Cancer Registry:

Population 4069603 Male: 2114763 Female:1954840

Leading Cancer Sites							
	M	ale		Female			
Site	Nos.	CIR*	Site	Nos.	CIR*		
Stomach	245	11.6	Breast	711	34.0		
Lung	181	8.6	Cervix	415	19.9		
Mouth	141	6.7	Ovary	167	8.0		
All cases	2253	106.8	All cases	2624	125.5		

#### Kundankulam Cancer Registry:

Population 3131579 Male: 1597500 Female:1534079

Leading Cancer Sites							
	Male			Fen	nale		
Site	Nos	CIR*	Site	Nos	CIR*		
Stomach	103	6.8	Breast	325	21.0		
Lung	89	5.9	Cervix	202	13.0		
Mouth	49	3.2	Stomach	54	3.5		
All cases	856	56.4	All cases	1107	71.5		

#### Vizag Cancer Registry: (Urban)

Population 2035922 Male: 1025676 Female:1010246

Leading Cancer Sites					
	Male			Female	
Site	Nos.	AAR	Site	nos.	AAR
Lung	40	4.7	Breast	205	20.4
Stomach	39	4.3	Cervix	126	13
Mouth	32	3.3	Ovary	49	4.8
All sites	347	38.2	All sites	625	63.5

#### 2. Health Check-up Programs – Service & Research:

Health Check-up activities continued at Kaiga and Rawatbhata under the department supervision and guidance. The second report of Kaiga Health check-up was sent to Chairman of DAE. The Kaiga Health check-up completed the screening with 12481 individuals and the project report was being compiled. The Kota Health Survey would screen about 75,000 individuals of which, 15269 individuals had been screened from a enumerated population of the 21579 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 higher than the national average. Hence, a Tobacco Survey was initiated in 2015 in the areas of Supa, Ankola, Yellapur and Karwar. A population of 26200 was enrolled under the program of the 400000 population to be covered. Dr. Sharmila Pimple, Head

Dr. Gauravi Mishra

## **Preventive Oncology**



The Department of Preventive Oncology was a designated WHO Collaborating Centre for cancer prevention, screening and early detection (IND 59), Region SEARO, since 2002 with five main thrust areas:

- Information, Education and Communication: 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: Dissemination of cancer control activities
- Research for development of newer methods and strategies for the prevention and early detection of common cancers in India.

The department of Preventive Oncology conducted Information, Education and Communication programmes and created 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 for Oral, Breast and Cervical cancers were 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. The Hospital and workplace tobacco cessation programs were organized for tobacco users across various sections of the society.

#### Service

A total of **5693** new patients were registered for Preventive Oncology services. Another **7436** were registered for follow up screening services. A total of **13115** individuals (6060 women &7055 men) availed of the Preventive Oncology screening services in 2017.

The institutional tobacco cessation clinic counseled **1015** employees and a total of **576** persons attended the community tobacco cessation clinics.

Of the high risk public sector employees, **4000** BEST employees and **400** taxi drivers were screened.



Newspaper coverage of Tobacco Awareness and Cessation program of High Risk Groups

#### **Education**

Many workshops were conducted for tobacco control and early cancer awareness and detection.

There were 38 observers from diverse fields of medicine who attended the clinics, including three from USA.

#### Research

Thirteen (13) Investigators-initiated research projects investigating effective 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.

International Funded projects: Extended follow up of the Randomized trial of 2 versus 3 doses of HPV Vaccine in India in collaboration with International Agency for Research on Cancer (IARC), France.



# **Satellite Centres**

Atoms for Cancer Care

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## Homi Bhabha Cancer Hospital & Research Centre, Mullanpur Village, District Mohali, Punjab



The Punjab Government had allotted 50 acres of land to construct the "Homi Bhabha Cancer Hospital & Research Centre" at Mullanpur Village, Mohali District, Punjab that would offer a complete range of services to cancer patients.

M/s. DDF Consultants Private Limited, New Delhi were appointed as EPC Consultant and M/s Shapoorji & Pallonji and Co. Pvt. Ltd. as EPC Developer.

The cost of the construction was approximately INR 217 crore on an area of 40545 square meters.

All the statutory approvals viz. MoEF (Environment), Civil Aviation, AERB, Commencement Certificate) were obtained and the construction activities have already commenced.

The project is expected to be completed by early 2019.

## Homi Bhabha Cancer Hospital (HBCH), Sangrur





Homi Bhabha Cancer Hospital, Sangrur was commissioned at Civil District Hospital, Sangrur, Punjab in January 2015. Till date, about 10000 new patients including referral have been registered. The HBCH was fully equipped to treat cancer patients with facilities that included Radiation Oncology, Surgical Oncology and Medical Oncology. This hospital was recognized under the Mukh Mantri Punjab Cancer Raah Kosh Scheme (MMPCRKS) to support cancer patient from Punjab.

In the Phase II, the new building will have 4 state of art Operation Theatres, additional beds (increase to 75 from the existing 25), expanded Intensive Care Units (ICU), Laboratory etc.

The Nuclear Power Corporation of India Limited (NPCIL) sponsored procurement of Minimal Invasive System under Corporate Social Responsibility (CSR). The National Fertilizers Limited (NFL) promised purchase of Bronchoscopic equipment. The Punjab Government sanctioned INR 5 crore for starting Interventional Radiology for cancer management. The planning of the same was under way.

A simple Dharamshala to support the patients was functioning well.

This was the only Government facility in the entire State of Punjab to offer Immunohistochemistry (IHC) services.

#### **Services**

The hospital was well equipped with advanced modalities required to cater for diagnosis as well as for treatment.

In a month, more than **500** radiological procedures and over **4500** laboratory investigations were performed. Chemotherapy was administered to over **500** patients and about **50** surgical procedures performed. Radiotherapy was offered to about **80** patients monthly. The number of medical faculty available in the Hospital increased over a period of time. The patient management services were all online.

Medicines were sold at 60 % less than the Maximum Retail Price (MRP).

#### **Education**

The B.Sc courses for Technicians in RT, Lab, Radiology, Surgical and Anesthesia continued with the support of State Goverment and from the Baba Farid University of Health Sciences, Faridkot, Punjab.

From the next academic year, it was proposed to start a M.Sc. (Histopathology) with 2 seats; the intention being to improve the standard of histopathology in the State for better management of cancer patients.



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

**Dr. Digumarti Raghunadharao,** Director



Homi Bhabha Cancer Hospital & Research Centre at Visakhapatnam caters to cancer patients from the states of Andhra Pradesh, Orissa, Chattisgarh, Jharkhand and Telangana.

Clinical Services were started on the site of the main campus in Aganampudi on 2 June 2014. The facility is entirely operational from *temporary* accommodation consisting of porta cabins and a few brick-and-mortar buildings.

It offers 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.

Majority of the 'temporary' buildings were made possible by generous donors, including most of the equipment.

We also provide 3 meals a day at the city centre and a lunch at the main campus, free of cost to all patients and an attendant, entirely sustained on donations.

We have 2 buses, 1 van, 1 ambulance and a staff car - all on philanthropy.

#### **The City Centre**

Under corporate social responsibility, the Port Authority of Visakhapatnam leased us a floor in their hospital. Here, using donations, we have created a modern operation theatre, a 5 bedded intensive care unit and 3 cabins of 6 beds each. The facility is functional since June 2014 and is mainly used for surgeries and in patient care, prior to which, surgeries were performed at the St. Joseph's Hospital.

We also have 'temporary' accommodation in 2 locations for the staff: in the nearby Port Hospital Residential Area as well as on the Hills along the beach.

We also have the following equipment on donation: apharesis unit (for stem cell transplants), a hemodialysis unit, a water treatment plant, hysteroscopy and laparoscopy equipment, and a digital colposcopy unit for the main campus.

#### **Present Scenario**

We run eight out-patient clinics every day at the Main Campus in Aganampudi: medical and paediatric oncology, gynaecological oncology, surgical oncology, head and neck oncology, palliative care, physiotherapy and entire range of cancer pharmacy services. We also take care of hospice and home care, in association with the Senhasandhya Age Care Foundation.

The Jiv Daya Foundation of Dallas, USA supports the childhood cancer and palliative care services with a nurse and social worker for each of the areas.

We conduct at least one rural cancer screening camp a month.

The information technology and computer services, administration, accounts, stores, medical records, cancer registries (PBCR and HBCR), a lecture hall, a meeting room and engineering services also function from *porta cabins*.

There is an exclusive kitchen cum canteen for both patients and staff.

We also have an EPABX and 3 internet connections from BSNL, RailTel and Reliance. There is complete power back up with a generator.

#### The Patient load and Projections

We cater to nearly 150 to 175 patients in a day. Last year, we registered **2879** new patients. This year, we hope to touch 4000 to 4500 new patients. The review patient load is nearly 8 times that figure.

In a couple of months, we shall be permitted to treat patients covered under the State Health Schemes – serving & retired government employees & dependents and, the prestigious *Dr. NT Ramarao Arogyasree Scheme* for patients below poverty lines.

#### The Staff

At present, the 5 full time medical staff include: 1 anaesthetist, 2 head and neck surgeons, a biochemist and a pathologist. The 3 ad-hoc medical staff include: 1 each of radiologist, gynaecological oncologist and a palliative care specialists. Five 4<sup>th</sup>-year bond-doctors from TMC work in anaesthesiology, surgical oncology, radiology, physiotherapy and medical oncology rotate for a few months each.

About 11 permanent nurses and 7 ad-hoc nurses are

presently manning all the stations.

All the administrative staff (5), accounts (2), the registry staff (8), the services staff and the technical staff (6) are all adhoc staff.

It is imperative that we recruit additional medical, nursing, scientific, technical and administrative staff as early as possible to be able to meet the impending demand.

This will enable us to offer services in those areas that are distinctly ABSENT in cancer armamentarium both in diagnostics and in treatment, especially bone and soft tissue, hemato lymphoid, transplantation, thoracic, neurosurgical and paediatric cancers.

#### The Status of the Main Hospital

Construction of several hospital buildings in the main campus is nearing completion: the registration block, the radiotherapy cum imaging block, the Dharamshala, the nurses' hostel, doctors' hostel, services block, kitchen & canteen and the power house with generators.

Apart from the instrumentation and for each of these blocks, the pending works include services: water, electricity, telephony, local area network, elevators, plumbing, sullage and sewage, air conditioning and roads. The same are expected to be completed by the 3<sup>rd</sup> quarter of this year.

A Bhabhatron has been installed and needs to be commissioned after due calibration once power is in place. The Linear Accelerators, the MRI, CT Scan, DSA, Gamma Camera, PET-CT and other high end equipment are likely to be installed and functional by the end of the year.

The civil structure of main hospital building – outpatient clinics and inpatient wards as well as the operation theatres and the intensive care units is likely to be completed by about the middle of next year.



# **Staff Honors**

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## **Staff Achievements**

#### Acharekar, Anagha

- IACR Day 1 Best Poster Award: 'Understanding radioresistance mechanism in Glioblastoma', 36<sup>th</sup> Annual Convention of the Indian Association for Cancer Research and National Conference on 'The 21<sup>st</sup> century – war on cancer', Amala Cancer Research Centre, Thrissur: February 9-11, 2017
- NCE Best Poster Award: 'Role of mechanical microenvironment in aggressive nature of relapsed GBM cells post radiotherapy', NCE Meeting, NIT, Hamirpur: November 2017

#### Acharya, Saujanya

 Springer Poster Presentation Award (Second Prize): 'HtrA3 serine protease: elucidating the complex regulatory mechanisms of a unique cell death regulator', Indo US Conference on 'Advances in Enzymology: implications in health, disease and therapeutics, ACTREC, Navi Mumbai: January 15-19, 2017

#### Achrekar, Meera

 Nurses Day Oration: 'Nurses - a Voice to lead, achieving the sustainable goals', Godrej Hospital, Mumbai: May 12, 2017

#### Agarwal, JP

• Appointed Chairman of Doctoral Committee of Homi Bhabha National Institute (HBNI).

#### Aher, Swapnil

 Second Prize: 'Arsenic trioxide induces degradation of NPM1 mutant oncoprotein in AML cells' (poster presentation), International Conference on 'Revolution of laboratory medicine in modern biology', National Institute of Immunohematology, Mumbai: February 15-17, 2017

#### Ajit, D.

• Procured a patent in the name of Tata Memorial Centre from The Patent Office, Intellectual Property Rights, Government of India for the invention of *Liquid Based Thin Layer Cytopreparation*.

#### Ambulkar, Reshma

• Secretary, Mumbai branch of Indian Society of Critical Care Medicine: 2016-17

#### Badwe, RA

- Honorary Degree of Doctor of Science conferred by Gitam University, Visakhapatnam on 7.11.2017.
- Jewel of Ruia Award conferred by Ruia College on 21.1.2017.
- Oration: "Cancer Care India challenges and solutions" Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER) on 12.4.17.
- Professor B.N. Balakrishna Rao Memorial Oration Cancer Care in India – Role of Surgeon, Bangalore 24.6.2017.

#### Bajpai, Jyoti

 "Guest Editor" for especial issue "Common Cancers: Indian Data" South Asian J Cancer 2016;5: Issue 3,137-8.

#### Banavali, Shripad

- Chair of Indian Pediatric Oncology Group (InPOG) for Jan 2018 - Dec 2020.
- Nominated as "Mumbai Heroes 2017" by Mumbai Mirror (A Times of India Publication) for "Battling Cancer & it's Costs).
- Keynote Speaker at 8th World Congress on "Pharmacology and Toxicology" Melbourne, Australia."Propranolol in Angiosarcoma: First Major Advance in Decades". July 24-26, 2017.
- Recepient of the Laxman Vinayak Sapre Guruji Smruti Samiti Award for Academic Contribution in the field of Medicine (7th March 2017).

#### Bodade, Anand

 Awarded 1st prize for oral presentation on HLA associated susceptibility and resistance to AML patients in an Indian cohort: A case control study: Anand Bodade, Ashok Patel, Manisha Tambe, Sunil Rajadhyaksha, Meenakshi Singh at International Conference on Revolution of Laboratory Medicine in Modern Biology organized by ICMR (15th to 17th February 2017, Mumbai).

#### Chatterjee, Mohua

 Best Presentation Award: 'Effectiveness of physiotherapy in hand dysfunction of leukemia patients with chronic musculoskeletal graft versus host disease post bone marrow transplant' (oral presentation) 19th International Conference on Physiotherapy (ICP 2017), London, UK: January 19-20, 2017

#### Chaturvedi, Pankaj

- Chairman, Oral Cancer Foundation
- Excellence in Oncology award by Chief Minister of Maharashtra.
- Secretary General of International Federation of Head Neck Oncology Society.
- SMS Hospital Oration Jaipur.
- JIMA oration, Kolkata.

#### Chaudhari, Pratik

• First Prize for Platform Presentation: 'Hemidesmosomal linker proteins regulate cell motility, invasion and tumorigenicity of oral cancer derived cells', 13<sup>th</sup> National Research Scholars Meet in Life Sciences, ACTREC, Navi Mumbai: December 14-15, 2017

#### Chaugule, Sachin

 Best Oral Presentation Award: 'Role of marine mollusk derived bioactive neutraceutical in inhibiting post menopausal osteoporosis', 2<sup>nd</sup> International Conference on Nutraceuticals and Chronic Diseases (INCD 2017), Goa: September 1-3, 2017

#### Chaukar, Devendra

• Secretary General, International Federation of Head & Neck Oncology Societies.

#### Chiplunkar, Shubhada

- Prof. Milton Yatwin Oration: 9th Biennial Conference on Hyperthermia, Gujarat Cancer & Research Institute, Ahmedabad: February 18-19, 2017
- Hospital Day Oration: The Gujarat Cancer & Research Institute and the Gujarat Cancer Society, Ahmedabad: March 11, 2017
- Shri R.J. Kinariwala Research Award: The Gujarat Cancer & Research Institute and the Gujarat Cancer Society, Ahmedabad: March 2017
- Chairperson: Scientific Advisory Committee and Member, Research & Recognition Committee, MGM Institute of Health Sciences, Navi Mumbai: 2014-18
- Chairperson: Institutional Committee for Stem Cell Research, National Institute for Research in Reproductive Health, Mumbai: 2015 onwards
- Chairperson, Ad-hoc Board of Studies in Applied Biology, and Member of its Research and Recognition Committee, University of Mumbai, Mumbai: 2015-18
- Ex-Officio Member of the Academic Council, of the Faculty of Science, and of the Board of University Teaching and Research, Faculty of Science, University of Mumbai, Mumbai: 2015-18

 Chairperson: Task Force Committee of Cancer Biology, Department of Biotechnology, Government of India, New Delhi: 2017-20

#### Chopra, Supriya

- Received International Mobility Grant, DST Austria India Mobility Grant (PI).
- International Young Leader, UICC.

#### Daddi, Anuprita

• Participated in Standard Chartered Mumbai Marathon 2017's half marathon of 21 km in 2 hours 25minutes.

#### Dalal, Sorab

• DBT Nominee on the Institutional Biosafety Committee, Biogenomics and Reliance Life Sciences.

#### Damini, Anuja

• Recipient of the AAHPM Developing countries scholarship award 2017.

#### D'cruz, AK

- Board of Director, Union for International Cancer Control (UICC).
- Governing Council, Foundation for Head & Neck Oncology (FHNO).
- William Rudder Memorial Lecture: Cancer Council Queensland, Australia, July 2017.
- William Rudder Visiting Professor, Cancer Council Queensland July 2017.
- Dr. Jatin Shah Oration: 13th Annual Scientific Symposium of Joint International Conference JIC 2017.
- Oration: Indo Global Summit on Head & Neck Oncology (IGSHNO 2017.

#### Deodhar, Jayita

- Awarded Postgraduate Diploma in Palliative Medicine (Cardiff University).
- Member, Education Committee and LMIC Section of International Psycho-Oncology Society.

#### Desai, Sangeeta

 International Award "Outstanding International Surveyor" in recognition of her contribution to quality of ethics committees in the Asia-Pacific region by Forum for Ethical Review Committees in the Asian and Western Pacific region (FERCAP).

#### Deshpande, DD

- Chairperson at "Elekta Indian Radiation Oncology Neuro summit" at New Delhi.
- Felicitated at AMPICON, 2017 Jaipur for immense contribution for AMPI.

 Chairman of Standing Committee on TeachingCourses & Radiation Professional (SCTC & RP) of AERB at RP & AD, BARC.

#### Dhende, Suhas

• Jwala Devi National Award for the best innovative technical paper, "Cytopreservation Technique for Repository of Cytology Samples" at CYTOCON 2017 held at Shillong.

#### Divatia, JV

- Editor-in-Chief, Indian Journal of Anaesthesia.
- President, All-India Difficult Airway Association (2015-2017).
- Dr. R K Pradhan Oration at MISACON 2017 on October 7, 2017 (Maharashtra State ISA Conference, October 5-8, 2017) on Anaesthesia Today - Beyond Spinal, Intubation & Extubation.
- World Anaesthesia 2017 conference Oration on 14th October 2017 (ISA Mumbai) on Anesthesia as a Game changer of Health Care.

#### D'Souza, Anita

• Secretary Oncology Nursing Association of India (ONAI).

#### Dutt, Amit

- Award of Shanti Swarup Bhatnagar Prize for Science & Technology for the year 2017 in Medical Sciences, New Delhi: November 2017
- Distinguished Alumni Award, Jamia Millia Islamia, New Delhi: 2017

#### **Dutt, Shilpee**

 2017 ISNO President's Annual Award for the Outstanding Work in Neuro-Oncology: 9<sup>th</sup> Annual Conference of the Indian Society of Neuro-Oncology, Kidwai Cancer Institute, Bengaluru: March 10-12, 2017

#### Gamre, Poonam

 First Prize in Oral Presentation: 'Respiratory motion management in treatment of cancer', 4<sup>th</sup> National Conference – 2017 of the Indian Society of Radiographers and Technologists, Aizawl, Mizoram: September 7-9, 2017

#### Ganesh, B.

• Expert Committee member of Board for Research in Nuclear Science (BRNS), DAE for various Health Survey Projects.

#### Ghoshal, Arunanghsu

• Completed his MSc Clinical Research program from King's College London, UK.

#### Ghosh-Laskar, Sarbani

Dean, Student Affairs, TMH -HBNI.

#### Gulia, Ashish

• Awarded with G.S. Grewal award for best scientific presentation in North zone orthopedic meeting in February 2017.

#### Gupta, Abhay

- Won 1st prize in PG Quiz at 40th Mumbai Haematology Group (MHG) Annual Conference, Mumbai held on 11th and 12th March 2017.
- 1<sup>st</sup> Prize: PG Transfusion Medicine Quiz, 40<sup>th</sup> Annual Conference of Mumbai Hematology Group, Mumbai: March 11-12, 2017
- Winner: Faculty Quiz (non-PG) in Transfusion Medicine, 6<sup>th</sup> Annual Conference of Indian Society of Transfusion Medicine, Lucknow: November 3-5, 2017

#### Gupta, Sudeep

• Plenary Talk: 'A study in locally advanced cervical cancer, funded by Department of Atomic Energy - Clinical Trials Centre, proved that giving chemotherapy plus radiation resulted in better outcome compared with chemotherapy followed by surgery', Plenary Session, ESMO Meeting, Madrid: September 10, 2017

#### Gupta, Tejpal

- ISNO President's Award for Best Clinical Researcher.
- Keynote Lecture: 'Altered fractionation RT in HNSCC', Indo-Global Summit on Head Neck Oncology, Bhagwaan Mahaveer Cancer Hospital, Jaipur: February 11-12, 2017
- ISNO President's Award for Best Clinical Researcher: 'Leveraging technology and harnessing biology: research efforts in medulloblastoma', Indian Society of Neuro-Oncology Meeting, NIMHANS, Bangalore: March 10-12, 2017

#### Gurav, Mamta

- Awarded with International Membership Grant 2017 of Association of Molecular Pathology.
- Received an International Molecular Pathology Award for Conference Travel at the AMP 2017 Global Congress on Molecular Pathology 2017 at Berlin, Germany.

#### Ingle, Arvind

• President: Asian Federation of Laboratory Animal Science: 2017-18

#### lyer, Prajish

 Best Poster Award: 'Diversity of somatic alterations and Salmonella infections in gallbladder cancer' (poster presentation), NextGen Genomics, Biology Bioinformatics and Technologies (NGBT 2017) Conference, Bhubaneswar: October 2-4, 2017
# Jagdish, Prathepa

• President Oncology Nursing Association of India (ONAI).

# Jain, Hemani

- Won the First prize for Oral presentation in ' Science behind the Cure' Awards - 1st THG Annual Conference 2017 for "Significance of Cytogenetic Aberrations In Bone Marrow of Patients With B-cell Non-Hodgkin's Lymphoma".
- First Prize Science behind the Cure Awards: 'Significance of cytogenetic aberrations in bone marrow of patients with B-cell non Hodgkin's lymphoma' (oral presentation), First Annual Conference of Thane Hematology Group, Thane: April 16, 2017

# Jalali, Rakesh

- President, Indian Society of Neuro Oncology.
- In-Charge Brain Tumour Foundation (BTF) of India.
- Executive Editor, ASNO region, Neuro Oncology Practice.
- Webmaster, Asian Society for Neuro Oncology (ASNO).

#### Joshi, Swapna

- Received the Florence Nightingale president's award by Honorable President Mr. PranabMukharji at Rashtrapati Bhavan at New Delhi on 12th May 2017.
- President of the Trained Nurses' Association of India (TNAI).

#### Kane, Shubhada

- First president of the new Association of Cytologists of Maharashtra (ACM).
- Invited speaker in the "GAP conference" organised at MD Anderson Hospital, Houston, USA on 'Diagnosis and Management of lung cancer – An Indian Scenario" in May 2017.
- Editorial board member of the Indian Journal of Pathologists and Microbiologists.
- Special award by Association of Indian Pathologists in North America (AIPNA) for exceptional contribution towards improving cancer education in India,2017.

# Kinhikar, RA

 Inaugurated the Physics Society and delivered a lecture at Sant Gadge Baba Amravati University, Amravati on 19<sup>th</sup> August 2017.

#### Krishnatry, Rahul

- Training Award: TN-RAS6072-1702275: Regional Training Course on Quality Audits of Intensity Modulated Radiation Therapy, Singapore.
- Journal Special issue Editor "Pediatric NeuroOncology": Cancer Translational Medicine.

# Kulkarni, AP

- President of Association of SAARC Critical Care Societies (ASAARCS) (2016-2018).
- Secretary General, Asia Pacific Association of Critical Care Medicine (APACCM) (2016-2019).
- Oration for ISCCM Kolhapur branch 30th April 2017.

# Kulkarni, SS

- Secretary general: Indian Society of Vascular and Interventional Radiology (ISVIR).
- Secretary: Society of Interventional Onco-Radiology of India (SIO).
- Distinguished Achievement Award (given by the Board Directors of Asian Conference on
- Tumor Ablation) in China area of tumor ablation.

# Lasarado, Carmine

• President of Association of periOperative Registered Nurses (AORN).

# Laskar, Siddartha

• Nominated Expert from India: CERN Knowledge Transfer Forum.

# Lipsa, Anuja

 Best Poster Award: 'CMMRD and beyond: varied mutation spectrum of PMS2 and other MMR genes producing diverse phenotypes', 2nd International Conference on Founder Populations – the landscape of genetic variants in Asian founder populations from near and far east', Kochi: November 9-12, 2017

#### Maddirala, Madhu Mohan

 Prof. Dr. GD Mogli's Professional Excellence Award for the year 2017: 'HIM role in quality and patient safety' (oral presentation), JIPMER-HIMA Asia Conference, JIPMER, Puducherry: October 27-28, 2017

#### Mahajan, Abhishek

• Foundation of Head & Neck Oncolgy, Gold Medal for best paper presentation on 15.09.2017.

#### Mahantshetty, Umesh

• Best oral presentation: Plenary presentation at Eur Soc Gyn Onco (ESGO) 2017.

#### Mishra, Sumit Kumar

 ISNM-ACS Best Poster Presentation Award: 'In vivo photothermal therapy using Au-nanosphere can cure therapy resistance cancer', 2<sup>nd</sup> Annual Conference of the Indian Society of Nanomedicine (NanoBioteck-2017), Thiruvananthapuram: December 6-8, 2017

### Mishra, TN

- Special Executive Officer, Government of Maharashtra.
- Recepient of 'Padmashri Prof. Kakarla Subbarao Life Time Achievement Award' presented by Kakarla Subbarao Radiological & Educational Sciences Trust.

### Mojidra, Rahul

 Second Prize in Poster Presentation: 'Status of DNA double strand breaks, machinery for their repair and chromosomal aberrations in imatinib sensitive and resistant cells representing CML-BC', 58th Annual National Conference of the Indian Society of Hematology and Blood Transfusion, Guwahati: November 3-5, 2017

#### Mujawar, Aaiyas Abdulhamid

• CSIR Shyama Prasad Mukherjee Fellowship in Life Sciences: Awarded by CSIR to the Toppers of the CSIR-UGC JRF-NET Exam conducted in December 2016: Result declared in December 2017

#### Mukaden, Mary Ann

- President of Indian Association of Palliative Care.
- Executive board member of Asia Pacific Hospice Network.
- Advisor for Cipla foundation.

#### Mundhe, Dhanashree

 Sitaram Joglekar Award for Best Oral Presentation by a Young Scientist: 'p63 regulates activin A-mediated migration in human oral cancer cells', 36th Annual Convention of the Indian Association for Cancer Research and National Conference on 'The 21st century – war on cancer', Amala Cancer Research Centre, Thrissur: February 9-11, 2017

### Mytra, S

- President, All India Difficult Airway Association (AIDAA).
- Secretary Accreditation, Indian College of Critical Care Medicine (ISCCM).
- INICC Secretary for India (International Nosocomial Infection Control Consortium) Argentina (headquarters).

#### Nagaraju, Palumara

 2nd Prize for Oral Presentation: 'Are we really wasting blood? An analysis of red cell component status in blood transfusion service of a tertiary care oncology centre', 42nd National Conference of the Indian Society of Blood Transfusion and Immunohematology (Transcon 2017), Govt. Medical College, Kota: December 8-10, 2017

# Nair, Jyothi

• IACR Day 2 Best Poster Award: 'Deciphering therapy resistance in GBM using orthotopic mouse models and in vitro transcriptome analysis', 36th Annual Convention

of the Indian Association for Cancer Research and National Conference on 'The 21st century – war on cancer', Amala Cancer Research Centre, Thrissur: February 9-11, 2017

 ISNO Best Abstract Award: 'Preclinical orthotopic mouse model recapitulates clinical scenario of glioblastoma resistance, captures residual cells and identifies their dependency on SETMAR mediated NHEJ repair for survival and relapse' (oral presentation), 9th Annual Conference of the Indian Society of Neuro-Oncology, Kidwai Memorial Institute of Oncology, Bengaluru: March 10-12, 2017

#### Narula, Gaurav

- Visiting Professor Lecture at National Cancer Institute -Center for Global Health, Rockville MD, USA on 10th Oct 2017 on "Driving CARs (Chimeric Antigen Receptor T-cells) on Indian Roads".
- Editor-in-Chief, Pediatric Hematology Oncology Journal.

#### Navkudkar, Anisha

 Awarded 2nd prize for poster presentation on Epitope matched platelets: An effective way to provide platelet transfusion support in platelet refractory patients: Anisha Navkudkar, Jyoti, Manisha Tambe, Ashok Patel, Sunil Rajadhyaksha, Meenakshi Singh, at International Conference on Revolution of Laboratory Medicine in Modern Biology organized by ICMR (15th to 17th February 2017, Mumbai).

#### **Omshree**, Shetty

- Was awarded by the Department of Science and Technology Travel Grant 2017 for attending Association of Molecular Pathology Annual Meeting 2017 at Salt Lake City, Utah, USA.
- Won the best paper award for oral presentation entitled "MYD88 and CARD 11 mutations in HIV associated Lymphomas" at the "1st annual update on Lymphomas" held at the ITC Grand Central, Parel, Mumbai from 28th to 29th October 2017.

#### Oza, Nikita

 Best free oral paper presentation award for "Audit on FNAC of Thyroid Nodules - What do we learn??" at CYTOCON 2017.

#### Pai, Prathamesh

• Secretary, Indian Society for Thyroid Surgeons.

#### Pal, Kavita

 Award for Best Poster Extended Abstract: 'Prevention of chemotherapy toxicity by agents that neutralize or degrade cell-free chromatin', The Xth Circulating Nucleic Acids in Plasma and Serum Meeting, Montpellier, France: September 20-22, 2017

# Parab, Swapnil

• Won the best poster 'award at New Zealand Anaesthesia Annual Scientific meeting 2017.

### Parmar, Vani

• Director, of Education (West zone) in Association of Breast Surgeons of India.

# Patil, Rushikesh

• DST-INSPIRE Faculty Award: Department of Science & Technology, Government of India: July 2017

#### Pimple, Sharmila

 Selected as Certified Trainer for the Faculty for the online International Federation of Cervical Pathology and Colposcopy IFCPC-IARC training course in Colposcopy and the prevention of Cervical Cancer: India program.

#### Poladia, Pratik

 Best Oral Presentation: 'Quality indicators in hematology lab', 37<sup>th</sup> Conference of Indian Cooperative Oncology Network (ICON), New Delhi: September 15-17, 2017

#### Pramesh, CS

- Directorate member, International Society for Diseases of the Esophagus (ISDE).
- Directorate Member, Worldwide Innovative Network (WIN) Consortium.
- World Health Organization (WHO) Expert Group on medical devices in cancer management.
- World Health Organization (WHO) Task Force, Strategic technical meeting on management of cancer.

#### Prasad, Maya

• Section Editor- Pediatric Solid Tumors for Pediatric Hematology Oncology Journal.

# Puri, Ajay

- President, Asia Pacific Musculoskeletal Tumor Society.
- President Indian Musculoskeletal Tumor Society.
- Guest editor: Indian Journal of Orthopaedics, special edition on musculoskeletal oncology.

# Qureshi, Sajid

- Delivered the K. M. Yusuf Memorial Oration at the Tamil Nadu & Pondicherry Paediatric Surgery Annual Conference, SEPSCON, Salem, Tamil Nadu. July 2017.
- Appointed Webmaster-International Society of Paediatric Surgical Oncology. (IPSO).

# Rajyadhyaksha, SB

• Editor, Global Journal of Transfusion Medicine, the official journal of Asian Association of Transfusion Medicine.

# Rekhi, Bharat

- Recipient of Dr V.R. Khanolkar award for the year 2017-18 for the best published paper in Modern Pathology.
- Editorial board member of the Indian Journal of Pathologists and Microbiologists.

# Saleem, P.

• Procured a patent in the name of Tata Memorial Centre from The Patent Office, Intellectual Property Rights, Government of India for the invention of *Liquid Based Thin Layer Cytopreparation*.

# Salins, Naveen

- Editor of Indian Journal of Palliative Care.
- Honorary Tutor, School of Medicine, Cardiff University, UK.
- Director of the EPEC India Program of North Western University Chicago.
- Visiting Associate Professor, Northern Adelaide Palliative Services, Modbury Hospital, Australia.

# Sarin, Rajiv

- Chairperson of the National Apex Committee for Stem Cell Research & Therapy.
- Keynote Address "Genetic Testing in Cancers Who, What, When" at Cancer CI Conference, Hyderabad.
- National Apex Committee for Stem Cell Research & Therapy, ICMR Headquarters, Delhi.

# Sastri, Supriya

• UICC International Young Leaders Program 2017-18 Award: UICC World Cancer Congress, Mexico City, Mexico: November 13-15, 2017

# Shalini, KS

 Best Paper Award: 'Role of hypoxia on activation and effector functions of gdT cells in patients with oral cancer', 40<sup>th</sup> Annual Conference of the Indian Immunology Society (Immunocon-2016), GITAM University, Visakhapatnam: February 16-18, 2017

#### Shetty, Dhanlaxmi

• Elected executive committee member of Indian Society for Prenatal Diagnosis and Therapy (ISPAT) 2017 - 2019.

# Shrikhande, SV

- Dr. Alfred Mascarenhas Memorial Oration.
- Prof. R. S. Naik oration in CGASICON Raipur.
- Prof. T. G. Goel oration in Lucknow.

# Singh, Meenakshi

• Counselor Asia Pacific Histocompatibility and Immunogenetics Association (APHIA).

# Subramanian, PG

- Elected President of The Cytometry Society of India.
- President (Clinical): The Cytometry Society of India

### Sundararajan, Rangapriya

 Biochemical Journal Best Oral Presentation Award: 'Regulatory networks of the PSMD9 proteasomal chaperone', Indo US Conference on 'Advances in Enzymology: implications in health, disease and therapeutics, ACTREC, Navi Mumbai: January 15-19, 2017

#### Tembhare, Prashant

• Secretary of the Cytometry Society of India.

# Thakur, MH

- President, Breast Imaging Society of India (BISI), India.
- Chairperson, Global Health Symposium and Annual Global Academics Programs 2017, Houston, Texas, USA organized by M.D. Anderson Cancer Centre, Houston, USA.

# Upreti, RR

• Awarded financial grant from IAEA to attended ICARO2 conference at Vienna (Austria) during June 20th to 23rd, 2017.

# Vagal, Manjusha

• Awarded 'N. Swaroop Trophy for Best Innovative Technology' for Splinting Protocol for Preventing Manus Valgus Deformity in Children Following Excision of Radius 'at 54th National Conference of the 'All India Occupational Therapists' Association, Jaipur, India, Feb 2017.

# Velaskar, Shruti

 2<sup>nd</sup> best Platform presentation award for "Validation and translation of EORTC, CIPN 20, QOL module into Hindi and Marathi" at 1<sup>st</sup> Can Rehabilitation Conference on 9<sup>th</sup> April 2017.

# Yadav, Prabha

• Gilles oration at APSICON 2017, Kochi.

# **Books and Chapters**

# **Book Chapters**

- Banavali S, Thacker N."Challenges in neonatal malignancies". In: Lokeshwar MR (ed.) Fetal and neonatal hematology, oncology and immunology. New Delhi: JP Medical Ltd., 2017. Pp. 207-276. (ISBN: 978-93-86322-76-0)
- 2 Caroline CV, Mal A, De A et al."The ãsecretase protease complexes in neurodegeneration, cancer and immunity". In: Chakraborti S, Dhalla N (Ed.) Pathophysiological aspects of proteases. Singapore: Springer Nature, 2017. Pp. 1-14. (ISBN: 978-981-10-6140-0)
- 3 Chakrabarti S."Pearls and pitfalls in oral cancer management". In: Kuriakose MA (Ed.) Contemporary oral oncology: diagnosis and management. Switzerland: Springer Nature, 2017. Pp. 235-270. (ISBN: 978-3-319-14916-5)
- 4 Gujral S, Tiwari M. "Release of Results". In: Sood SK, Mukherjee R, Sood S. Assuring quality and competence: A Guide for Medical Laboratories Seeking Accredation to ISO 15189. Noida: Sumeet Sood, 2017. Pp.189-196. (ISBN: ASIN: B06XFL8ZTQ)
- 5 Gujral S, Tiwari M. "Reporting the Results". In: Sood SK, Mukherjee R, Sood S. Assuring Quality and Competence: A Guide For Medical Laboratories Seeking Accredation to ISO 15189. Noida: Sumeet Sood, 2017. Pp.182-188. (ISBN: ASIN: B06XFL8ZTQ)
- 6 Mahajan A, Cook G." Clinical aPp.lications of PET/CT in oncology". In: Khalil MM (Ed.) Basic Science of PET Imaging. Switzerland: Springer Nature. 2017. Pp. 429-450. (ISBN: 978-3-319-40068-6)
- 7 Mahajan A, Cook G." Physiologic and molecular basis of PET in cancer Imaging". In: Khalil MM (Ed.) Basic Science of PET Imaging. Switzerland: Springer Nature. 2017. Pp. 429-450. (ISBN: 978-3-319-40068-6)
- 8 Maya P." Fetal neonatal germ cell tumors". In: Lokeshwar MR, Sachdeva A. (Ed.) Fetal and neonatal hematology, oncology and immunology. New Delhi: Jaypee Brothers Medical Publishers. 2017. Pp.254-276. (ISBN: 978-93-86322-76-0)
- 9 Misra PK, Bunkar N, Jain SK (et al.) "Bhopal (1984): Cancer Risk among Survivors and Opportunities for Translational Environmental Health Research". In: Brimblecombe P (Ed.) Air Pollution Episodes. Singapore: World Scientific. 2017. Pp.101-127. (ISBN:9781786343406)

- 10 Munnolli SS, Pujar SM. "Altmetrics on Altmetrics! A study of top 100 Articles on Altmetrics". In: Sangam SL, Hosamani SS, Anand TB, Shivaram BS (Eds.) Information for All: Scientometrics, Infographics, Social Medica & Public Libraries. Bengaluru: LIS Academy. 2017. Pp. 15-24.
- 11 Myatra SN, Monnet X, Teboul JL. "Use of tidal volume challenge to improve the reliability of pulse pressure variation". In: Jean-Louis V (Ed.) Annual update in intensive care and emergency medicine 2017. Switzerland: Springer Nature. 2017 Pp. 81-91. (ISBN: 978-3-319-51907-4)
- 12 Parui AL, Bose K." Caspases: regulatory mechanisms and their implications in pathogenesis and therapeutics". In: Chakraborti S, Dhalla N (Eds.) Pathophysiological aspects of proteases. Singapore: Springer Nature, 2017. Pp. 423-488. (ISBN: 978-981-10-6140-0)
- 13 Prachand V, Ferguson MK, Pramesh CS (et al.) Thoracoscopic and Laparoscopic esophagectomy with cervical anastomosis. In: Wang J, Ferguson MK (ed.). Atlas of Minimally Invasive Surgery for Lung and Esophageal Cancer. Springer, 2017. Pp.307-338. (ISBN: 9402408355)
- 14 Qureshi S. "Neonatal liver tumor". In: Lokeshwar M.R and Sachdeva A (Ed.) Fetal and neonatal hematology, oncology and immunology. New Delhi: Jaypee Brothers Medical Publishers. 2017. Pp.230-237. (ISBN: 978-93-86322-76-0)
- 15 Wagh AR, Bose K." Emerging roles of mitochondrial serine protease HtrA2 in neurodegeneration". In: Chakraborti S and Dhalla N (Eds.) Pathophysiological aspects of proteases. Singapore: Springer Nature, 2017. Pp. 325-353. (ISBN: 978-981-10-6140-0)

# **Books**

- 1 "Indelible footprints on the sands of time"
- 2 De'Souza C, Peter R, Tucci DL (Eds.) Implantable hearing devices. San Diego: Plural Publishing Inc., 2017. (ISBN: 978-1-59756-855-5)
- 3 Jiwnani S, D'cruz A, Badwe R (Eds.) Atlas of operative surgical oncology. New Delhi: Jaypee Brothers medical Publishers (Pvt.)Ltd., 2017. (ISBN:978-93-86261-98-4)
- 4 Kulkarni AP, Divatia JV, Patil VP (Eds.) Objective Anaesthesia Review: A comprehensive Text Book for the Examinees. 4th ed. New Delhi: Jaypee Brothers Medical Publishers. 2017. (ISBN 978-93-5270-049-3)
- 5 National Cancer Grid (Eds.) NCG Guidelines for Common Cancers. India: National Cancer Grid., 2017. (ISBN: 978-93-82963-10-3)

# **Staff Publications**

# International

- Adams C, Henshall S, Torode J, D'Cruz AK, Kumar HS, Aranda S (2017) - C/Can 2025: City Cancer Challenge, a new initiative to improve cancer care in cities. Lancet Oncology. 18(3):286-287. PMID:28169173.
- 2 Agarwal J, Krishnatry R, Chaturvedi P, Ghosh-Laskar S, Gupta T, Budrukkar A, Murthy V, Deodhar J, Nair D, Nair S, Dikshit R, D'Cruz AK (2017) - Survey of return to work of head and neck cancer survivors: A report from a tertiary cancer center in India. Head and Neck. 39(5):893-899. PMID:28170129.
- 3 Agarwal JP, Chakraborty S, Laskar SG, Mummudi N, Patil VM, Prabhash K, Noronha V, Purandare N, Joshi A, Tandon S, Arora J, Badhe R (2017) - Prognostic value of a patient-reported functional score versus physicianreported Karnofsky Performance Status Score in brain metastases. Ecancermedicalscience. 11:A7779. PMID:29225686
- 4 Agarwal V, Parab SY, Pramesh CS (2017) Protective Lung Strategy During Bronchoscopic Laser Resection of Tracheobronchial Tumors: A Case Series. Journal of Cardiothoracic and Vascular Anesthesia. 31(6):2161-2166. PMID:28587760
- 5 Aggarwal J, Chakraborty S, Ghosh Laskar S, Patil VM, Prabhash K, Bhattacharya A, Noronha V, Purandare NC, Joshi A, Mummudi N, Arora J, Badhe R (2017) -Reference Data for Standardized Quality of Life Questionnaires in Indian Patients with Brain Metastases from Non-small Cell Lung Cancer: Results from a Prospective Study. Cureus. 9(4):e1149. PMID:28497011
- 6 Agha RA, Borrelli MR, Vella-Baldacchino M, Thavayogan R, Orgill DP, Pagano D, Pai PS, Basu S, McCaul J, Millham F, Vasudevan B, Leles CR, Rosin RD, Klappenbach R, Machado-Aranda DA, Perakath B, Beamish AJ, Thorat MA, Ather MH, Faroog N, Laskin DM, Raveendran K, Albrecht J, Milburn J, Miguel D, Mukherjee I, Valmasoni M, Ngu J, Kirshtein B, Raison N, Boscoe M, Johnston MJ, Hoffman J, Bashashati M, Thoma A, Healy D, Orgill DP, Giordano S, Muensterer OJ, Kadioglu H, Alsawadi A, Bradley PJ, Nixon IJ, Massarut S, Challacombe B, Noureldin A, Chalkoo M, Afifi RY, Agha RA, Aronson JK, Pidgeon TE (2017) - The STROCSS statement: Strengthening the Reporting of Cohort Studies in Surgery. International Journal of Surgery. 46:198-202. PMID:28890409

- 7 Agha RA, Fowler AJ, Saeta A, Barai I, Rajmohan S, Orgill DP, Afifi R, Al-Ahmadi R, Albrecht J, Alsawadi A, Aronson J, Ather MH, Bashashati M, Basu S, Bradley P, Chalkoo M, Challacombe B, Cross T, Derbyshire L, Farooq N, Hoffman J, Kadioglu H, Kasivisvanathan V, Kirshtein B, Klappenbach R, Laskin D, Miguel D, Milburn J, Mousavi SR, Muensterer O, Ngu J, Nixon I, Noureldin A, Perakath B, Raison N, Raveendran K, Sullivan T, Thoma A, Thorat MA, Valmasoni M, Massarut S, D'cruz A, Vasudevan B, Giordano S, Roy G, Healy D, Machado-Aranda D, Carroll B, Rosin D (2017) - Erratum to "The SCARE guidelines: Consensus-based surgical case report guidelines." [Int. J. Surg. 34 (2016) 180-186]. International Journal of Surgery. 47:151-PMID:27851898
- 8 Agrawal A, Pantvaidya G, Murthy V, Prabhash K, Bal M, Purandare N, Shah S, Rangarajan V (2017) - Positron Emission Tomography in Mucosal Melanomas of Head and Neck: Results from a South Asian Tertiary Cancer Care Center. World Journal of Nuclear Medicine. 16(3):197-201. PMID:28670177.
- 9 Akhtar OS, Deodhar KK, Dutta A, Jabeen F, Akhtar SS (2017) - An Unusual Case of Vaginal Bleeding in an 18-Year-Old Female. Journal of Obstetrics and Gynaecology India. 67(5):372-375. PMID:28867890
- 10 Ambulkar R, Kumar P, Patil S, Ranganathan P (2017) -63 Evaluation of the ability of anaesthetists to give effective cricoid pressure: prospective interventional study. Acta Anaesthesiologica Scandinavica. 61(8):999.
- Ambulkar R, Ranganathan P, Karthik V, Divatia J (2017)
   Evidence-based medicine: A survey among perioperative health care professionals in India. Journal of Anaesthesiology, Clinical Pharmacology. 33(4):487– 492. PMID:29416241
- 12 Anupama S, Laha P, Sharma M, Pathak K, Bane S, Ingle AD, Gota V, Kalraiya RD, YU L-G, Rhodes JM, Swamy BM, Inamdar SR (2017) Pharmacokinetics, biodistribution and antitumour effects of Sclerotium rolfsii lectin in mice. Oncology Report. 37(5): 2803-2810, PMID: 28394001
- 13 Ashraf R, Hamidullah, Hasanain M, Pandey P, Maheshwari M, Singh LR, Siddiqui MQ, Konwar R, Sashidhara KV, Sarkar J (2017) - Coumarin-chalcone hybrid instigates DNA damage by minor groove binding and stabilizes p53 through post translational modifications. Science Report. 7: 45287. PMID: 28349922

- 14 Azoulay E, Schellongowski P, Darmon M, Bauer PR, Benoit D, Depuydt P, Divatia JV, Lemiale V, van Vliet M, Meert AP, Mokart D, Pastores SM, Perner A, PÃ<sup>--</sup>ne F, Pickkers P, Puxty KA, Vincent F, Salluh J, Soubani AO, Antonelli M, Staudinger T, von Bergwelt-Baildon M, Soares M (2017) - The Intensive Care Medicine research agenda on critically ill oncology and hematology patients. Intensive Care Medicine. 43(9):1366-1382. PMID:28725926.
- 15 Baheti AD, Bhargava P (2017) Altmetrics: A Measure of Social Attention toward Scientific Research. Current Problems in Diagnostic Radiology. 46(6):391-392. PMID:28751106
- 16 Baheti AD, Jagannathan JP, O'Neill A, Tirumani H, Tirumani SH (2017) - Current Concepts in Non-Gastrointestinal Stromal Tumor Soft Tissue Sarcomas: A Primer for Radiologists. Korean Journal of Radiology. 18(1):94-106. PMID:28096721
- 17 Bajpai J, Chandrasekharan A, Talreja V, Simha V, Chandrakanth MV, Rekhi B, Khurana S, Khan A, Vora T, Ghosh J, Banavali SD, Gupta S (2017) - Outcomes in nonmetastatic extremity osteosarcoma treatment naive patients treated with a novel non-high-dose methotrexate-based, dose-dense combination chemotherapy regimen 'OGS-12'. European Journal of Cancer. 85:49-58. PMID:28888849.
- 18 Bakshi SG, Bhawalkar P (2017) Role of WhatsAppbased discussions in improving residents' knowledge of post-operative pain management: a pilot study. Korean Journal of Anesthesiology. 70(5):542-549. PMID:29046774
- 19 Barkun J, Fisher W, Davidson G, Wakabayashi G, Besselink M, Pitt H, Holt J, Strasberg S, Vollmer C, Kooby D, Asbun HJ, Barkun J, Besselink MGH, Boggi U, Conlon KCP, Han H-S, Hansen PD, Kendrick ML, Kooby DA, Montagnini AL, Palanivelu C, RÃ, sok BI, Shrikhande SV, Wakabayashi G, Zeh H, Vollmer CM (2017) - Research considerations in the evaluation of minimally invasive pancreatic resection (MIPR). HPB. 19(3):246-253. PMID:28274661
- 20 Barreto SG, Sirohi B, Shrikhande SV (2017) Timing of rectal cancer surgery following neoadjuvant chemoradiation: how close are we to striking an equipoise? Future Oncology. 13(4):303-305. PMID:27875904.
- 21 Bassi C, Marchegiani G, Dervenis C, Sarr M, Abu Hilal M, Adham M, Allen P, Andersson R, Asbun HJ, Besselink MG, Conlon K, Del Chiaro M, Falconi M, Fernandez-Cruz L, Fernandez-Del Castillo C, Fingerhut A, Friess H, Gouma DJ, Hackert T, Izbicki J, Lillemoe KD, Neoptolemos JP, Olah A, Schulick R, Shrikhande SV, Takada T, Takaori K, Traverso W, Vollmer CR, Wolfgang

CL, Yeo CJ, Salvia R, Buchler M; International Study Group on Pancreatic Surgery (ISGPS). (2017) - The 2016 update of the International Study Group (ISGPS) definition and grading of postoperative pancreatic fistula: 11 Years After. Surgery. 161(3):584-591. PMID:28040257

- 22 Basu S, Parghane RV, Ostwal V, Shrikhande SV (2017) -Neoadjuvant strategies for advanced pancreatic neuroendocrine tumors: should combined chemotherapy and peptide receptor radionuclide therapy be the preferred regimen for maximizing outcome?. Nuclear Medicine Communications. 39(1):94-95. PMID:29206780
- 23 Baumann BC, Sargos P, Eapen LJ, Efstathiou JA, Choudhury A, Bahl A, Murthy V, Ballas LK, Fonteyne V, Richaud PM, Zaghloul MS, Christodouleas JP (2017) -The Rationale for post-operative radiation in localized bladder cancer. Bladder Cancer. 3(1):19-30. PMID: 28149931
- 24 Besselink MG, van Rijssen LB, Bassi C, Dervenis C, Montorsi M, Adham M, Asbun HJ, Bockhorn M, Strobel O, Bacchler MW, Busch OR, Charnley RM, Conlon KC, FernÄindez-Cruz L, Fingerhut A, Friess H, Izbicki JR, Lillemoe KD, Neoptolemos JP, Sarr MG, Shrikhande SV, Sitarz R, Vollmer CM, Yeo CJ, Hartwig W, Wolfgang CL, Gouma DJ; International Study Group on Pancreatic Surgery. (2017) - Definition and classification of chyle leak after pancreatic operation: A consensus statement by the International Study Group on Pancreatic Surgery. Surgery. 161(2):365-372. PMID:27692778.
- 25 Bhamre R, Anam JR, Bhandare M, Saklani A (2017) -Locally advanced colorectal cancer: Is a second look surgery and prophylactic HIPEC warranted? Journal of Clinical Oncology. 35(15\_Suppl.):(abstr e15056)
- 26 Bhandare M, Patil P, Pai V, Bhamre R, Engineer R, Ostwal V, Saklani A (2017) Peritoneal Carcinomatosis in Colorectal Cancers Management Perspective Needs a Change. Clinical Colorectal Cancer. 16(2):e1-e6. PMID:27670895.
- 27 Bhargava A, Khare NK, Bunkar N, Chaudhury K, Pandey KC, Jain SK, Mishra PK (2017) Cell-free circulating epigenomic signatures: Non-invasive biomarker for cardiovascular and other age-related chronic diseases. Current Pharmaceutical Design. 23(8):1175-1187. PMID:27817745
- 28 Bhat S, Gardi N, Hake S, Kotian N, Sawant S, Kannan S, Parmar V, Desai S, Dutt A, Joshi NN (2017) - Impact of intra-tumoral IL17A and IL32 gene expression on T-cell responses and lymph node status in breast cancer patients. Journal of Cancer Research and Clinical Oncology 143(9):1745-1756. PMID:28470472

- 29 Bhat VG, Vira H, Khattry N, Toshniwal M (2017) -Cryptococcus laurentii diarrhea post hematopoietic stem cell transplant. Transplant Infectious Disease 19(2): e12663. PMID: 28083955
- Bhat VG, Vira HJ, Kelkar RS, Biswas SK, Chavan P (2017)
   Gram negative bacterial sepsis in a cancer centre: Bacteriological spectrum and antibiotic susceptibility profiles. Journal of Basic and Clinical Pharmacy. 8:144-148.
- 31 Bhattacharya S, Reddy D, Jani V, Gadewal N, Shah S, Reddy R, Bose K, Sonavane U, Joshi R, Gupta S (2017) -Histone isoform H2A1H promotes attainment of distinct physiological states by altering chromatin dynamics. Epigenetics Chromatin. 10(1):48. PMID:29047414.
- 32 Bhattacharyya T, Bhattacharjee A (2017) A new index to measure intra-observer variation in delineating GTV primary in head and neck cancer. MOJ Cell Science & Report. 4(4): 00093.
- 33 Bhattacharyya T, Bhattacharjee A, Santhosh S, Kiran P, Sadanandan VP, Geetha M (2017) - Impact of waiting time for treatment on survival in patients undergoing radiotherapy for head and neck cancer. Journal of Cancer Policy. 13:1-4.
- 34 Bhosale PG, Cristea S, Ambatipudi S, Desai RS, Kumar R, Patil A, Kane S, Borges AM, Schäffer AA, Beerenwinkel N, Mahimkar MB (2017) - Chromosomal Alterations and Gene Expression Changes Associated with the Progression of Leukoplakia to Advanced Gingivobuccal Cancer. Translational oncology. 10(3):396-409. PMID:28433800
- 35 Bhosale PG, Pandey M, Cristea S, Shah M, Patil A, Beerenwinkel N, Schäffer AA, Mahimkar MB (2017) -Recurring amplification at 11q22.1-q22.2 locus plays an important role in lymph node metastasis and radioresistance in OSCC. Science Report. 7(1):16051. PMID: 29167558
- Bhosale S, Yadav A, Ambulkar R, Joshi M, Divatia J (2017)
   97 Efficacy of transthoracic ultrasound for rapid detection of pneumothorax. Acta Anaesthesiologica Scandinavica. 61(8):1022-1021.
- 37 Bindal A, Laskar S, Khanna N, Chaudhary S, Vora T, Chinnaswamy G, Kembhavi S, Shah S, Ramadwar M, Qureshi S, Muckaden MA, Kurkure P (2017) - P-561 Sensorineural Hearing Loss After IMRT for Nasopharyngeal Carcinoma: Is Paediatric Cochlea Radioresistant? Pediatric and Blood Cancer. 64(Suppl. S3):S422
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Archives of Otorhinolaryngology. 21(1):21-27. PMID:28050203.

- 39 Budrukkar A, Dasgupta A, Pandit P, Laskar SG, Murthy V, Upreti RR, Gupta T, Dholam K, Agarwal JP (2017) -Clinical outcomes with high-dose-rate surface mould brachytherapy for intra-oral and skin malignancies involving head and neck region. Journal of Contemporary Brachytherapy. 9(3):242-250. PMID:28725248
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- 42 Carr R, Ozdag H, Tekin N, Morris T, Conget P, Bruna F, Timar B, Gagyi E, Basak R, Naik O, Auewarakul C, Srithana N, Dimamay MP, Natividad F, Chung JK, Belder N, Kuzu I, Omidvar N, Paez D, Padua RA (2017) - The effect of biological heterogeneity on R-CHOP treatment outcome in diffuse large B-cell lymphoma across five international regions. Leukemia Lymphoma. 58(5):1178-1183. PMID:27724056
- Catoe H, Jarvis J, Gupta S, Ginsburg O, de Lima Lopes G Jr (2017) - The road to addressing noncommunicable diseases and cancer in global health policy. American Society of Clinical Oncology educational book / ASCO. 37: 29-33. PMID: 28561645
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# **HBCHRC** - Visakhapatnam

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# **TMC** Audit

N23.56

340,4%

A23:5%

AS: AT

253:34

1236,16%

321:4% 299.4%

632:8%

1997. 3" A25: 5%

153:109

Atoms for Cancer Care

Paragra ph No of Auditor' s Report	Auditor's comments (to be reproduced in full)	Action Taken	Expected month and year for completion of Action
(1)	(2)	(3)	(4)
_	We have audited the attached Financial Statements of <b>Tata Memorial Centre (the Centre)</b> which comprises Balance Sheet as at 31 <sup>st</sup> March, 2018 and the Statement of Income and Expenditure Account, the Statement of Receipts and Payments Account for the year ended on that date, as required by the Bombay Public Trusts Act, 1950 (the Act), and a summary of significant accounting policies and other explanatory information.	This is a statement of fact and information. No action required	
8	The trustees are responsible for the preparation of these financial statements that give a true and fair view of the financial position, financial performance in accordance with the Accounting principles and Accounting Standards generally accepted in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.	This is a statement of fact and information. No action required	
	Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those standards require that we comply with the ethical requirements plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of any material misstatement. An audit involves performing procedures to obtain audit evidence about the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Centre's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the financial statements in order to design audit procedures that are appropriate in the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the circumstances used and the reasonableness of the accounting policies used and the reasonableness of the accounting estimates made by	This is a statement of fact and information. No action required	ALLON CONTROLLER CANTACT

ACTION TAKEN REPORT ON AUDITOR'S OBSERVATIONS FOR THE YEAR 2017-18

	at the audit evidence we have obtained is sufficient and appropriate to for our audit opinion.		
In our opinion a to us, the financ required, we rep	and to the best of our information and according to the explanations given icial statements give the information required by the Act in the manner so port that:	This is a statement of act and information. Vo action required	
(a) In the ca March, 2( (b) In the ca Income o	ase of the Balance Sheet, of the state of affairs of the Centre as at 31 <sup>st</sup> 2018. case of Income and Expenditure Account, of the Excess of Expense over of the Centre for the year ended on that date.		
	And Mar SURYAKANT MOHAPATH MR. SURYAKANT MOHAPATH NR. SURYAKANT MOHAPATH NR. SURYAKANT MOHAPATH NR. SURYAKANT MOHAPATH T. CONTROLLER (F & A) TMC TIEL RETURN SURVER (91) AL THE TIEL RETURN SURVER (91) AL THE TRANSF SURVER OF AND AL THE TRANSF SURVER AND ATH	THE POINT OF	

# KAILASH CHAND JAIN & CO. (Regd.)

CHARTERED ACCOUNTANTS

"Edena" 1st Floor, 97, Maharshi Karve Road, Near Income Tax Office, Mumbai - 400 020. e-mail : mail@kcjainco.com, kcjainco@gmail.com Phone : 022-22009131 022-22065373 022-22005373 Fax : 022-22089978

#### AUDITOR'S REPORT

The Chairman, Governing Council of Tata Memorial Centre,

#### **Report on Financial Statements**

We have audited the attached Financial Statements of Tata Memorial Centre (the Centre) which comprises Balance Sheet as at 31<sup>st</sup> March, 2018 and the Statement of Income and Expenditure Account, the Statement of Receipts and Payments Account for the year ended on that date, as required by the Bombay Public Trusts Act, 1950 (the Act), and a summary of significant accounting policies and other explanatory information.

#### Management's Responsibility for the Financial Statements

The trustees are responsible for the preparation of these financial statements that give a true and fair view of the financial position, financial performance in accordance with the Accounting principles and Accounting Standards generally accepted in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

#### Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those standards require that we comply with the ethical requirements plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of any material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Centre's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Centre's internal control. An audit also includes evaluating the appropriateness of accounting

Branches: 819, Laxmi Deep Bldg., Laxmi Nagar District Centre, Laxmi Nagar, Delhi - 92. Ph.: 011-46081818 e-mail : delhi@kcjainco.com 227, Starlit Tower, 29, Yeshwant Niwas Road, Indore - 452 001. Ph.: 0731 - 2547979 e-mail : indore@kcjainco.com House 25, G. T. Capital Home, Bihiyee Science Centre, Saddu, Raipur, Chhattisgarh - 492 014. e-mail : raipur@kcjainco.com

# KAILASH CHAND JAIN & CO. (Regd.)

CHARTERED ACCOUNTANTS

Phone : 022-22009131 022-22065373 022-22005373 Fax : 022-22089978

"Edena" 1st Floor, 97, Maharshi Karve Road, Near Income Tax Office, Mumbai - 400 020. e-mail : mail@kcjainco.com, kcjainco@gmail.com

policies used and the reasonableness of the accounting estimates made by trustees as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

#### Opinion

In our opinion and to the best of our information and according to the explanations given to us, the 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 31<sup>st</sup> March, 2018.
- (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.

As per our report of even date attached For Kailash Chand Jain & co. Chartered Accountants Firm Reg No. 112318W

MUMBAJ

ACTION

SaurabhChouhan Partner Membership No. : 167453 Mumbai DATE : 24 08 2018

Branches: 819, Laxmi Deep Bldg., Laxmi Nagar District Centre, Laxmi Nagar, Delhi - 92. Ph.: 011-46081818 e-mail : delhi@kcjainco.com 227, Starlit Tower, 29, Yeshwant Niwas Road, Indore - 452 001. Ph.: 0731 - 2547979 e-mail : indore@kcjainco.com House 25, G. T. Capital Home, Bihiyee Science Centre, Saddu, Raipur, Chhattisgarh - 492 014. e-mail : raipur@kcjainco.com

TATA MEMORIAL HOSPITAL AND ADVANCED BALANCE S	CENTRE FOR TREATN HEET AS AT 31ST N	IENT, RESEARCH AND EDI 1ARCH, 2018	UCATION IN CANCER. In ₹
PARTICULARS	Schedule	As at 31.03.2018	As at 31.03.2017
CAPITAL FUND AND LIABILITIES			
Capital Fund	-		
Earmarked / Endowment Fund	2	2,18,12,93,512	1,96,63,60,472
Academic Fund	3	11,76,03,234	9,37,11,838
Current Liabilities & Provisions	4	18,03,06,63,381	17,46,19,68,558
TOTAL		20,32,95,60,127	19,52,20,40,868
ASSETS			
Fixed Assets			
Gross Block		8,17,97,41,255	7,93,82,97,214
Less: Provision for Depreciation		3,75,54,54,217	3,34,17,14,583
Net Block		4,42,42,87,038	4,59,65,82,631
Capital Work - in - Progress		4,38,13,14,763	2,59,46,74,179
Total	5	8,80,56,01,801	7,19,12,56,810
Current Assets. Loans and Advances	9	8,44,95,03,859	8,06,40,52,544
Capital Fund	1	3,07,44,54,467	4,26,67,31,514
TOTAL		20,32,95,60,127	19,52,20,40,868
Significant Accounting Policies	13		
Notes on Accounts	14		

REVISED AS PER THE 68TH/STANDING COMMITTEE MEETING HELD ON 23.08.2018

For and on behalf of the Governing Council

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CO. Ł AIN MUMBAI SHCHAND RECOUNT As per our report of event date attached Wy. CH For Kailash Chand Jain & co. \* Membership No.: 167453 Firm Reg No. 112318W Chartered Accountants Saurabh Chouhan Partner

Muchallon JCPA

Mumbai DATE :- 24 08 2018

Dr. R.A. Badwe Director, TMC

DNA.K. D'Ofuz Difector, TMH

Mr.Anil M CAO, TMC

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		Van Fudad 31 02 2018	Vaar Fudad 31 03 2017
	and a second	OTATION'IC NAMED INCL	I TATION TO DODDE 1851
A) INCOME			0.00 00 00 00 0
Grant in Aid - Govt of India	L	3,57,88,74,434	2,88,57,49,849
Hospital Income		2,41,33,11,647	2,26,27,69,764
Sale of Drugs and Surgical Goods		2,65,00,95,804	2,18,97,15,896
Interest Income	90	32,59,78,616	36,27,98,627
Other Income	6	10,82,55,126	6,56,41,146
TOTAL (A)		9,07,65,15,627	7,76,66,75,281
B) EXPENDITURE			
Academic Expenses		6,19,41,930	5,69,73,596
Consumption of drugs and Surgical Goods	10	2,50,53,93,201	2,16,79,34,810
Consumables		91,47,27,492	82,92,12,341
Staff Cost / Salaries	=	4,72,41,37,854	4,21,96,26,498
Other Administrative Expenses	12	91,11,64,084	83,72,95,884
TOTAL (B)		9,11,73,64,561	8,11,10,43,130
Excess of Income over expenditure before Depreciation and Provisions on retirement benefits of employees (A-B)		(4,08,48,934)	(34,43,67,848)
Less : Depreciation		42,22,75,404	43,62,55,323
Less : Provision for Retirement Benefits			
Gratuity		10,34,21,199	52,40,77,346
Pension		7,52,78,511	2,34,77,41,528
Leave Encashment		21,09,82,287	22,67,05,822
Balance being deficit / (surplus) for the year trf to		966 JU 04 90	778 LF 10 L8 E
Balance Sheet	10.00	CCC'00/07'C0	0001/14/16/2010
Significant Accounting Policles			
As per our report of event date attached For Kailash Chand Jain & co.	142	For and on behalf of the Gove	erning Council
Chartered Accountants	E		
Firm Reg No. 112318W	100	N a second	( 19mg
1.0. 1. Min. 1.	MAXL.	· · · · · · · · · · · · · · · · · · ·	H // H

Dr. R.A. Badwe Director, TMC

Dr. A.K. D'Creiz Director, TMH

CAO, TMC Mr. Anil

Partner Membership No. : 167453 Mumbai Dovt : 24 |08 | 2018 .

CQ. ħ.

MUMBAL

\*

Saurabh Chouhan

TATA TATA MEMORIAL HOSPITAL AND ADVANCED (	MEMORIAL CENT	TRE NT, RESEARCH	AND EDUCATION I	N CANCER
SCHEDULE 1 - CAPITAL FUND				in₹
PARTICULARS	As at 31.03.2	018	As at 31.03	3.2017
CAPITAL FUND				
Balance at the beginning of the Year	(4,26,67,31,514)		(1,78,70,56,884)	
Add: Non Recurring Grant Utilised during the year	1,96,75,21,000		1,31,46,90,679	
Add: Recurring Grant utilised for Capital Expenditure Add: Assets purchased from Donation	36,73,566 6,31,72,294		63,42,151 7,40,18,685	
Add: Assets purchased out of Sponsored Project Fund	1,07,16,522		44,21,720	
Less: Deficit/ (surplus) Transferred from the Income & Expenditure Account	(2,22,16,48,132) 85,28,06,335		(38,75,83,649) 3,87,91,47,865	•
Total	5	(3,07,44,54,467)		(4,26,67,31,514)





PARTICULARS			As at 31.	63.2018					As at 31.	03.2017		L L
EARMARKED / ENDOWMENT FUND	SCIENCE & RESEARCH FUND	SAMJAL MISTRY FUND	DONATION	PROJECTS	WORKSHOP	TOTAL	SCIENCE & RESEARCH FUND	SAMJAL VISTRY FUND	DONATION	PROJECTS	WORKSHOP	TOTAL
A. Balance at the beginning of the Year Addition during the year	21,39,84,209	1,84,04,843	1,09,29,83,068 64,34,13,602	58,91,67,753 23,66,22,921	5,18,20,596 4,81,52,739	1,96,63,60,469 92,81,89,262	19,90,12,105	1,84,04,842	78,55,87,595	51,14,03,480 41,39,23,839	3,66,27,127 7,72,32,954	1,55,10,35,149 1,22,99,20,036
Re-grouping Interest on Saving / Back FD received Dividend TDS Projects	1,36,36,940	12,60,652 3,562	\$1,07,183	2,29,97,234		4,30,02,009 3,562 1,53,343	1,49,72,104	13,16,784 3,069		4,39,33,653 25,21,811	contarts	5,02,22,541 3,069 25,21,811
Total (A)	22,76,21,149	1,96,69,057	1,74,15,03,853	84,89,41,251	355,57,99,9	2,93,77,08,645	21,39,84,209	1.97,24,695	1,52,43,50,838	97,17,82,783	11,42,36,134	2,84,40,78,659
<ol> <li>Utilisation / Expenditure towards objective of fund Revenue Expenditure Capital Expenditure</li> </ol>		*	40,89,72,250	22,33,19,607 1,07,16,523	4,89,70,247	68,12,62,104 7,38,88,817	*:-	2	35,73,49,085 7,40,18,685	37,81,93,310 44,21,720	6,24,15,538	79,79,57,933 7,84,40,405
Acceptosposy Transfer to Sarnjal Scholarship Account Transfer to Sarnjal Partient welfare		6,32,107				6,32,107 6,32,107		6,59,827 6,60,025				6,59,827 6,60,025
Tetal (B)		12,64,214	47,21,44,543	23,40,36,130	4,89,70,247	75,64,15,134		13,19,852	43,13,67,770	38,26,15,030	6,24,15,538	87,77,18,190
Closing Balance at the end of the year (A-B)	22,76,21,149	1,84,04,843	1,26,93,59,310	61,49,05,122	5,10,03,088	2,18,12,93,512	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





TATA MEMORIAL HOSPITAL AND ADVAN EDUCATI	ORIAL CENTRE CED CENTRE FOR TREATMEN ON IN CANCER	T, RESEARCH AND
SCHEDULE 3 - ACADEMIC FUND		in ₹
PARTICULARS	As at 31.03.2018	As at 31.03.2017
Opening Balance	9,37,11,838	7,31,33,253
Add :- Addition During the year	6,19,41,930	5,69,73,596
	15,56,53,768	13,01,06,849
Less : Deduction During the year	3,80,50,534	3,63,95,011
Total	11,76,03,234	9,37,11,838





TATA M	EMORIAL CE	NTRE		
TATA MEMORIAL HOSPITAL AND ADVANCED CER	NTRE FOR TREATM	ENT, RESEARCH A)	ND EDUCATION	IN CANCER
SCHEDULE 4 - CURRENT LIABILITIES AND PROVISIONS	s			in₹
PARTICULARS		As at 31.03.2018		As at 31.03.2017
A) CURRENT LIABILITES & DEPOSITS				
Deposits				
- From Student	2,28,00,477		1,99,93,295	
- From Patient	1,75,27,25,622		1,49,89,33,203	
- From Suppliers & Contract	11,86,11,791	1,89,41,37,890	9,34,17,461	1,61,23,43,959
Other Current Liabilities				
Undisbursed and Unclaimed Salaries		14,91,211		4,63,357
New pension scheme liability		37,34,017		32,10,184
Sundry Creditors-Capital		84,40,658		1,08,24,114
Other Liabilities		15,54,74,161		11,79,18,835
Book OD		5,21,78,967		
Statutory Liabilities		2,95,20,853		2,12,09,271
Outstanding Expenses				
- Salary	48,97,98,176		63,13,27,340	
- Operational Expenses	68,51,99,526	1,17,49,97,702	38,15,96,572	1,01,29,23,912
Unutilised Grant from Govt of India c/f*			000 01 0	
- Recurring Grant	25,77,64,000	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3,12,000	1 00 00 mm mm mm
- Non Recurring Grant	39,01,40,000	64,79,04,000	1,00,96,61,000	1,00,57,99,000
TOTAL (A)		3,96,78,79,459		3,78,88,66,632
B) PROVISIONS( for retirement benefits of employee)				
Gratuity		1,35,36,79,087		1,25,02,57,888
Leave Encashment		1,28,89,32,527		1,07,79,50,240
Pension		11,42,01,72,308		11,34,48,93,798
TOTAL (B)		14,06,27,83,922		13,67,31,01,926
TOTAL (A+B)		18.03,06,63,381		17,46,19,68,558





TATA MEMORIAL CENTRE

Schedule 5 - FIXED ASSETS

		GROSS BI	JOCK		Contraction of the		DEPREC	NOLLA		500 - 10H	NETB	LOCK
DESCRIPTION	Cost / Valuation as at the beginning of the year (01/04/2017)	Total Additions / adjustments during the year	Deletions / Ajustment	Cost / Valuation at the end of the year (31/03/2018)	As at the beginning of the year (01/04/2017)	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 (31/03/2018)	As at the Current year-Ended 31/03/2018	As at the Previous year- Ended 31/03/2017
A FIXED ASSETS: L LAND: a) Freehold	1,97,608			1,97,608							1,97,608	1,97,608
2. BUILDINGS : a) On Freehold Land	1,75,44,46,381	34564080		1,78,90,10,461	22,85,59,518	2,85,97,476	6,83,136	2,92,80,612		25,78,40,130	1,53,11,70,331	1,52,58,86,863
3. PLANT MACHINERY &	5,40,82,44,759	18,08,42,887	74,88,792	5,58,15,98,854	2,59,48,37,088	32,36,79,264	85,52,572	33,22,31,836	50,43,555	2,92,20,25,369	2,65,95,73,485	2,81,34,07,671
4. VEHICLES	3,88,25,015	60,70,441	11,04,850	4,37,90,606	2,29,48,056	33,54,928	3,12,888	36,67,816	11,04,849	2,55,11,023	1,82,79,583	1,58,76,959
<ol> <li>FURNITURE, FIXTURES</li> <li>OFFICE EOUIPMENT</li> </ol>	18,80,61,262 4,62,39,170	1,13,62,545 22,06,161	3,74,936 2,42,000	19,90,48,871 4,82,03,331	12,91,92,543 1,83,44,642	85,90,612 23,03,038	32,55,577 65,469	1,18,46,189 23,68,507	3,74,828 1,14,564	14,06,63,904 2,05,98,585	5,83,84,967 2,76,04,746	5,88,68,719 2,78,94,528
7. COMPLITER/ PERIPHERALS	50,22,83,018	1,75,06,531	18,98,025	51,78,91,524	34,78,32,733	4,11,74,444	17,05,998	4,28,80,442	18,97,969	38,88,15,206	12,90,76,318	15,44,50,285
TOTAL (A)	7,93,82,97,213	25,25,52,645	1,11,08,603	8,17,97,41,255	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	4,42,42,87,038	4,59,65,82,631
CWIP	2,59,54,76,549	1,85,37,80,080	6,71,39,496	4,38,21,17,133							4,38,21,17,133	2,59,54,76,549
LESS: PROVISION FOR DOUBTFUL CAPITAL ADV	8,02,370			8,02,370							8,02,370	8,02,370
(LAND) NET CAPITAL WIP (B)	2.59,46.74,179	1,85,37,80,080	6,71,39,496	4,38,13,14,763							4,38,13,14,763	2,59,46,74,179
TOTAL (A + B)	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	7,19,12,56,810
								Contraction of the second	Concession of the local division of the loca	And the second second	the set of a set of a	1 100 10 20 10 10 1
PREVIOUS YEAR (TMC)	9,70,93,42,736	1,02,73,01,431	20,36.72,773	10,53,29,71,393	3,00,49,96,690	40,26,69,927	3,35,85,392	43,62,55,319	9,95,37,426	3,34,17,14,583	7,19,12,56,809	6,70,43,46,044

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

PARTICULARS	As at 31.0.	3.2018	As at 31.03	3.2017
A. CURRENT ASSETS				
1. Inventories				
Stock of Drugs, Medical and Surgical Goods	32,44,17,950	2000 B 100	27,83,05,663	
Stores & stationery	91,66,044	33,35,83,994	66,80,759	28,49,86,422
2. Sundry Debtors	1 1			
<ul> <li>a) Outstanding more than six months</li> </ul>				
Considered Good	15,88,31,630		6,85,86,102	
Considered Doubtful	1,55,69,096		1,93,19,507	
	17,44,00,726		8,79,05,609	
Outstanding less than six months	1 1			
Considered Good	24,62,33,535		22,01,31,972	
Considered Doubtful		L	-	
	42,06,34,261		30,80,37,581	
<li>b) Less: Provision for Doubtful Debts</li>	1,55,69,096	40,50,65,165	1,93,19,507	28,87,18,074
3. Cash Balances	Caster			
Cash in Hand	53,260		3,03,112	
Cheques on Hand	30,000		96,00,603	
Franking Balance	3,96,591	4,79,851	93,102	99,96,817
4. Bank Balances				
With Scheduled Banks :				
- Current Accounts	2,57,65,232		25,38,93,212	
<ul> <li>Fixed Deposit Accounts</li> </ul>	5,47,60,07,273		4,76,06,77,003	
<ul> <li>Margin Money Deposit Accounts</li> </ul>	1,40,66,00,000	I	1,67,50,00,000	
<ul> <li>Fixed Deposits Projects</li> </ul>	52,28,45,230		46,70,79,943	
- On Savings Accounts	22,37,044	7,43,34,54,779	35,01,601	7,16,01,51,759
TOTAL (A)	-	8,17,25,83,789		7,74,38,53,072



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TAT. TATA MEMORIAL HOSPITAL AND ADV SCHEDULE 6 - CURRENT ASSETS, LOA	A MEMORIA ANCED CENTRE F IN CANCE NS AND ADVANCE	L CENTRE FOR TREATMENT R S	, RESEARCH ANI	DEDUCATION
				in ₹
PARTICULARS	As at 31.03	.2017	As at 31.03	.2016
B. LOANS AND ADVANCES				
<ol> <li>Advances recoverable in cash or in kind or for value to be received (unsecured, considered good) Considered Good</li> </ol>	1,74,54,879		39,76,775	
Considered Doubtful	•			
Less: Provision for Doubtful Advances	1,74,54,879	1,74,54,879	39,76,775	39,76,775
<ul> <li>b) Prepaid expenses</li> </ul>		1,41,20,902		4,84,58,842
<ul><li>c) Other Deposits</li><li>c) Receivable from Govt of India</li></ul>		4,22,70,060		4,11,88,575
2. Loans & Advances to staff				
Interest Bearing Advances Non Interest Bearing Advances	50,22,586 54,95,959	1,05,18,545	68,66,154 40,22,212	1,08,88,366
<ol> <li>Interest Accured Interest Accured on Fixed Deposits Interest Accured on Corpus Deposits</li> </ol>	13,41,45,457 1,55,63,604		15,30,89,285 1,59,31,070	
Interest Accured on Sam Jal Deposits	4,86,646	15,01,95,707	6,66,098	16,96,86,453
4. Interest Accured but not due		1,06,69,743		1,24,14,476
5. Tax Deducted at Source		3,16,90,234		3,35,85,985
TOTAL (B)		27,69,20,070		32,01,99,472
TOTAL (A+B)		8,44,95,03,859		8,06,40,52,544





TAT	A MEMORIAL CENTRE		6
TATA MEMOKIAL HOSPITAL AND ADVANCE	O CENTRE FOR TREATMENT, RE	ESEARCH AND EDUCATION IN CANCER	Y.
SCHEDULE 7 - RECURRING GRANT			in₹
PARTICULARS	As at 31.03.2018	As at 31.03.2017	
Balance at the beginning of the Year	3,12,000	24,04,000	
Add: Grant Received During the year	3,84,00,00,000	2,89,00,000	
Total	3,84,03,12,000	2,89,24,04,000	
Less: Grant Utilised for Captial Expenditure (A)	36,73,566	63,42,151	
Balance	3,83,66,38,434	2,88,60,61,849	
Less: Grant Utilised for Revenue Expenditure (B)	3,57,88,74,434	2,88,57,49,849	
Harnent Ralance off	77.77	64.000 3.12	12.000





# TATA MEMORIAL CENTRE

#### TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER

#### SCHEDULE 8 - INTEREST INCOME

PARTICULARS		Year Ended 31.03.2018		Year Ended 31.03.2017
Interest : (gross) (includes tax deducted at source) from banks : on fixed deposits/ margin money deposits on saving accounts	32,08,41,757 2,67,879	32,11,09,636	35,91,27,904 2,54,326	35,93,82,230
from others : on Vehicle Advances on House Building Advances on Computer Advances	1,03,006 19,16,591 6,073		1,22,151 20,49,100 1,00,452	
		20,25,670		22,71,703
Interest accrued but not Due on staff Advances		9,02,696		11,44,694
Interest on Income Tax Refund		19,40,614		
These		32,59,78,616		36,27,98,627





# TATA MEMORIAL CENTRE

## TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER.

#### SCHEDULE 9 - OTHER INCOME

in ₹

in ₹

PARTICULARS	Year Ended 31.03.2018	Year Ended 31.03.2017
Miscellaneous Receipts	4,66,69,669	5,21,36,089
Animal House Receipts	68,94,356	57,85,409
Project Overheads	59,91,285	75,65,906
Effect of exchange fluctuation (net)	3,62,75,156	1,53,742
TOTAL	10,82,55,126	6,56,41,146





# TATA MEMORIAL CENTRE TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER

#### SCHEDULE 10 - CONSUMPTION OF DRUGS & SURGICAL GOODS

PARTICULARS	Year Ended 31.03.2018	Year Ended 31.03.2017
Opening stock of Drugs / Surgical goods	27,83,05,663	23,49,75,810
Add: Purchases	2,56,62,79,797	2,23,18,45,885
Less: Closing stock of Drugs / Surgical goods	32,44,17,950	27,83,05,663
Less: Return/ Rejected / Expired Drugs / Surgical goods	1,47,74,309	2,05,81,222
TOTAL	2,50,53,93,201	2,16,79,34,810





in ₹

TATA MEMORIAL CENTRE TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR TREATMENT, RESEARCH AND EDUCATION IN CANCER.		
PARTICULARS	Year Ended 31.03.2018	in ₹ Year Ended 31.03.2017
<ul> <li>a) Salaries and Wages</li> <li>b) Allowances and Bonus</li> <li>c) Expenses on Employee's Retirement and Terminal Benefits</li> <li>d) Pension scheme</li> <li>e) Fellowships</li> </ul>	2,18,01,22,851 1,52,00,20,830 11,63,57,603 49,63,58,231 41,12,78,339	1,34,54,09,427 1,91,22,33,054 12,79,55,902 45,07,24,160 38,33,03,955
TOTAL	4,72,41,37,854	4,21,96,26,498





TATA MEMORIAL	CENT	RE	
TATA MEMORIAL HOSPITAL AND ADVANCED CENTRE FOR 1 CANCER	FREATMEN	VT, RESEARCH ANI	D EDUCATION IN
SCHEDULE 12 - OTHER ADMINISTRATIVE EXPENSES			in₹
PARTICULARS		Year Ended 31.03.2018	Year Ended 31.03.2017
a) Linen and Laundry		4,98,60,164	4,20,93,788
b) Library Expenses		7,03,99,211	6,27,60,524
c) Electricity		25,36,89,958	27,88,68,728
d) Water Charges		1,65,08,406	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
e) Repairs and Maintenance		35,35,345	38,52,556
p) Rates. Taxes and Insurance		1,78,58,682	82,81,043
h) Minor Equipments and Replacement of Capital Equipments		13,57,681	21,03,718
i) Postage, Telephone and Communication Charges		88,12,774	95,53,096
[] Printing and Stationery		3,50,56,122	2,28,19,881
k) Travelling and Conveyance Expenses		3,44,33,921	2,18,88,765
Di Intra Mural Research Expenses		1,77,26,921	2,89,54,550
m) Cancer Registry Program Expenses		1,23,56,220	69,84,619
n) Auditors Remuneration	. 000 000		1 00 000
Audit fees	1,00,000		4,00,000
GST	36,000	1,36,000	1010101
o) Symposium and Training		20,09,644	101,24,16
p) Professional Charges		2 01 45 243	1 56 07 676
9) Advertisement Expenses		(37,50,416)	(65,48,796)
s) Hostel maintenance expenses		1,49,96,605	2,17,64,122
t) Miscellaneous Expenses		1,64,76,221	5,53,51,139
u) Bad debts written off		12,08,632	4
Suchan Jew TOTAL		91,11,64,084	83,72,95,884
MUMBAN SS			
11/10			



#### 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

- 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.





- 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%

- Depreciation on assets purchased during the year is provided from the date of its purchase / installation
- iii) 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 prorata basis up to the date, on which such asset has been sold.
- 5. Inventories
  - 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
  - Stock of linen, laundry, cutlery and crockery, are treated as consumed as and when purchased





#### 6. Government Grant

- 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

- 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 Profit and Loss 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 1<sup>st</sup> 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

- 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 :
- 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





### SCHEDULES FORMING PART OF ACCOUNTS

#### SCHEDULE 14: NOTES ON ACCOUNTS

- 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.
- 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.
- Fixed Deposits of the Centre includes an amount of Rs. 140,66,00000/- (Pr Year Rs.167,50,00,000/- which represents Earmarked Funds kept aside for the capital commitments.
- 5. Due to an incident of fire in the drug store in the Main Building Basement on 11<sup>th</sup> February, 2017, the stock of drugs and surgical goods amounting to Rs.6,01,99,611/- was damaged. A claim has been lodged with the insurance agency. The consumption of drugs for the previous year includes stock of the above value.
- One equipment was lost by fire WDV amounting to Rs 2,57,89,355/- as on 31<sup>st</sup> May, 2015, the hospital filled insurance claim of Rs. 2,06,56,365/- received during the year.
- Prior Period income of Rs.15,98,913/- included in Income & Expenditure account during the financial year. Outstanding Salary and pension expenses Rs.48,97,98,176/- included in Income & Expenditure account during the financial year.
- The Centre is covered by a system of internal audit conducted by the Department of Atomic Energy and Indian Audit and Accounts Department.
- 9. 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.95,52,158/- (incl interest of Rs.40,29,801/-) 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.





 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.60,21,811/-

- Employer's Contribution to New Pension Scheme - Rs.6,96,51,372/-

			Gratuity	
			31-3-2018	31-3-2017
I	Ch	ange in obligation during the year		
	1	Liability at the beginning of the year	1,25,02,57,888	72,61,80,542
	2	Interest Cost	8,73,20,880	5,34,39,848
	3	Current Service Cost	4,83,75,715	1,04,37,674
	4	Past Service Cost	9,31,88,630	31,39,74,250
	5	Benefit Paid	(6,84,04,251)	(8,39,87,966)
	6	Actuarial (Gain)/Loss	(5,70,59,775)	23,02,13,540
	7	Liability at the end of the year	1,35,36,79,087	125,02,57,888
п	Ne	t asset / (liability) recognised in the Balanc	e Sheet	
	1	Liability at the end of the year	1,35,36,79,087	125,02,57,888
	2	Plan assets at the end of the year	0	0
	3	Liability recognised in the Balance sheet	1,35,36,79,087	125,02,57,888
ш	Exp	enses recognized in the Income and Expe	nditure account	
	1	Current Service Cost	4,83,75,715	1,04,37,674
	2	Interest Cost	8,73,20,880	5,34,39,848
	3	Expected Return on Plan Assets	a - 21 2 1894 - 119	
	4	Actuarial (Gain)/Loss	(5,70,59,775)	23,02,13,540
	5	Past service cost	0	0
	6	Total expenses recognised in the Income and Expenditure Account	17,18,25,450	60,80,65,312
IV	Pri	ncipal actuarial assumptions at the Balance	e Sheet date:	
	1	Discount rate at	7.85%	7.15%
	2	Expected return on plan assets	0.00%	0.00%
	3	Salary escalation	7.00%	7.00%
Ger	neral	description of the defined benefit plan :	3X	
1	Th qu em	e Centre operates a gratuity scheme, whic alifying employees. The Scheme provide ployees on retirement, death while in er	h is an unfund es for lump su nployment or t	ed scheme for n payment to 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.
	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.
2	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 31 <sup>st</sup> March, 2018 works out to Rs. 1,28,89,32,527/
3	The Centre operates a Pension scheme which is an unfunded scheme for employees, who have joined prior to 1 <sup>st</sup> 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 31 <sup>st</sup> March, 2018 works out to Rs. 11,42,01,72,309/

11. 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

Date: Place : Mumbai



Mr. Anil Sathe CAO, TMC

For Tata Memorial Centre

Dr. R.A. Badwe Director







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



Mahamana Pandit Madan Mohan Malviya Cancer Centre (MPMMMCC) Banaras Hindu University, Varanasi.



#### Tata Memorial Hospital (TMH)

Dr. E. Borges Marg, Parel East, Mumbai 400012, Maharashtra Tel: +91 22 2417 7000 Fax: +91 22 2414 6937 Email: msoffice@tmc.gov.in Website: hhtps://tmc.gov.in

#### Advanced Centre for Treatment, Research & Education in Cancer (ACTREC)

Kharghar, Navi Mumbai 410210, Maharashtra Tel: +91 22 2740 5000 Fax: +91 2202740 5085 Email: mail@actrec.gov.in Website: http://actrec.gov.in

#### Centre for Cancer Epidemiology (CCE)

Kharghar, Navi Mumbai 410210, Maharashtra Tel: +91 22 2740 5151 Fax: +91 2202740 5085 Email: cce.dept@actrec.gov.in Website: tmcepi.gov.in

#### Homi Bhabha Cancer Hospital & Research Centre (HBCHRC)

Plot No. 212, Aganampudi Village, Gajuwaka, Mandalam, Visakhapatnam 530053, Andhra Pradesh Tel: +91 891 2871 561 Email: hbchvizag.admin@tmc.gov.in

#### Homi Bhabha Cancer Hospital (HBCH)

Civil District Hospital Campus, Sangrur 148001, Punjab Tel: +91 1672 241 241 Email: hbchsangrur.admin@tmc.gov.in

#### Homi Bhabha Cancer Hospital & Research Centre (HBCHRC)

'Medicity' Mullanpur village, New Chandigarh, District SAS Nagar Mohali, Punjab. Email: mohaliproject@tmc.gov.in

#### Dr. Bhubaneswar Borooah Cancer Institute (BBCI)

Gopinath Nagar, A K Azad Road, Guwahati-781016, Assam. Tel: +91 9957033199 Fax: +91 361 2472636 Email: bbci\_info@yahoo.co.in Website: www.bbcionline.org

#### Homi Bhabha Cancer Hospital (HBCH)

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