



ACTREC OPEN DAY

30 November & 1 December 2023



The Cancer Research Institute (CRI) - then located at the Tata Memorial Centre's Parel, Mumbai campus organized its first 'Open Day' to showcase its research programs before the undergraduate and graduate students from science colleges of Mumbai in 1995. This tradition is continued uninterrupted and with the same vim and vigor even after CRI moved to the newly established Advanced Centre for Treatment, Research and Education in Cancer (ACTREC) in Kharghar, Navi Mumbai, in 2002. Both CRI and the Clinical Research Centre (CRC - established in 2005) are actively participating in ACTREC's Open Day. During the pandemic, Open Day was conducted virtually.

During this year, ACTREC is conducting its Open Day on Thursday, 30th November and Friday, 1st December 2023 to showcase its facilities to the invited group of students and accompanying faculties from science, pharmacy, medical and allied colleges of Mumbai and Navi Mumbai. During these two days (four sessions of half day each) almost 530 students are expected to visit the Centre. Each session will begin with a poster display on cancer research, diagnosis, treatment and prevention, followed by an introductory talk about ACTREC highlighting on the research, clinical and academic focus of the Centre.

After the talk, the lab visits - which are the highlights of Open Day will start. Each batch consisting of 15 students and their faculties will be led by the volunteers to the demonstrating labs. Each demonstration will focus on the technological platform used to further the group's research or clinical programs. The visitors will see the cutting edge research and technology, and interact with scientists, clinicians, and research scholars.

Demonstrations for OD23

No.	Demo Labs	Title of Demonstration
1	Academics (ACTREC students)	Academics @ ACTREC by Students Council of ACTREC
2	Biorepository Facility (KS)	ACTREC Biorepository Facility
3	Lab Animal Facility	Laboratory Animal Models for Cancer Research
4	Flow Cytometry (KS)	Flow Cytometry Facility
5	Clinical Pharmacology Dept (KS)	High Performance Liquid Chromatography - Dionex 3000 UPLC
6	Ray Lab (KS)	Investigating the Key Molecular signatures of Acquirement of chemoresistance in Epithelial Ovarian Cancer
7	Histopathology Dept (KS)	Dept. of Surgical Pathology
8	Hematopathology Dept (CCE)	Hematopathology Department
9	Cytogenetics Dept (CCE)	Conventional karyotyping and FISH in haematological malignancies
10	Small Animal Imaging Facility	Comparative Oncology Program and Small Animal Imaging Facility

Demo: Academics @ ACTREC

Students Council of ACTREC

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This year, on the occasion of ACTREC's Open Day, the Students Council of ACTREC (SCA) has taken the initiative to hold informal discussion with the visiting groups of young students from different colleges/ universities, who may be interested in pursuing a career in research or academics. During this session, representatives of SCA will shed light on cancer research at ACTREC from a student's perspective. It will be an open discussion where we will brief them about different career options available after graduation/ post-graduation and various competitive exams that will help them get entry into the Ph.D. program at ACTREC and other institutes across India. The session will cover the following aspects:

Training program at ACTREC: Students will be informed how 6 weeks summer training in the College break during undergraduate studies or 3-6 months research training after graduation/ post-graduation will help them decide whether a research career is suitable for them.

Openings after graduation (B.Sc. / B.Tech.): Master's degree programs are offered by old, established universities like Mumbai, Pune, Hyderabad, etc. Students can appear for exams conducted by JNU and IIT-JAM (Biotechnology/ Biochemistry/ Life Sciences) or MSU Baroda (Biotechnology/ Medical Microbiology). Some institutes also have programs for Masters by research. Students who do not wish to continue in the Science field can leave academics at this point, and can opt either for MBA or service in the public/ private sector - based on their interest.

Openings after post-graduation (M.Sc. / M.Tech.): Students can opt to enter into the Ph.D program. We will provide them information about entrance examinations such as JGEEBILS, CSIR-UGC, DBT, ICMR, BARC-DAE (OCES/DGFS), TIFR, etc, as well as the exam pattern and further processes for getting enrolled into the Ph.D. program. Ph.D. options abroad will be discussed if there are specific queries. Students may alternately seek an academic opening as a lecturer. We will provide information about the NET/ SET exams for lectureship.

Important: There is no doubt that having a Ph.D. degree can make you more employable, boost your prospects, and help secure your future in the long term. But it is not a cakewalk. Your Ph.D. is a reflection of basic scientific aptitude, as also hard work of five plus years.

Openings after Ph.D.: The session will briefly touch upon the post-doctoral program in India/abroad, along with openings in academia or R&D openings in Pharma and other industries. At the end of this session, questions will be taken from visiting students and faculty.

Demo: ACTREC Biorepository

Dr. Poonam Gera, M.D.Pathology, Officer-in-charge Cancer Genetics & Genomics lab AND Biorepository, ACTREC

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Biorepository or Biobank is the systematic collection and storage of bio-specimens for research purpose. Biorepositories may be established for any particular disease or population.

ACTREC Biorepository is the centralized facility for facilitating the translational research.

There are a very few Tumor tissue banks in India, ACTREC Biorepository is one of them, which was established in 2007.

In the cancer research, setting up the experiments in appropriate models are very important, cell lines are widely used for the same. However, working on human tissue samples is very precious. Obtaining the appropriate human tissues with all ethical formalities is the time consuming process. ACTREC Biorepository facilitates this process so that a lot of time and energy can be saved individually.

ACTREC biorepository facility collects, annotates, stores, and distributes biological samples to in-house researchers for duly approved research projects. The bio specimens are collected from Operation Theatre, Frozen room and Surgical Pathology as well as breast OPD. After taking the ethical consent from the patients.

ACTREC Biorepository also maintains the quality of the bio specimens by validating the protocols time to time by various Quality Check analysis. Quality checks are performed based on various downstream applications. The tissues stored have been used in various research projects based on Genomics, proteomics etc. and National and International publications from the same have been achieved.

Demo: Laboratory Animal Models for Cancer Research

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ACTREC has Laboratory Animal Facility (LAF) to breed, maintain and supply quality rodents for its basic cancer research programs. Available animals encompass 10 basic strains of mice, 1 hybrid strain (B6D2F1) of mice, 10 transgenic mice, 11 knockout mice, and 29 crosses of Tg and knockout mice, one each Nude, SCID and NSG mice strains; 1 strain of rat; and 1 strain of hamster, majority of which are inbred [<https://actrec.gov.in/index.php/cr-research-support-facility-detail/70>]. Standard operating procedures are followed for all the activities of LAF, and stringent programs are in place for genetic monitoring, clinico-pathology, and assessment of microbiological status of laboratory rodents and animal feed. An embryo freezing program has been introduced for the animal strains maintained at ACTREC. LAF offers quality control services to outside facilities and provides surplus animal strains to the CPCSEA-registered animal facilities in India. The facility is an "Institutional Member" and recognized "Training and Education Center" of the International Council for Laboratory Animal Science (ICLAS), Brussels, Belgium. Since 2005, LAF has organized eight workshops and two certificate courses for laboratory animal professionals. It also accepts M.Sc./ M.V.Sc./ MTech students as dissertation trainees under its on-going quality control program. The LAF demonstration during Open Day 2022 will introduce some of the representative animal models maintained in the Laboratory Animal Facility of ACTREC, their characteristics, and usage for the biomedical/ cancer research. The demonstrators will also detail the numbering system, environment, food and water requirements, and housing enclosure conditions for different animal models.

Demo: Flow Cytometry Facility

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The Flowcytometry Facility in ACTREC is a core facility dedicated to research purpose. The facility is well equipped with updated Cell Sorter and Analyzer. It consists of 2 Cell Sorter and one Analyzer. A wide range of Flowcytometry based application used by students and scientist to perform their experiment. including immunophenotyping with fluorescence tagged antibodies (up to 18 colors), DNA content determination and cell cycle analysis. The Facility can also been used to study functional and biochemical assays like apoptosis studies, detection of mitochondrial membrane potential, proliferation assay, intracellular calcium influx, oxidative burst analysis, intracellular cytokine analysis, cytometric bead array assay for detection of multiple cytokines, The stem cell studies has been carried out using various experiments including Immunophenotyping, side cell

population, dermal stem cell analysis. The Cell Sorter play a major role in purification of specific cell population from heterogeneous tumour cells and peripheral blood cells, which further helps the researcher to develop in vivo studies in animal model, in vitro drug uptake studies and also single cell sorting to develop monoclonal studies. The facility is also updated with a range of softwares- Flow jo, FACSDiva, Attune NxT ModFit and FCAP Array to analyse the data.

Demo: High Performance Liquid Chromatography - Dionex 3000 UPLC

Dr. Vikram Gota, Professor & Officer-in-charge, Department of Clinical Pharmacology, CRC, ACTREC
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High performance liquid chromatography (HPLC) is a powerful tool in bio-analytical chemistry. It has the ability to separate, identify, and quantitate compounds that are present in any sample that can be dissolved in a liquid. HPLC provides two-fold detection of analytes based on retention time, absorbance in UV-visible range and/or fluorescence. HPLC can be, and has been, applied to just about any sample, such as pharmaceuticals, forensic samples, therapeutic drug monitoring and industrial chemicals. Vital features of HPLC include: (a) Reliable analysis in small sample volume (usually in microlitres), (b) High-performance operation for consistent and reliable results, (c) Excellent retention time precision, detector sensitivity and linearity, (d) Rugged components to ensure high instrument performance, (e) System wellness and predictive performance indicators, (f) Modular design for easy module upgrade, addition, or replacement, and (g) Automated autosampler and column compartment for high throughput screening. The technique has a wide range of applications including bioavailability studies, bioequivalence studies, therapeutic drug monitoring (TDM), and pharmacokinetics studies.

Demo: Investigating the Key Molecular signatures of Acquisition of chemoresistance in Epithelial Ovarian Cancer

Dr. Pritha Ray, Principal Investigator, Imaging Cell Signaling & Therapeutics Lab, ACTREC-TMC
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Development of drug resistance is a major challenge to complete cure of cancer. Despite of several novel discoveries and implementation of novel treatments (targeted therapy, immunotherapy) and improved medical supports, death due to relapsed malignant cancers is a constant challenge for the society. Thus, it is important to investigate the underlying biology and identify new molecular cues to combat recurrent drug resistant cancer development.

Research at Ray lab is focused on developing dynamic cellular models of chemoresistance for Epithelial Ovarian cancer (EOC) and Gastric cancer and understanding the underlying molecular signatures with a thrust on IGF1R-PI3KCA-AKT/IGF1R-MAPK-ERK signaling, p53, autophagy, cancer stem cells (CSCs) and other molecular pathways from live cell to living organism through molecular imaging methods. Over the years we have shown that an oscillatory IGF1R signaling promotes initiation of resistance to a highly resistant state in EOC (Singh et al, 2014, Cancer Letters; Dhabde et al, BBA-Mol Basis Disease, 2020) and regulates active autophagy, tumorigenicity of CSCs (Singh et al, 2016, Scientific Report, Bishnu et al, Cell Death and Disease, 2021) at early resistance and higher metastasis at late resistance (Deo et al, BBA-Mol Basis of Disease, 2021). Our recent

research involves isolation of tumor cells from treatment-naïve and relapsed EOC patients and investigate the role of PIK3CA-Akt signaling, RUNX1 and ID mediated transcriptional regulation, autophagy, mitochondrial dynamics etc. in the quest for novel therapeutic approaches.

Demo : Dept. of Surgical Pathology

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The department of surgical pathology forms the diagnostic backbone for the cancer patients at ACTREC. The services provided by the department include histopathology, immunohistochemistry, cytopathology, and intraoperative consultation (frozen section) services. The laboratory deals with tissue and body fluid samples from the patients for cancer diagnosis, staging and also evaluation for biomarkers, which are now increasingly as one form of personalization of the treatment in the clinics. The laboratory boasts of a multiple high-end automated equipment – cryostats, automated tissue processors, automatic/semiautomatic microtomes, autostainers, and also vast repertoire of antibodies for immunohistochemical analysis of tissues. Our team of skilled technical staff equipped to handle this high-end state of the art technology, has been involved in processing close to 9000 tissue samples and nearly 1000 cytopathology samples this year. Our pathologists have clinical and research expertise in various subspecialties of oncopathology and work in tandem (including by participating in joint clinics) with other specialities to offer best of the patient care. The histopathology and immunohistochemistry services are NABL accredited and ensure quality of services by participation in the External Quality Assurance Scheme (EQAS). The laboratory also offers one year advanced histotechnology training programme for qualified technicians to enhance their skills in this field and is also involved in training of post MBBS doctors enrolled in the MD (pathology) and superspeciality (DM-oncopathology).

Demo: Hematopathology Laboratory

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The Hematopathology Laboratory is one of the largest state-of-the-art laboratory in the world. The focus of the lab is diagnostic and treatment monitoring services required in the management of different types of blood cancers. Laboratory is also actively involved in the clinical research pertaining to different types of blood cancers. Laboratory has two units that included 1. advanced multicolor flow cytometry (FACS) facility and 2. molecular genomic facility.

Flow cytometry (FACS) is a unique single cell technique that enables simultaneous analysis of multiple physical characteristics and protein expression in cells. This method leverages the principles of light scattering and antibody-bound fluorescence emission to provide insights into cell size, complexity, granularity, and the presence of specific biomolecules (proteins) enabling the detailed analysis of blood cells. This technique is widely used in various research in fields such as human, animal and plant biology, immunology, particle physics, proteomics, marine biology etc.

The flow cytometry lab in ACTREC is equipped with seven high-end flow cytometers allowing 13 and 16 and 21 color complex immunophenotyping, immune cell profiling, cell cycle analysis, cell function assay and serum cytokine profiling. These assays are performed in various body fluids such as bone marrow, peripheral blood, cerebrospinal fluids, ascitic fluids, tissue biopsies etc. Flow cytometry lab approximately 9000 samples yearly. The lab also focuses on flow cytometric data analysis using dimensionality reduction advanced techniques such as Umap and tSNE uncovering potential biomarkers, therapeutic targets, and refining treatment strategies tailored to individual patient profiles.

Most importantly, our laboratory conducts one year technical course in advanced flow cytometry which is the only systematic certificate course available throughout the world for candidates freshly passed with MSc. in Biological sciences.

Demo : Conventional karyotyping and FISH in haematological malignancies

Dr. Dhanlaxmi Shetty, Scientific Officer 'F', Cancer Cytogenetics Dept., ACTREC

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The Cancer Cytogenetics Department is a patient service facility with research programs in haematological malignancies. The service program is NABL (National Accreditation Board for Laboratories) accredited and extensively expanded to patients referred to TMH, ACTREC and other Tata medical centers from India. The Department offers specialized diagnostic services including Fluorescence in situ hybridization (FISH) for all Hematolymphoid Malignancies and Conventional Karyotyping in CML, AML, MPAL and MDS. The Dept. is well equipped with state of art technology and has developed comprehensive FISH panels for cytogenetic risk stratification and assessment of treatment response in leukemia, lymphoma and myeloma patients. Every year, around 6000 bone marrow aspirate/peripheral blood specimens are investigated in patients with haematological malignancies at diagnosis and on treatment for prognostic assessment. The Dept. ensures quality of services by providing proficiency testing through External Quality Assessment program (EQAS) to leading cytogenetic laboratories in the country.

Demo: Small Animal Imaging Facility - Comparative Oncology Program and Small Animal Imaging Facility

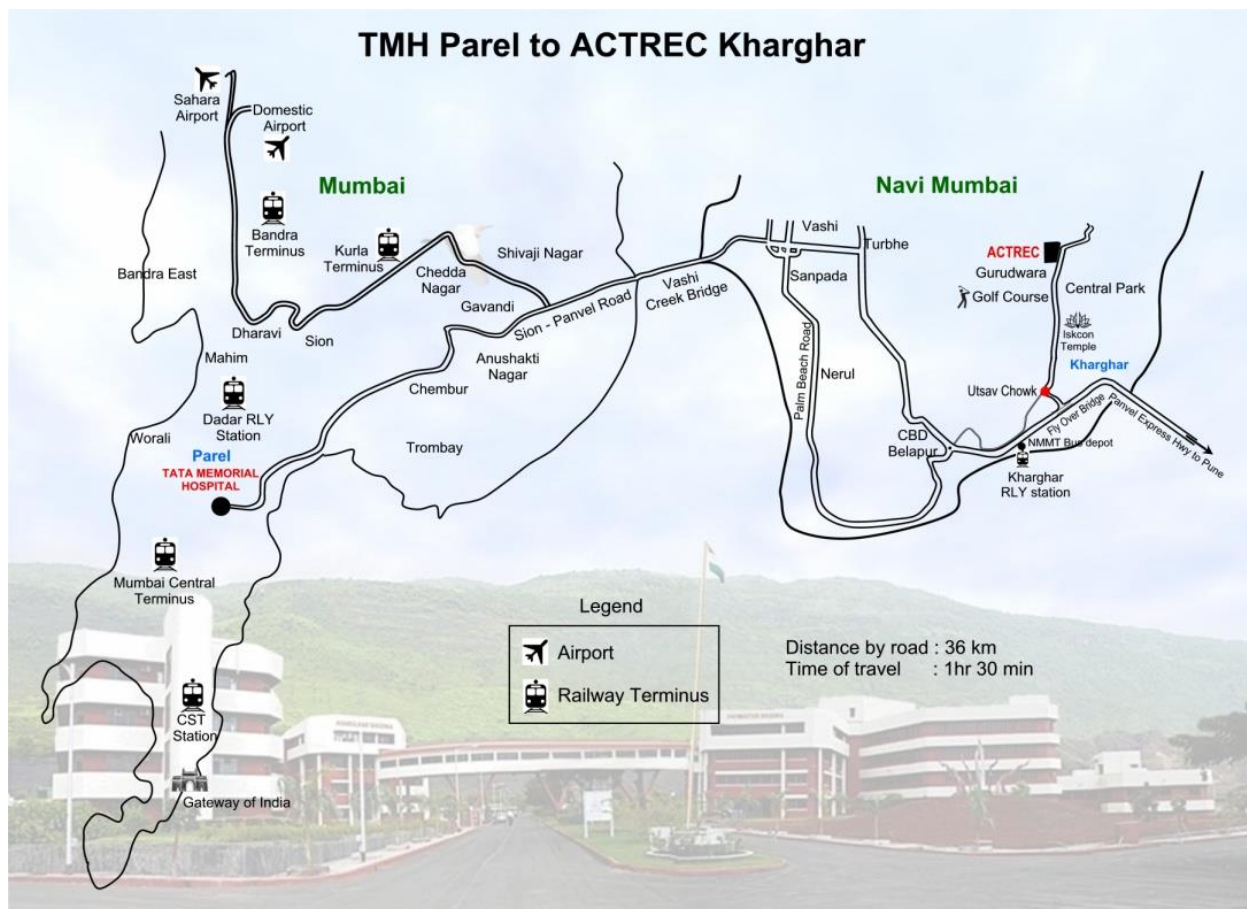
Dr. Pradip Chaudhari, Scientific Officer G, CRI, ACTREC

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Preclinical research is the backbone of modern medicine and new drug discoveries. The use of small-animal models in basic and preclinical sciences is a major keystone for these kinds of research and development strategies, representing a bridge between discoveries at the molecular level and clinical implementation in diagnostics and/or therapeutics. The high-resolution in vivo imaging technologies provide a unique opportunity for studying diseases in real-time, quantitatively, at the molecular level non-invasively. ACTREC has got state-of-art imaging facility having PET (positron emission tomography [PET] and SPECT (single photon emission computed tomography) and ultrasound. Each modality has intrinsic advantages and limitations. The focus of the facility is on

preclinical animal imaging and research on radiopharmaceuticals. Diagnostic radionuclides such as technetium-99m and fluorine-18 complexes are being evaluated for their utility in imaging and monitoring cancer in various mouse xenograft and orthotopic models.

In the arena of the Comparative Oncology Program - Animal Cancer Care Centre (Kukkuripa) provides diagnosis and treatment of pet animals suffering from spontaneous cancer. Also, it examines comparative aspects of animal and human cancers. The animal cancer biorepository maintains biological specimens such as blood, fresh-frozen or formalin-fixed or formalin-fixed paraffin-embedded tissues collected during diagnosis/ treatment, and uses it for comparative oncology research.



*Trains on Harbour Line ply between Mumbai CST and Panvel stations. You could alight either at Kharghar or CBD Belapur.
NMMT bus route numbers from Kharghar: 45 and 54; from CBD Belapur: 52 and 55*

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

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