

MGMIHS Facilities For Research & Innovation

ABSTRACT

The progress of an institution depends on its sustained growth of education and research in science and technology. MGMIHS ensures that all the core and inter disciplines flourish in research by adopting the highest norms and common facilities of a scholarly undertaking. MGMIHS is emerging as a cradle of innovation with state of art research Infrastructure & facilities for our faculties and researchers.

A State of the Art research infrastructure facility has been created, both through Government funded S&T departments such as DST, DBT etc as well as through internal resources. The Institute earmarks a significant amount from its capital funds for acquiring research equipment. Most of the institutes/departments have established advanced research facilities during the last 4 years. The compilation will enable optimal utilization of facilities by sharing among the faculties, research scholars and students at all MGMIHS Campus.

The Institute invests money and resources in creating infrastructure for central facilities for all constituent colleges coming under the Trust. It also provides fellowships to deserving research scholars for pursuing higher studies. World class infrastructure notably OMICS lab, Movement science, NABL accredited Central laboratory and Central Research Laboratory etc. have been created.

Kindly visit the below mentioned links to download the compiled data:-

DETAILS OF THE RESEARCH LABS AVAILABLE

I. CENTRAL RESEARCH LABORATORY / CENTRAL RESEARCH FACILITY:

MGM Skills Lab

MGM Skills Lab is a state of the art equipped Skills Training Centre, under the aegis of MGM Medical College Navi Mumbai. It was established in March 2015. It is only the 2nd Medical College in Maharashtra to offer American Heart Association (AHA) Certified Basic Life Support (BLS) and Advanced Cardiac Life Support Courses (ACLS) to all medical and paramedical graduates and post-graduates. In addition to these, we also offer training in Basic Clinical Skills, Basic Surgical Skills and Advanced Airway Skills.

Mission Statement:

- Early exposure for medical students to both clinical as well as life support skills
- To impart high quality standardized procedural and clinical skills training for interns and junior doctors
- Impart AHA Accredited Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) training courses
- To introduce Life Support Skills Training into medical and allied curriculum as competency based education
- > To educate the community at large about cardiac arrest and basic resuscitation skills



CENTRAL LABORATORY is reputed diagnostic laboratory catering patients from Navi Mumbai the laboratory is one of the few **NABL** accredited laboratories in Navi Mumbai. The Laboratory offer more than 600 tests, using the most advanced state-of-the-art technology supported by our highly skilled personnel. We believe in delivering accurate and quality reports in affordable rates.

MGM central laboratory wish to extend its services in communities by participating in Health checkup plans and also by establishing memorandum of understanding with other hospitals at periphery, in order to benefits all needy and disserving patients.

BLOOD BANK: MGM Medical College and Hospital Blood Bank is a state of art Blood Bank with **NABH** accreditation. It is fully equipped with the best in class infrastructure and technology for component separation and Apheresis procedure. It operates round the clock for issue of blood components to patients mainly in-house and to other surrounding hospitals. Our blood bank supports Voluntary blood donation with more than 90% collection in camps, an in-house blood donor registry with more 5000 donors registered. Our blood bank promotes rational use of blood components and safe blood transfusion through good manufacturing practices controlled by quality standards, skilled manpower and high end technology for component separation and Apheresis procedure.



RESEARCH FACILITIES AVAILABLE

School of Biomedical Sciences is an interdisciplinary science that involves the study of human health and disease. Students are trained in various disciplines to gain an understanding of how the human body is organized (Anatomy), how the various organs and cells function (Physiology, biochemistry and molecular biology), structural and chemical changes taking place in human system (Pathology and Clinical Biochemistry), agents of diseases (Microbiology, non-communicable diseases, genetics), diagnosis (Clinical Pathology, Microbiology, Biochemistry and molecular biology) agents used for treatment of diseases (Pharmacology) and Molecular mechanisms (Biotechnology).

MGMSBS gives a lot of emphasis to students and staff for conducting research, presentation and publications of research papers in various peer reviewed indexed journals and also presenting students work in various national and international conferences.

For encouraging research among staff and students we have a dedicated Central research Laboratory under MGMSBS which is intensely working to carry out Genetic, Molecular and Biotechnological Applied Research. The laboratory is well equipped with High throughput technique of Real-time PCR as well as technology for ELISA, DNA/RNA extraction, Electrophoresis (Vertical/Horizontal), Microbiological assays and Zebra fish cultivation (as animal model).

- Rational Drug discovery
- Discovery of novel predictive Biomarkers
- > Affordable and Rapid Diagnostic for TB and Malaria.
- Prediction of Disease and Prophylactic Disease Management.
- Decoding Infectious Diseases at Host Genome level.

Keeping up with recent trends in research we have upgraded our facility to include:

- Zebra fish lab
- Molecular lab RT PCR,
- Infectious lab TB drug delivery & diagnostic,
- Genetic testing and counseling Lab
- Animal house as a part of medical college which gives support to carry out research

MGM LABORATORY FOR INFECTIOUS DISEASE, RESEARCH AND DIAGNOSTICS

MGM CRL Molecular lab has state of the art molecular research facility for all interdisciplinary studies. The thrust area to run this lab is its own R&D programs in technology development, assay development and biomarker discovery. This lab is equipped with cutting edge technologies like Real Time PCR, NAAT, DNA Hybridization assays, EVOS FL Auto microscope, Immunological assays and Culture and Drug susceptibility studies.

As a healthcare organization, we are conscious of our responsibility to reduce the test cost burden on the society. We aim to achieve this objective with increased efficiency and productivity gained from a centralized processing laboratory which is in line with the Vision and Mission of our institute.



This laboratory is closely pursuing Research & Development regarding laser based fluorescent detection system & related activities/ systems for quick detection of TB/ Infectious Diseases using Nanotechnology and related advanced areas.

A joint patent has been filed and published. The collaborating institutes are BARC, MGM and BITS, Goa. Concept and Micro Nano-Engineering support was provided by BARC, Bio-chemical process using Gold Nano Particles was developed by MGM and Fluorescence Detection methodology was developed by BITS, Goa. Presently all the aspects of the development viz., biochip engineering, biotechnology and detection system are being pursued at MGM, Kamothe campus.



Pictures of Detector system

GENETIC TESTING AND COUNSELING LAB:

Genetics is the field of heredity which deals with chromosomes in nuclei of cells and genes on the chromosomes and nucleotides which forms the genes. Cytogenetic is the branch of genetics in which chromosomes are studied in terms of their number and structure. Karyotyping is a gold standard technique in which chromosomes are studied and arranged according to their sizes. On the basis of report of karyotyping genetic counseling is offered to the patients, relatives and parents. Genetic counseling done at right time will definitely achieve the goal of reducing incidence of same genetic defect. Cytogenetic laboratory in MGMIHS offers karyotyping by using peripheral blood, bone marrow and products of conception. Up till how we have done karyotyping in more than 200 cases and offered Genetic counseling in more than 150 cases.



Genetic Research Lab

MGMIHS SLEEP MEDICINE AND RESEARCH CENTER IN COOPERATION WITH PENN MEDICINE, UNIVERSITY OF PENNSYLVANIA, US UNDER DEPARTMENT OF RESPIRATORY MEDICINE

Sleep is essential to health, restoring properties that promote wakefulness & a sense of well-being. Sleep disturbance caused by a sleep breathing disorder or any other sleep disorder results in a wide range of systemic & neuropsychological symptoms. Sleep disruption also has consequences for societal & public health by impairing work performance &psychosocial interaction. There is lack of awareness of sleep related disorder among community physicians & patients. Knowing the importance of this relatively new subject MGMIHS has taken initiative to introduce the subject of sleep medicine in metropolitan area of Navi Mumbai& Raigad district. MGMIHS sleep medicine, university of Pennsylvania, USA. This center is 1st State of art Polysomnographycenter in Navi-Mumbai & Raigad district. The sleep studies are done by registered Polysomnography technician under supervision & guidance of respiratory faculties. Sleep studies are reported by experienced respiratory faculties.



MGM CENTRE OF HUMAN MOVEMENT SCIENCE (MGMCHMS)was MGM Centre of Human Movement Science (MGMCHMS) was established under the auspices of MGM School of Physiotherapy, MGM Institute of Health Sciences, Navi Mumbai in 2015. The Center was supported by International Society of Biomechanics and BETiC, IIT-B to address the urgent need to integrate clinical biomechanics in Indian healthcare.

The Center aims to provide movement analysis facilities following traumatic musculoskeletal dysfunction, amputations (loss of limb), sports injury, surgical interventions such as joint replacement, diabetic foot complications, neurological disorders such as stroke, cerebral palsy, Parkinson 's disease, injury prevention and enhancement of function in sportsmen and dancers, at an affordable cost. The vision is to generate a task force within the country to undertake research and develop the science of movement analysis in India by conducting integrated training for clinicians and engineers.

The core team of MGMCHMS includes 5 Physiotherapists supported by a committed team of Mechanical engineers from IITB and human movement scientists from Cardiff University, UK contributing with complementary skills on specific research projects. A cohesive effort between healthcare professionals and engineers is a highlight of team work at MGMCHMS resulting in translational healthcare research.

Inter-disciplinary collaborative research funded internally and extramurally is ongoing. . Internally funded projects focus on exploration of biomechanical demands of Yogasanas, Suryanamaskar; traditional ground level activity such as squatting and classical dance form namely-Bharatnatyam. Some of our research projects include exploration of functional outcome in children with cerebral palsy undergoing surgery. Pilot work is undertaken to study plantar tissue stiffness among people with diabetic neuropathy.. The Center also focuses on validation of devices and design development. A collaborative project between Department of Mechanical Engineering IIT Bombay and MGM School of Physiotherapy, Navi Mumbai aimed towards developing a powered trans-tibial prosthesis for people with below knee amputation; funded by Department of Biotechnology is ongoing.. MGM School of Physiotherapy is working with Sancheti College of Physiotherapy, Pune to explore effectiveness of two modifications of traditional Suryanamaskar. Additionally, PhD scholars and post-graduate students of Physiotherapy and engineering are engaged in interdisciplinary collaborative projects.

The center has offered 12 training courses in clinical biomechanics, over 4 years, which were received well by enthusiastic clinicians and engineers across Maharashtra, Gujarat, Karnataka and Kerala & Delhi. Participants reported an excellent feedback on knowledge base, awareness of applications of movement analysis in clinical care and academic programs. Ongoing observer ship, guided tours and short-term demonstrations are conducted to spread awareness and knowledge of biomechanics among clinicians, students and faculty members from health care disciplines and engineering.

Intense efforts to deliver a triad of clinical service, research and training programs in clinical biomechanics continue at MGMCHMS to meet the ultimate goal of addressing healthcare needs specific to Indian lifestyle.







FABRICATION LAB:

MGM Department of Prosthetics and Orthotics started rendering services since 2011, under the MGM Medical College and Hospital, Navi Mumbai. With the aim to provide the best of Prosthetic –Orthotic Education, the MGM Institute's University Department of Prosthetics and Orthotics, Constituent unit of MGM Institute of Health Sciences (Deemed to be University u/s 3 of UGC Act, 1956) Navi Mumbai, was started in 2014. Prosthetics and Orthotics is a specialized health care profession, which combines a unique blend of clinical and technological skills. The Prosthetic and Orthotic Professionals assess and evaluate patients, prescribe, fabricate, and fit Outhouses and

Prostheses. Rehabilitation of persons with locomotors disabilities or neuromuscular disorder is a team work, where Centre of attention is the persons with disabilities. This work requires substantial clinical and technical judgment. Prosthetics and Orthotics Professionals make the patient independent, confident and useful member of the society through comprehensive prosthetic and orthotic management. Service to general health and work related disorder such as foot disorders, fractures, sports injuries, disorders due to aging, tendinitis, muscular pain, aesthetic restoration and pre and post-surgical management of amputees and other neuro-musculoskeletal disorders patients are assessed, measured with various techniques, fabricated & aligned for their Prostheses/Orthoses, gait training of the patients and finalization of the devices are performed in Prosthetics & Orthotics Labs.



MGMIHS OMICS RESEARCH CENTER

OMICS Research Center of MGMIHS is a center of excellence in drug discovery and molecular diagnostics. Center is accelerating the basic and applied research. Using various domains of OMICS such as genomics, proteomics and computational biology, this center is providing unique and exploratory platform for discovery research. Research and technology innovation of center is mainly revolving around the integration of advanced knowledge of protein science, enzymology, metabolic network, natural products chemistry, green synthesis etc. The thrust area of this center

i.e. biomarker discovery, rational drug discovery, nano-biotechnology, reversal of drug resistance and green technology. Presently center is actively engaged in discovery and diagnostic research in the area of tuberculosis, malaria, obesity and disability.



Center is equipped with important instruments such as spectrofluorophotometer, UV-Vis Spectrophotometer, ELISA Reader, HPLC, Fume Hood, Laminar Air flow, Biosafety Cabinet, CO₂ Incubator, Thermal cycler, Gel Electrophoresis instruments, Inverted microscope, -20°C refrigerator etc. and other large number of basic and small supportive instruments. This center is also enriched with facility for protein isolation, purification and crystallization. This center is powered by availability of animal cell culture and microbial culture facility. Centre is also equipped with an advanced proteome/protein based several bio-systems for bio-fabrication of metallic nanoparticles. Bio-fabrication based generation of quantum dots facility is major attraction of center. Due to interdisciplinary research platform, center has provided facilities for various divisions of MGM medical college and hospital such as Ophthalmology, Pediatrics, Pharmacology, Biochemistry, Pathology and other unit of MGMIHS i.e. MGM School of

Physiotherapy, MGM School of Biomedical Sciences, MGM Dental College and MGM College of Engineering and Technology for research and training work. Centre has also supported Ph.D. Biotechnology program under MGMIHS, M.Sc. Molecular Biology (two years) program under School of Biomedical Sciences and MGMIHS Incubation and Innovation Centre. Presently nine major internal projects are going in full pace.

To enhance the diagnostics and therapeutic program, center has successfully established the several biogenic processes for the simple and green synthesis of metallic nanoparticles. Protein based bioreactor for generation of cerium oxide florescent nanoparticles (quantum dots) is major achievement in technology development section. Centre has successfully developed capability to conjugate antibodies with quantum dots, which display good florescence intensity. MGMIHS OMICS Research Center has developed cerium quantum dot powered IP-10 antibody assembly for identification of TB antigen which is an important achievement. This center has also identified several edible plant source including spice plants as source anti-obesity molecule i.e. pancreatic lipase inhibitor. Identification of new source of pancreatic lipase inhibitor from spice plant as an anti- obesity molecule is breakthrough in this section. Center has successfully completed animal trial using rat model for anti-obesity activity of selected molecule. Besides peer reviewed publication, center has filed several patents.

MGMIHS OMICS Research Center is an interdisciplinary synergy and it is also acting as central facility for MGMIHS research. Faculty, clinician, scientific staff and students are using this facility. Researchers of the center have been also awarded by various national and international organization/foundation.

II. Animal House / Medicinal Plant Garden / Museum

The word museum is derived from the Greek word "mouse ion" which means "seat of the Muses" (Muses are the patron divinities in Greek mythology of the arts) and hence a building set apart for the study and display of the arts. Considering a need of innovative practices and modification of existing infrastructure to teach medical students.

Anatomy museum is situated in the spacious 250 square meter area in the Anatomy department. It is divided in to 4 large sections, gross anatomy, embryology and radiology with cross sectional anatomy and Osteology. Museum has total **367** mounted wet specimens. (Gross anatomy, embryology & cross sectional anatomy)

Gross anatomy section has total number of specimens **236** arranged on racks as following sections (Region wise)Upper limb – 32, Lower limb – 24, Thorax – 24, Abdomen + Pelvis – 67,HFN – 37, Neuroanatomy-52

Embryology section has 32 specimens &86 POP + Plastic models

Radiological and cross sectional anatomy section99 sectional specimens are mounted. Museum has total collection of **1557** normal Radiographs out of which 31 are mounted on view boxes. **24** CT scans are displayed on view boxes as cross sectional radiology.

In **Osteology section 61** painted bones and **1** whole skeleton are kept on display.

There are **141** charts displayed around the museum.

Museum also has attached rooms for specimen preparation as per MCI requirement.

For teaching purpose museum has 3 x ray view boxes & seating arrangement for 50 students

A well-maintained pathology, forensic museum is a great source of information on rare diseases. Regular visits to a pathology museum are, therefore, considered an essential component of teaching pathology to medical students. Department of pathology has a state of art museum with more than 800 mounted specimen with recent acrylic gel technology. Gross specimen mounted contain specimen of various systems including some rare ones like amoebic colitis and amoebic liver abscess and typhoid intestine and also houses common ones like leiomyoma. The museum also has 146 charts and Models and is being constantly upgraded to keep with the recent trends.



ANIMAL HOUSE

MGM Medical College, Navi Mumbai & Aurangabad, a teaching and research institutional with many postgraduate students performing research on animals. As per the CPCSEA (Committee for the Purpose of Control and Supervision of Experiments on Animals) norms, the Institutional Animal House is registered (CPCSEA Registration No: - 303/PO/Re/S/2000/CPCSEA & CPCSEA Reg. No. 1777/PO/Re/S/14/CPCSEA) with Government of India. The Institutional Animal House has separate housing rooms for each species of experimental animal (rats, mice, rabbit, Guinea Pig, etc), acclimatization, washing, storage and procedural and rooms as per the norms of CPCSEA, Government of India.

Institutional Animal Ethics Committee (IAEC) has been constituted to supervise and evaluate all aspects of the animal care and use program in the institution under rule 5(a) of the breeding and Experiment on Animals (Control and Supervision) rules 1998.

IAEC Ensures that quality and consistent ethical review mechanism for biomedical research in animal is put in place for all proposals dealt by the Committee. IAEC is also responsible for reviewing From - B, form - C and Form- D, inspecting animal facilities and uphold 3R's principles of (Replacement, Reduction and Refinement) ensuring adherence to CPCSEA

guidelines. Before research involving animal can be undertaken, the project will have to be reviewed and approved by the IAEC.

FUNCTION OF IAEC:

The function of the Institutional Animal Ethics Committee (IAEC) are as follows:

- Review proposed use of animals in research and require any modifications necessary for approval, or withhold approval prior to use of animals
- Approve research involving animals which conform to the various guidelines for use of animals in research
- Review periodically the Institute's animal facility
- Review and investigate legitimate concerns involving the care and use of animals during research
- Ensure that all personnel involved in animal care and use are appropriately qualified to perform their duties and conduct proposed activities



MGMCRL ZEBRAFISH FACILITY

Our Zebra fish facility is located in the MGM Medical College Building in the Central Research Laboratory having a total area of about 77 sqmtr. The facility consists of two dedicated rooms with 3 iron Tank racks for accommodating about 110 tanks for research

and breeding projects and features dusking and dawning automatic diurnal lighting control. The 110 tanks have a holding capacity of more than 550 adult zebra fish.

Basic parameters including temperature, conductivity, and pH are monitored that provides continuous real time data to maintain ideal housing conditions. Biological water testing is conducted quarterly. Both the rooms are equipped with their own work space to allow for behavioral studies complete with Motic Stereo microscope attached with computer for easy data acquisition. For more in-depth studies we have the In-vitrogen Evos FL Auto Imaging System for automated imaging platform which is capable of live fish imaging, stained area scanning, image stitching, and time-lapse imaging and fluorescent image scanning. The zebra fish facility is used by PhD students, M.Sc students and other students of MGMIHS (dental, medical, etc) for their dissertation work.

The thrust area of our zebra fish laboratory is

- Nanotoxicity,
- Model for toxicological, environmental & compound screening
- Behavioral studies
- screens for different disease model



III. Media Laboratory / Business Laboratory / e-Resource studio

MGM MEDIA LAB

RADIO:

Communication truly become mass communication with the advent of Radio. Outside of the printing press, it is believed that the humble radio has done more for communication than any other medium. In a country with diverse population, it has helped unite the masses like never before. To most of us, however, the radio is a medium of entertainment alone. Given the wide range and ease of use, radio can be used to share information and knowledge that can benefit the community at large. This is probably why there has been an increase in the interest and involvement of the government and other NGO's in the setting up and use of Community Radio Station (CRS). The role and the function of a CRS is more specific and as the name signifies, heavily focused on the community, its growth and its development.

"MGM Radio" 90.8 Mhz is dedicated and devoted community radio station that nurture educational field and society within 35-km radius in and around Aurangabad. This radio station being a part of Mahatma Gandhi Mission Trust has a futuristic vision of Quality Education which would be imparted from MGM Radio.

OUR OBJECTIVES

"MGM Community Radio" is a form of local radio which defines itself as an autonomous entity and relies on the community for its survival without any commercial aims or objects. We are motivated by community well-being and not commercial considerations.

PROGRAMS OF MGM RADIO

Our radio stations broadcast important and informative programs based on educational as well as social issues. We also aim to provide program in entertainment & cultural activities. We encourage participation of the listener through various sources.

PARTICIPATION OF COMMUNITY IN MGM RADIO

MGM Community Radio is a program conceived, devised, developed and managed by the Community. MGM Radio encourages local artist & group for creating awareness on different issues.



IV. Research / statistical databases / health informatics

Statistical Package for Social Sciences (SPSS) is computer software that allows users to enter data, perform statistical tests such as parametric and non-parametric tests and draw graphs. Moreover, the software is user-friendly, easy to learn and compatible with a personal computer/laptop. It is therefore preferred statistical data analysis software among students and professional researchers due to its numerous modules. SPSS software importance in analyzing data since it is capable of analyzing a large amount of data.

MGM Institute of Health Sciences has qualified expert who has been providing guidance and conducting continuous hands on training for faculties, researchers, students and supporting scholars in diverse health care research and academic fields to produce high-quality dissertations and theses. Use of latest version 24.0 SPSS for data analyses from 2017 and hands on training





V. Clinical Trial center:

MGM Clinical Trials Centre (**CTC**) now has a diverse group of clinicians/researchers. We are contributing to major advances in clinical care via our high-quality collaborative clinical trials research from reputed industries such Wockhardt Ltd, Lupin, Mcleods, Glenmarks , and hospitals like Tata Memorial, etc. Our Clinical trial Center is committed to excellence in producing the highest quality data while meeting the highest ethical and professional standards.

Objective of this center are:

To evaluate the efficacy and safety of medicinal products or medical procedures in humans

- By participating in trials:
 - patients gain access during and after the clinical trial to new treatments that are not yet available to the general population
 - ➢ may obtain medical care free of charge
 - will be closely monitored for possible adverse events
 - contribute to medical research that may result in the advancement of medicine and healthcare in general thereby helping other fellow human beings
- 1. To initiate clinical research at MGM medical College & Hospital, Aurangabad, following measures were taken:
 - Approval of existing institutional ethics committee from DCGI.
 - Sensitizing the doctors for conducting clinical trials.
 - Contacting CROs for initiating clinical trials at MGM Medical College and hospital.
 - Signed MOU between MGM and Grapecity SMO; MGM and Ardent SMO and initiated trials.
- 2. Following activities are done in our well established Clinical Research Unit under Dept. of Pharmacology:
 - Physicians and clinical research staff have to acquire GCP training.
 - Site qualification visit is done by sponsor to identify the site and the resources.

- Site initiation visit prior to the start of the study is done by sponsor. Someone from the sponsor company will come to your research site and introduce to the study, answer questions, and make sure you are properly set up for the trial.
- Monitoring visits by CRAs and monitors to ensure that all required processes are being followed by combing through recorded data and querying information.
- While rare, prepared for possible DCGI or FDA site audits
- We have successfully completed ten trials.
- Currently 12 trials are ongoing at our site.

The answers to these types of trials have revealed important advances in patient care, which have resulted in better health outcomes for patients globally. We also plan to maintain and build more collaborative ties with other research networks, universities, government, and industry, to answer important clinical questions in new therapy areas.