

AMRITA HOSPITALS

KOCHI * FARIDABAD (DELHI-NCR) * AMARAVATI

A COMPREHENSIVE OVERVIEW



2018

Amrita Institute of Medical Sciences and Research Center
Kochi, Kerala
INDIA

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MISSION STATEMENT

AMRITA INSTITUTE OF MEDICAL SCIENCES AND RESEARCH CENTRE

(Amrita) is a not-for-profit organization dedicated to establishing a center of healthcare excellence and improving the well-being of the community through quality programs of preventive medicine, medical education, and research. We are committed to providing outstanding and affordable medical care in a patient-friendly environment and in a spirit of compassion to all, regardless of race, caste, religion, or economic condition. We offer charitable care to the fullest extent possible for those in need.



MESSAGE FROM THE DIRECTOR

With our present healthcare operations spread across Kerala, Karnataka, Maharashtra, Andaman and Nicobar Islands, we soon stand to make our presence felt in Bangalore, Faridabad (Delhi NCR) and Amaravati (Andhra Pradesh).

Amrita Hospitals, with a total bed capacity of 1100 (490 units) beds, has treated more than 10 million (1 crore) patients across India. Charity Medical Care stands at a whopping US\$ 110 million (Rs.700 crores) that has provided much needed free medical care to over 5 million deserving patients.

The Amrita healthcare system stands on an edifice of sophisticated care being provided with love and compassion. Today, Amrita Hospitals is recognized as one of the premier healthcare institutions in South Asia. Our commitment to affordable quality care has attracted a dedicated team of highly qualified medical professionals from across the world. The Amrita team, comprised of physicians, surgeons and other healthcare professionals, are of the highest caliber and experience.

The massive healthcare infrastructure in Kochi, Kerala with over 3.33 million sq. ft. of built-up area, spread over 125 acres of land, supports a daily patient volume of approximately 3500 outpatients with 95 percent inpatient occupancy. Annual patient turnover touches an incredible figure of almost 1million outpatients and nearly 50,000 inpatients. There are 12 super-speciality departments, 45 other departments, 4500 support staff and 670 faculty members.

We have extensive facilities comprised of 28 modern operating theaters, 275 equipped intensive-care beds, a fully computerized and networked Hospital Information System (HIS), a fully digital radiology department, 17 NABL accredited clinical laboratories, NABH Accredited

Hospital Services, NAAC with "A Grade, ISO 9001:2008 Certified Services and a 24/7 telemedicine service.

Amrita features one of the most advanced hospital computer networks in India. The network supports more than 2800 computers and has computerized nearly every aspect of patient care, including all patient information, lab testing and radiological imaging.

The most recent additions are the DA VINCI SURGICAL ROBOTIC SYSTEM; ROSA, the latest generation in robotic neurosurgery assistance; the MAKO ROBOTIC-ARM ASSISTED TECHNOLOGY which is transforming the way joint replacement surgeries are being performed; a CYBERKNIFE M6 and TOMOTHERAPY for the most precise radiotherapy available today; the GE VOLUSON E10 4D ultrasound system for spectacular 2D and 3D/4D images; a Philips 256 slice iCT scanner; a PET-3TESLA MRI scanner which is extremely useful for early detection of cancer, and the Digital Pathology Solution, a virtual microscope which digitizes lab slides which more accurately help clinicians in better, faster, cheaper diagnosis and prediction of diseases.

Amrita offers a total and comprehensive healthcare solution comparable to the best hospitals in the world.

Sincerely,

Dr. Prem Nair

Medical Director

Amrita Institute of Medical Sciences

Operating Officer, Health Sciences Campus

Amrita Vishwa Vidyapeetham



OUR FOUNDER AND INSPIRATION

SRI MATA AMRITANANDAMAYI DEVI

“A LOVING SMILE, A KIND WORD, A DISPLAY OF GENUINE CONCERN BY MEDICAL PRACTITIONERS WILL DEFINITELY COMPLEMENT THE CURATIVE POWER OF THE MEDICINES.”
—AMMA

Love, compassion, empathy and tolerance—under the pressures of modern life, these qualities have all but disappeared. Through her loving embrace and charitable activities, Sri Mata Amritanandamayi Devi (affectionately known as Amma or Mother) is healing the heart of the world, rekindling love and mutual respect, and awakening people to their fundamental oneness.

Through her extraordinary acts of love and self-sacrifice, Amma has endeared herself to millions. Tenderly caressing everyone who comes to her, holding them close to her heart in a loving embrace, Amma shares her boundless love with all. Be they young or old, sick or healthy, rich or poor—everyone who comes to her receives the same unconditional love.

Amma’s teachings are universal. Whenever she is asked about her religion, she replies that her religion is Love. She does not ask anyone to believe in God or to change their faith, but only to inquire into their own Real Nature.

Amma had a vision of creating a hospital in Kerala where the poor could receive free advanced medical care, such as heart operations and kidney transplants, in an atmosphere of love and compassion. She saw that while the poor did receive basic medical care through various charitable clinics, advanced care was beyond their dreams. This eventually led to the birth of the highly sophisticated, 1600-bed tertiary referral and teaching Amrita Hospitals (Amrita). Amrita exemplifies Amma’s use of science and technology to maximize health services for the poor, offering medical care with a wide spectrum ranging from cardiology to oncology and from geriatrics to pain and palliative medicine. Today, Amrita are not just hospitals for the poor; they are an Institute of Medical Sciences of international repute, offering healthcare education and super-specialty hospitals that offer world class healthcare within the reach of the underprivileged and the downtrodden.

AWARDS AND ACCREDITATIONS



BRITISH MEDICAL JOURNAL (BMJ) -
INDIA 2014, 2015, 2016



NATIONAL EXCELLENCE HEALTHCARE AWARDS FOR
PATIENT SAFETY AND INNOVATION IN
MEDICAL TECHNOLOGY BY FICCI (2016)



NABH ACCREDITED HOSPITAL
SERVICES



NABL ACCREDITED LABORATORIES



ISO 9001:2008 CERTIFIED SERVICES



CENTERS AND SPECIALTY DEPARTMENTS

CENTER FOR HEART DISEASES

- Department of Adult Cardiology
- Department of Pediatric Cardiology
- Department of Cardiovascular Surgery
- Department of Pediatric and Congenital Heart Surgery

CANCER CENTER

- Bone Marrow Transplantation
- Center for High Precision Radiotherapy
- Department of Medical Oncology
- Department of Surgical Oncology
- Department of Radiation Oncology
- Pain and Palliative Care
- Gynec Oncology
- Pediatric Oncology

CENTER FOR DIGESTIVE DISEASES

- Department of Gastroenterology and Hepatology
- Department of Gastrointestinal Surgery

CENTER FOR NEUROSCIENCES

- Department of Neurology
- Department of Pediatric Neurology
- Department of Neurosurgery

CENTER FOR ROBOTIC SURGERY

- Orthopedics
- Minimally Invasive Cardiac Surgery
- Gynec Oncology
- Surgical Oncology
- Gastrointestinal Surgery
- Neurosurgery
- ROSA Robotic Assistant for Neurosurgery
- daVinci Robotic Surgical System

CENTER FOR PLASTIC/RE-CONSTRUCTIVE AND MICRO-VASCULAR SURGERY

- Division of Head and Neck
- Division of Re-constructive Surgery
- Division of Cosmetic Surgery
- Division of Hand Surgery
- Division of Cleft and Craniofacial Surgery
- Division of Burn Surgery

CENTER FOR ENDOCRINOLOGY AND DIABETES

- Department of Endocrinology
- Division of Diabetes and Podiatry

CENTER FOR PSYCHIATRY AND BEHAVIORAL MEDICINE

- Division of Clinical Psychology
- Division of Psychiatric Social Work
- Department of Psychiatric Social Work

SOLID ORGAN TRANSPLANT CENTER

- Division of Kidney Transplant
- Division of Liver Transplant
- Division of Heart Transplant
- Division of Pancreas and Bowel Transplant
- Division of Hand Transplant

CENTER FOR LABORATORY MEDICINE

- Pathology
- Biochemistry
- Cytology
- Cytogenetics
- Hematology
- Genomic and Proteomics
- Histopathology
- Metabolic Disorders
- Microbiology
- Molecular Biology
- Serology
- Toxicology and Poison Control Center
- Virology

CENTER FOR MEDICAL INFORMATICS, BIOINFORMATICS, MULTIMEDIA-EDUCATION, AND TELEMEDICINE

- Department of Continuing Medical Education
- Department of Informatics
- Department of Medical Multimedia
- Department of Medical Simulation and Haptics
- Department of Telemedicine
- E-Learning Center
- Learning Resource Center (LRC)
- Public Health and Health System Research

CENTER FOR WOMEN AND CHILDREN

- Fetal Surgery
- Gynecology and Obstetrics
- General Pediatrics
- Neonatology
- Pediatric Neurology
- Pediatric Gastroenterology
- Pediatric Surgery
- Perinatology
- Reproductive Medicine

SPECIALTY DEPARTMENTS

- Anesthesiology
- Dentistry
- Dermatology
- Emergency Medicine
- ENT
- Geriatrics
- Internal Medicine
- Medical Physics
- Medical Statistics
- Medical Genetics
- Nephrology
- Nuclear Medicine
- Ophthalmology
- Pulmonary Medicine
- Radiology
- Audiology and Speech Pathology
- Urology
- Vitreo-Retinal-Surgery



CENTER FOR HEART DISEASES

RAPID CHANGES IN THE LIFESTYLES OF DEVELOPING ECONOMIES HAVE RESULTED IN AN UNPRECEDENTED EPIDEMIC OF HEART DISEASE.

Along with preventive measures that involve healthcare planning, public education, and lifestyle changes, facilities to take care of the immediate consequences of heart disease have become the need of the day. The Center for Heart Diseases at Amrita Institute of Medical Sciences is comprised of the adult and pediatric departments for medical and surgical services and provides affordable, high-quality tertiary medical care by highly qualified as well as experienced personnel using state-of-the-art medical technology. Having evolved as a leader in the fight against cardiovascular disorders in the state of Kerala, it serves approximately 10,000 cardiovascular patients annually.

The Amrita Team focuses on medical and surgical management of all types of cardiac ailments including primary and secondary prevention as well as cardiac rehabilitation.

Accordingly, the program specializes in minimal access cardiac surgery, “beating heart” off-pump bypass surgery, as well as intensifying patient health education and disease prevention, outreach programs, specialized training and research programs.

DEPARTMENTS

- Adult Cardiology
- Pediatric Cardiology
- Fetal Cardiology Division
- Cardiovascular and Thoracic Surgery
- Pediatric and Congenital Heart Surgery

► ADULT CARDIOLOGY

The cardiology team provides advanced treatment to patients with a variety of cardiovascular disorders. For an immediate response, a 24 hour emergency team with a mobile intensive care unit provides speedy access in emergencies. The Center is fully equipped to provide intensive and multidisciplinary, comprehensive medical care for patients with complex, multiple disorders.

SERVICES OFFERED

Outpatient Services

The outpatient facility is structured for general evaluation of patients with chest pain and various forms of heart diseases. With the best biomedical equipment, the diagnostic work up is performed with the least amount of patient discomfort and high levels of accuracy. The multidisciplinary team provides heart care services for the cardiac patient who may also have coexistent medical problems. For a majority of patients, the diagnosis, treatment planning and recommendations are completed in a single day.

Emergency Response Team and Heart Station

Amrita provides mobile coronary care units which are fully equipped with advanced life support systems, communication facilities with the Heart Command Center located in the Coronary Care Unit, and manned by well trained and experienced paramedical and medical personnel. These units

provide rapid access to handle emergencies. Patient transfer happens not only state wide, but also from neighboring states.

Noninvasive Cardiovascular Imaging

A. ECHOCARDIOGRAPHIC HEMODYNAMIC LABORATORY

The heart has a complex, multi-dimensional shape. A proper assessment of the function of its parts requires a multi-dimensional depiction of its structural and functional intricacies. This complex physical relationship can be studied using reflections from high frequency sound waves, called ultrasound, which can give information on blood and heart muscle motion.

Services offered included in echocardiography:

- Trans-thoracic Echocardiography
- Trans-esophageal Echocardiography
- Tissue Doppler Imaging (tissue velocity and strain imaging)
- 3D Echocardiography
- Contrast Echocardiography
- Pharmacological Stress Echocardiography
- Intra-operative Echocardiography

Four echo labs are located in the out-patient department. Echo machines are also used in the Cathlab, Surgical theaters and ICUs.

Available machines include high end Vivid 7 Dimensions 9GE, Philips IE 33 with 3 D with trans-esophageal probe.

B. MULTI DETECTOR COMPUTED TOMOGRAPHY (MDCT)

For the imaging of cerebrovascular, cardiac, visceral and peripheral vasculatures, CT coronary angiography using a 256 slice CT scanner enables accurate, noninvasive detection of significant coronary artery disease in patients hospitalized for acute chest pain syndrome and negative biomarkers. It is also useful for screening patients with intermediate risk for developing coronary artery disease. It is now the preferred diagnostic modality for evaluating blood clots on arteries supplying lungs (pulmonary embolism).

Diagnosis and treatment planning with nonoperative techniques for aortic aneurysms (thinning and bulging) as well as the dissection of the aorta needs good quality picture generated by MDCT. Occlusion of blood supply to legs, hands and other organs can also be accurately quantified by this technique.

C. CARDIAC MAGNETIC RESONANCE IMAGING (MRI) 3 TESLA

This imaging is very useful in assessing the damage of heart muscles caused by heart attack, as well as:

- Evaluation of heart failure
- Detection and quantification of heart defects present at birth
- Tumors of the heart
- Pericarditis (inflammation of the sac covering the heart)
- Evaluation of arrhythmogenic RV dysplasia, sarcoidosis and other causes of ventricular arrhythmia and heart failure

D. NUCLEAR CARDIOLOGY

Using radioisotopes as a diagnostic tool, it is possible to assess the function of the heart and its blood supply. Our sophisticated facility has a Siemens gamma camera to perform the following procedures:

- Thallium and MIBI perfusion studies
- Viability testing
- MUGA (Ventriculogram)
- Ventilation perfusion lung scans
- Renal perfusion scans
- Tc labelled RBC venogram for DVT

E. POSITRON EMISSION TOMOGRAPHY (PET) MRI

Positron emission tomography, also called PET imaging or a PET scan, is a type of nuclear medicine imaging. Combined with an MRI, it is used to identify the patients with damaged heart muscles likely to get benefit from angioplasty and bypass surgery. It is also effective in determining the blood flow to the heart as well as infections and cancers.

F. SYNCOPE (FAINTING) EVALUATION

Holter monitoring and head-up tilt tests with pharmacological challenges are utilized for the evaluation of patients with syncope. Detailed expert clinical assessments and implantation of Loop recorder as well as EP study in selected patients is conducted when necessary.



PET-MRI

Coronary Care Unit (CCU)

The unit is staffed by a specially trained physician and nurses capable of serving patients with heart attack, heart failure and arrhythmias.

This 24-bed facility provides care for the sick patients who may require ventilatory support, invasive and non-invasive advanced life support such as emergency pacing (trans-venous and trans-thoracic) and intra-aortic balloon pump support for a failing heart. Hemodynamic monitoring including blood gas analysis enables the management of patients on various therapeutic medications for heart attack and heart failure. CCU protocols help to provide therapies per guidelines and recommendations. Infection control protocols, 1:1 critical care nursing, the 24x7 availability of a trained physician/cardiologist code blue team have helped in improving outcomes in our CCU, and ensures immediate access to our cathlab.

Interventional Cardiology

A. CARDIAC CATHETERIZATION LABORATORY

The cardiac catheterization lab is equipped with a twin suite Siemens HICOR digital imaging system which is fully networked. The Cath Lab is one of the larger volume centers in India and with the outstanding results achieved so far, the Amrita Cath Lab has played a role in elevating the hospital to national prominence.

B. CORONARY ARTERY DISEASE

Remediation offers services including:

- Diagnostic Angiogram
- Intra-vascular Ultrasound
- Fractional Flow Reserve (FFR)
- Angioplasty and Stenting
- Rotablation
- Day care radial route angiogram and angioplasty
- Primary angioplasty program offers 24x7 acute myocardial infarction treatments. In order to facilitate the rapid establishment of blood flow in occluded artery, we bypass the emergency room delay by transporting patients directly to the Cath Lab

C. PERIPHERAL VASCULAR DISEASE

- Angioplasty and stenting of blood vessel supplying the brain

(carotid artery) to prevent catastrophic stroke in symptomatic patients with blocks

- Renal angioplasty in patients with critically reduced blood flow to kidneys
- Limb saving re-canalization of occluded peripheral vessels.
- Aortic angioplasty and stenting for congenital/acquired evaluation/aortoarteritis.

D. STRUCTURAL HEART DISEASE

- Device closure of heart defects - congenital atrial septal defect and ventricular septal defect
- Post myocardial infarction septal rupture device closure
- Keyhole treatment of valvular heart disease, Mitral, Aortic, Pulmonary and Tricuspid balloon valvotomy
- Alcohol ablation of septal myocardium in Obstructive Hyper-trophic Cardiomyopathy.

E. ENDOVASCULAR TREATMENT

- Aortic aneurysm treatment with stent grafts.
- Peripheral artery aneurysm-stent grafting.

F. ELECTRO-PHYSIOLOGY LABORATORY AND ARRHYTHMIA SERVICE - 3D NON-CONTACT MAPPING AND NAVIGATION SYSTEM

Amrita is one of the few centers in India offering comprehensive cardiac arrhythmia services and has taken the lead in providing the most modern cardiac arrhythmia care by installing a state-of-the-art, 3D mapping system. This system helps in navigating EP catheters in real time as well as for mapping any arrhythmias. The system generates and displays 3D graphical images of cardiac structures. This 3D system helps in offering long lasting cures for complex arrhythmias like post MI scar ventricular tachycardia, Atrial Fibrillation and Focal Tachycardia. It also helps improve procedural success and at the same time reduces procedural time and X-ray exposures (fluoroscopy) times. The EP team provides:

- Diagnostic electro-physiological study
- Radio-frequency ablation of different arrhythmias in adults and children
- Pacemaker implantation for patients with Brady (slow) arrhythmias



The CARDIAC CATHETERIZATION LABORATORY is equipped with a twin suite Siemens HICOR digital imaging system which is fully networked. The Cath Lab is one of the larger volume centers in India and with the outstanding results achieved so far, the Amrita Cathlab has played a role in elevating the hospital to national prominence.





- Cardiac resynchronization (bi-ventricular pacing) in patients with heart failure with expertise in optimization of therapy based on expert ECHO guidance
- Automatic Internal Cardiac Defibrillator (AICD) for patients with potentially lethal heart rhythm abnormalities
- Syncope evaluation including autonomic evaluation, Head-Up Tilt Testing
- Pacemaker – AICD follow up clinic
- Implantation of loop recorders for evaluation of syncope of unknown etiology

Preventive Cardiology

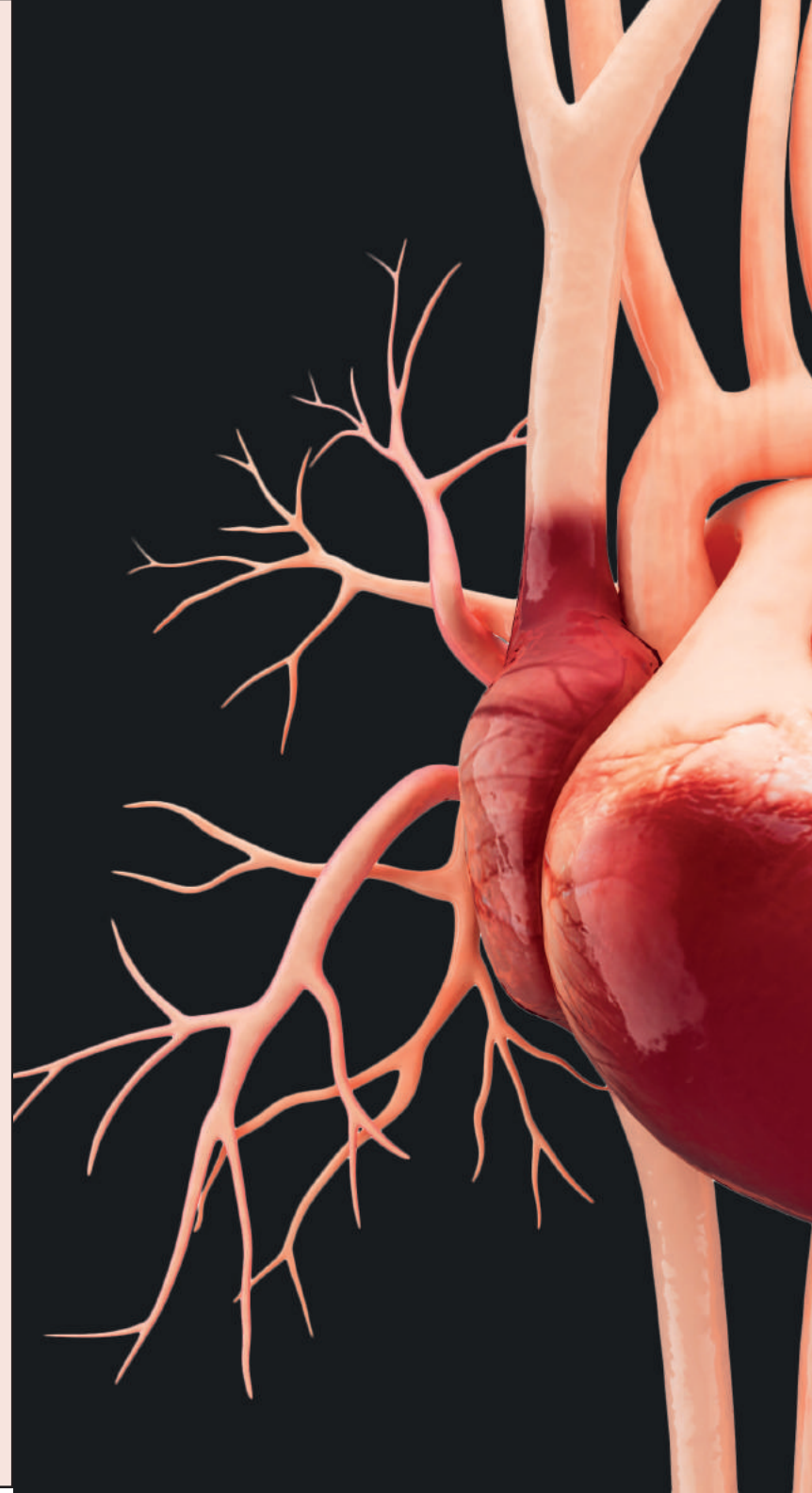
The Comprehensive Cardiac Health Check up identifies high risk individuals and recommends lifestyle modification and drugs for primary prevention of coronary artery disease. Secondary prevention is enabled by risk factor identification, counseling, diet modification and with treatment of associated problems like diabetes mellitus with drugs, during hospitalization.

► CARDIOVASCULAR AND THORACIC SURGERY

The Department of Cardiovascular and Thoracic Surgery at Amrita is one of the busiest programs in the country. Over 2000 cardiac surgical operations are performed annually.

INFRASTRUCTURE AND FACILITIES

- 5 fully equipped state of the art operation theaters
- 48 ICU beds
- 4 IABP Machines
- 1 ECMO Machines
- Maquet Vasoview 7 endoscopic vein harvesting system
- Karl Storz Video-assisted thoracoscopic (VATS) unit with latest Endochameleon HD endoscope
- Lerut Distending mediastinoscope
- State-of-the-art Library with access to all leading journals
- Fully Functional super-specialty training program for MCh degree in CVTS with current approval for two candidates per year
- Provides training to BSc and MSc students in the subjects of Perfusion Technology and BSc students in the course of Physician Assistant in Cardiovascular Surgery



SERVICES OFFERED

A. Adult Cardiac Surgery

SURGERY FOR CORONARY ARTERY DISEASE

The Department of Cardiovascular and Thoracic Surgery at Amrita is well equipped for holistic management of coronary artery disease including life-threatening mechanical complications of myocardial infarction (heart attack).

Special features of this program include emphasis on off-pump CABG (surgery is performed while the heart continues to pump blood by itself without the need for a heart-lung machine) and total arterial revascularization. Minimal access techniques for coronary artery bypass grafting are being used in appropriate patients. The department has acquired a reputation for its success in complex coronary artery bypass surgeries done on high-risk patients with poor heart muscle function and multiple co-morbidities.

Our surgeons are well experienced in performing successfully CABG along with carotid endarterectomy (surgery to remove plaque in carotid arteries to help prevent a stroke), correction of ischemic mitral regurgitation and DOR procedure (surgical method to restore a dilated left ventricle to its normal, elliptical geometry) as and when required.

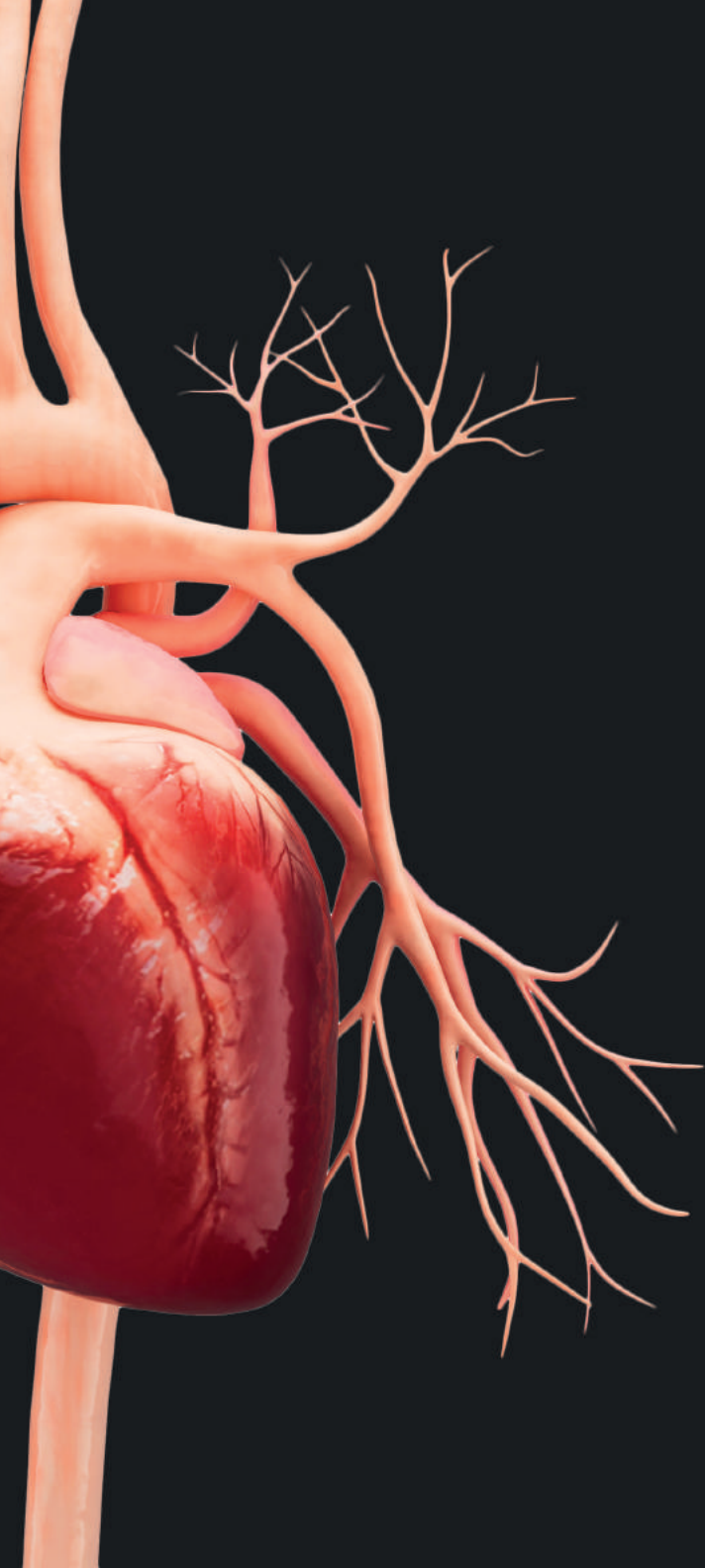
SURGERY FOR HEART VALVE DISEASE

Valvular heart disease is any disease process involving one or more of the four valves of the heart (the aortic and mitral valves on the left and the pulmonary and tricuspid valves on the right). Normally functioning valves ensure that blood flows with proper force in the proper direction at the proper time. In valvular heart disease, the valves either become too narrow and hardened (stenotic) and fail to open fully, or are leaky and unable to close completely (incompetent). The mitral and aortic valves are the ones most frequently affected by valvular heart disease.

These problems may be the result of a valve that was abnormal at birth that has stiffened or become leaky over time or due to acquired problems like infections (such as rheumatic fever or infective endocarditis), atherosclerosis, connective tissue disorders or due to degeneration of valve with age etc. Valve repair or replacement provides a solution for problems related to heart valves.

MITRAL VALVE REPAIR PROGRAM

Amrita has a well integrated mitral valve repair program. If the mitral valve is leaking, it can most of the time be repaired by a combination of the techniques of mitral valve repair like inserting a cloth-covered ring around the valve to bring the leaflets into contact with each other (annuloplasty), removal of redundant/loose segments of the leaflets (quadrangular/wedge resection), supporting the leaflets with artificial (Gore-Tex) cords etc.



Advantages of Mitral Valve Repair

Mitral valve repair provides better long-term survival, better preservation of heart function, less complications, lower risk of bleeding, stroke and infection (endocarditis) after surgery, and there is no need for long-term use of blood thinners (anticoagulants). For these reasons, our surgeons are committed to mitral valve repair.

VALVE REPLACEMENT SURGERIES

Replacement is more commonly used to treat aortic valves or severely damaged mitral valves which are not amenable to repair. There are two kinds of valves that are used for valve replacement.

Mechanical valves are made from durable metals, carbon, ceramics and plastics. The major advantage is durability. However, blood thinners must be taken for the rest of the patient's life.

Biological valves are made from animal tissue, either an actual pig valve or a bovine pericardial engineered valve. Biological valves are not as durable as mechanical valves and may need to be replaced. Patients with biological valves will need to take blood thinners in the short term.

At Amrita, all complex single, double and triple valve replacements are performed with excellent results.

HYPERTROPHIC CARDIOMYOPATHY (HCM)

Hypertrophic cardiomyopathy (HCM) is a genetic disease condition in which the heart muscle (myocardium) becomes abnormally thick (hypertrophied) and mitral valves start leaking. This condition is much more common than we think. The thickened heart muscle can make it harder for the heart to pump blood.



Many people with HCM live a completely normal life, but others develop heart conditions which shorten life or decrease the person's quality of life including making them a target of heart failure, sudden cardiac arrest and sudden cardiac death.

Amrita Institute of Medical Sciences has a comprehensive program, the first of its kind in the country, to help these patients and their families. This starts with screening patients, early diagnosis and almost curative surgical treatment (extended septal myomectomy) for this problem.

HEART TRANSPLANT AND VENTRICULAR ASSIST DEVICES

Amrita has a highly skilled and experienced multidisciplinary team of heart transplant specialists which includes cardiologists,

heart surgeons, intensivists, transplant coordinators, social workers, dietitians, a physiotherapist, staff nurses. Each member of the heart transplant team offers a specialized service in the care of our patients.

With our team, you can be sure that if you receive a heart transplant at Amrita, you'll get the most innovative and refined care this country has to offer.

What about patients who have intractable heart failure and are not candidates for transplants or waiting for a donor? We have solutions for this. Our team is also exceptionally experienced and certified to implant ventricular implants like THORATEC HEART MATE 2 and BERLIN HEART (a circulatory device that is used to partially or



completely replace the function of a failing heart) which will act as bridge therapy for transplant candidates and destination therapy for non-transplant candidates.

EXTRA-CORPOREAL MEMBRANE OXYGENATION (ECMO)

Extra-corporeal Membrane Oxygenation (ECMO) is an advanced form of life support used to treat infants, children, and adults in whom the heart or lungs or both are not functioning. ECMO is achieved by draining venous blood through a closed circuit, removing carbon dioxide and adding oxygen using an artificial lung, and pumping the blood to the circulation (by artificial pumps) via a vein (venovenous ECMO) or an artery (venoarterial ECMO).

The Cardiovascular team at Amrita provides 24/7 support for those critically ill patients in whom all other modalities of treatment have failed and need ECMO to sustain life till the organ function improves.

We plan to expand in this area and aim to start mobile units to institute ECMO at distant areas where this facility is not available.

PULMONARY THROMBOENDARTERECTOMY

Presence of clotted blood or thrombus clogging the arteries of the lung, chronic pulmonary embolism (CPE), leads to a serious condition called chronic thromboembolic pulmonary hypertension (CTEPH), wherein patients present with progressive breathlessness and deteriorating function of the right ventricle of the heart. Pulmonary thromboendarterectomy is the surgical procedure done for the removal of blood clots in the arteries of the lung and restoration of the lung and right heart function. This is a complex procedure in which the heart and lung function is temporarily stopped for a period of time (circulatory arrest) using advanced bypass techniques while the surgeon operates on the clogged arteries. Amrita is one of the few specialized centers in India equipped with the expertise to perform this complex procedure.

We continue to update ourselves with cutting-edge technology in our effort to make it available to our patients in the most affordable way.

B. Thoracic Surgery

LUNG CANCER

Lung cancer has emerged as the leading cause of death among all cancers in males, especially smokers in India in the last decade. Prognosis of lung cancer is heavily dependent on early diagnosis, assessment of the stage of disease and appropriate management protocols which may include surgery, radiotherapy and/or chemotherapy.

Comprehensive lung cancer management at Amrita epitomizes the 'multidisciplinary approach' wherein the treatment protocols are individualized for each patient by a team of doctors which includes the thoracic surgeon, pulmonologist, radiation oncologist, medical oncologist, oncopathologist and radiologist.

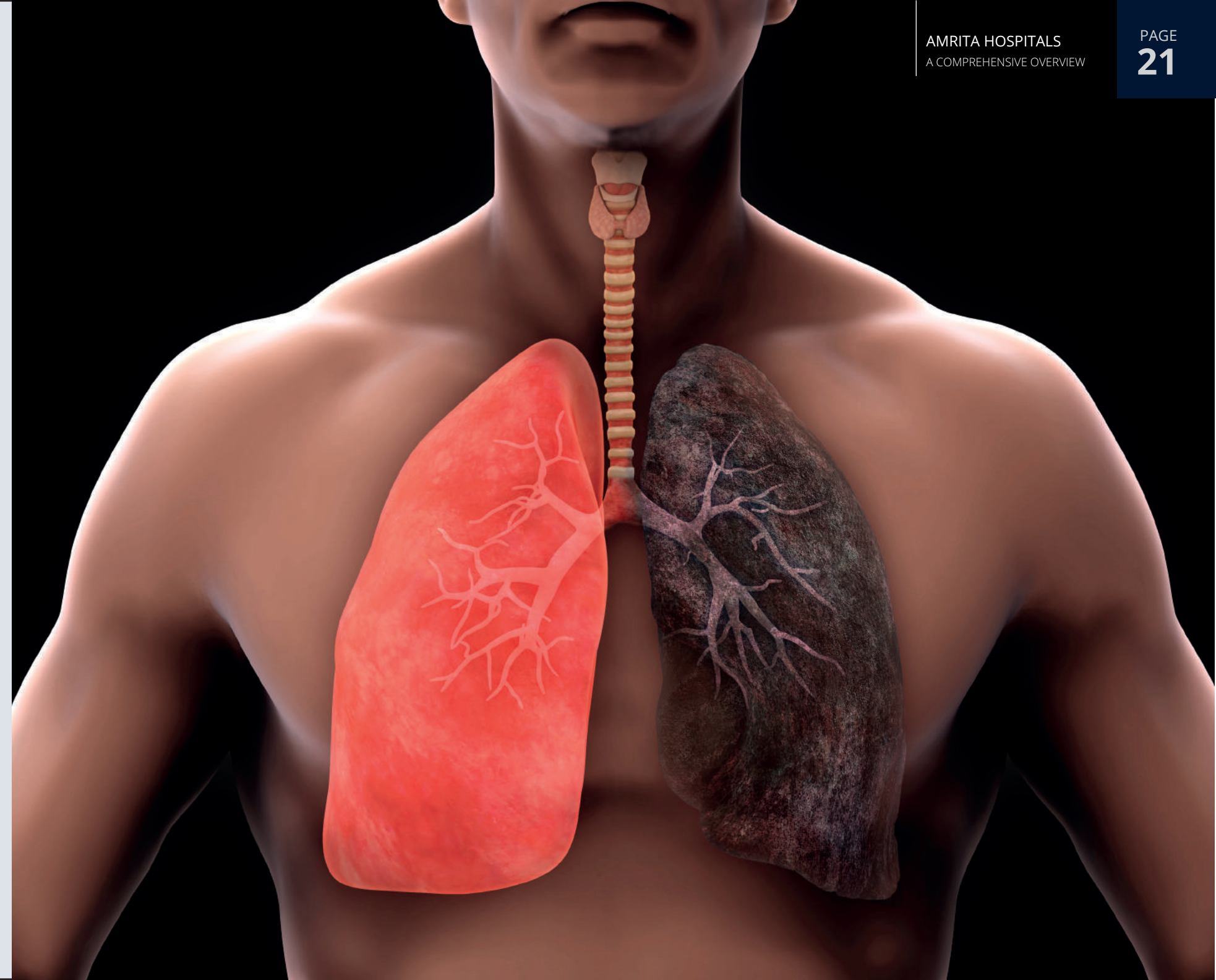
The surgical expertise offered for lung cancer includes minimally invasive surgical procedures like mediastinoscopy and thoracoscopy which aids in early diagnosis of cancer and therapeutic procedures like lobectomy (removal of the affected parts of the lung) and pneumonectomy (removal of one entire lung) using conventional open and minimally invasive techniques (VATS).

Previously, lung cancer was managed surgically with lobectomy or pneumonectomy which required patients to have adequate lung function for undergoing the procedure, but the novel concept of lung parenchymal sparing procedures extends the benefits of surgery (segmentectomy and sleeve resection) even to patients with borderline lung function who were earlier condemned to palliative therapy.

Intraoperative planning for radiotherapy using surgical clip markers, brachytherapy wires and CT-guided wire localization techniques for solitary pulmonary nodules are used as and when required. Accurate staging of the cancer mandates mediastinal lymph node dissection wherein lymph nodes in the chest are dissected out and sent for pathological evaluation to confirm their involvement. With our facilities to provide postoperative adjuvant radiotherapy or chemotherapy our patients are assured of comprehensive lung cancer management all under one roof.

CHEST WALL TUMOR EXCISION AND RECONSTRUCTION

Osteochondroma, osteoclastoma, hemangioma, rib and sternal metastases and advanced lung cancers involving the chest wall present with swelling, pain or even pathological fractures. Our unit specializes in chest wall tumor and sternal tumor excision and reconstruction of



the defect caused with various prosthetic materials like Prolene mesh, vicryl mesh and Polymethylmethacrylate (PMMA) implants to provide good cosmesis. Complex reconstruction after removal of part of the lung and adjacent chest wall is also done with good long term results. We are the only center in Kerala specialized in managing sternal infections especially post coronary bypass sternal osteomyelitis with VAC therapy and muscular flaps.

MEDIASTINAL TUMOR EXCISION

Mediastinal tumors like thymoma, retrosternal goiter, lymphoma, duplication cyst, pericardial cyst, neurogenic tumors and germ cell tumors are found incidentally on routine chest x-ray or present with chest pain and breathlessness. These tumors are amenable to surgical excision to provide complete cure. Our unit in Amrita specializes in keyhole surgery to remove mediastinal tumors through keyhole (1-2 cm) incisions in the chest using high definition state-of-the-art endoscopes. Amrita is well known for its expertise in the field of retrosternal goiter management which needs the sternum (breastbone) to be cut for approach.

BULLECTOMY, PLEURODESIS AND LUNG VOLUME REDUCTION SURGERY (LVRS)

Chronic smokers and certain congenital abnormalities (alpha -1 antitrypsin deficiency) cause the alveolar walls of the lung to weaken and balloon out (bullae). Patients usually present with sudden onset of severe unilateral chest pain caused by rupture of bullae and accumulation of air in the chest cavity (spontaneous pneumothorax). Bullectomy and pleurodesis is done as a minimally invasive keyhole procedure in which the surgeon uses video-assisted thoracoscopic techniques and lung endostaplers to remove the affected ballooned out area of the lung and cause the lung to permanently stick to the chest wall and thus prevent recurrence. Chronic smokers develop localized overinflation especially in the upper lobes of the lung (centrilobar emphysema) for which doctors perform lung volume reduction surgery (LVRS) which gives good relief from severe breathlessness.

DECORTICATION

Tuberculosis and other infections of the lungs can cause fluid accumulation in the chest cavity (pleural effusion) which can further become infected to form pus (empyema). This causes the lung to become trapped in a fibrinous layer (pleural peel) which prevents the normal expansion of the lung and thus compromises its function. We perform the surgical procedure called Decortication both by open surgery or minimally invasive techniques wherein the pleural peel is removed and the lung expands to its normal size and regains full functional capacity with good immediate and long term relief to the patients.



Rapid changes in the lifestyles of developing economies have resulted in an unprecedented epidemic of heart and lung diseases.

CHEST TRAUMA

Chest injuries like rib and sternal fractures, lung contusions and flail chest (condition where 3 or more ribs are fractured in 2 or more places) caused by road traffic accidents and accidental falls, undergo expert management at Amrita in the hands of competent thoracic surgeons, cardiac anesthetists and critical care specialists who are available round the clock to manage emergency situations. Pain management techniques like intercostals nerve blocks, epidural analgesia, advanced ventilatory techniques like intermittent positive pressure ventilation (IPPV) and surgical fixation of the “flail” segment with titanium implants form the standard of care for trauma patients admitted at Amrita.



KEYHOLE CHEST SURGERY

PATIENT NAME: _____
AGE: 58 years male
HEIGHT: 145 cm, 55 kg
HB: 12
PROCEDURE: _____
SPONGES: _____
GAUZES: _____
DATE: 23-06-2018

THORACIC SYMPATHECTOMY - LEFT CARDIAC SYMPATHETIC DENERVATION

Certain conditions that are caused by sympathetic over activity like increased sweating in the palms and feet (hyperhidrosis), life threatening arrhythmias of the heart unresponsive to standard medications are now managed by thoracic surgeons at Amrita who are trained to do thoracic sympathectomy via the key hole technique. This novel surgical procedure is being practiced the world over as the curative solution to these distressing problems .

THYMECTOMY

The thymus gland which is situated behind the breastbone (sternum) can become enlarged (hyperplasia) or can harbor small tumors benign (thymoma) or malignant (thymic carcinoma) which mandates its removal by a surgical procedure called Thymectomy. Thymectomy is also indicated in situations where an enlarged thymus gland is associated with autoimmune pathologies like myasthenia gravis and pure red cell aplasia. We regularly perform both the open and keyhole technique for thymectomy with remission rates of myasthenia gravis up to 60% which is comparable with Western standards.

MEDIASTINOSCOPY

Mediastinoscopy is a minimally invasive surgical procedure where the surgeons use a specialized instrument called the mediastinoscope which uses a miniature camera to visualize the structures in the center of the chest cavity (mediastinum) and even take appropriate biopsies from lymph nodes or tumors. This is vital to early detection of lung cancer in smokers and for keyhole diagnosis of various chest diseases. Doctors at Amrita use the latest Lerut Distending Mediastinoscope for performing routine mediastinoscopy in thoracic patients as an OP procedure through a small (1 cm) incision at the root of the neck, which minimizes the pain and allows speedy discharge from the hospital.

MINIMALLY INVASIVE THORACIC SURGERY (VATS) (KEYHOLE CHEST SURGERY)

Minimally invasive thoracic surgery is also called video-assisted thoracic surgery (VATS). It is the surgery of the chest that is performed

with a thoracoscope (small high definition video camera) using small incisions (1-2 cm) and special instruments to minimize trauma. The video camera transmits images of the operative field onto a video monitor that is positioned next to the patient. Instead of the traditional single 10-15 cm muscle cutting, incisions used in traditional open surgery, VATS uses 3-4 ports, 1-2 cm incisions through which the video camera and surgical instruments are passed into the chest to perform the procedure.

Amrita is equipped with the Karl Storz HD VATS unit and the latest innovative Endocameleon camera technology that enables the surgeon to visualize vital structures in the chest cavity from 0 to 120 degrees and perform complex thoracic procedures with more dexterity and less operating time.

Compared to traditional open surgery, patients who undergo VATS experience:

- Decreased postoperative pain
- Shorter hospital stay
- More rapid recovery and return to work
- Reduced risk of infection
- Less bleeding

WHO ARE THE CANDIDATES FOR VATS (MINIMALLY INVASIVE THORACIC SURGERY?)

Almost all the thoracic procedures performed in an open manner can be performed minimally invasively. There are still some situations like severe chest wall adhesions, bleeding and large tumors more than 6cm that are relatively contraindicated for the minimally invasive approach. The surgical efficiency and oncological outcome of the minimally invasive surgery is comparable to open surgery as proved by numerous studies worldwide.

Thoracic surgery procedures routinely performed at Amrita using VATS include:

- Lobectomy
- Pneumonectomy
- Sleeve resection
- Wedge resection
- Lung/pleural and lymph node biopsy

- Drainage of pleural effusion/empyema
- Mediastinal tumor excision
- Thymectomy
- Left cardiac sympathetic denervation
- Bilateral sympathectomy
- Decortication

C. Vascular Surgery

DISEASES OF THE AORTA

Old age, long standing uncontrolled hypertension, smoking and connective tissue diseases are the important risk factors that contribute to diseases of the aorta like aortic dissection (tear in the aorta which causes blood to flow between the layers of the wall of the aorta), aortic aneurysm (ballooning out of the wall of the aorta) and penetrating aortic ulcer. The Center for Aortic Diseases at Amrita is one of the first initiatives in the country to provide patients with comprehensive and total aortic solutions by a core team of cardiothoracic surgeons, cardiologists and radiologists trained to offer surgical, endovascular or hybrid therapeutic options. Amrita offers the latest endovascular aneurysm repair (EVAR and TEVAR) wherein doctors treat complex aortic diseases with aortic stents introduced through the lower limb arteries obviating the need for complex surgical procedures.

Aortic Surgical procedures performed :

- Bentall De Bono Procedure
- Supra-coronary ascending aortic replacement
- Aortic arch replacement
- Elephant trunk procedure
- Thoraco-abdominal aneurysm repair
- TEVAR, EVAR
- Hybrid aortic procedures
- Infra renal aortic aneurysm repair
- Arterial Occlusions

Severe pain in the lower limbs on walking (claudication pain) leading to devastating complications like loss of limb and function is due to blockage of the arteries to lower limb over the course of time due to accelerated

atherosclerosis due to hypertension, diabetes mellitus, smoking and old age. Open surgical bypass techniques like aortobifemoral bypass, femorofemoral bypass, femoropopliteal bypass and endovascular procedures like stenting and angioplasty to increase blood flow to lower limbs are regularly done at Amrita with excellent results.

Arteries in various parts of the body can become weakened commonly due to infection or injury which causes them to balloon out (pseudo-aneurysm). Unless they are managed surgically pseudo-aneurysm can rupture and cause complications. Pseudo-aneurysm repair commonly of the femoral artery (artery of thigh) is a common procedure done at Amrita as a day care surgery.

CAROTID INTERVENTIONS

Carotid endarterectomy is the surgical procedure done in stroke (cerebrovascular accident) patients in whom blocked arteries to the brain can be opened up to restore blood supply and thus prevent a major stroke later in life. Amrita has an excellent comprehensive stroke program with surgical, medical and rehabilitation services. We specialize in doing carotid endarterectomy as an isolated procedure or as a combined procedure with other cardiac operations like coronary artery bypass grafting with stroke rates below 1%. This procedure opens up new avenues in stroke management which are certain to benefit stroke patients. Other carotid surgeries for rare diseases like carotid artery aneurysm and carotid body tumors are regularly done.

► PEDIATRIC AND CONGENITAL HEART SURGERY

Pediatric and Congenital Heart Surgery at Amrita is one of the well known centers of excellence in the country. To date (2017), the program has to its credit more than 13,000 congenital heart surgeries successfully performed. An average of 2-4 operations are performed for children with congenital heart disease every



day, the overall survival rate matching the best in the world. With a dedicated team of doctors, we cater to the needs of patients from all over the country and abroad.

Open heart procedures include closure of atrial and ventricular septal defects, repair of tetralogy of Fallot, repair of total anomalous pulmonary venous connection, arterial switch operation, Senning operation, Fontan procedure (including the extra-cardiac Fontan operation), Glenn procedure, repair of common AV canal defects, Rastelli operation, Ross operation, Norwood operation, conduit replacements, single stage unifocalization, ALCAPA repairs and double switch procedures.

SERVICES OFFERED:

Neonatal Cardiac Surgery

The department has successfully performed more than 450 arterial switch operations and 800 TAPVC repairs in neonates:

- Arterial switches: Done in cases of transposition of great arteries where the aorta originates from the wrong ventricle and the baby is blue.
- Total anomalous pulmonary venous return repair: Done in cases where the pulmonary veins open into the wrong side of the heart and the baby is blue.
- Norwood operation: Done for hypoplastic left heart syndrome where the whole left side of the heart is underdeveloped.
- Systemic pulmonary shunts.
- One stage repair of arch anomalies with correction of intra-cardiac defects.

Infant Cardiac Surgery

- Closure of simpler intra cardiac defects.
- Total corrections for Tetralogy, Double Outlet Right Ventricle.
- Repair of Endocardial Cushion Defects.
- Senning operation.
- Anomalous Left Coronary Artery from the Pulmonary Artery (ALCAPA) repairs.
- Double switch procedures.

Complex Valve Repairs

- Correction of Ebstein's Anomaly.
- Congenital Mitral Stenosis and Mitral Regurgitation.
- Aortic and mitral valve repairs.

Operation for Single Ventricle Physiology

The Center performs staged repairs for single ventricle physiology.

- PA banding
- Systemic-pulmonary shunts
- Cavopulmonary shunts
- Fontan operation

Congenital Defects in Older Children and Adolescents

- The whole spectrum of congenital heart surgery ranging from total corrections to conduit reconstructions is performed
- Redo operations for congenital heart defects
- Surgeries like replacement of conduits, surgery for endocarditis, staged Fontan surgeries are routinely performed

Cosmetic Congenital Heart Surgery

The Center is well known for surgery of congenital heart defects employing cosmetically appealing incisions. More than 1500 open-heart procedures employing limited posterior thoracotomy incisions have been performed. Approximately 300 infants and children have undergone open-heart procedures through ministernotomy (so called key-hole approach). These include corrections like Tetralogy repairs, closure of septal defects (both atrial and ventricular), anomalous venous connections and endocardial cushion defects.



The Pediatric Cardiac Program was initiated at Amrita recognizing the pressing need for quality care for children with heart disease at an affordable cost.



► PEDIATRIC CARDIOLOGY

It is perhaps the first and most comprehensive model of a dedicated and cohesive team that is specifically focused on the care of children with heart disease. The program is now recognized as one of the leading pediatric heart programs in India and is a preferred destination for patients from all over India, other countries in South Asia, the Middle East and Africa. The program is known for the quality and range of services that are provided at an affordable cost, its training program and its research initiatives.

The constituent departments of the pediatric cardiac program include the following:

- Pediatric Cardiology
- Pediatric Cardiac Surgery
- Pediatric Cardiac Intensive Care and Anesthesiology

SERVICES OFFERED

- **Cardiac Surgical Program:** Newborn Heart Surgery, Cosmetic Congenital Heart Surgery, Surgery for Complex Heart Defects
- **Catheter Interventions** including closure of common heart defects without surgery (ASD, PDA and VSD), newborn interventions, interventions to complement surgery
- **Comprehensive Imaging and Diagnostic Services:** Echocardiography (trans thoracic, 3D echocardiography, trans-esophageal and fetal echocardiography), Multi-slice CT scan (256 slice CT), MRI (3 Tesla) for congenital heart defects (Amrita has the country's first cardiac MRI service), diagnostic cardiac catheterization and angiography.
- **Fetal Cardiac Unit:** A comprehensive fetal cardiac program (the only one of its kind in the

country) is available at Amrita. The services include prenatal diagnosis and counseling of pregnant mothers with suspected heart defect in the fetus, prenatal treatment for fetuses with cardiac rhythm disorders.

- **Training Programs:** Amrita has a well-established structured training program in pediatric cardiology (DM Pediatric Cardiology). This was the first DM pediatric cardiology in the country to be recognized by the Medical Council of India. This is a 3-year structured training in pediatric cardiology. Additionally, there are dedicated training programs in cardiac anesthesiology and intensive care. AIMS offers an ideal opportunity to train pediatric cardiovascular surgeons in their formative years. Six leading pediatric heart surgeons in India have been trained here and overseas programs in Japan, China and Portugal have sent their surgeons for advanced training at AIMS.
- **Research Unit:** This is under the Indian Council of Medical Research (ICMR). Community based research projects in all facets of pediatric heart care in developing countries are being conducted here.



4D STIC FETAL ECHOCARDIOGRAPHY

EQUIPMENT AND PROCEDURES

EQUIPMENT

NON-INVASIVE

- **Advanced Pediatric and Fetal echo Lab:** Launched in 2008, this lab has Philips APIQ and IE 33 echo machines exclusively for Pediatric cardiac imaging (2D, 3D, 4D, TEE). The lab has a work-station with the advanced Q-lab software for offline processing of 3D images, a digital library for image archiving in DVDs, electronic databases of the echo reports and a dedicated staff consisting of 2 nursing assistants and a secretary.
- **Additional echo machines:** Sonosite Machines for Portable echocardiography.
- **Dedicated Fetal Cardiac Service**

- **Exercise Machines:** CPX machine (Exclusively for pediatric work), Treadmill
- **Arrhythmia and Syncope Evaluation:** Head up Tilt Test, Holter
- Additional Imaging Equipment Available through the Radiology and Nuclear Medicine Department
 - Siemens multi-slice 256 slice CT scan.
 - Siemens Sonata: MRI and MR angiography.
 - Gamma Camera (Siemens).

INVASIVE

- Two Siemens Hi-Cor catheterization laboratories (digital flat panel)
- Comprehensive facility for arrhythmia and pacing
 - Advanced EP laboratory
 - Facilities for implantation and follow up of pacemakers and ICD
- Electronic databases and digital library of the catheterization studies



DEDICATED OPERATION ROOMS

Facilities for newborn, infant and complex congenital heart surgery. State-of-the-art monitoring systems including dedicated pediatric trans-esophageal echocardiography are available.

DEDICATED STATE-OF-THE-ART PEDIATRIC CARDIAC INTENSIVE CARE FACILITY

With supporting monitors and ventilators, Inhalational Nitric Oxide and facilities for LV assist and extra-corporeal support. The pediatric cardiac intensive care unit has 24 beds in total, 12 of which are located close to the operation theater.

PROCEDURES

PEDIATRIC HEART OPERATIONS

A strong team of four dedicated full time pediatric cardiac surgeons perform heart operations with results that match international standards. On an average 3-4 operations are performed for children with congenital heart disease every day. The open heart procedures include closure of common heart defects, repair of tetralogy of Fallot, repair of total anomalous pulmonary venous connection, arterial switch operation, the Senning operation, the Fontan procedure (including the extra-cardiac Fontan operation), the Glen procedure and, repair of common AV canal defects. The Norwood operation for hypoplastic left heart syndrome is performed at Amrita and this is one of the few centers in the country that regularly perform this operation. The closed heart procedures include BT shunt, coarctation repair and PDA ligation and interruption. Thus far approximately 13,000 heart operations have been performed at Amrita in children with heart conditions. The highlights of the pediatric cardiac surgical program at Amrita are the excellent outcomes with heart operations in newborns and young infants. Complex defects (such as double outlet right ventricle, multiple ventricular septal defects) are routinely corrected here with excellent results. The results of surgery are audited by the International Quality Improvement Collaborative. Current surgical mortality is less than 2% in spite of a relatively high degree of complexity and a high proportion of neonatal operations.

CATHETER INTERVENTIONS

Closure of many heart defects traditionally need operations for their treatment and often this is an open-heart operation. Today, newer developments in cardiac catheterization technology allow closure of selected patients with heart defects without an operation. This avoids the trauma of surgery and allows very rapid recovery. The procedures are performed in the cardiac catheterization laboratory and require no more than a needle prick in the groin. Amrita has leadership status in catheter interventions and several regional, national and international workshops are frequently conducted here for a variety of cardiac defects.

Examples of heart defects that can be closed in the catheter laboratory include:

- Atrial septal defects (ASD): Amrita has one of the largest experiences in trans-catheter ASD device closure in India.
- Patent Arterial Ducts (PDA): Using cost-effective techniques developed at Amrita over 2500 PDA closures have been performed in the catheterization laboratory at Amrita. This is one of the largest experiences in the world
- Ventricular Septal Defects (VSD): The technique as been modified at Amrita to allow closure of some of these defects at reduced cost to the patient
- Other Defects: Coronary artery fistula, pulmonary arterio-venous malformation

Additional procedures performed in the catheter laboratory at Amrita include balloon dilation procedures for valve obstruction at all ages, stenting of coarctation, pulmonary artery and PDA. Recently, we have performed hybrid procedures for complex CHDs like hypoplastic left heart where the surgeon and the cardiologist combine together.

PACEMAKER IMPLANTATION IN CHILDREN

Amrita has comprehensive facilities for pacemaker therapy in children.

PEDIATRIC ELECTROPHYSIOLOGY

Comprehensive EP facility is available at Amrita for children of all ages.

LIST OF CLINICS

REGULAR OUTPATIENT CLINICS:

All patients undergo comprehensive evaluation and every effort is made to complete the evaluation process including all non-invasive tests and most procedures (surgical or catheter interventions) are scheduled before the patient leaves the hospital.

SPECIALTY CLINICS:

1. Fetal Cardiac Services initiated in 2008. Provides comprehensive diagnosis and counseling besides in-utero treatment for arrhythmias.
2. Pulmonary Hypertension Clinic - Our department is one of the nodal centers for the international organization, Pulmonary Vascular Research Institute (PVRI) and this clinic focuses on patients with various forms of pulmonary hypertension.

OUTREACH CLINICS:

Regular outreach clinics are conducted by the pediatric cardiology department in Kozhikode, Palakkad, and Kollam.

ACADEMICS

- **DM in Pediatric Cardiology:** The pediatric cardiology department is the first center in India that has been recognized by the Medical Council of India for DM in pediatric Cardiology. This course was started in August 2011 and so far four pediatric cardiologists have graduated from the program.
- **Overseas Fellowship:** The pediatric cardiology program is now training fellows from overseas. We have trained fellows from a number of countries that include Sri Lanka, Bangladesh, Vietnam, Uganda, Germany and the UK.
- **PDCC (Post doctoral Certification Course) in Cardiac anesthesiology and Intensive Care:** The department of anesthesiology has an intense training program in cardiac anesthesia and intensive care. This one-year course has prepared many candidates to independently deliver pediatric cardiac anesthesia and take care of the operated children in postoperative ICU.

- **CME Courses:** The department has organized a large number of major conferences and CMEs over the past 17 years. Some of the major ones include the annual conference of the Pediatric Cardiac Society of India (PCSI) in 2000 and 2008, Symposia in post operative care for CHD (2003, 2006) the first Interventional forum for structural and congenital heart diseases (IFISCH 2008), teaching program in cardiology (2004), fetal echo workshops (2005 and 2006), pediatric echo CME (2002) and CME on neonatal cardiac care (2008).

RESEARCH

Several grant Funded Research Projects of the Indian Council of Medical Research (ICMR) and department of Science and Technology (DST) have been conducted by the department of pediatric cardiology at Amrita. A dedicated research office has been set up for this purpose.

PUBLICATIONS:

Over 120 papers have been published from the department in peer-reviewed journals. (e.g. Pediatrics, Circulation, Annals of Thoracic Surgery, Cardiovascular and Interventional Radiology, Catheterization and Cardiovascular Interventions, Journal of thoracic and cardio-vascular surgery, Journal of Pediatrics, Heart, National Medical Journal of India. The department faculty have helped initiate a new journal (Annals of Pediatric cardiology) and edited two books.

International Collaborations

- **Children's Heartlink:** The pediatric heart program at Amrita has been a partner site for children's heartlink (www.childrensheartlink.org) for over a decade and we are the first among several international sites to acquire the status of a global training site.
- **Children's Hospital Boston, Harvard Medical School:** Collaborations have been initiated between the children's hospital and Amrita. The areas include cardiac MRI, fellowship exchange and clinical research.
- **International Quality Improvement Collaborative:** The pediatric heart program at Amrita is now a member of the IQIC (an initiative of the Boston Children's Hospital) and a number of quality

improvement processes have been initiated and monitored through this process.

- **Stanford University:** Collaborations have been initiated for intensive care and nursing. This has been in the form of frequent visits by leading Nurse practitioners and Dr. Steve Roth, Chief of Pediatric Cardiac Intensive Care at LPCH.
- **Government of Sri Lanka (Sri Lankan College of Pediatrics):** The first three dedicated pediatric cardiologists in Sri Lanka have been trained at Amrita.
- **UCSF:** Annual visits from Dr. VM Reddy, Chief Pediatric Cardiac Surgeon
- **Berlin Heart Institute:** Research exchange
- **University of Cologne Germany:** Academic exchange programs.

► FETAL CARDIOLOGY DIVISION

The fetal cardiology division at Amrita Institute of Medical Sciences, Kochi was launched in January 2008. The aim of this service is to create awareness among the medical community regarding the need and potential benefits of prenatal diagnosis of birth defects of the heart. This will provide the concerned families with more options for management rather than facing the trauma of taking a decision after the baby is born. We offer a comprehensive approach to the patient including facilities for diagnosis, counseling and treatment of various types of heart problems in the developing fetus. We have the state-of-the-art equipment for fetal heart imaging including 4D STIC ultrasound technology for the fetal heart. We have pioneered the concept of prenatal diagnosis and planned perinatal care for fetuses with critical heart defects in India with on site delivery and expedited neonatal cardiac care, all under one roof. We have a dedicated fetal cardiologist, counselor and a coordinator and we work in close liaison with the allied departments like obstetrics and gynecology, radiology, genetics, cardiac surgery and neonatology. We have also established outreach services for fetal heart screening in high-risk obstetric units in Kerala.

Since its inception in January 2008, we have already done more than 7500 fetal echo studies, including our extended services. More than 300 women with a fetus with critical heart defect have undergone planned delivery at Amrita Institute of Medical Sciences and more than 100 neonatal cardiac



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procedures have been accomplished with a near total success rate. The first successful in-utero fetal cardiac intervention in Kerala (fetal balloon aortic valvuloplasty) was done by our team. Fetal Heart is our annual academic event, bringing together a multidisciplinary forum of experts from all over the country to discuss the state of art developments in the field of Fetal Cardiology. We offer training facilities for those medical professionals who are interested in learning the art of fetal heart scan. Prof. Balu Vaidyanathan heads the program, supported by Dr. Shine Kumar (Associate Consultant). Dr Balu is the recipient of the prestigious commonwealth fellowship (UK) in fetal cardiology.

SERVICES OFFERED

- Comprehensive fetal cardiac imaging and diagnosis including 4D STIC fetal echocardiography
- Counseling about treatment options
- Planned peripartum care in liaison with Department of Obstetrics and Gynecology
- Neonatal cardiac care including all forms of complex heart surgery and catheter based interventions
- In-utero treatment for selected cardiac defects in liaison with Fetal Medicine



LINAC

CANCER CENTER

THE CANCER CENTER AT AMRITA HOSPITAL IS DEDICATED TO PROVIDING FULLY INTEGRATED, MULTIDISCIPLINARY CANCER TREATMENT UNDER ONE ROOF WITH STATE-OF-THE-ART TECHNOLOGY INCLUDING PREVENTION, DETECTION, DIAGNOSIS, TREATMENT, REHABILITATION, TRAINING AND RESEARCH.

The Center has assembled a wide range of experts in all disciplines related to cancer, from various parts of the country and abroad, to form an integrated team to treat the disease. We feel that this approach will provide the highest quality of scientifically guided cancer care in a modern, serene, compassionate and respectful environment and at affordable cost.

The major departments of Radiation, Medical, and Surgical Oncology are supported by community outreach programs in health awareness and education. These programs facilitate the early detection and cure of the disease. Although success is usually measured by cure, the ultimate measure of success is in the prevention of disease. This is our long-term goal.

The existing strong programs at Amrita Hospital in all the specialties and our institutional resources greatly help the management of disease in cancer patients and assure optimum care. Utilizing the latest and most advanced technology, we provide precision treatment that minimizes the unwanted side effects usually associated with cancer treatment.

MULTIDISCIPLINARY APPROACH

The strength of the Cancer Center lies in our ability to offer all treatment modalities under a single roof. Patients are seen and evaluated in multimodality clinics such as Head and Neck, Breast and Gynecology, by a team of specialists in each malignancy. Treatment decisions are then made by multidisciplinary tumor boards where these specialists sit together and discuss the plan of treatment. The emphasis is on combining all modalities of treatment in the right combination to achieve the best results, while minimizing the side effects.

To facilitate multidisciplinary care of cancer patients, the Center offers the following tumor site specific teams:

- Head and Neck Oncology
- Urologic Oncology
- Neuro-Oncology
- Pediatric Oncology
- Soft Tissue and Sarcoma Services
- Thoracic Oncology
- Hematological Malignancies
- Gastrointestinal Oncology
- Gynecologic Oncology
- Orthopedic Oncology

The Center includes the following disciplines:

- Radiation Oncology
- Medical Oncology

- Surgical Oncology
- Pain and Palliative Medicine
- Molecular Oncology
- Blood and Marrow (Stem Cell) Transplantation
- Medical Physics
- Cancer Registry

► RADIATION ONCOLOGY

The Department of Radiation Oncology at Amrita Hospital is of international standards and has one of the most technologically advanced clinical radiation therapy programs in the country. In addition to a dedicated team of doctors and state-of-the-art equipment, the department has the services of highly trained and qualified medical physicists, radiation technologists, radiation oncology nurses, supportive care team members, etc., ensuring a very high quality of comprehensive radiation treatment.

FEATURES

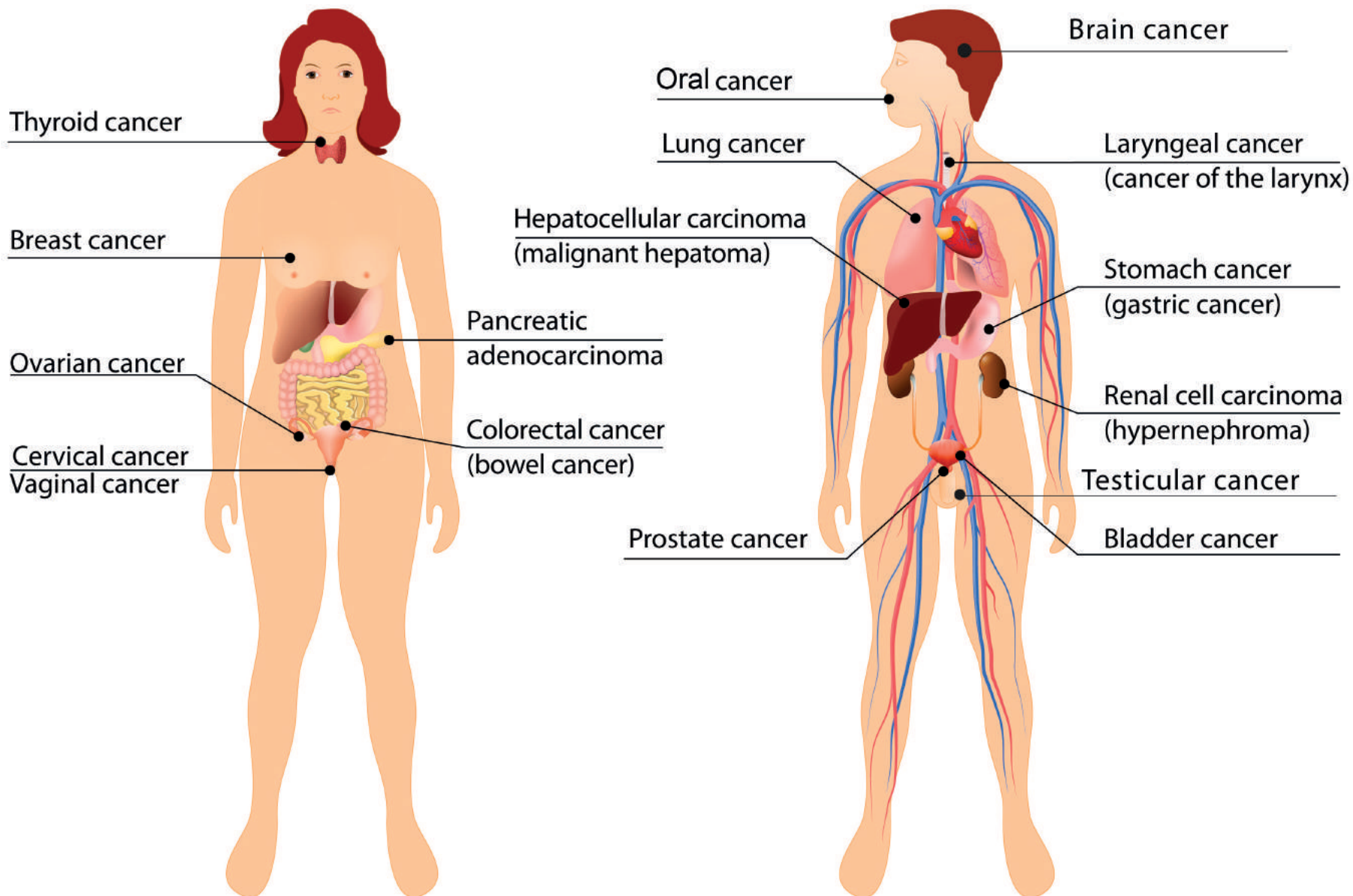
- CyberKnife and TomoTherapy
- Three-dimensional Conformal Radiation Therapy (3DCRT)
- IMRT (Intensity Modulated Radiation Therapy)
- Internal Radiation Therapy
- Stereotactic Radiosurgery and Radiotherapy (SRS and SRT)
- Total Body Radiation (TBI)
- Total Skin Radiation
- Strontium Therapy for Ocular Tumors

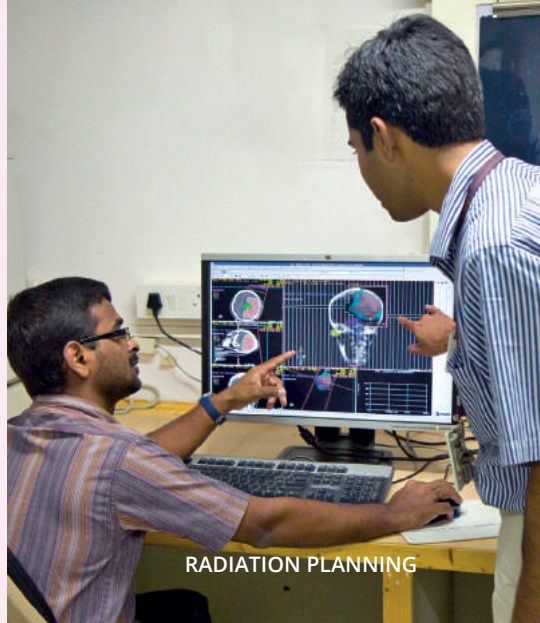
SERVICES OFFERED

Three-dimensional Conformal Radiation Therapy (3DCRT)

Successful treatment outcome in radiation oncology is based on irradiation of tumor-bearing tissues to adequate or curative doses, and the sparing of normal or uninvolved tissues from unnecessary radiation. Recent improvements in powerful computer systems and treatment planning software allow physicians to visualize a patient's anatomy in three dimensions relative to the radiotherapy treatment machines which

SOME COMMON CANCERS





RADIATION PLANNING

enables them to “conform” a radiation dose more closely to the shape of an individual’s tumor. Three-dimensional treatment planning improves the accuracy of planning, resulting in both better coverage of tumors and reduced treatment of normal tissues. Higher doses of radiation may be delivered to some tumors without increasing the risk of side effects from the treatment. We routinely use 3D-CRT for all curative treatments.

IMRT (Intensity Modulated Radiation Therapy)

IMRT is a more advanced form of radiation treatment. IMRT imparts a high dose of radiation to a localized tumor from multiple angles. A large number of very fine radiation beams of varying intensity target the tumor while minimizing the dose to the surrounding healthy tissue. The result is that side effects are reduced, and the chance of eradicating the tumor is increased. We use IMRT for clinical situations where critical normal structures are very close to the tumor or when a higher dose of radiation is required for tumor eradication.

Internal Radiation Therapy

Also called Brachytherapy or internal radiation therapy, uses sealed radioactive sources for cancer treatment. These can be in the form of needles, wires, seeds etc. Earlier internal radiation required a hospital stay for 3 to 5 days in isolated rooms. But presently with HDR (High Dose Rate) brachytherapy available in our institution, the treatment can be taken on

an out-patient basis. The time period of treatment is less than an hour. Internal radiation is usually delivered in one of two ways:

Interstitial Radiation Therapy - the sources are directly inserted into the tumor under anesthesia. It is used to treat tumors of the head and neck, cervix, breast, limbs, peri-anal and pelvic regions.

Intracavitary or intraluminal radiation therapy - done by inserting tubes (catheters /applicators) into the body cavities and passages to take the sources near the tumor. It is commonly used in the treatment of cancer of the uterus cervix, vagina, esophagus (food pipe), trachea and bronchus (wind pipes in the neck and lungs), and gallbladder.

Stereotactic Radiosurgery and Radiotherapy (SRS & SRT)

Stereotactic (or stereotaxic) radiosurgery uses a large single dose of radiation to a small target area within the head. The procedure does not involve actual surgery. Very high precision and accuracy is ensured by fixing a special frame to the patient’s head with which the patient is scanned. These images are fed into sophisticated computers where they are fused with diagnostic scan images (MRI/MR angiogram/MDCT/DSA). The target is localized precisely in dimensional space and radiation is delivered very accurately to the target sparing the nearby tissues. Some times stereotactic radiation is delivered in multiple fractions spread over several days. This is called stereotactic radiotherapy. The department has a linear accelerator based X- Knife for this procedure. The most common conditions treated are:

- 3D Line ERGO++ treatment planning system is used for Stereotactic Radiosurgery (SRS) and Stereotactic Radiation Therapy (SRT). The advantage is a small tumor can be completely controlled without a major Neurosurgical Procedure.
- SRS Frames help localize the target
- Micro MLC s are used to define the treatment field
- Arteriovenous/vascular malformations
- Trigeminal Neuralgia
- Malignant and benign brain tumors
- Intracranial metastases
- Meningioma
- Acoustic tumors
- Pituitary tumors

Total Body Radiation (TBI)

Total body irradiation (TBI) gives a dose of radiation to the whole body. TBI is used for patients about to undergo a bone marrow or stem cell transplant to destroy any undetectable cancer cells and also to produce immune suppression in patients undergoing an organ transplant so that the immune system will not attack the donor's cells during the transplant.

TBI can eradicate cancer cells in areas of the body that chemotherapy may not reach. However, the dose of radiation must be low enough so that the body's healthy cells can recover. For this reason, TBI alone cannot be used to destroy large numbers of cancer cells. Instead, the transplant preparative regimen uses TBI along with high-dose chemotherapy. Treatments are usually delivered one to three times a day for two to four days. The schedule will be based on the treatment plan (protocol) and the diagnosis and other factors. The treatment may be carried out in standing or lying down. Each treatment session may take 30 to 60 minutes. After completion of radiation treatment patient will be scheduled for bone marrow transplant.

Total Skin Radiation

This technique permits delivery of high doses of radiation to the skin without treatment to the underlying tissues and organs. It is especially useful in the treatment of mycosis fungicides (cutaneous T-cell lymphoma) and other rare lymphomas of the skin. The Linear accelerator in the department is equipped with facility for generating high dose rate electrons for this treatment. The treatment is usually given on alternate days and may take 4 to 6 weeks for completion.

Strontium Therapy for Ocular Tumors

The department is equipped with a strontium 90 ophthalmic applicator which is used to treat eye tumors (both benign and malignant), an example being recurrent pterygium which almost always recurs and each successive recurrence being a grave threat to the patient's vision and much more difficult to control. Postoperative radiation is used because of its simplicity, minimum morbidity, excellent cosmetic results and good cure rates. This applicator can also be used to treat other eye conditions like superficial conjunctival tumors which is commonly recommended.

FACILITIES

Linear Accelerators with Multi-leaf Collimators and aSi panel

These units are used for external beam treatment to treat all tumors. Two identical Elekta Precise digital linear accelerators with triple photon and multiple electron are available. Both linear accelerators have amorphous portal imaging system for verification of treatment fields. These units are capable of delivering 3Dimensional conformal therapy (3D CRT), Intensity Modulated Radio Therapy (IMRT) and Stereotactic Radio Surgery. Even if there is a breakdown of one machine, since both machines are identical, it is easier to treat all patients without interruption.

Nucletron/Micro Selectron HDR Brachytherapy

High Dose Rate after loading system with CT Scan image based treatment planning system. The treatment unit and the computerized planning system is Micro Selectron and Plato from Nucletron, Netherlands. This helps to deliver a high dose to the tumor with minimal dose to the adjacent normal structures. Also the treatment is completed in a relatively short time.

Radiation Oncology Treatment Planning System

Dedicated high-end computers and high-end software programs are used to plan/tailor radiation treatment and to localize the tumor target. These tools are critical for precise delivery of high dose radiation. This system comprises four HP servers and ten workstations with XiO / Focal software from Computerized Medical System, USA. XiO/ Focal is a comprehensive 3-D/IMRT treatment planning platform that combines the latest tools and most robust dose calculation algorithms to generate plans quickly and accurately to optimize the delivery of radiation therapy.

Dedicated CT Simulator – Siemens / Somatom Emotion

CT Simulator is a CT scanner with special software and moving laser beams. These CT scans are used to localize the tumor and other critical organs around the tumor. They help to ensure delivery of adequate dose to target volume with minimum possible dose to critical structures.

Diagnostic radiographs, angiograms, CT, PET-CT and MRI scans, are also used in radiation treatment planning. These technologies offer doctors a

clear picture of the tumor allowing precision planning for treatments involving 3-D CRT, IMRT and SRS / SRT.

Conventional Simulator – Nucletron / Evolution

An X-ray machine called a 'simulator' is used to plan and verify treatment ports for radiotherapy treatment. It is called a simulator because it is built to simulate (or be like) a radiotherapy machine, but without giving the treatment. The Simulix EVOLUTION simulator is the ultimate new-generation simulator, incorporating digital flat panel technology.

MULTIDISCIPLINARY TUMOR BOARDS

The availability of all associated departments under one roof makes the management of most malignancies easier for the patient and physician. There is a strong emphasis on a multi-disciplinary approach to treat the patient with tumor board meetings being held regularly to discuss the cases and decide the best management options.

Leukemia and Lymphoma Tumor Board

The doctors from pathology, radiation oncology and medical oncology involve in this tumor board and the cases are discussed for management with the best outcome.

Neuro Oncology Multidisciplinary meeting

A team of neuro surgeons, radiation oncologists and medical oncologists discuss all brain tumor cases. The clinical information and scans and other investigation results are reviewed and the best treatment strategy for each patient is formulated through these combined discussions.

Urology Tumor Board

Urological cancers are discussed in this tumor board comprising urologist, radiation oncologist and medical oncologist, and the best treatment strategy is decided for each patient.

Chest Tumor Board

Lung cancers are discussed in this tumor board comprised of a pulmonologist, cardiothoracic surgeon, radiation oncologist, and medical oncologist and the best treatment strategy is decided for each patient.



Head and Neck Oncology Multidisciplinary Meeting

A panel of head and neck oncology surgeons, plastic and reconstructive surgeons, radiation oncologists, medical oncologists, and pathologists discuss every head and neck case and the best treatment modality for each patient is decided.

Breast and Gynecology Tumor Board

All breast cancer cases, and gynecology related cases are discussed by gynecologists, surgical oncologists, radiation oncologists and medical oncologists. All relevant case records and investigations are reviewed before arriving at the best possible treatment plan.

GI Tumor Board

All cases of gastrointestinal cancers are discussed by a surgical gastroenterologist, radiation oncologist and a medical oncologist. The optimal sequencing of each modality of treatment for each individual patient is discussed and planned in this meeting.

CYBERKNIFE AND TOMOTHERAPY

The Center is equipped with a full range of the latest state-of-the-art radiation therapy equipment, computer planning systems, and quality assurance technology.

The **CyberKnife® M6™ Series System**, the premier solution for full-body radiosurgery, enables users to maximize dose, minimize side-effects and maximize patient comfort.

KEY FEATURES AND BENEFITS of CyberKnife® M6™ Series System:

- Sub-millimeter accuracy and precisely sculpted doses deliver the confidence to treat with high doses even close to critical structures
- Reduce the risk of critical structure toxicity and complications, non-isocentric, non-coplanar delivery from hundreds of beam angles paints tumor with dose
- Highly conformal dose distributions with steep dose fall off
- Minimize the volume of irradiated healthy tissue



- Combine the flexibility of MLC beam shaping with the benefit of expansive, non-coplanar delivery
- Improve treatment quality and make treatment faster and more efficient
- Expand clinical opportunities and treatment options to more patients
- Treatment accuracy and precision even for moving targets
- Continual monitoring and correcting for patient and tumor position throughout treatment increases accuracy
- Dynamic delivery model adapts in real time to the movement and location of the tumor
- Robotic mobility precisely guides each beam to the target

The **TomoTherapy® H™ Series** is designed to treat the entire spectrum of radiation therapy patients with enhanced speed, precise performance and ease of use. Installation is simple, with over 95% of existing vaults

installed to date requiring minimal-to-no retrofitting.

KEY FEATURES AND BENEFITS of TomoTherapy® H™ Series:

- VoLO™ Planning enables flexibility, speed and efficiency with real time interactive planning
- CTrue™ Image guidance provides daily 3D CT target localization and enables margin reduction while sparing healthy tissue
- TomoHelical™ and TomoDirect™ modalities deliver individualized treatments for both routine and complex indications
- TomoEDGE™ spares more normal tissue while enabling increased throughput

► **MEDICAL ONCOLOGY AND HEMATOLOGY**

The Department of Medical Oncology and Hematology provides



medical expertise for the treatment and prevention of solid tumors and hematological neoplasms in adults and children. Facilities are available to undertake outpatient chemotherapies in a specialized day care unit. Specialized methods of administering chemotherapy include the use of indwelling catheters and chemo ports.

SERVICES OFFERED

- Chemotherapy (out-patient and in-patient)
- Blood and Marrow (Stem Cell) Transplantation
- Blood and Component Transfusion
- Paracentesis
- Bone Marrow Aspiration and Biopsy
- Lumbar Puncture
- Psycho-Oncology Clinic
- Bio-Safety Cabinet for preparation of chemo drugs
- Dedicated service for dispensing chemotherapy drugs

Quality Improvement Program

- Bio-Safety Cabinet for preparing cytotoxic drugs
- For patients' convenience and safety, we have introduced a new system for procuring and preparing chemotherapy drugs before administration. All drugs will be reconstituted in a controlled environment to protect healthcare providers as well as the patients and ensure safety.
- Weekly meeting to discuss all new cases and references
- Daily morning and evening rounds
- Multidisciplinary tumor board meetings in various disciplines

Psycho Oncology Services

A specific clinical service to address the psychosocial issues of patients and their family attending the Department of Oncology. Palliative care is available.

DISORDERS TREATED

- Leukemia
- Lymphoma
- Myeloma
- Tumors of brain and spinal cord
- Tumors of the lung



- Tumors of the gastrointestinal tract
- Tumors of the genitourinary tract
- Tumors of the gynecological type
- Tumors of reproductive organs
- Sarcoma
- Pediatric malignancies
- Coagulation disorders
- Platelets disorders
- Hemoglobinopathies
- Anemia

► SURGICAL ONCOLOGY

The Department of Surgical Oncology provides surgical care to patients with solid tumors in combination with adjuvant treatments. Major surgical management of the cancers of the breast, gastro-esophageal, hepatobiliary, pancreatic, colorectal, genitourinary, gynecological, head and neck, endocrine and musculoskeletal tumors are conducted.

SERVICES OFFERED

Breast, Gynecologic Oncology and Skin and Soft-tissue Sarcoma Services

This unit offers surgery for breast cancer, including breast conservation surgery, breast reconstruction, accelerated partial breast irradiation, sentinel node biopsy, and oncoplastic surgeries. The social workers also provide individual patient counseling, support group programs when needed and breast prosthesis rehabilitation. The gynecology services include staging laparotomies for carcinoma endometrium, CA ovary, radial hysterectomy for CA cervix, besides surgeries for gynecological sarcomas and vulval malignancies. The skin and soft tissue services offer limb conservation surgeries, brachytherapy for soft tissue sarcoma, sentinel node for melanoma and other skin malignancies besides mould brachytherapy, electron beam therapy and Intensity Modulated Radiation Therapy (IMRT).

Head and Neck Oncology Services

The Head and Neck Oncology division treats all malignancies of the

head and neck region and has the expertise to perform complex craniofacial surgeries and microvascular reconstruction.

GI Oncology Services

The Gastrointestinal Oncology division takes care of all GI malignancies, including esophagus, pancreas, liver, colon, rectum and anus. They have considerable expertise in procedures such as hepatectomy, Whipple's Procedure, total mesorectal excision and laparoscopic oncologic procedures.

Uro-oncology Services

The Urologic Oncology division is well equipped to treat all malignancies of the urologic tract including bladder, prostate, and testicular cancer. The division has expertise in performing radical prostatectomies, radical cystectomies and laparoscopic adrenalectomy as well as routine Uro-Oncology procedures.

Neuro-Oncology Services

An active Neuro-Oncology program under the Department of Neurosurgery has the facilities for the comprehensive management of all central nervous system and craniospinal neoplasms. These include cavitron ultrasonic surgical aspirator (CUSA), neuroendoscopic and stereotactic biopsy, transsphenoidal surgery for pituitary tumors and advanced skull-base and microneurosurgical techniques.

Orthopedic Oncology Services

Tumors of the muscles and bones, while not as common as other tumors, pose a serious health challenge to people who have them. The Center for Orthopedics provides surgical treatment of muscle and bone tumors and works closely with the Cancer Center to coordinate additional follow-up care for cancer patients. Pre and post operative chemotherapy will improve the prognosis to a large extent and is carried out with the help of the Oncology Department.

► PAIN AND PALLIATIVE MEDICINE

The department of pain and palliative medicine at Amrita Hospital focuses on the active total care of the person suffering from advanced

and non-responsive diseases as well as their families. It is concerned with quality of life and addresses physical, psychological, social and spiritual aspects of suffering. The department seeks to provide total care for people suffering from cancer and chronic non cancerous ailments.

FEATURES

- Improving quality of life
- Rehabilitation for the patients and their relatives
- Offer support to other members in the family
- Chronic cancer pain management
- Chronic pain management

SERVICES OFFERED

Out-Patient Services

Utilizing a team of committed palliative care physicians, nurses, social workers and office staff, we aim at improving quality of life with the available resources. We treat the person as a whole and not just the disease.

We provide care to patients with:

- Cancer: pain, symptom and supportive management.
- Chronic pain: includes patients mainly with chronic pain (pancreatitis, peripheral vascular disease, low backache, fibromyalgia, myofascial pain syndromes, post-herpetic neuralgia etc.)
- Lymphodema: both cancerous and non-cancerous origin
- Advanced, non-responsive and debilitating diseases like chronic cerebrovascular accidents, HIV infection, end-stage systemic diseases (heart diseases, renal disease, liver disease), etc.

In-Patient Care

In-patient care is provided when symptoms like pain, nausea, vomiting, constipation, intestinal obstruction, breathlessness, insomnia, delirium, convulsions, bedsores, etc., are difficult to control on an out-patient basis.

Empowerment of the family members in various aspects of patient care like skin care, mouth care, bed sore care, etc., is undertaken to make them self-reliant and confident. We encourage them to be actively involved in the care for their loved ones.



In-patient service includes **end of life care**, one of the components of palliative care. Our palliative medicine department liaisons with the intensive care units to provide better end of life care in an attempt to provide 'A Good Death' in the presence of their loved ones. This facility is extended to patients of all specialties who are terminally ill.

Home Care

The very word 'home care' signifies the active total care provided at home to the patients and their families, who cannot approach the hospital for their treatment. Home care service is provided free of cost to all deserving patients.

OBJECTIVES ARE:

- To provide active total care to the patient and family at home
- To improve quality of life for the patients and their families
- To set forth a team effort (by empowering the family) in the care of patients
- To provide rehabilitation for the patients and their relatives
- To help patients live and die with the highest possible quality at home
- To provide bereavement support to the family after the death of the patient

The concept of home care was adopted by Amrita Hospital in January 2001. It is provided for deserving patients who reside within a radial distance of forty kilometers from the hospital.

Minor procedures like ascitic tapping, urinary catheterization and bladder wash, wound debridement, nasogastric intubation, enemas and rectal evacuation, sponge bath, skin care, mouth care, bowel care, tracheostomy care, intravenous and subcutaneous infusions and injections, bedsore management, Lymphodema management, trigger point injections, etc., are done by the team at home.

BENEFICIARIES ARE:

Those patients who require care at home and those who cannot travel, which includes both cancer and non-cancer patients (mainly geriatric patients).

Lymphodema is a notoriously debilitating progressive condition with no known cure. Worldwide, 140-250 million cases of Lymphodema are

estimated to exist, with filariasis being the most common cause. Kerala has a high incidence. Because Lymphodema is disfiguring and sometimes painful and disabling, it can create mental, physical, and sexual problems.

We have specially trained palliative care nurses to provide patient tailored Lymphodema care. The majority of patients can be treated successfully with conservative measures.

Interventional Pain Management

The majority of pain types can be managed with pain medicines alone. A minority of pain cases may require hi-tech interventions for which this department is well equipped and is a leader in such services in the country.

The interventions available for pain relief include:

- Stellate ganglion block
- Coeliac plexus block
- Hypogastric nerve block
- Chemical lumbar sympathectomy
- Intercostal nerve block
- Continuous epidural analgesia
- Epidural neurolysis
- Epidural steroid injections
- Trans-cutaneous nerve stimulation
- Trigger point injections
- Facet joint injections
- Sacro-iliac joint infiltration
- Post-operative epidural analgesia
- Splanchnic nerve block
- Spinal subarachnoid neurolysis
- Single nerve block
- Paravertebral nerve block
- Intra articular steroids
- Ascitic fluid tapping
- Pleural fluid tapping
- IV Morphine trial
- IV Lignocaine trial

Post-Operative Pain Relief

This concept has been introduced in this institution with the objective of providing a pain free surgical experience to our patients. This venture is in line with the goal of achieving a 'Pain Free Hospital' status for this institution by 2020.

We work in partnership with surgical departments for the management of postoperative pain. Post operatively the patient stays pain free, comfortable and satisfied with the overall hospital experience.

Additionally:

- Wound healing is faster
- Patients are able to get back to their normal lives earlier
- The postoperative hospital stay has been reduced by nearly half
- Ensured better bed utilization and faster turn over
- Enables the patients to get mobilized early

Disorders Treated:

- Post herpetic neuralgia
- Diabetic neuropathy
- Trigeminal neuralgia
- Myofascial pain syndrome
- Fibromyalgia
- Chronic migraine
- Central pain syndromes
- Chronic back pain
- Cancer pain and symptoms
- HIV infection and related issues
- Failed back syndrome
- Cervical spondylosis
- Peripheral vascular disease
- Lymphodema
- Advanced systemic diseases
- Post-operative pain
- Pancreatic pain
- Procedure related pain
- Pediatric pain

► MOLECULAR ONCOLOGY

Molecular Oncology has now become an essential part of cancer diagnosis and treatment. Identification of genetic changes in hereditary cancer syndromes such as neurofibromatosis, Lynch syndrome, hereditary breast and ovarian cancer syndrome are now an essential part of routine diagnostic tests in cancer care worldwide. Also, specific molecular diagnostics tests are required now for selecting a chemotherapeutic regimen in certain cancers such as adenocarcinomas of lung for better survival rate and quality of life. The molecular oncology diagnostics requires a streamlined workflow starting from good quality histopathological examination, leading on to tailor-made and affordable molecular biology assays, analysis that is ultimately translatable into clinically meaningful interpretations. Experts in oncology, pathology and molecular biology departments in Amrita have joined hands to make this possible in a seamless way to provide an efficient and advanced genetic and genomic level variance detection in cancer diagnostics. We have currently introduced the following list of tests in the Amrita Molecular Oncology Laboratory.

FACILITIES

- NABL accredited molecular biology laboratory
- Onco-pathologists directed tissue triaging and sampling
- High quality molecular biology grade reagents and standards
- State-of-the art equipment such as:
 - a. Thermo ABI 7500 Fast® Real-time PCR
 - b. Qiagen Roto-Gene® Real-time PCR
 - c. Thermo Veriti Thermal Cycler
- Separate stations for DNA/RNA biosafety cabinets
- Separate labs for DNA extraction, pre-PCR mixture, post PCR processing etc
- Sequencing and fragment analysis done in different facilities
- Custom made assays with proper validation and controls
- Double validation of mutational variants using two different techniques ultimately confirmed by DNA sequencing or fragment analysis

- Advanced tests with affordable price
- Analysis using professional software and publicly available databases
- Handled by experts who are both clinicians and molecular biologists so that analysis, troubleshooting and clinical interpretation is all streamlined
- Pre-test counseling: Introduction to genetic test and pre-test counseling done routinely by clinical onco-geneticist
- Post-test interpretation of result, analysis details and implications are explained routinely

SERVICES OFFERED

Research Activities

Many new research studies have been initiated with the co-ordination of all the clinical, and non-clinical departments. For e.g. Amrita Phakomatoses Clinic. A specialized clinic to screen patients who have been suspected to have hereditary phakomatoses syndromes causing multiple tumors in the brain and spinal cord and other nervous system related regions of the body.



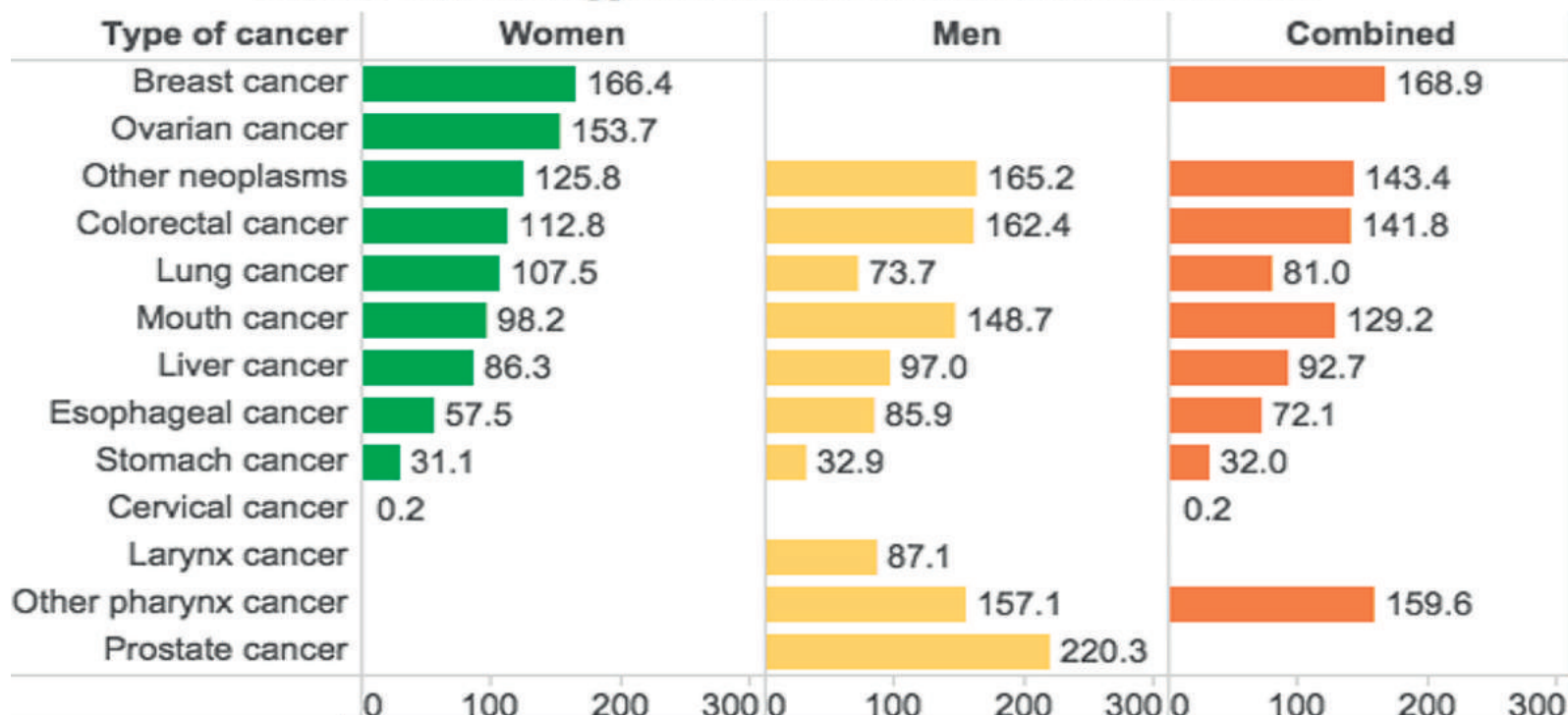
The disorders include neurofibromatosis type 1-, type 2, von Hippel Lindau syndrome, Gorlin syndrome etc. The clinic is a coordinated effort of Neurosurgery, Neurology, Urology, GI surgery, Endocrinology, Ophthalmology, Pediatric Genetics and Molecular Diagnostics Division of Medical Oncology.

► CANCER REGISTRY

The cancer registry is involved in the systematic collection recording and analysis of cancer cases seen at Amrita Hospital. This is a hospital based cancer registry. The registry provides an important source for functional auditing for the center, research and training. Assessing the burden and distribution of cancer provides leads for cancer research and control. Effectiveness of treatment is measured by the survival time and for evaluation of the quality of survival. Cancer registry data provides evidence based information for all facets of oncology training.

The cancer registry in Amrita Institute began in April 2004. Cancer patients are seen in various speciality clinics in Amrita Hospital. Patients are referred to the cancer institute when they require treatment. Various tumor boards discuss the case management before initiation of treatment. All patients attending Amrita Hospital for medical consultation are registered in the outpatient registration office and a registration number, the Medical Record Department Number (MRD) is issued. A unitary system of registering is maintained. ie., one patient one record number. Registry workers visit various clinics daily and denote a serial number on the case record when it is observed or suspected to be a cancer case. A register is maintained to record the MRD numbers of such cases. This is maintained as a suspense file. We participate in ICMR sponsored outcome research in cancer.

Cancers With The Biggest % Increase In Cases From 1990 to 2013



► CENTER FOR HEAD & NECK SURGICAL ONCOLOGY

The Head and Neck surgical Oncology Service at Amrita Hospital has always striven to be a model for comprehensive multidisciplinary care in the country.

The infrastructure, clinical services offered and the outcomes of patient care are on par with the best centers in the world. Head and neck cancers comprise of tumors of mouth, throat, voice box (larynx) and the associated structures such as sinuses, salivary and thyroid gland. It is now clearly established that multi-modality treatment with surgery, radiation therapy and chemotherapy alone or in various combinations offer the best chance to cure the disease and to improve the quality of life of patients. Because of the involvement of multiple specialties, the treatment decision and monitoring is best carried out through a multidisciplinary head and neck oncology team, rather than by a single physician or a specialty.

The team comprises of the head and neck surgical oncologist, radiation and medical oncologists, radiologist, pathologist, medical social worker and supportive care specialists. Our weekly tumor board consisting of these experts oversees the planning and care of all head and neck cancer patients. We also have dedicated tumor boards for thyroid and skull base disorders every month where in the treatment planning is done in great detail. All the treatment decisions are based on best current evidence and universally accepted treatment guidelines.

SERVICES OFFERED

The surgical procedures offered are planned with a great focus placed on the functional and esthetical recovery of the patients. Our planning is to ensure early return to the presurgical state. Microvascular reconstructive surgery forms a cornerstone in ensuring early return of form and function. The reconstructive surgery offered ranges from reconstruction of the tongue, cheek, jaw bone and even the food passage.

Laser surgery for early tongue and laryngeal cancers are available. This mode of treatment facilitates early healing.

Tumors of the nose and sinuses often present in advanced stages. The skull base services within the department use the combined expertise of neurosurgery and head and neck surgery. For the sinus and skull base

tumors, endoscopic and neuro-navigation assisted surgeries are available for precise tumor removal. Reconstruction is essential following complex resections of the face and skull base. This is offered to patients undergoing such surgeries in our department.

Thyroid tumors can present as small swellings or large invasive tumors in advanced stages. The treatment offered in the department combines the expertise of head and neck surgery, medical endocrinology and nuclear medicine. In certain advanced cases, the surgery should address the airway and the food passage. Such tumors are managed in the department. For a narrow airway, widening of the air passage by stenting is possible by the Radiology colleagues.

Salivary gland swellings can be both cancerous and non-cancerous. The treatment is usually surgery followed by radiation in selected cancer cases. Tumors of the parotid salivary gland sometimes can involve the facial nerve which is essential for functioning of the facial muscles. Repair and reconstruction of the facial nerve function is routinely offered to such patients. Stone formation is common within the gland and the ducts. For selected patients, non invasive endoscopic (sialendoscopy) removal is offered.

Dental rehabilitation in form of dentures and implants are also offered for patients after tumor removal. Prosthetic implants are



MAKING A PROSTHETIC IMPLANT



planned and fabricated by the prosthodontic colleagues for defects of the face, ear and eye socket. The dental oncology service within the department takes part in the pre-radiotherapy dental treatments and offers advice on dental care during radiation.

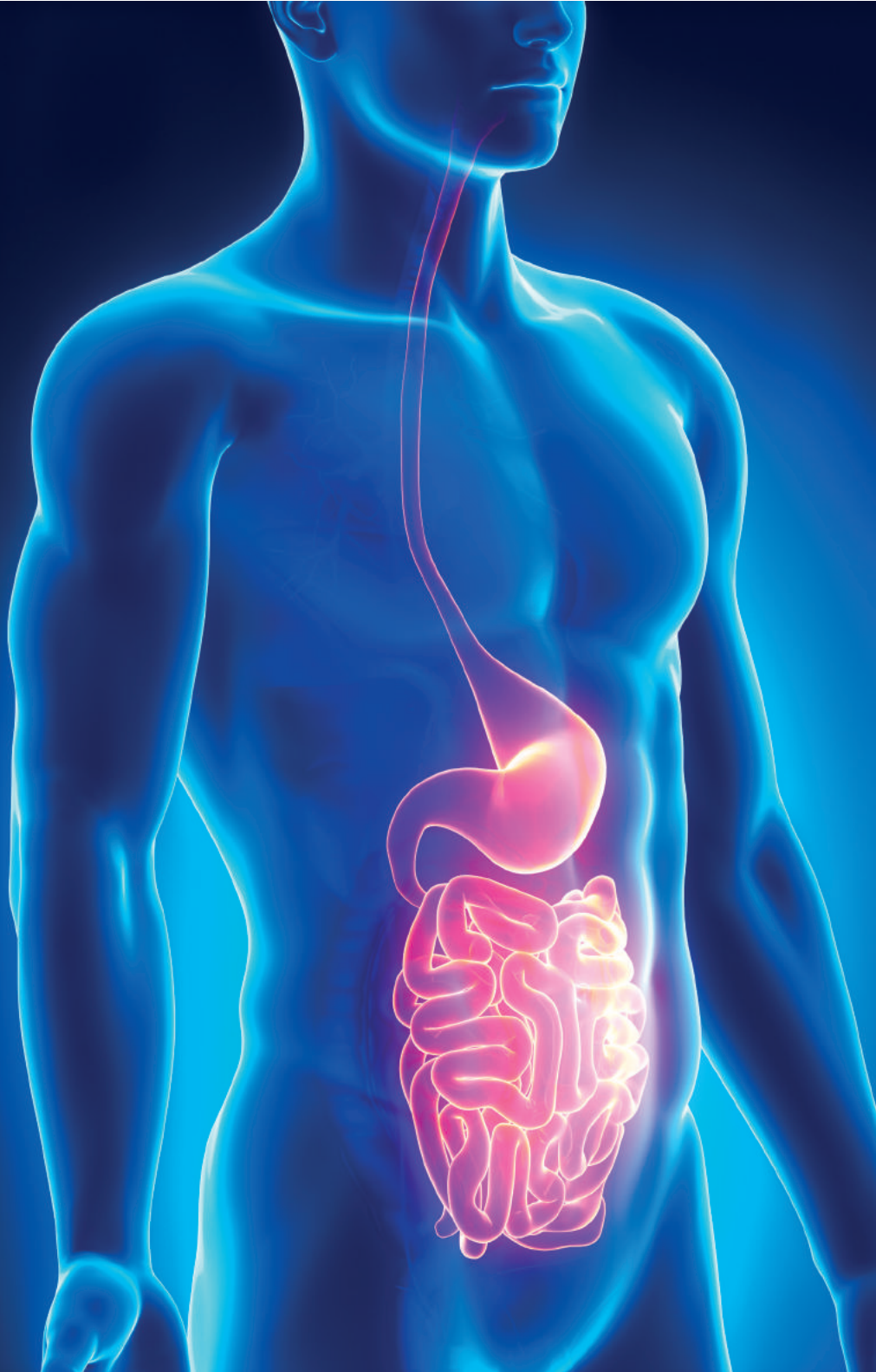
Sufficient rehabilitation of the patient with respect to speech and swallowing is required after extensive surgery to remove tumors. We have a dedicated speech and swallowing service which participates in the early rehabilitation of speech and swallowing function of our patients. These patients include both those who have undergone surgery and those who have received radiation treatment. Endoscopic and fluoroscopic evaluation precisely identifies the problem in these patients which can thereafter be corrected by rehabilitative techniques.

Non cancerous swellings of the head and neck including congenital swellings, vascular malformations, neurogenic tumors amongst others are also routinely managed by the department. The department has a state-of-the-art operation theater complex and a dedicated 12-bedded ICU for round the clock monitoring of post operative patients.

CENTER FOR DIGESTIVE DISEASES

THE CENTER FOR DIGESTIVE DISEASES HAS STATE-OF-THE-ART FACILITIES FOR THE EARLY DETECTION, DIAGNOSIS, AND TREATMENT OF COMPLEX GASTROINTESTINAL, LIVER, GALLBLADDER, AND PANCREATIC DISEASES.

The departments of imaging, interventional radiology, nuclear medicine, oncology and lab services also work closely with the Center to provide comprehensive treatment to patients. At Amrita, we strive to offer both patients and referring physicians a comprehensive multidisciplinary approach for disorders of the pancreas, bile ducts and gallbladder. A team of gastroenterologists, interventional endoscopists, radiologists, GI HPB and transplant surgeons, medical and radiation oncologists, work together to design a personalised diagnostic and therapeutic plan for each patient. Nursing coordinators organize and expedite patient evaluations to minimise multiple visits for testing and physician consultation.



AREAS OF SPECIALTY

- Gastroenterology/Hepatology
- Liver center
- Center for biliary and pancreatic disorders
- Center for luminal disorders
- Diagnostic and therapeutic endoscopy and ERCP
- Center for swallowing and esophageal disorders
- Gastrointestinal hemostasis
- Cancer detection and palliation unit
- Pediatric gastroenterology
- Intensive care services
- Tele-medicine and tele-education services

► GASTROENTEROLOGY AND HEPATOLOGY

The Department of Gastroenterology and Hepatology at Amrita is comprised of the following services and areas of specialty:

- Center for Liver Diseases
- Center for Pancreatic Diseases
- Pediatric Gastroenterology
- Diagnostic and Therapeutic Endoscopy and ERCP
- Center for Swallowing and Esophageal Disorders
- Gastrointestinal Hemostasis
- Cancer Detection and Palliation Unit

DIAGNOSTIC FACILITIES

State of the art diagnostic modalities include:

- All forms of upper and lower gastrointestinal video-endoscopy
- Small bowel enteroscopy
- Motility studies
- High speed helical CT scans
- MRI (with facilities for noninvasive cholangio and pancreatography and MR angiography)
- Color Doppler studies
- Endosonography
- Fluoroscopic imaging of the liver, gall bladder, bile ducts, pancreas and intestinal tract

- Intraoperative fluoro-radiology (image intensifier)
- Ultrasound

Nuclear medicine facilities offer tests such as mebrofenin (HIDA), blood pool and Meckel's scanning and bone scans. All tests provide highly accurate detection of disease. Screening facilities for digestive disorders are also available.

► CENTER FOR LIVER DISEASES

The Center for Liver Diseases offers comprehensive services to patients with acute, chronic, and end-stage liver diseases. The clinical core of the Center for Liver Diseases consists of outpatient and inpatient consultations aiming at comprehensive, multidisciplinary approach to a variety of liver diseases. We coordinate and deliver state-of-the-art diagnostic and therapeutic procedures and liver transplantation in an evidence based fashion.

SERVICES

- General Hepatology inpatient and outpatient services
- Liver Transplant Evaluation and Post Liver Transplant follow up
- Diagnostic and Therapeutic (interventional) services
- Research
- Patient Education
- Screening and Prevention

CLINICAL AREAS PROVIDED BY INPATIENT SERVICES

- Management of liver cirrhosis and its sequel like hepatic encephalopathy, ascites, portal hypertensive bleeding, hepatorenal syndrome, spontaneous bacterial peritonitis.
- Management of acute and chronic hepatitis of different etiologies with state-of-the-art medical therapies.
- Treatment of Fulminant hepatic failure in a dedicated ICU area, in close co-operation with the Division of Liver Transplant Surgery.
- Liver Transplantation-pretransplant workup and post transplant followup.
- Multidisciplinary approach to the management of liver malignancies (primary or metastatic).

We coordinate and deliver the following diagnostic and therapeutic modalities in close co-operation with Radiology, the Center for Laboratory Medicine, Liver Pathology and the Division of Liver Transplant Surgery:

- Endoscopic Facilities
- Ultrasonogram
- Lab facilities for clinical pathology, biochemical and virological work up
- Liver biopsy (percutaneous or transjugular) with complete histopathological staining including special stains
- Copper and iron quantification on liver biopsy specimen
- Hepatic vein pressure gradient (HVPG)
- Radiofrequency Ablation (RFA)
- Transarterial Chemoembolization (TACE)
- Percutaneous Aspiration/Drainage of liver abscess/hepatic cyst
- Transjugular Intrahepatic Portosystemic Shunt (TIPS)
- Paracentesis with or without pigtail insertion
- Liver transplantation

OUTPATIENT ACTIVITIES

State-of-the-art facilities for the complete diagnosis and management of whole spectrum of acute and chronic liver diseases, including:

- Viral hepatitis
- Alcoholic hepatitis
- Lifestyle liver disorders-Fatty Liver, Non-alcoholic Steatohepatitis (NASH)
- Drug-induced hepatitis
- Autoimmune liver disease
- Cirrhosis of various etiologies
- Genetic abnormalities
- Metabolic disorders
- Hematochromatosis
- Wilson disease
- Primary sclerosing cholangitis
- Liver tumors, especially Hepatocellular carcinoma and Metastatic liver cancer
- Hepato-Biliary tuberculosis
- Liver abscess

► CENTER FOR PANCREATIC DISEASES

THE AMRITA PANCREAS CLINIC

The Pancreas Clinic offers comprehensive services by experienced pancreatologists with long track records for patients with acute and chronic pancreatitis, pancreatobiliary cancers and pancreatic cystic disease. The services comprise comprehensive care including detailed workups, diagnosis, medical or/and surgical treatment, when indicated, on an outpatient as well as inpatient basis. We provide a unique hotline for our registered patients to contact the clinic staff directly in case of an urgent problem. All the newest and world class diagnostic and therapeutic (interventional) services, and screening, including preventive strategies for cancer, are available here. The center has for many years undertaken research into the causative factors of pancreatitis and published books and research papers. We offer the patient all the current options in treatment with the patient's perceptions in mind. Personal care, counseling, patient education, psychological support and empowerment makes this clinic unique in this category.

SUPPORTING SERVICES

The multidisciplinary Pancreas Clinic includes pancreatologists and a pediatric gastroenterologist, with quick back up by other experts such as diabetologists, surgeons, and the services of an ultra-modern Radiology Department and a Metabolic Lab. Dedicated services of a clinic coordinator, diet and nutrition experts and trained medical sociologists are available in the Pancreas Clinic. The clinic has been functioning for the past ten years now and it has one of the largest pancreatic registries in India; nearly 1400 patients.

DIAGNOSTIC AND THERAPEUTIC FACILITIES

Facilities include Endoscopic retrograde cholangiopancreatography (ERCP), Multi-Slice CT scan, Magnetic resonance imaging (MRI), Magnetic resonance cholangiopancreatography (MRCP), pancreatic stenting, pseudocyst drainage, Endoscopic ultrasound (EUS), Endoscopic ultrasound-guided FNA (EUS-FNA), celiac plexus block, lithotripsy, etc. Comprehensive management of alcohol related pancreatitis, tropical pancreatitis, autoimmune, metabolic and drug induced pancreatitis etc is



VIDEO-ENDOSCOPY PROCEDURE

also available. Pancreatic function testing and evaluation of idiopathic or unknown causes of pancreatitis is undertaken here.

The highlight of our distinctive Pancreatitis Care Program is the integration of clinical care of pancreatitis, care of pancreatic diabetes and its complications, advice on diet and life style during each visit, explaining the basis of the disease and the rationale for decision making and making the patient a full partner in the treatment of his/her disease. In this clinic the maximum emphasis is laid on the quality of life of the patient - it is totally patient oriented and not disease oriented.

MANAGEMENT OF PANCREATOBILIARY CANCERS

Diagnostic facilities available include non-invasive tumor markers, endoscopic ultrasound (EUS) and EUS —FNA apart from all established imaging modalities. Non-surgical management including biliary drainage and stenting, etc. is available. Evaluation and management of pancreatic cysts and cystic cancers is also undertaken. Excellent support is extended to the Pancreas Clinic by the pancreatobiliary surgeons from GI Surgery. This group of surgeons have a vast experience in hepato-pancreato-biliary surgery and routinely undertake all types of surgeries ranging from the simplest to the most complicated, including liver transplantation.

PEDIATRIC GASTROENTEROLOGY

The Pediatric Gastroenterology wing has been set up to provide efficient diagnosis and management of pediatric gastroenterological and hepatobiliary problems.

Endoscopy including upper and lower GI and ERCP, nuclear scans and endoscopic ultrasonography of pediatric patients are being routinely performed.

Center for Gastrointestinal Hemostasis

A dedicated team of endoscopists, gastrointestinal surgeons, interventional radiologists, and vascular surgeons are available around the clock for treating patients with upper or lower gastrointestinal bleeding. A fully-monitored emergency ICU service, an outstanding blood bank which provides blood component therapy, and a 24 hour endoscopic and surgical service ensure immediate control of massive bleeding. Complex diagnostic and therapeutic modalities often avoid the need for high-risk surgery.

The availability of all the investigational modalities within the hospital itself makes the Amrita Center for Digestive Diseases one of the best centers for evaluation of gastrointestinal bleeds. The unit has risen to be a tertiary referral center in the state of Kerala for this pathology. Patients presenting with GI bleeds are resuscitated in the intensive care setting if needed. A blood bank that is capable of supplying large volumes of whole blood or its components even at short notice helps in the resuscitation of these patients.

The investigation required for each patient is decided after consultation between the surgeon, interventional radiologist and the medical gastroenterologist.

The availability under a single roof of all advanced imaging techniques like Upper GI Endoscopy, Colonoscopy, Enteroscopy, CT Scan, MRI Imaging, On-table Enteroscopy, Angiography and Nuclear Medicine scanning ensures that a patient will not need to be shifted out of the hospital for any evaluation.

Unlike many other centers, all these facilities are available round the clock at Amrita. No time is lost in the evaluation and treatment of these patients.

► GASTROINTESTINAL SURGERY

The Amrita Department of Gastrointestinal Surgery features a highly experienced team of gastrointestinal, hepatobiliary and pancreatic surgeons. Emergency cases are handled round the clock through Casualty.

This department has a comprehensive surgical program focusing on:

- Oncological Surgery of the GI Tract
- Pancreatico-Biliary Surgery
- Gastric and Esophageal Surgery
- Liver Transplant
- Advanced Laparoscopic Surgical Procedures
- Specialised Colorectal Surgery including Sphincter Saving
- Stapled and Pouch Procedures
- Intra-Abdominal Vascular Reconstructions
- Retroperitoneal Tumor Excisions
- Intra-Abdominal Trauma

da Vinci Surgery

WHAT IS THE DA VINCI ROBOTIC SURGICAL SYSTEM?

The da Vinci Surgical System is a tool that utilizes advanced, robotic technologies to assist your surgeon with your operation. It does not act on its own and its movements are controlled by your surgeon.

HOW CAN IT HELP ME?

da Vinci Surgery is a less invasive technique than traditional surgery. With da Vinci Surgery, the cuts (incisions) made in your body by your surgeon are much smaller than the cuts made during traditional surgery. AMRITA uses da Vinci for gastro surgical, uro-surgical, thoracic and gynecologic surgeries. Compared with traditional surgery, having da Vinci Surgery may offer you:

- A shorter hospital stay
- Less blood loss
- Fewer complications
- Less need for narcotic pain medicine
- A faster recovery
- Smaller incisions for minimal scarring





SERVICES OFFERED

Surgical Procedures

GASTRIC AND ESOPHAGEAL SURGERY

All major gastric and esophageal surgeries are undertaken. Minimally invasive gastric and esophageal surgeries are offered to patients where appropriate. The following conditions are treated on a regular basis:

- Gastric Cancer - Palliative and curative resections for gastric and gastro-esophageal junction cancers are performed frequently, along with gastrectomy with extended lymph node dissections.
- Achalasia Cardia - The initial work up is done in the esophageal motility lab in the Medical Gastroenterology department, then the GI Surgery department sees patients who need surgery. Laparoscopic myotomy is performed so that patients can avoid the risk of open surgery with its attendant morbidity.
- Esophageal Cancer - Transthoracic and transhiatal esophagectomies are also performed regularly. Inoperable patients are palliated by expandable metallic stents or endoscopic feeding gastrostomies. The management of these patients is generally undertaken in consultation with an oncologist to plan the adjuvant treatment that may be needed.
- Gastro Esophageal Reflux Disease -The treatment is begun only after extensive evaluation in the motility lab of the Medical Gastroenterology department. Optional minimally invasive anti-reflux surgery is offered to the patient.
- Ulcer Disease - With the current advances in medical treatment, it is rare for patients to need surgical intervention. When such cases do arise, the department offers the options of laparoscopic as well as open acid reduction procedures.

SMALL INTESTINE AND COLORECTAL SURGERY

The GI Surgery department provides integrated oncology care. The treatment of patients with rectal cancer is planned in consultation with an oncologist to include pre-operative radiotherapy. This approach significantly reduces the risk of recurrence of the cancer. The department carries out a variety of procedures and treats conditions including:

- Colorectal Cancers - Low anterior resections and stapled pouch anastomosis are carried out routinely. All attempts are made at sphincter preservation. Laparoscopic colorectal resections are being taken up depending on patient preference and suitability.
- Polyposis Syndrome - Patients with polyposis syndrome are evaluated fully in the department for coexisting pathology and are offered sphincter-preserving procedures like Ileal Pouch Anal Canal Anastomosis.
- Inflammatory Bowel Diseases - Inflammatory bowel disease like ulcerative colitis and Crohn's Disease are handled in consultation with the Medical Gastroenterology department. Advanced procedures like Ileal Pouch Anal Canal Anastomosis are done regularly. Staged procedures for complicated IBD and management of fistulas utilize the services of the integrated stoma care services.
- Abdominal Tuberculosis - The advanced facilities available in the hospital permit non invasive or minimally invasive confirmation of this often obscure pathology.
- Rectal Prolapse - Rectal prolapse is being treated routinely by Laparoscopic Rectopexy, thus allowing early return to activity for the patients.
- Complicated Perianal Conditions - The evaluation and management of complex perianal fistulae is aided greatly by the excellent imaging modalities of conventional and MR fistulograms done in the Radiology department. Stapler hemorrhoidectomy is offered to patients at their choice, avoiding the painful and prolonged convalescence after piles surgery.
- Anal Sphincter Reconstruction and Augmentation Reconstruction of anal sphincter with muscle transfer procedures are done for patients with incontinence due to traumatic injuries to the sphincter.

HEPATO PANCREATO BILIARY SERVICES

- Liver surgery - Major liver resections are undertaken routinely for primary cancers of the liver and the biliary tree.

- **Pancreas** - The unit has carried out more than 120 major pancreatic resections with results being comparable with the best centers in the world. Surgical treatment is offered to patients with pancreatic cancers as well as chronic pancreatitis.
- **Disorders of the biliary system** - The treatment of gallstone disease is done in coordination with the Medical Gastroenterology Department so as to allow planning of combined and sequential treatment procedures that would help in reducing the hospital stay. Surgical management of complicated benign biliary disorders is done by biliary reconstructive procedures.
- **Bile duct and gall bladder cancer** - Palliative and curative resections for biliary cancer and palliative drainage procedures are performed. Combined liver and bile duct resection for advanced bile duct cancers are being performed regularly with excellent results. Patients who have inoperable diseases are offered various palliative measures like stenting or bypass procedures.



LAPAROSCOPIC SURGERIES

The unit operates with two fully equipped laparoscopic suites, which are also equipped with advanced equipment like Harmonic Scalpel, Argon laser, endoscopic stapling devices and endoscopic suturing devices.

The unit is routinely conducting:

- Lap cholecystectomy
- Lap common bile duct exploration for stone disease
- Lap appendectomy
- Laparoscopic hernia repair
- Diagnostic laparoscopy for the evaluation of obscure abdominal symptoms, pain or ascites
- Lap assisted colorectal resections for cancer
- Lap liver surgeries for cystic diseases of the liver
- Lap directed small bowel surgeries
- Lap myotomy for Achalasia Cardia
- Lap splenectomy
- Lap cysto-gastrostomy
- Lap bariatric surgery

LIVER TRANSPLANTATION

The treatment options for treatment of patients with end stage liver disease are limited and the patient usually follows a steady downhill course unless transplanted.

GASTRO INTESTINAL ONCOLOGY

The department works in close association with the Department of Oncology. Management of cancers is handled on the basis of protocols already in place. This close association between the departments allows the patients to get integrated care for their diseases. Unlike most other centers, all phases of the treatment can be completed under one roof. Adjuvant treatment for colorectal cancers, cancers of the stomach and pancreas, cholangiocarcinoma, etc. are taken up after detailed discussions between the surgeon and the oncologist. This interaction helps in the optimisation of the treatment for each patient.

Stoma Care Center

The department has a fully equipped stoma care center that takes care of patients with stomas. Patients who need permanent or temporary diversion of the faecal stream are given advice regarding the types of stoma care materials and are trained about the proper use and care of the appliances. The unit is manned by trained enterostomal therapists. They take care to ensure smooth and painless transition to life with a stoma.

Stoma care products are available at subsidised rates through the hospital pharmacy, which is a boon to patients who need a variety of imported and indigenous products for stoma care. The facility of stoma counseling and products are available for patients operated at other hospitals.

Trauma and Emergency Services

The GI Surgery unit functions as a tertiary referral center for hepatobiliary and pancreatic trauma from all over Kerala. Complicated postoperative GI and biliary fistulas are also admitted through the emergency services. The GI bleed team composing of the critical care specialist, the medical gastroenterologist, interventional radiologist and the GI surgeon manage the patient with a well coordinated approach. The excellent conventional and interventional radiological facilities available in the hospital allow conservative treatment for many major intra-abdominal injuries, especially major intra-abdominal vascular trauma.

Specialty Clinics

LIVER TRANSPLANTATION CLINIC

The Amrita transplant team comprises of experienced transplant and vascular surgeons backed up by a large GI surgical and anesthetic team. The pre-transplant work up and follow up are done at a monthly liver transplant clinic conducted at the Department of GI Surgery. In this clinic, experienced hepatologists and the transplant team streamline the treatment plans for individual patients with end-stage liver disease. The excellent intensive care and supportive services meet the full compliment of requirements for a successful transplant setup.

PANCREAS CLINIC

Surgical treatment is offered to patients with pancreatic cancers as well as chronic pancreatitis. The pancreas clinic is conducted in coordination with the Medical Gastroenterology and Endocrinology departments to give integrated care to patients with chronic pancreatitis.

OBESITY CLINIC

The clinic is conducted primarily by the endocrinology team, in coordination with the departments of Gastrointestinal Surgery and Plastic Surgery. AIMS is probably the only obesity center in the country to incorporate endocrinologists, GI surgeons and plastic surgeons working together for a common cause under the sphere of obesity management. In addition to hormonal assessment of obesity, our center also has state-of-the-art facilities for body fat assessments, preoperative assessments and postoperative follow up for obesity patients. We have a comprehensive medical nutrition program, exercise counseling, drug therapy and plastic surgery, as well as bariatric procedures.



CENTER FOR NEUROSCIENCES

THE CENTER FOR NEUROSCIENCES AT AMRITA IS ONE OF THE LARGEST IN SOUTHERN INDIA, PROVIDING FULL FACILITIES FOR INVESTIGATIONS AND TREATMENT OF NEUROLOGICAL DISORDERS IN ADULTS AND CHILDREN.

The Center caters to more than 21,000 patients in out-patient services and 1500 in-patients per year. In spite of the large number of patients, the Center for Neurosciences provides quality care combining traditional clinical evaluation with judicious use of the most advanced investigation modalities that are unmatched in any hospital in India.

► NEUROLOGY

The Department of Neurology provides care to patients with diseases of the brain, spinal cord, peripheral nervous system, muscle-related diseases and conditions utilizing state-of-the-art technology and a world-class medical team. It includes the following disciplines:

- Epilepsy Center
- Headache Service
- Pediatric Neurology
- Sleep Medicine
- Multiple Sclerosis Clinic
- Botulinum Toxin Clinic
- Movement Disorders and Gait Service
- Neuromuscular Service
- Cerebrovascular Diseases (Stroke) Center
- Comprehensive Neuro Rehabilitation
- Clinical Neurophysiology Laboratory
- Speech Therapy
- Sleep Medicine

SERVICES OFFERED

Epilepsy Center

Epilepsy is controlled mainly by the appropriate use of anti-epileptic medication. Drug treatment, when properly applied, can result in effective seizure control in 70% - 80% of people with epilepsy. However, epilepsy may be refractory (resistant to ordinary methods of treatment) to drug therapy in a small but significant number of patients. The most common causes of refractoriness include:

- The use of a sub-optimal medication for a particular seizure type
- An inability to properly determine the type of seizure experienced by an individual by standard examination and testing methods
- An occurrence of certain neurological or psychological symptoms which can mimic seizures
- Poor drug compliance

The alternatives for the treatment of refractory seizures include epilepsy surgery, investigational medications, vagus nerve stimulation, and others.

Headache Service

Diagnosis and treatment of patients with chronic headache conditions such as muscle-contraction headaches, migraine, and cluster headaches are provided. Due importance is given for prevention of headaches; medication-based and non-medication treatments that transcend the realms of conventional neurology are utilized.

Pediatric Neurology Service

Newer diagnostic modalities and therapies are offered as part of Pediatric Neurology. We also perform surgery as a therapeutic option in a few selected cases of childhood epilepsy. There are several imaging modalities including functional studies which are routinely performed here. These include PET (Positron emission tomography), SPECT (Single-photon emission computed tomography), fMRI (Functional magnetic resonance imaging), Electrophysiology, Electrocorticography and Video EEG (Electroencephalography). There is an active learning disability program for children involving psychologists, neurologists and developmental specialists.

Sleep Clinic

The clinic attends to persons with sleep disorders. Insomnia or inability to sleep is the commonest sleep problem faced by individuals. The other extreme is excessive daytime sleepiness where one's day-to-day activities are affected by increased day time sleepiness.

The common sleep disorders seen in this clinic are insomnia, obstructive sleep apnoea, narcolepsy, restless leg syndrome and sleep problems associated with various chronic illnesses. During a sleep clinic visit, initially a detailed questionnaire-based interview is taken, and subsequently if needed, the person undergoes specialized tests like polysomnography (PSG), Multiple sleep latency test (MSLT), positive airway pressure (PAP), titration etc.

The clinics are well supported by our allied departments like Endocrinology, Psychiatry, Clinical Psychology, Holistic medicine, Pulmonology, ENT, Faciomaxillary and Bariatric surgery.

Multiple Sclerosis Clinic

Highly specialized in providing accurate diagnosis and implementing appropriate treatment and support for patients with multiple sclerosis, the clinic has already attended to more than 100 patients with multiple sclerosis. All patients undergo clinical evaluation and are diagnosed based on modified McDonald's criteria. They are subjected to detailed examinations including the Expanded Disability Status Scale (EDSS) and other disability scales like PASAT (Paced Auditory Serial Addition Test), 2-hole peg test, etc., and are actively followed up. A registry of patients is also maintained.

In association with the Urology department, the clinic provides specialized treatment options like Botulinum Toxin therapy for spasticity and urodynamic studies for bladder problems. The MS Clinic also helps patients to participate in various clinical trials. Basic clinical research in multiple sclerosis is also being conducted in our hospital.

Botulinum Toxin Clinic

The Botulinum Toxin Clinic is among one of the few regularly run such clinics in Kerala. It provides botulinum injection therapy for various disorders like hemifacial spasm, blepharospasm, oromandibular dystonia, cervical dystonia, laryngeal dysphonias, focal dystonia, post stroke spasticity, etc. It also provides botulinum toxin therapy for rarer indications like chronic migraine, refractory trigeminal neuralgia, painful peripheral neuropathy, etc.

So far, the clinic has helped more than 200 patients with their specific problems. The clinics regularly follow up the patient through a registry maintained in the department.

Movement Disorders and Gait Service

The Movement Disorders and Gait Service provides comprehensive evaluation and treatment of patients with Parkinson's disease, tremor, ataxias, dyskinesias, dystonia, gait disorders, tics and Tourette's syndrome.

Neuromuscular Service

The Neuromuscular Service provides comprehensive diagnostic evaluation, consultation and management of all neuromuscular disorders, including motor neuron diseases (ALS), peripheral neuropathies, myopathies, muscular dystrophy, and myasthenia gravis. We are routinely



MULTIPLE SCLEROSIS
AWARENESS

doing thymectomy for myasthenia gravis. Our cardio-thoracic surgeon has wide experience in this field and is well supported by a team of neurologists, anesthesiologists, critical care physician and nephrologists.

Stroke Medicine and Neuro-Intensive Care Unit

Stroke is the third leading cause of death and the number one cause of disability. Recently, the introduction of thrombolysis as treatment for acute stroke has significantly decreased the disability from stroke. Critically ill patients requiring ICU admission for their neurological illness such as intracerebral hemorrhage, neuromuscular diseases, and severe strokes are managed in a well equipped stroke and neuro-intensive care unit.

Disorders Treated

EPILEPSY

Epilepsy is a condition characterized by the propensity to have recurrent seizures ("fits"). It is one of the most common neurological disorders seen in children. The control of epilepsy is achieved mainly through the appropriate use of anti-epileptic medication. Drug treatment, when properly administered, can result in effective seizure control in 70% - 80% of people with epilepsy. However, epilepsy may be refractory to drug therapy in a small but significant number of patients. They may need complimentary treatments like resective surgery.

SYNCOPE

Syncope (fainting) is defined as falling down and being unconscious for a short period of time. Usually, there is complete recovery in a matter of seconds or a few minutes. Fainting is a symptom and not a disease. It occurs due to temporary reduction of blood supply to the brain. There are many different reasons for fainting.

SLEEP DISORDERS

Sleep disorders are common but often under-diagnosed medical problems. A thorough sleep evaluation can characterize the extent of the problem and direct the appropriate management practice. Amrita features a modern sleep lab that can perform polysomnography and sleep latency testing. Various breathing disorders can be assessed and ameliorated via respiratory assertive devices.



NEUROPATHIES

The brain and spinal cord constitute the central nervous system while the nerves coming from them and connecting to the muscles constitute the peripheral nervous system. These nerves allow us to move our body parts and also to experience feelings such as pain, temperature, touch and limb position from the surface of our body. They also connect to internal organs that allow involuntary actions such as breathing, sexual function and digestion. Any damage to the nerves of the peripheral nervous system is called peripheral neuropathy.

SPEECH AND LANGUAGE DISORDERS

Services provided are counseling, guidance, and rehabilitation for patients with the following disorders:

- Developmental Speech and Language Problems
- Deviant Speech and Language
- Post-Laryngectomy Speech Disorder
- Aphasia
- Dysarthria
- Hearing Problem
- Dysphagia

MYASTHENIA GRAVIS

Myasthenia gravis is a disease causing fluctuating muscle weakness. It can affect any skeletal muscle of the body. However, the limbs, swallowing and eye movement muscles are more commonly affected.

HEADACHES

Headaches may have multiple causes. Although migraines are the most common form of headache, different types of migraine headaches will require different treatment modalities. Proper classification and treatment selection is critical.

STROKE

A stroke occurs when the blood supply to part of the brain is suddenly interrupted or when a blood vessel in the brain bursts, spilling blood into the spaces surrounding brain cells. Thrombolysis is a special form of treatment that helps in breaking arterial blocking blood clots by means

of interarterial as well as intervenous drugs. Amrita is also a recognized referral center for carotid endarterectomy (CEA).

Other disorders treated are:

- Parkinson's disease and other movement disorders
- Wilson's disease
- Vertigo
- Neuromuscular disorders
- Critical care neurology
- Fibromyalgia syndrome
- Childhood neurological problems
- Neurological complications of HIV infection
- Neurological rehabilitation
- Dementias
- Nutritional and vasculitic illness
- Inborn Errors of Metabolism

Diagnostic services include:

- Non-invasive vascular testing
- Magnetic resonance spectroscopy
- Functional magnetic resonance imaging
- Cerebral angiograph
- Nerve conduction study
- Electromyography (EMG)
- Electroencephalography (EEG)
- Polysomnography (sleep study)

PROCEDURES

EEG (ELECTROENCEPHALOGRAM)

EEG is the name commonly used for electroencephalography. Just as the ECG records the electrical activity of the heart, EEG records the electrical activity of the brain. It is safe and painless. Electrodes (small metal, cup-shaped discs) are pasted to your scalp and record the electrical activity.

EVOKED POTENTIALS (BAEP, VEP, SSEP)

Evoked potentials are potentials recorded from the scalp in response to a brief auditory, visual or electrical stimulation to nerves to assess the hearing (BAEP - brainstem auditory evoked potential), visual (VEP - Visual

Symptoms of Parkinson's Disease



TREMOR



SLOWNESS OF
MOVEMENT



DIFFICULTY IN
SPEAKING



RIGIDITY



ANXIETY



DIFFICULTY IN
SOLVING
PROBLEMS

evoked potential) or sensory (SSEP - somatosensory evoked potential) pathways respectively. This is a painless test for evaluating the functioning of various pathways.

POLYSOMNOGRAPHY (PSG)

A Polysomnogram (PSG) is a test designed to monitor and evaluate sleep characteristics and physical stage during sleep. Patient will spend the night in a private bedroom at the sleep lab. Small electrodes or sensors will be painlessly attached to different parts of the body to monitor brainwaves, heart function, breathing and muscle activity. The patient will be videotaped to correlate body position and movement with physiological data. Patients have to complete a proforma related to sleep details before and after the study.

MULTIPLE SLEEP LATENCY TEST (MSLT)

Multiple Sleep Latency test is designed to evaluate the degree of sleepiness in patients with sleep disorders. Small electrodes or sensors will be painlessly attached to different parts of your body to monitor brain waves, heart function and muscle activity. During the test patients will be asked to nap at two hour intervals for 4 to 5 times in the day. At the start of each period the technologist will check the sensors and then instruct patients to try to go to sleep.

ENMG (ELECTRO NEURO MYOGRAPHY)

The ENMG (Electro Neuro Myography) examination is a diagnostic examination of nerve and muscle function. Nerve conduction studies are performed by placing discs on the skin over the nerves or muscles and recording their responses to electrical stimulation of the nerves.

INTRA-OPERATIVE MONITORING

Intra-operative electrophysiological monitoring is routinely performed during scoliosis surgery. This monitoring helps the surgeon to signal if there is any undue pressure or potential damage to the spinal cord in the potentially reversible phase. Intra-operative somatosensory evoked potential, motor evoked potential, brain stem auditory evoked potential, facial nerve stimulation and identification of central sulcus with sensory evoked potentials are some of the procedures routinely performed.

AUTONOMIC DYSFUNCTION TESTS (ADT)

Tests such as sympathetic skin response to sensory and auditory stimuli, RR interval variability during posture changes, RR interval variation during respiration and during valsalva manouver are routinely performed for patients with dysfunction of autonomic nervous system. These tests often provide useful information about the severity of involvement with significant impact on treatment and prognosis.

► NEUROSURGERY

Neurosurgery is the specialty concerned with the surgical treatment of diseases of the nervous system composed of the brain, spinal cord and spinal column, as well as the nerves that travel through all parts of the body. Modern day neurosurgery, however, is very different from what has been seen earlier. Among medical specialties, neurosurgery is, by far, one of the most technically advanced. There is virtually no area of the brain where lesions cannot be approached with a high degree of safety and accuracy with modern techniques like image-guided surgery. The advent of techniques of minimally invasive surgery have contributed to a much shorter hospital stay and heightened patient comfort, while maximizing the efficacy of the procedure.

The Department of Neurosurgery at Amrita is fully equipped to perform all types of surgeries for a wide range of illnesses. These include:

- Congenital diseases of the brain and spine and other illnesses affecting children
- Tumors of the brain, spine and spinal cord
- Vascular diseases such as aneurysms and vascular malformations
- Degenerative disc and other spinal diseases
- Instrumentation of the spine and the cranio-vertebral junction
- Diseases of the pituitary gland
- Stereotactic surgery
- Surgery for epilepsy and movement disorders
- Stroke and hemorrhage in the brain and spinal cord

A large number of diseases previously considered untreatable or unsuitable for surgery are now being routinely managed with a high probability of success. These include diseases like epilepsy, which

were earlier treated only with medicines. There have been several exciting advances in the treatment of malignant brain tumors, spinal cord injuries, stroke, chronic pain, and severe head trauma that have significantly improved the results of treatment. The department is well-supported by other clinical services including Radiology, Neurology, Oncology, Head and Neck Surgery, Endocrinology and Pathology.

FEATURES

- Neuro-oncology and skull base surgery
- Pediatric Neurosurgery
- Cerebrovascular surgery
- Minimally invasive surgery-Stereotactic, Endoscopic and Endoscope assisted surgery
- Spine surgery
- Stereotactic Radiosurgery (SRS)
- Craniospinal trauma
- Craniofacial reconstructive surgery
- Peripheral nerve and plexus surgery
- Surgery for Movement Disorders
- Epilepsy Surgery

SERVICES OFFERED

- Neuro-oncology
- Pediatric Neurosurgery
- Cerebrovascular surgery
- Minimally invasive surgery- Stereotactic, Endoscopic and Endoscope-assisted surgery
- Spine surgery
- Skull base surgery
- Craniospinal trauma
- Craniofacial reconstructive surgery
- Peripheral nerve and plexus surgery
- Functional Neurosurgery
- Neuro- Endocrine Surgery

DISORDERS TREATED

Brain tumors

The management of the entire spectrum of brain tumors, including benign and malignant tumors, are routinely done. This includes the most advanced



techniques used to preserve functional integrity of the brain and spine including functional MRI, neuronavigation for image-guided surgery, awake surgery for brain tumors, intraoperative electrophysiology like sensory, motor-evoked potential monitoring and corticography.

Vascular disorders of the brain

Ours is one of the few centers in Kerala treating abnormalities of the blood vessels of the brain and spine. This includes aneurysms and vascular malformation of complex types.

Traumatic and other spinal disorders

Age related and other degenerative conditions of the spine like disc prolapse, spondylolisthesis, complex craniovertebral junction anomalies and other conditions of the vertebral column like traumatic spine fractures are routinely treated here. The treatment options we offer range from routine microdissectomies to artificial disc replacement surgeries of the lumbar and cervical spine. Spinal stabilization which includes various types of complex instrumentation at all spinal levels is routinely performed for a variety of conditions.

Spine tumors

Various spinal tumors including meningiomas, schwannomas, ependymomas, gliomas etc., are treated using most advanced intraoperative monitoring modalities to give an optimal outcome and maximize functional recovery.

Congenital disorders

Disorders like congenital hydrocephalus, spina bifida and tethered cord are treated. Congenital craniofacial anomalies are managed in conjunction with the Departments of Maxillofacial Surgery and Plastic Surgery.

Brain and spine trauma

The Neurosurgical Trauma Care attends to a wide range of brain and complex spine trauma which usually need emergent surgical treatment.

FACILITIES

The department is supported by state-of-the-art dedicated neurosurgical operation theaters equipped with:

- Carl Zeiss Operating Microscopes: OPMI Pentero and OPMI NC4 with digital recording and documentation facilities

- Karl Storz Ventriculoscope and Transnasal Neuroendoscopy system
- Stryker 3-chip HD Endoscopic camera
- Midas Rex (Legend) and Anspach high speed pneumatic drill system
- Valley Lab Cavitron Ultrasonic Surgical aspirator (CUSA)
- Siemens C-arm with facility for DSA
- Codman and Aescullap operating instruments
- Leksell Stereotactic frame
- KTP Laser
- Nicolet Viking Intraoperative electrophysiological monitoring
- Xomed Cranial nerve monitor
- The Brain Lab Vector Vision Image Guided surgery system is a recent addition to the surgical armamentarium; the first of its kind in the state of Kerala
- Transcranial Doppler Sonography
- A dedicated 10 bed Neurosurgical Intensive Care Unit, with ventilators and multichannel invasive monitors for all beds, provides comprehensive care for postoperative and acutely ill patients
- ROSA Robotic Surgical Assistant

Amrita's Center for Excellence in Robotics incorporates the latest in neurosurgical technology, the **ROSA Robotic Surgical Assistant**, which assists a broad range of interventions for treating Parkinson's, epilepsy, tumors and exploratory endoscopy.

WHAT IS ROSA?

ROSA is the latest generation in robotic assistance working alongside neurosurgeons to provide precise targeting, dexterous handling by means of a minimally invasive approach to reduce clinical complications and increase patient's safety.

HOW CAN IT HELP ME?

ROSA includes state-of-the-art surgical robotics technology as well as comprehensive and innovative proprietary software designed for advanced surgical planning. Compared with traditional surgery, having ROSA may offer you:

- Reduced operating time due to increased efficiencies
- Reduced invasiveness and trauma
- Increased consistency in surgical performance and outcome
- More streamlined treatment

ROSA



► PEDIATRIC NEUROLOGY

Division of Pediatric Neurology, one of the major centers of excellence in the Department of Neurology, is well equipped to treat the entire range of neurological disorders in children. The Division has the expertise for the evaluation and management of neurological disorders including epilepsy, sleep disorders, stroke, neuromuscular disorders, behavioral disorders and learning disabilities.

FEATURES

- Comprehensive epilepsy center
- Multidisciplinary management teams for neurodevelopmental disabilities
- Pediatric sleep disorder center
- Advanced and highly skilled neuro critical care and stroke management

PATIENT CONDITIONS TREATED

Epilepsy

Epilepsy is one of the commonest neurological disorders in children. This requires evaluation by EEG, and the majority of patients respond to drugs. Fifteen percent may remain refractory to drug treatment. Epilepsy is one of the thrust areas of the division and the program is well known in the national and international circuits.



The hallmarks of the pediatric epilepsy services:

- Comprehensive pediatric epilepsy program with facilities for diagnosis and management of difficult epilepsies in children of all age groups
- Internationally acclaimed special expertise in EEG monitoring of newborn and small infants
- Pre surgical evaluation of drug resistant epilepsies in children with facilities for VEEG monitoring, PET and SPECT studies and electrocorticography
- Ketogenic diet program for drug resistant epileptic encephalopathies which are not amenable to surgery
- Clinical psychology services for children with epilepsy along with learning disorders or autistic tendencies.
- Close liaison with clinical genetics team for the evaluation of genetic epilepsies

Sleep Disorders

One of the less attended problems in pediatric age group. Poor sleep can result in memory problems and impaired attention affecting studies. The symptoms may include excessive day time sleepiness, snoring or abnormal behavior in sleep. We have a well equipped sleep lab for doing PSG, MSLT and PAP titration for various sleep problems. Currently, it is the only center in Kerala offering comprehensive evaluation and management for sleep disorders in children.

Stroke

Pediatric stroke is an acute emergency. A 24-hour imaging facility providing CT, the division has MRI, MRV, MRA and DSA. A well equipped neurosurgery department supports the division in the management of stroke, including revascularisation procedures for rare disorders like Moya Moya disease.

Critical Care

An exclusive pediatric ICU with pediatric ventilator and bed side EEG machine is available for any acute neurological emergencies like status epilepticus and viral encephalitis. The division is well supported by a well trained critical care team.

Behavioral and Learning Disorders

Attention Deficit Hyperactivity Disorder (ADHD), autistic spectrum disorders and learning disabilities are becoming increasingly common in children. The Division has child psychologists and special educators for the evaluation and management of these children. Special parental guidance is also available.

Neuromuscular Disorders

The Division uses all the state-of-the-art techniques in the evaluation of the neuromuscular disorders like NCS, EMG, nerve and muscle biopsy.

In addition, the Division runs weekly multispecialty clinics for the management of children with cerebral palsy, other gait disturbances and brachial plexus injuries.

► PEDIATRIC NEUROSURGERY

Kids are not small adults. Neurosurgical problems in children are distinct and require a different perspective and knowledge set. The treatment of any child primarily revolves around delivering comprehensive care with an eye towards a happy future for them.

In the last decade, our division of Pediatric Neurosurgery has emerged as one of the best and leading treatment and academic centers in the country for neurosurgical problems in children.

SERVICES OFFERED

- Spina bifida (myelomeningocele, lipomyelomeningocele) / tethered cord
- Hydrocephalus (excess fluid in the brain due to various causes)
- Minimally invasive neurosurgery/neuroendoscopy (for hydrocephalus, arachnoid cyst, tumor biopsy)
- Pediatric neuroncology (tumors of brain/orbit, spine and spinal cord in children)
- Craniofacial anomalies/craniosynostoses (abnormal shapes of head and associated problems)
- Cerebral infections (abscess, tuberculosis, meningitis, ventriculitis)
- Neurosurgical problems in neonates (hydrocephalus, myelomeningocele, infections, tumors, congenital anomalies)
- Antenatal counselling for fetal neurological pathologies/ fetal intervention



- Pediatric spine pathologies, scoliosis correction
- Pediatric epilepsy
- Pediatric head injury
- Pediatric rehabilitation for neurological problems
- Pediatric vascular malformations

Speciality clinics for multidisciplinary comprehensive care

- Hydrocephalus clinic (combined with pediatric neurology, pediatric ophthalmology, clinical psychology, physical medicine)
- Pediatric Craniofacial clinic (combined with maxillofacial surgery, plastic surgery, pediatric genetics, clinical psychology, dental surgery, hand surgery, ophthalmology)
- Multidisciplinary spina bifida clinic (combined with pediatric urology, pediatric surgery, pediatric orthopedics, physical medicine, clinical psychology)
- Fetal board for fetal neurological pathologies (combined with perinatology, pediatric surgery, neonatology and obstetrics)
- Multidisciplinary tumor board (combined with pediatric neurooncology, radiation oncology, radiologist, pathologist)
- Brachial plexus clinic
- Pediatric Craniofacial Surgery

► PEDIATRIC CRANIOFACIAL SURGERY

Any abnormal shape of child's head and face requires medical attention. In common terms these constitute the craniofacial anomalies/craniosynostoses.

The treatment involves reconstructive surgeries to preserve or restore brain function (by reducing pressure on brain and airway issues) and improve aesthetics/appearance of face. The ultimate aim of the treatment in any child with these conditions, primarily involves around delivering a comprehensive care, to give them a normal childhood and future.

Serving this goal is our division of Pediatric Craniofacial Surgery, which is one of the very few dedicated divisions in the state of Kerala and the country treating craniofacial problems in kids. In the last few years, the division has emerged as one of the leading treatment and academic centers in the country for craniofacial problems in children.

Amrita Pediatric Craniofacial Team

The surgical team of the Amrita Pediatric Craniofacial Surgery unit offers the following services:

- Correction of craniofacial anomalies/ craniosynostoses (abnormal shapes of head and associated problems)
- Simple/single craniosynostoses (coronal synostoses, sagittal synostoses, metopic synostoses, lambdoid synostoses)
- Complex craniosynostoses (syndromic viz. crouzons, aperts, pfeiffers etc)
- Secondary craniosynostoses (post vp shunt etc)
- The options available are open remodelling, distraction and endoscopic with helmet application
- Hypertelorism correction
- Correction midface anomalies
- Traumatic craniofacial deformities
- Sleep study for related airway issues
- Correction of other abnormalities like syndactyly of fingers, rhinoplasty
- Revision surgery for previously operated craniosynostoses
- Antenatal counselling for fetal craniofacial pathologies

► AMRITA ADVANCED CENTER FOR EPILEPSY

Amrita Advanced Center for Epilepsy (AAE) provides comprehensive care to individuals who suffer from epilepsy. The Center celebrated the successful completion of a hundred epilepsy surgeries in its fourth year of service on February 25, 2014.

An estimated 6 million individuals suffer from epilepsy in India. Apart from being a physical disease, epilepsy has a strong mental and social implication. This disease adversely affects women with pregnancy and also is an important contributor of learning disability in children. The incidence of divorce among epilepsy patients is on the rise. The unpredictability of the epileptic attack leaves the patients helpless and most of the time at the mercy of others.

At Amrita Advanced Center for Epilepsy (AAE), treatment is not confined to medicines only. A significant number of patients have been cured by surgery also.

Our team of experts include adult epileptologists, pediatric epileptologists, epilepsy surgeons, radiologists, nuclear medicine physician, neuropathologist, neuropsychologist, medical social worker and dietician.

OUR SERVICES

Epilepsy Monitoring Unit

Amrita epilepsy monitoring unit is a 5-bedded state of the art VEEG telemetry unit. It is an inpatient facility for diagnosis and localisation of the seizure.

Intracranial EEG

Electrodes are implanted onto the surface of the brain or within the brain itself. These pick up the seizure electrical activity.

Stereo EEG

The newest technology that allows implantation of fine electrodes into the brain through pinholes on the skull avoiding open surgery. Ours is the first center in India to do stereo EEG.

PET and SPECT scan

Time-tested nuclear medicine imaging tools for localizing epileptogenic focus especially when MRI is normal.

AMRITA ADVANCED CENTER FOR EPILEPSY



► AMRITA COMPREHENSIVE SLEEP CENTER

As part of our efforts to augment the awareness of sleep disorders, Amrita established the first state of art sleep lab in Kerala in the year 2000.

Our 2 bedded sleep lab has the capability for conducting sleep studies for adults and children with sleep disorders. The tests we conduct are polysomnography, multiple sleep latency test (MSLT), maintenance of wakefulness test (MWT), PAP titration (CPAP, Bi PAP Auto PAP, Servo ventilation).

We also undertake blood genetic tests for diagnosis of narcolepsy.

Our referral base comprises of different types of sleep disorders.

Snoring, obstructive sleep apnea, obesity hypoventilation syndrome, insomnia, narcolepsy, excessive day time sleepiness, restless leg syndrome, somnambulism, parasomnias.

We also run a regular sleep clinic and offer comprehensive care for patients with sleep disorders. A team of experts that include a Neurologist, Pulmonologist, ENT surgeon, Faciomaxillary surgeon, Endocrinologist, Gastrosurgeon, Cardiologist, Physician, Psychiatrist, Geneticist, Neuropsychologist, Holistic medicine, ensures a tailored care highly customized to each patient.



SLEEP STUDY

Functional MRI

Used to identify areas of the brain that control speech, movements of hands and legs, vision, and memory.

Functional Brain Mapping

Electrodes implanted into the brain are used to precisely map the areas of the brain involved in different functions like speaking, moving, sensations, vision. This information is then used to safely preserve important brain functions while removing the area responsible for the seizures.

Wada

Uses administration of a drug directly into the arteries of the brain to confirm the side of the brain involved in language and memory.

► NEUROIMMUNOLOGY LAB

The neuroimmunology laboratory under the Department of Neurology at Amrita, Kochi is the first of its kind in India—a dedicated comprehensive testing facility for autoimmune neurological disorders under a trained clinical autoimmune neurologist. Autoimmune neurology is the 21st century subspecialty in neurology. It includes disorders of all other subspecialties of neurology like epilepsy, movement disorder, cognition, neuromuscular but with an autoimmune etiology. These disorders can be associated with a cancer (paraneoplastic) as well as without a cancer association (non paraneoplastic).

These disorders are under diagnosed and often misdiagnosed. Many times, these diseases are misdiagnosed as “neurodegenerative disorders” which means practically no effective treatment available. But in fact, if properly investigated with appropriate tools (which include disease marker testing in a neuroimmunology lab) and diagnosed as an autoimmune neurological syndrome, it becomes potentially treatable and often fully reversible. Early diagnosis is the key factor in recovery. Herein lies the importance of comprehensive neuroimmunology services which can provide an early diagnosis.

Lack of testing facilities for markers of the disease and lack of awareness among care givers are the two important limitations in diagnosing and treating these diseases. Our aim is to provide a world class testing

facility, define the spectrum of these disorders in our country, as well as to disseminate information among the physician community. We are planning to do research on discovering new disease markers, to develop a nation wide registry for autoimmune neurological disorders and to develop a bio bank for these disorders in collaborations with physicians and institutions across the country.

► MEMORY CLINIC

Apart from the increasing recognition of dementia, memory problems do occur in the general population due to the changed life style. We are now too dependent on external memory devices for our memory. There is a lack of attention and untrained multitasking. Memory inhibiting diet and poor sleep hygiene are other life style issues.

Our memory clinic deals with day to day memory problems as well as dementia. The aim is to have customized assessment and interventions. Memory clinic caters to students and people in different walks of life. It is not a purely a patient oriented clinic but aims at enhancing memory and learning through a structured approach.





CENTER FOR ENDOCRINOLOGY & DIABETES

THE CENTER FOR ENDOCRINOLOGY AND DIABETES IS THE ONLY FULL-FLEDGED ENDOCRINOLOGY CENTER IN THE ENTIRE STATE OF KERALA AND PROVIDES ADVANCED CARE FOR DIABETES MELLITUS AS WELL AS COMPLEX ENDOCRINE DISEASES.

There are full facilities for the investigation and treatment of endocrine problems in adult, pediatric, and adolescent patients and all the complications of diabetes. The Center consists of a dedicated and well-qualified team of healthcare professionals comprising consultant endocrinologists, endocrinology specialists, diabetic foot surgeons, diabetic fellowship trainees, diabetic educators, physiotherapists, psychologists, podiatry assistants and other supporting staff.

FEATURES

- Comprehensive Diabetes Care Program
- Obesity Management Program
- Thyroid Cancer Care Clinic
- Pediatric Endocrinology Clinic
- Osteoporosis and Metabolic Bone Disease Program
- Insulin Pump Therapy
- Rhythm disorder surgery
- Pituitary Diseases Clinic
- Adrenal Disorder Assessment

SERVICES OFFERED

Diabetes Care Program

The Diabetes Care Program provides intensive management of diabetes and diabetes related problems:

- Retinopathy
- Nephropathy
- Neuropathy
- Ischemic Heart Disease

The Program also offers:

- Management of gestational diabetes
- Pediatric diabetes clinics
- Psychological and social worker consultations
- Assessment of family risks of developing diabetes
- Diabetic Foot Care Program and Vascular Clinic

The Department of Endocrinology at Amrita is the most comprehensive one stop Center for the evaluation, treatment and rehabilitation of preventive and therapeutic aspects of diabetic foot. The diabetic foot division of the Department of Endocrinology is fully equipped with the most modern equipment to assess the function of nerves and blood vessels. The department provides all services under one roof, including special customized foot wear. The foot care program is the only one in Asia to carry out reconstructive surgery in deformed diabetic foot—an emerging strategy for preventing diabetic foot-related amputations.

Pediatric and Adolescent Endocrine Clinic

This clinic provides specialized care for children and adolescents with growth disorders, early or delayed puberty, thyroid diseases, bone diseases, diabetes or other endocrine disorders.

Lipid Clinic

The Lipid Clinic is devoted exclusively to treating patients with high cholesterol and high triglyceride levels.

Exercise and Dietary Program

The Exercise and Dietary Program is aimed at full fitness, utilizing treadmills, exercise bicycles, and other equipment under the guidance of a trained physiotherapist. The amount of exertion is gradually increased depending on each individual's capability.

Bone Clinic

Metabolic bone diseases are a relatively less-recognized aspect of endocrinology. These diseases include osteoporosis (an age and menopause-related thinning of bones), osteomalacia (weakening of bones due to vitamin D deficiency), hyperparathyroidism (a disease with bone pains and kidney stones, caused by excess parathyroid hormone levels resulting in dangerously high calcium levels in blood) and other complex bone diseases. The Centre has the best Bone Densitometer, the DEXA Dual Energy X-ray Absorptiometry, in the state to evaluate these complex disorders. Unexplained bone pains and early onset fractures are diseases investigated and managed by the department.

Comprehensive Diabetes Care

In addition to the routine out-patient based care of diabetic patient, the department has also initiated comprehensive diabetic care program, focused on providing an annual diabetes check up to patients. Diabetes is known as a silent killer, and if left untreated, can cause kidney, nerve, eye, heart and foot problems. The annual checkup assesses the degree of glucose control and also measures the presence of diabetic complications. If detected early, many of these complications can be treated, and their progression can be stopped.

Obesity Clinic

A common example of an under-treated endocrine disease is obesity. In this regard, Amrita has started a multidisciplinary obesity clinic. The clinic is conducted primarily by the endocrinology team, in coordination with the departments of Gastrointestinal Surgery and Plastic Surgery. Amrita is probably the only obesity center in the country to incorporate endocrinologists, GI surgeons and plastic surgeons working together for a common cause under the sphere of obesity management. In addition to hormonal assessment of obesity, our Center also has state-of-the-art facilities for body fat assessment, preoperative assessment and postoperative follow up for obesity patients. We have a comprehensive medical nutrition program, exercise counseling, drug therapy and plastic surgery, as well as bariatric procedures.

Community Services

In order to better serve and communicate with patients with diabetes within the community, Amrita has initiated the Amrita Diabetes Welfare Association (ADWA). This association is intended to provide patients with a platform to raise relevant issues, including the cost of medicines and insulin, as it is ADWA's intention to help poor patients who have difficulty in procuring diabetic medication such as insulin.

Activities of the association:

- Diabetic awareness classes and exhibitions
- Free medical camps
- School health programs for diabetic awareness
- Free insulin distribution for poor patients
- Publication of DIABEAT - a quarterly magazine on diabetes care for patients
- Supply of glucometers and walkers on a rental basis
- Documentaries for creating awareness of diabetes and its complications

Podiatric Surgery

The Department of Endocrinology and Podiatric Surgery provides comprehensive care in all aspects of diabetic lower limb surgical problems. This integrated team approach, important in the proper management of the diabetic lower limb problems, is available in only a

few centers worldwide. Our evaluation and management techniques are of world standards.

The concept of surgical correction for the diabetic foot and ankle deformity has recently evolved as a means to correct foot deformities secondary to long standing diabetes. This re-shaping of a deformed foot or toes by surgical correction is presently being done in a large way in only a few countries like the US, UK, Russia, Germany, Spain, and Australia. These surgeries help to prevent the formation of calluses and ulcers of the foot, and thus these surgeries can prevent amputations in diabetics. We are the only major center in India where these reconstructive surgeries are being performed routinely in high-risk diabetic foot patients. By employing these novel surgical techniques, a large number of amputations are being prevented. The cases we manage include large numbers of extensive lower-limb necrotizing fasciitis, various types of foot infections and Charcot's cases, some with marked destruction of the foot and ankle bones, and many others with grossly deformed toes and feet. We have a footwear factory with trained staff making diabetic footwear, providing high quality preventive, post-operative and rehabilitative footwear.

We are also conducting a post MS one year fellowship in podiatric surgery and a two-year podiatry assistant paramedical course. We are the only Institute in Asia to conduct these two courses.

THE AMRITA SLING TECHNIQUE

To avoid the serious complications of pin-tract infections, wire breakage and others associated with the application of external fixators in diabetic patients, we have devised an entirely new and novel technique of foot and ankle stabilization for the reconstruction of destroyed Charcot foot and ankle, called 'The Amrita Sling Technique'. This has been published in 'The Journal of Diabetic Foot Complications', from the United States, in February 2009. In the past two years, we have successfully operated on over 20 cases of destroyed rare hind-foot Charcot's cases, using this technique, with excellent results. We are also using polymethyl methacrylate as replacement prosthesis for unsalvageable Charcot's foot bones. We have also synthesized a new polymer based footwear for diabetic patients.

By comprehensive management, we have been able to maintain a limb salvage rate of 91.5%, in diabetic foot and ankle diseases, comparable to the best centers in the world.

AMRITA DIABETIC FOOT CONFERENCE

Our institute has been conducting the international “Amrita Diabetic Foot Conference” (A.D.F.C.) since 2009. The conference features talks and live surgical demonstrations by well known podiatric surgeons from the United States. We also invite endocrinologists from other countries who have special interest in the management of diabetic foot problems.

MILESTONES ACHIEVED

1. Devised the ‘Amrita Sling Technique’, a new and novel technique of foot and ankle stabilization for the reconstruction of destroyed Charcot’s foot and ankle—first in the world.
2. Using polymethyl methacrylate as replacement prosthesis for unsalvageable Charcot’s foot bones.
3. Synthesized a new polymer based footwear for diabetic patients.
4. Lower limb salvage rate of 91.5%, in diabetic foot and ankle diseases, comparable to the best centers in the world.
5. An integrated team approach, so important in the proper management of the diabetic lower limb problems, available in only few centres worldwide.
6. We are the only major center in India where reconstructive and corrective foot and ankle surgeries are being performed exclusively in high-risk diabetic foot patients.
7. We conduct a post MS (post-doctoral) one year fellowship in podiatric surgery and a two-year podiatry assistant paramedical) course. We are the only institute in Asia to conduct these two courses in diabetic foot.
8. Over 5000 high risk diabetic lower limb surgeries carried out in the past eight years with excellent results.



CENTER FOR ORTHOPEDICS

THE DEPARTMENT FOR ORTHOPEDICS TREATS MUSCLE, BONE AND JOINT DISORDERS. AREAS OF SPECIAL EMPHASIS INCLUDE ARTHRITIS, JOINT REPLACEMENT, SPINE SURGERY, SPORTS MEDICINE, PHYSICAL MEDICINE, HAND, FOOT AND ANKLE, ORTHOPEDIC ONCOLOGY, TRAUMA, AND PEDIATRIC ORTHOPEDICS.

Our orthopedic surgeons have diverse expertise and are committed to provide effective solutions to orthopedic problems. Specialized services include arthroscopy, musculoskeletal tumor surgery and reconstruction, rheumatology and treatment for orthopedic trauma.



► ORTHOPEDIC SURGERY

SERVICES OFFERED

Spine Surgery

The spine surgery program is a comprehensive interdisciplinary service incorporating orthopedic surgeons, neurosurgeons, neurologists, physical and rehabilitation medicine and the anesthesia pain clinic program.

In addition to conventional disc surgery of the neck and back, this service performs microscopic surgery, endoscopic spinal surgery (key hole surgery), and minimal access surgery. The surgical team is experienced in handling spinal trauma, spinal deformities, and spinal tumors as well as congenital and degenerative diseases of the spine. Spine division has done the maximum number of scoliosis surgeries (congenital, neuromuscular, idiopathic scoliosis) in the region. Spine fusion surgeries such as TLIF, PLIF, ALIF are routinely done. High grade spondylolisthes - a condition where a vertebral body slips over another - are managed with an intra operative four channel neuromonitoring device. En bloc spondylectomy (total removal of vertebra) with vertebral body cage reconstructions are carried out in patients with spinal tumors. Operative services are supported by intraoperative spinal cord monitoring (SSEP/MEP), critical care facilities, vascular embolization and excellent anesthesia services.

Back and neck pain is evaluated and treated by a team of orthopedic surgeons, neurosurgeons, occupational therapists, and psychiatrists in a pain clinic. Patient education and occupational rehabilitation are the prime goals of this department. This center is a recognized AO Spine International Fellowship training in spine surgery and every year accommodates a fellow for training.

Hand and Microvascular Surgery

This service is offered as an interdisciplinary program involving orthopedic hand surgeons and plastic surgeons. The Center offers expertise in microvascular procedures to treat hand injuries, congenital deformities, arthritis and degenerative disorders, infectious diseases, and reimplantation. Joint replacement of the wrist and endoscopic hand surgery are special features of this division.

Joint Replacement Services

The Center offers all types of joint replacement to restore freedom of movement and relieve the pain of degenerated and diseased joints. Surgery often provides dramatic improvement in daily functioning for people with arthritis. Medications and physical therapy services are helpful adjuncts.

MAKO ROBOTIC-ARM ASSISTANT

Over the years, joint replacement techniques and instrumentation have undergone countless improvements. The Mako Robotic-Arm Assisted Technology is an example of how technology is transforming the way joint replacement surgeries are being performed.

When we hear 'robotic-arm assisted technology,' it's important to understand that the Mako Robotic-Arm doesn't actually perform the surgery. Surgery is performed by an orthopedic surgeon who uses the Mako System software to pre-plan our surgery. The surgeon will guide the Mako robotic-arm to remove diseased bone and cartilage. Then the surgeon will insert an implant.

Mako Technology was designed to help surgeons provide patients with a personalized surgical experience based on their specific diagnosis and anatomy. It is minimally invasive and bone sparing, with minimal tissue trauma for faster recovery.

Benefits

The benefits of the Mako Robotic-Arm Surgical Assistant Knee and Hip Replacement Surgery include:

- Smaller incisions
- Rapid recovery
- Precise placement of the implant
- Reduced injury to adjacent tissues
- Increased longevity of the implant

• Total Hip Replacement

This is usually undertaken in patients who have had their hip joints destroyed due to injury or diseases like osteoarthritis, rheumatoid arthritis, etc. Hip resurfacing and replacements using ceramic liners are

Mako Technology was designed to help surgeons provide patients with a personalized surgical experience based on their specific diagnosis and anatomy. It is minimally invasive and bone sparing, with minimal tissue trauma for faster recovery.



MAKO ROBOTIC-ARM

done for relatively young active patients. Amrita is one the first South Indian Centers to use 36 diameter Delta Ceramic bearings.

Revision Joint Replacement

Revision joint replacement is a frequent procedure and we have the entire revision instrumentation along with high speed burrs for difficult surgeries, both for the hip and knee joint. Ours is the first center in India to use trabecular metal cone for revision knee surgery.

Total Knee Replacement

For knees that are severely damaged due to disease or injury, total knee replacement is the best option. The end of the thigh bone is normally replaced with a metallic component and the upper end of the leg bone with a polyethylene component with metal base plate. Most patients are ambulant from the day after surgery and are discharged the fifth day. The latest Hi-flexion fixed bearing and mobile bearing designed knee components and those specifically designed for women (gender solution knees) are routinely used.

Computer-assisted Total Knee Replacement (TKR) improves the component positioning and is routinely done in our Center. It is predicted that the computer accuracy and the surgeon's experience together will improve the planning for implementation. The largest number of total knee replacements in Kerala using HI- flexion, female specific designed knees with computer navigation are performed in Amrita.

Total Shoulder / Elbow Replacement

Joints like the elbow and shoulder, which are damaged due to diseases like rheumatoid arthritis or due to traumatic injury are treated with total joint replacement.

Musculoskeletal Tumors

Tumors of the muscles and bones, while not as common as other tumors, pose a serious health challenge to people who have them. The Center for Orthopedics provides surgical treatment of muscle and bone tumors and works closely with the Cancer Center to coordinate additional follow-up care for cancer patients.

In recent years, limb salvage surgery is the treatment of choice for malignant lesions of the long bones, spine and pelvis. This includes total excision, bone grafting and limb reconstruction. Custom made prosthesis for long bones around the hip and knee are commonly done in our Center. Pre and post



operative chemotherapy will improve the prognosis to a large extent and is carried out with the help of the Cancer Center. Parathyroid adenoma and osteoid osteoma can be detected in the intraoperative period using a gamma counter.

Physical Medicine and Rehabilitation

The effects of stroke, spinal cord injuries, joint replacement, amputation, and other disabling conditions can often be reduced through physician supervised rehabilitative care. Services include treatment planning, a prescription for rehabilitative equipment, and disability determinations. Both outpatient and inpatient care for acute mobility problems are also provided.

Orthopedic Trauma

Traditionally, many bone injuries caused by trauma were repaired using immobilisation devices placed outside the body. Our orthopedic surgeons are leaders in using devices that are surgically placed on or in the injured bones. Those devices provide strong support and can be used in treating fractures of the pelvis, thighbone, hip, foot, and ankle.

Arthroscopic (Keyhole) Surgery

The Center is an ISAKOS (International Society of Arthroscopy, Knee Surgery and Orthopedic Sports Medicine) approved teaching center (www.isakos.com). Keyhole surgeries of the joints are done with state-of-the-art instruments. Recovery from the surgery is much faster compared to traditional open surgery. The facilities in arthroscopy include the video arthroscope for the knee, shoulder and hip, the smaller scope for wrist elbow and ankle, complete power shaver system, pressure sensitive pump for joint distension, arthroscopic electronic power system, VAPR (radiofrequency energy delivery system), Autologous Chondrocyte Implantation and Osteochondral Autograft Transfer System (OATS).

Keyhole surgery of the knee joint is routinely done mainly for meniscal repairs, anterior and posterior cruciate ligament reconstruction, double bundle reconstructions, biopsies, knee cap dislocations for MPFL reconstruction, popliteal cyst management etc. For routine arthroscopic surgeries, the patient has to stay in the hospital for only 1 or 2 days and has to continue the exercises at home. Bio-absorbable screws/implants are routinely used for ligament reconstruction.

Arthroscopic Surgery of Shoulder and Hip

Keyhole surgery of the shoulder and hip is done routinely for repairing joint problems in recurrent dislocations, frozen shoulder, supra scapular nerve decompression, synovectomy and rotator cuff tear repair. The hospital stay is only for a couple of days and the pain following the surgery is much less. The recovery is much faster compared to traditional open surgery. Arthroscopy of the hip is done to deal with impingement lesions and labral lesions.

Sports Medicine

This division offers excellent care in sports related injuries of the joints and ligaments. Arthroscopic techniques are used in cruciate ligament repair, meniscal repair, cartilage transfer, MPFL reconstruction, and multiple ligament injured knee.

Division of Ilizarov and Limb Reconstruction and Deformity Correction

We treat orthopedic disorders as well as correction of congenital deformities like club foot, congenital rocker bottom foot and club hand on a routine basis. Expertise in management of orthopedic problems and deformities, limb length inequality, as well as sequela of fractures and infections by Ilizarov technique is available. Severed limb implantation is done with the help of experienced plastic and vascular surgeons. Management of fractured pelvis and acetabular fracture fixation are undertaken routinely.

► DIVISION OF PEDIATRIC ORTHOPEDICS

We have a dedicated unit for treating all musculoskeletal problems in children, consisting of state-of-the-art treatment for all types of pediatric trauma, congenital malformations, metabolic diseases and genetic abnormalities (club foot, congenital dislocations, pseudarthrosis, birth injuries and other congenital deformities).

Pediatric Neuromuscular Division

Pediatric Neuromuscular Division at the Department of Orthopedics caters to the needs of children who are differently abled due to neuromuscular disorders like cerebral palsy, myopathies, muscular dystrophies, spina bifida, arthrogryposis, peripheral

neuropathy, traumatic brain injury etc. The primary goal of this division is the orthopedic correction of deformities in these children.

The neuromuscular unit also runs multispecialty clinics like neuromuscular management clinic including the Neurologist, Physiatrist and the Orthopedic Surgeon and also a specialised Spina Bifida Clinic including the Neurosurgeon, Pediatric Surgeon, Orthopedic Surgeon and Physiatrist. These clinics are designed as a one-stop referral clinic for all the needs of children with complex problems.

The orthopedic treatment offered by this division includes multilevel surgery in cerebral palsy, deformity correction in children with neuromuscular disorders, botox clinics etc.

Daycare Surgery

All facilities are available to promote daycare surgery for a variety of conditions in spinal disorders, joint problems and fractures. The system is designed taking into consideration patient comfort and convenience.

DISORDERS TREATED

- Artificial Joint Replacement
- Arthroscopic Surgery of Shoulder, Elbow, Wrist
- Arthroscopic Surgery of Hip, Knee and Ankle
- Cartilage Restoration / Transplantation
- Rheumatoid Arthritis, Degenerative Arthritis
- Nerve Decompression Surgery
- ACL, PCL and Meniscus Repairs
- Musculoskeletal Injuries
- Ligament Injuries
- Limb Lengthening, Deformity Correction
- Rotator Cuff Repair
- Scoliosis
- Spinal Disc and Degenerative Surgery
- Spinal Trauma, Tumor and Infection Surgery
- Spinal Deformity Correction under Spinal Cord Monitoring
- Minimally Invasive Spine Surgery
- Disk Replacement Surgery
- Shoulder Impingement Syndrome and Rotator Cuff Tear
- Sports-Related Injuries



CENTER FOR PLASTIC & RECONSTRUCTIVE SURGERY

THE CENTER FOR PLASTIC AND RECONSTRUCTIVE SURGERY FEATURES A HIGHLY EXPERIENCED TEAM ADEPT AT COSMETIC, RECONSTRUCTIVE AND MICROSURGICAL PROCEDURES. THE CENTER HAS A CLINICAL SERVICE FOCUSING ON:

- All types of cosmetic surgeries
- Leg and foot trauma reconstruction
- Hand trauma and elective hand surgeries
- Brachial plexus surgeries
- Cancer reconstruction including breast reconstruction
- Head and neck cancer reconstruction
- Chronic and acute wound and ulcer management
- Lymphodema management
- Obesity – Lifestyle management and body shaping
- Correction of cleft lip, palate and congenital anomalies
- Microsurgery – replantations, artery and nerve repairs, free tissue transfers
- Comprehensive burn treatment

SERVICES OFFERED

Cosmetic Surgeries

- Hair transplant
- Facial rejuvenation with Botox, fillers, etc
- Fat injection
- Facelift for wrinkles
- Liposuction
- Abdominoplasty and Hernia surgeries
- Rhinoplasty (Nose shaping)
- Breast reduction and augmentation

Deformity Corrections

- Cancer reconstruction
- Head and neck cancer
- Breast cancer
- Others
- Burn care, post deformity corrections

Microsurgery and Trauma

- Artery repairs
- Nerve repair, rehabilitation, tendon transfers
- Wound coverage by micro free tissue transfer
- Replantations
- Brachial plexus injury treatment
- Lymphodema – comprehensive management (surgical and non-surgical)
- Obesity care, management, body shaping

Cleft and Craniomaxillofacial Surgery

The specialty of craniofacial surgery involves the treatment of skull and facial deformities arising at the time of birth. The Department of Craniomaxillofacial Surgery at Amrita with its state-of-the-art facilities and outstanding team of doctors offers the highest quality of care. The philosophy of care for the child with a craniofacial condition is to provide a comprehensive multidisciplinary service that addresses both the equally important functional, aesthetic and psychological aspects of the conditions seen by the group. The multidisciplinary approach includes a Craniofacial Surgeon, Pediatric Neurosurgeon, Neuro-Anesthetist, Pediatrician, Ophthalmologists, Plastic Surgeons, Audiologists and Dentists.

CONDITIONS TREATED

CLEFT LIP AND CLEFT PALATE

Being a **Smile Train** accredited Center, cleft lip, palate and several cleft related surgeries are provided for free. Treatment for children with cleft lip and palate should report at the earliest so that naso-alveolar molding (to correct the shape of the nose) can be done. Cleft lip repair/surgery is usually carried out at the age 4 months, whereas cleft palate is done at the age of 1 year (before the child develops his or her speech).

CRANIOSYNOSTOSIS

Craniosynostosis is the early fusion of the cranial suture(s) leading to the distorted shape of the head. Surgical correction of craniosynostosis involves remodeling/reshaping of the skull and not the brain. The ideal time for correction of craniosynostosis is before one year of age. As age increases the deformity increases.

PLAGIOCEPHALY (UNICORONAL SYNOSTOSIS)

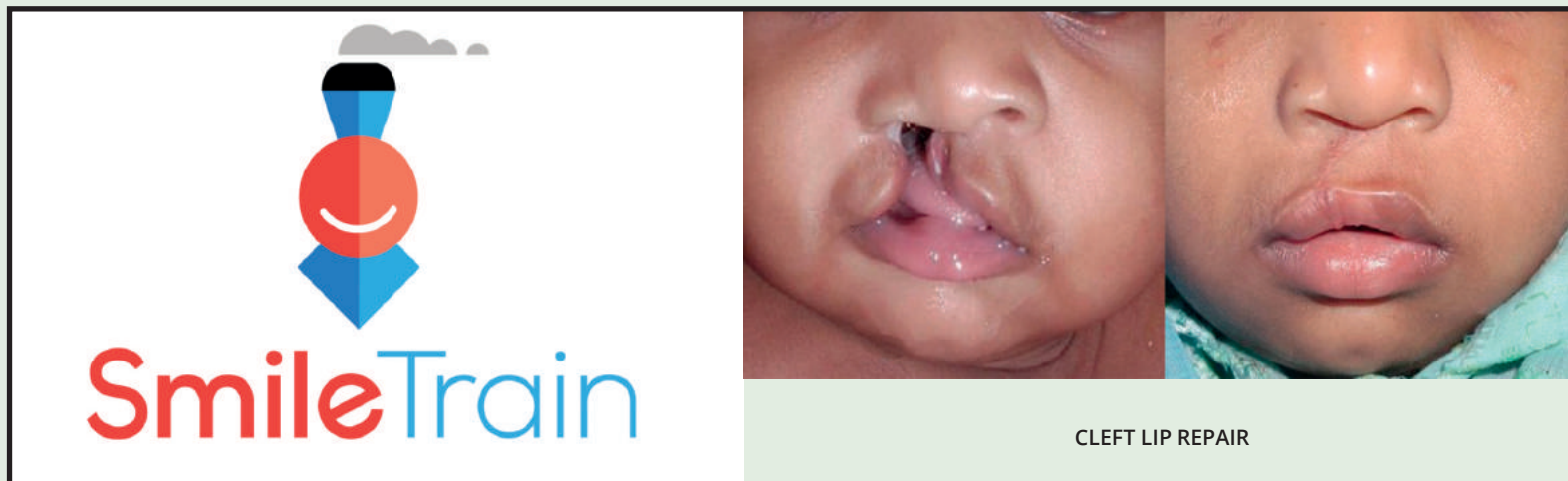
This is the most common craniofacial condition caused due to premature/early fusion of the coronal suture on one side (one half of the coronal suture) characterized by an asymmetrical distortion of the skull on the affected side (flattening of the forehead on the affected side and increased forehead bulge on the opposite side).

BRACHYCEPHALY (CORONAL SUTURE SYNOSTOSIS)

Caused due to the premature fusion of the entire coronal suture. Children with brachycephaly often have an increased height of the forehead and flat forehead.

TRIGONOCEPHALY (METOPIC SUTURE SYNOSTOSIS)

Head appears to be triangular in shape.



SCAPHOCEPHALY (SAGITTAL SUTURE SYNOSTOSIS)

Bullet-shaped head, often presents with an increased head length.

MULTI-SUTURAL SYNOSTOSIS

There is fusion of more than a cranial suture, which leads to a complete deformation of the head.

FACIAL CLEFTS

Facial cleft is an opening or gap in the face, or a malformation of a part of the face. All structures like bone, soft tissue, skin etc. can be affected. Facial clefts are extremely rare congenital anomalies.

HYPERTELORISM

Hypertelorism is an abnormally increased distance between the orbits (eyes). Usually associated with facial cleft.

CRANIOFACIAL DYSOSTOSIS

- Aperts syndrome
- Crouzons syndrome
- Saethre-Chotzen syndrome
- Pfeiffers syndrome

The issues associated with these conditions are increased intracranial pressure, compromised airway, visual disturbances (vision), sleep apnea, altered head shape. To correct the increased intra cranial pressure and to improvise the vision, posterior cranial vault is considered as an initial step. Once the intracranial pressure is relieved, the midface advancement

and cranioplasty is done to improve the airway (breathing ability) and appearance (correction of head shape).

TRANSFACIAL PIN MIDFACE DISTRACTION (ROBOTIC ASSISTED CRANIOFACIAL DEFORMITY CORRECTION)

- Cranio-fronto-nasal dysplasia
- Encephalocele
- Hemifacial microsomia
- Treacher-Collins
- Goldenhar/hemifacial microsomia

Burn Surgery

Reconstruction means to rebuild the lost form and function. Burns can destroy the form of a person especially when the face is burnt. It can also cause disfigurement that can cause loss of function. (e.g. burns of the eyelids can cause ectropion and that in turn can cause corneal ulcer and blindness). Burns of the neck cause severe neck flexion and even attachment of the lower jaw to the chest wall. Hand burns may cause claw deformity. Reconstruction aims at rebuilding the lost form and function.



Normal Plagiocephaly Brachycephaly Scaphocephaly



Restoration is to bring back the person not just physically but spiritually and emotionally.

The timing of reconstructive burn surgery begins with the treatment of the acute burns itself. It involves methods to prevent many of the ghastly complications with the help of splints and medications. It also varies from patient to patient, depending upon need and stage of healing.

Early reconstructive burn surgery is done before burn scars mature to allow early healing of the wounds. (It takes around six to eight months for the scars of burns to mature.) Late reconstructive burn surgery is done after the scars are mature. Late reconstruction may lead to fewer surgeries and more successful reconstructive efforts.

Burn surgeons perform tissue expansion, free flaps, perforator-based flaps, super charged flaps and skin grafting. Ears may be reconstructed using ones own cartilage or artificial support. Prosthesis are used when there are parts that cannot be reconstructed or when the patient wants early results or to avoid surgery.

Sometimes the mental and emotional damage is greater than the physical scarring in most severely injured burn victims. Seeing and treating the patient as a whole and supporting the family are all secrets of successful burns surgery.

Hair Transplant

WHY CHOOSE AMRITA HAIR TRANSPLANT PROGRAM?

Hair transplant was started at Amrita in 2005. More than 300 hair transplants have been performed here with good results.

1. Safety - It is given the utmost importance and all patients are having monitored anesthesia care and anesthesiologists are present to take appropriate care in the unfortunate event of an anaphylactic emergency.

2. Expertise - We have a team who is trained and experienced in hair transplants. The team includes doctors, physician assistants, nurses and trained technicians.

3. We have a dedicated hair lab where the slivering and separation into follicles are carried out.

4. Equipment: We have the state-of-the-art Carl Zeiss Operating microscopes for the slivering and separating into follicular units. We use a Safe scribe FUE machine which is the gold standard of FUE machines.

5. Technique: We use a simple yet effective technique so that we are able to achieve very high density in a short time.

6. Coolsense Cryo is used to make the procedure as painless as possible.

7. Body Hair transplant: We transplant hairs from areas other than the scalp in appropriate cases.

8. Specialized areas of transplant like eye brows, eye lashes, beard, mustache and chest wall are done here.




BEFORE

AFTER



HAIR FOLLICLES



CENTER FOR PSYCHIATRY & CLINICAL PSYCHOLOGY

THE CENTER FOR PSYCHIATRY AND CLINICAL PSYCHOLOGY AT AMRITA ADDRESSES ITSELF TO DEVELOPING CLINICAL SERVICES, TRAINING PROGRAMS AND RESEARCH PROJECTS.

Outpatient services treat all type of psychotic, neurotic, organic, psychiatric and dual diagnosis disorders. Patients with childhood behavior disorders, addiction disorders and old-age disorders are also treated. Consultation cases are also referred to our department from other clinical departments. Patients are evaluated in detail from psychiatric and behavioral perspectives. Drug treatment, psychotherapy, and psychosocial therapy are judiciously combined and used.

► PSYCHIATRY AND BEHAVIOR MEDICINE

The Department of Psychiatry and Behavior Medicine provides comprehensive mental health services ranging from psycho-social treatments like counseling and psychotherapy to biological treatment modalities including pharmacotherapy and electro-convulsive therapy. It provides sub specialty services in general psychiatry and de-addiction services as well and is ably supported by the departments of clinical psychology and social work in providing neuro-psychological and psycho-social services. The department has experienced and dedicated faculty who also include senior psychiatrists with many years of experience as educators and clinicians in premier medical institutions in the state. A number of interdisciplinary research programs are underway in diverse areas like community psychiatry, neuropsychiatry and psycho endocrinology. An inspiring and stimulating academic environment, excellent clinical and diagnostic services embedded in a remarkable basic science environment are what define the Department of Psychiatry and Behavior Medicine in Amrita.

SERVICES OFFERED

- General Adult Psychiatry Services
- Consultation-Liaison Psychiatry Services
- Geriatric Psychiatry Services
- De-addiction Services
- Child and Adolescent Psychiatry Services
- Neuropsychiatry Services
- OP Services
- IP Services - We have a 30-bedded psychiatry ward

Therapy Sessions

- Family and Marital Therapy
- Psycho-education and Alcohol Group Therapy
- Psychotherapy
- ECTs

FACILITIES AND EQUIPMENTS

- EMG Biofeedback
- Multi Behavior Sex Therapy
- Stammer Suppressor
- Aversion Therapy
- Brain Polarizer
- Electro Sleep Apparatus
- GSR Biofeedback
- Brief Pulse ECT

► CLINICAL PSYCHOLOGY

The Department of Clinical Psychology offers services for those in need of professional psychological help across the life span, from childhood to old age. The major areas of service include assessments, diagnostic services and psychotherapies.

PSYCHOLOGICAL SERVICES OFFERED

1. Assessment and Diagnostic Services

ASSESSMENT OF INTELLIGENCE

A deficiency in intelligence can be a major reason for poor performance at school, or other activities of daily life. Using standardized procedures, we assess the intellectual ability of the person and try to understand the level at which he or she is functioning.

ASSESSMENT OF PERSONALITY

This service helps to identify personality traits underlying various psychiatric conditions and personality disorders.

DIAGNOSTIC CLARIFICATION OF PSYCHIATRIC DISORDERS

This service aids in the diagnosis as well as the severity of an underlying psychiatric disorders using standardized diagnostic materials such as Rorschach Inkblot Test, Thematic Apperception Test, Minnesota Multiphasic Personality Inventory and rating scales.

NEUROPSYCHOLOGICAL SERVICES

This service primarily aims at understanding the various functions of the brain by a detailed assessment using standardized neuropsychological

tests. It is useful in planning intervention and rehabilitation strategies and tracking improvements in functioning.

2. Psychotherapy and Counseling Services

Therapeutic services aim at addressing and improving the psychological health of persons through interventions that supplement but do not use medications.

RELAXATION TRAINING

Relaxation techniques help a person to relax, to attain a state of increased calmness and reduce levels of anxiety, stress or anger. Relaxation techniques can decrease muscle tension, lower the blood pressure and slow heart and breath rates, among other health benefits.

BEHAVIOR THERAPY

Behavioral treatment approaches are focused on treating maladaptive behaviors. The therapeutic approach assumes that both normal and maladaptive behaviors are learned and that appropriate therapy will help a person learn new adaptive behavior and 'unlearn' maladaptive behavior.

COGNITIVE BEHAVIORAL THERAPY

Cognitive behavioral approaches focus on changing the faulty cognitions (thinking processes) of people about themselves and other people to more accurate perceptions.

FAMILY AND MARITAL PSYCHOTHERAPY

Family and Marital services focus on the family or the couple as a single integral unit to which each member contributes significantly. In family and couple therapy, the entire family or both members of a couple are treated simultaneously—not just the person identified as having the "problem". The therapy also focuses on enhancing adjustment between the couple and other members of the family unit.

CHILD AND ADOLESCENT PSYCHOTHERAPY

A wide variety of developmental (autism, mental retardation), behavioral (hyperactivity, conduct disorders), and emotional challenges (depression, anxiety, stress related rage) of children and adolescents are assessed and

treated by using behavioral, cognitive behavioral and psycho-dynamic methods.

GROUP THERAPY

Group Psychotherapy is a therapy in which a group is guided by a trained therapist to help each member of the group effect changes. Several technical maneuvers and theoretical constructs are used by the therapist to optimally utilize the group members' interactions to make that change.

BENEFICIARIES

CHILDREN WITH THE FOLLOWING PROBLEMS:

- Developmental delays
- Eating and sleeping disorders
- Thumb-sucking
- Nail-biting
- Nightmares
- Temper-tantrums
- Aggressiveness
- Stealing
- Bullying
- Sibling rivalry
- Sexual misconduct
- Fear of examination
- Irritability
- Depression
- Adjustment reaction due to stress
- Learning difficulties
- Problems of attention and concentration
- Decreased scholastic performance

ADOLESCENTS WITH PROBLEMS OF:

- Aggressiveness
- Rebelliousness
- Truancy
- Improper sexual behaviors
- Learning difficulties



- Adjustments problems
- Anger
- Fear
- Jealousy
- Inferiority feelings

ADULTS WITH PROBLEMS OF:

- Depression
- Anxiety

- Distress
- Chronic psychogenic pains
- Irritable bowel syndrome
- Phobias
- Marital and sexual problems
- Feeling of insecurity
- Lack of self confidence
- Immaturity

- Irritability
- Self condemnation

OLDER ADULTS WITH PROBLEMS OF:

- Dementia
- Depression
- Personality changes



CENTER OF EXCELLENCE IN ORGAN TRANSPLANTATION

TRANSPLANTATION OF ORGANS HAS BEEN CONSIDERED ONE OF THE SIGNIFICANT ADVANCES THAT HAS OCCURRED IN MEDICINE OFFERING A HEALTHY LIFE BACK TO NUMEROUS PEOPLE ALL OVER THE WORLD.

Transplants can be broadly grouped into three types, i.e., Tissue, Solid Organs and Vascularized Composite Tissues. Tissue transplants mainly include blood and marrow. Solid organ transplants include liver, heart, kidney, lung, small intestine and pancreas. Vascularized composite tissues, which are relatively new include hands, face and abdominal wall. The organs can be donated by live donors for certain organs and procured from brain-dead / deceased donors.

The first transplantation that was done at Amrita Institute of Medical Sciences was on 4 September 2001 and was that of a kidney procured from a live donor. Since then, the transplant services of the institution have pioneered many procedures in the state as well as the country becoming one of the largest centers in India carrying out these procedures. The center has a large experience in liver and kidney transplants and also has carried out heart, small intestine and pancreas transplants. The first and second hand transplants in India were successfully carried out in 2015. This center of excellence has a well organized transplant social worker network and has been involved in implementing the policies of the Kerala



Network for Organ Sharing from its inception. The institution has led the state in deceased organ procurement and has been involved in the training of other teams from the state. The immunology department has pioneered HLA matching in the state and has been practicing state-of-the-art methods in this. The center of excellence has initiated steps to start basic science research related to immunosuppression in composite tissue transplants suitable to our country.

SUPPORTING SERVICES

- Transplant Coordination and Social Work
- Transplant Immunology
- Transplant Pathology
- Transplant Anesthesiology
- Blood Bank

Blood and Marrow Transplantation

Blood and Marrow (Stem Cell) Transplantation Program at Amrita commenced in January 2013 comprising of both autologous and allogeneic transplants.

The facility is 6-bedded and fully HEPA filtered. The Unit has a full time nursing staff, duty doctors, Medical Social Worker/Counselor.

The team has, so far, performed 48 transplants which includes 22 autologous and 26 allogeneic blood and marrow transplants.

HIGHLIGHTS OF THE BLOOD AND MARROW (STEM CELL)

TRANSPLANTATION PROGRAM AT AMRITA

- Performs both pediatric and adult blood and marrow transplants.
- One of the fastest growing stem cell transplant programs in India.
- We have performed haploidentical and matched unrelated donor transplants, both of which are first in the State.
- Performs unrelated donor apheresis and has also setup an exclusive unit for Stem Cell Cryopreservation with liquid Nitrogen (N2).
- CD34 detection lab facility
- Registered with Indian Stem Cell Transplant registry and the Asia Pacific Blood and Marrow Transplantation (APBMT) group.
- Unrelated donor search in collaboration with DKMS (the German Bone Marrow Donor Center) Germany and DATRI.

- In-house HLA testing
- First successful treatment for acute blood cancer (myeloid leukemia) in the country through a relatively new treatment protocol named 'Microtransplant'.
- First ever Haplo Identical or Half Matched Stem Cell Transplantation in the State.

Liver Transplantation

Liver transplantation is the only treatment modality for patients succumbing to acute or chronic liver failure. Unlike in kidney failure, where an alternate option of dialysis is available there is no substitute to maintain a liver failure patient for lengthy periods.

A liver transplant is not a simple step to take, but it can save your life. Survival rates after liver transplant operations have improved remarkably over the past several years. Currently, over 80 to 90% of people survive liver transplantation and enjoy good quality life subsequently. Our survival rate is comparable with international standards.

HIGHLIGHTS OF THE LIVER TRANSPLANT PROGRAM AT AMRITA

- As the program completed 13 years in June 2017, the liver transplantation team is credited with 424 liver transplants. Of the total of 424 transplants 49 were from Brain Dead donors and 375 were from Live donors.
- First and largest Liver Transplant Program in Kerala. Regular Live Donor program from 2007.
- The team has performed 98 Liver Transplants in the past one year.
- Acute Liver failure: 75 out of 424 transplants were done for Acute Liver Failure, where the work up of donor and recipient were often completed within 24 hours.
- First Center in India to perform ABO incompatible adult transplant. At 14 cases, this is currently the largest series in India.
- First center in India to perform Partial Auxiliary Orthotopic Liver Transplantation {APOLT} where part of the recipient liver is left in situ allowing us to potentially withdraw immunosuppression once the native liver recovers.
- 50 pediatric transplantations, the youngest being a 5-month-old baby weighing 5 kgs.

- 14 deceased donor liver transplants in the past 12 months.
- Liver Transplant patients are treated by an integrated multi-disciplinary team comprising of GI and Transplant Surgeons, Hepatologists, Surgical Critical Care Specialists, Interventional Radiologists and other Supporting services such as radiology, transfusion services, infectious diseases, microbiology, histopathology, nephrology and dedicated ICU staff. Patients are cared for in a well equipped 8 bedded Transplant ICU managed by specially trained staff.

Small Bowel Transplantation

The first small bowel transplantation in Kerala was performed in Amrita on 5 January 2015.

A small bowel (intestinal) transplant is an operation to replace a diseased or shortened small bowel with a healthy bowel from a donor. It is a complicated and highly specialized operation that is not commonly performed, although the number of procedures carried out has increased in recent years. These procedures are carried out only at specialist centers.

The small intestine or small bowel is the part of the gastrointestinal tract between the stomach and the large intestine, and is where much of the digestion and absorption of food takes place. The small intestine has three distinct regions – the duodenum, jejunum, and ileum. It receives bile and pancreatic juice through the pancreatic duct, controlled by the sphincter of Oddi. The primary function of the small intestine is the absorption of nutrients and minerals from food.

WHY SMALL BOWEL TRANSPLANTS ARE CARRIED OUT?

A small bowel transplant is an option for children and adults whose bowel has stopped working properly and who are being fed by total parenteral nutrition (TPN). This is when a person requires all their nutrition to be given through a drip into a vein because their bowel is unable to absorb nutrients from the food they eat.

While many people needing TPN can have this treatment at home without experiencing any significant problems, the long-term use of TPN can lead to serious complications such as liver disease and repeated infections.



A small bowel transplant may be considered when the person has a serious problem with their bowel, but have developed complications from TPN or are unable to tolerate this form of feeding.

This is a complicated and difficult operation that takes, on average, around 8-10 hours and is carried out under general anesthesia. During the procedure, the surgeon will remove the bowel and connect the transplanted bowel to the blood vessels and digestive tract. They will also form an ileostomy, where part of the small bowel is diverted through an opening in the belly called a stoma. The stoma will allow digestive waste to pass out of the body into an external pouch, and lets the transplant team easily assess the health of the transplanted bowel. Although it is not always possible, the ileostomy may be reversed a few months later.

Intestinal Failure

Some persons are born with or develop irreversible intestinal failure. Intestinal failure occurs when a person's intestines can't digest food and absorb the fluids, electrolytes and nutrients essential to life and normal development. Patients must then receive TPN, which provides liquid nutrition through a catheter or needle inserted into a vein in the arm, groin, neck or chest.

TOTAL PARENTERAL NUTRITION (TPN)

Patients with intestinal failure may receive all or most of their nutrients and calories intravenously through total parenteral nutrition, or TPN. TPN is given through a catheter placed in the arm, groin, neck or chest. Patients on TPN may live for many years, but long-term use of TPN can result in serious complications, such as bone disorders, central venous catheter infections and liver disease. If those complications become life-threatening, an intestinal transplant may be required.

CAUSES OF INTESTINAL FAILURE

The most common cause of intestinal failure is short bowel syndrome where at least half or more of the small intestine has been removed. Short bowel syndrome is typically a postsurgical condition for treatment of conditions such as trauma or necrotizing enterocolitis.

Intestinal failure may also be caused by functional disorders such as Crohn's disease, a digestive disorder, or chronic idiopathic intestinal pseudo-obstruction syndrome. The conditions leading to intestinal failure are age-dependent. That is, some conditions are more closely associated with pediatric intestinal failure while others are more common with intestinal failure in adults.

PEDIATRIC CONDITIONS CAUSING INTESTINAL FAILURE

- Congenital malformations such as small bowel atresia, gastroschisis, aganglionosis, infections of the gastrointestinal tract such as necrotizing enterocolitis
- Short bowel syndrome following extensive bowel surgeries secondary to mesenteric ischemia (e.g., midgut volvulus), absorptive impairment (e.g., intestinal pseudo-obstruction, microvillus inclusion disease)

ADULT CONDITIONS CAUSING INTESTINAL FAILURE

- Short bowel syndrome following extensive surgeries secondary to mesenteric ischemia (following thrombosis, embolism, volvulus, or trauma)
- Inflammatory bowel disease such as Crohn's disease
- Small bowel tumors such as Gardner's syndrome (familial colorectal polyposis)
- Tumors of the mesenteric root and retroperitoneum (desmoid tumor)

Types of Intestinal Transplants

There are three major types of intestinal transplants that are described in detail below.

ISOLATED INTESTINAL (SMALL BOWEL) TRANSPLANTATION

In an isolated intestinal transplant, the diseased portion of the small intestine is removed and replaced with a healthy small intestine from a donor. In an isolated intestinal transplant, the disease is limited to the small bowel only without liver failure. This procedure can be lifesaving for patients with irreversible intestinal failure that has become life-threatening.

COMBINED LIVER AND INTESTINAL TRANSPLANTATION

Combined liver and intestine transplantation is done for patients with both liver and intestinal failure. In this procedure, the diseased liver and intestine are removed and replaced with a healthy liver and intestine from an organ donor. Complications of intravenous nutrition (TPN) are the main cause of liver failure attendant to intestinal failure. Without a transplant, patients with intestinal and liver failure have an expected median survival of 6 - 12 months while continued on TPN.



A small bowel transplant may be considered when the person has a serious problem with their bowel, but have developed complications from TPN or are unable to tolerate this form of feeding.

MULTIVISCERAL TRANSPLANTATION

Multivisceral transplantation is performed where two or more intra-abdominal organs (including the intestines) are failing. The transplanted organs may include the stomach, duodenum, pancreas, intestine, and liver. This complex procedure can be life-saving for patients with combined abdominal organ failure resulting diseases such as Gardner's syndrome (familial colorectal polyposis), a pre-malignant colorectal condition and intestinal pseudo-obstruction (decreased ability of the intestines to push food through).

Pancreas Transplantation

Amrita pioneered pancreas transplant in the state of Kerala. First simultaneous pancreas plus kidney transplant was performed on 17 August 2014. This was the 3rd such successful surgery in India.

A pancreas transplant is a surgical procedure to place a healthy pancreas from a deceased donor into a person whose pancreas no longer

functions properly. Almost all pancreas transplants are done to treat type 1 diabetes.

Pancreas is an organ that lies behind the lower part of the stomach. One of its main functions is to make insulin, a hormone that regulates the absorption of sugar (glucose) into the cells. Type 1 diabetes results when the pancreas can't make enough insulin, causing the blood sugar to rise to dangerous levels.

The side effects of a pancreas transplant can be significant, so a pancreas transplant is typically reserved for those who have serious diabetes complications. A pancreas transplant is often done in conjunction with a kidney transplant.

WHY IT'S DONE

A pancreas transplant offers a potential cure for type 1 diabetes, but it's not a standard treatment. Often the side effects of the anti-rejection medications required after a pancreas transplant can be serious. But if you have any of the following, a pancreas transplant may be worth considering:

- Type 1 diabetes that can't be controlled with standard treatment
- Frequent insulin reactions
- Consistently poor blood sugar control
- Severe kidney damage

Because type 2 diabetes occurs due to the body's inability to use insulin properly and not because of a problem with insulin production in the pancreas. A pancreas transplant isn't a treatment option for most people with type 2 diabetes.

If there is severe kidney damage due to type 1 diabetes, a pancreas transplant may be combined with a kidney transplant or be done after successful kidney transplantation. This strategy aims to give a healthy kidney and a pancreas that are unlikely to contribute to diabetes-related kidney damage in the future.

THE PANCREAS AND TYPE 1 DIABETES

The pancreas is a tadpole-shaped organ, around 10–15 cm long that is located in the top half of the abdomen.

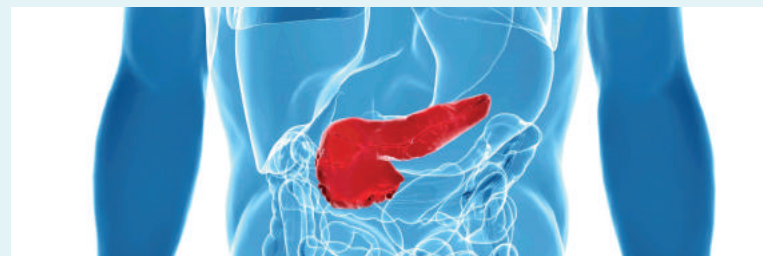
The pancreas has two main functions:

- It produces juices which the body uses to digest carbohydrates, fats and proteins
- It produces the hormone insulin which the body needs to break down glucose into energy

In cases of type 1 diabetes, the pancreas does not produce any insulin because the insulin-producing cells, the islets, have been destroyed by the patient's own immune system.

Most people with type 1 diabetes are able to control the condition with regular injections of insulin. However, a small number of people go on to develop serious complications despite being given the best available treatment, such as:

- Kidney failure – when the kidneys are no longer able to filter waste products from the blood
- Diabetic retinopathy – where high levels of glucose in the blood damages the eyes, which can lead to loss of vision
- Diabetic neuropathy – where high sugar levels have damaged the nerves in the hands and feet, meaning that sensation is lost and ulcers can occur
- Arterial disease – which affects the arteries to the heart, legs and brain



A pancreas transplant is often combined with a kidney transplant to reduce progression of the complications of diabetes.

TYPES OF PANCREAS TRANSPLANTATIONS

There are three types of pancreas transplantation:

1. Pancreas Alone Transplant (PAT): for the patient with type 1 diabetes who usually has severe, frequent hypoglycemia, but adequate kidney function.

2. Simultaneous pancreas-kidney transplant (SPK): when the pancreas and kidney are transplanted simultaneously from the same deceased donor.

3. Pancreas-after-kidney transplant (PAK): when a deceased donor pancreas transplant is performed after a previous, and different, living or deceased donor kidney transplant.

Simultaneous deceased donor pancreas and live donor kidney (SPLK) has the benefit of lower rate of delayed graft function than SPK and significantly reduced waiting times, resulting in improved outcomes.

During a pancreas transplant, the recipient's diseased pancreas is left in place. The donated pancreas is placed in the front part of the abdomen and connected to the lower abdominal blood vessels. The donated duodenum is attached to either the recipient's intestine or bladder so that pancreatic secretions can drain.

RISKS

Complications of the procedure

Pancreas transplant surgery carries a risk of significant complications, including:

- Blood clots
- Bleeding
- Infection
- Excess sugar in the blood (hyperglycemia)
- Urinary complications, including leaking or urinary tract infections
- Failure of the donated pancreas
- Rejection of the donated pancreas
- Anti-rejection medication side effects

After a pancreas transplant, the patient has to take medications for the rest of their life to help prevent the body from rejecting the donor pancreas. These medications can cause a variety of side effects, including:

- Bone thinning
- High cholesterol
- High blood pressure
- Skin sensitivity
- Puffiness
- Weight gain
- Swollen gums

- Acne
- Excessive hair growth

RESULTS

After a successful pancreas transplant, new pancreas will make the insulin the body needs, so no longer need insulin therapy to treat diabetes. But even with the best possible match between recipient and the donor, the immune system will try to reject your new pancreas.

To avoid rejection, recipient needs medications to suppress the immune system. Recipient will have to take these or similar drugs for the rest of life. Because medications to suppress the immune system make the body more vulnerable to infection, doctor may also prescribe antibacterial, antiviral and antifungal medications.

Kidney Transplantation

Amrita has been having a very successful kidney transplantation program. Over a very short span of a few years, this institution has been able to offer kidney transplantation to over 500 patients at a low cost. State-of-the-art facilities are provided to the patients who undergo kidney transplantation. The institute accepts only first degree relatives as kidney donors for their near ones. Amrita has permission from the appropriate authority, Government of Kerala, to do related donor kidney transplants. So far, the transplant unit has carried out 20 deceased donor (Cadaver Donor) transplantations as well.

The term "End Stage Renal Disease" refers to a condition where a patient has permanently lost over 90% of his/her kidney functions. This is a stage where patient needs to undergo lifelong dialysis or kidney transplantation. The common causes of end stage renal disease are diabetes mellitus, hypertension, glomerulonephritis, kidney stones, recurrent urinary infections and some inherited kidney diseases. A successful transplantation provides these patients a good quality of life and they would be able to carry out their normal daily activities very well.

In India, more than 100,000 new patients develop end stage renal disease every year. At least half of these patients are fit to undergo kidney transplantation. Of these 50,000 patients, about 3500 to 4000 undergo kidney transplantation every year; the remaining do not have a suitable related donor to donate a kidney. The only way to help these unfortunate patients is to increase cadaver organ donation.

The Hemodialysis unit prepares the patients for the transplant surgery; the unit has the latest computerized dialysis machines and monitors to ensure patient safety. The renal transplant team includes nephrology, urology, anesthesiology, vascular surgery units as well as transplant co-ordinators, medical social workers, physician assistants and dieticians. The recipient and the donor go through the process of counseling and pre-transplant evaluation according to a protocol. Pre-transplant evaluation is done to ensure that the patient is fit for transplant surgery.

EVALUATION OF DONOR AND RECIPIENT

The first-degree relative donors (parents, siblings, and children) or spouse has to be a healthy adult of either gender, between 20 and 60 years of age.

Initially a psychological evaluation is done by a medical social worker and transplant co-ordinator to assess the mental status and readiness to undergo kidney transplantation.

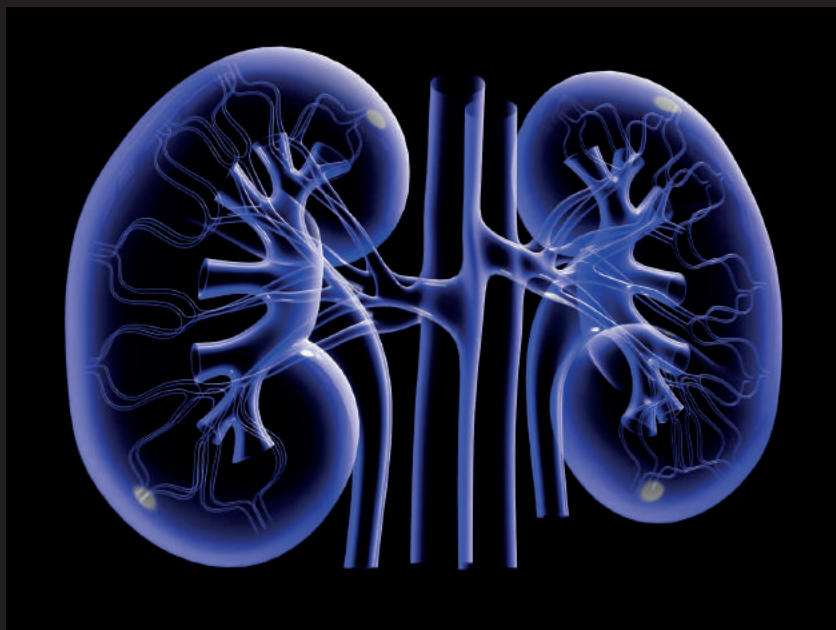
All the relevant investigations are done in a step wise manner according to our protocol.

Recipients are seen by various specialties to determine whether all the other organ systems are normal.

Evaluation of donors is done by nephrology, urology, anesthesiology, vascular surgery, cardiology, gynecology (for female donors) and other relevant specialities.

Amrita has well equipped and modern operation theaters where very experienced and qualified anesthesiology, urology and vascular surgery teams work help to provide a safe surgical procedure for patients. The surgical teams have been doing laparoscopic donor nephrectomy (removal of kidney using laparoscope) for the last ten years. This procedure reduces the length of the operative scar and pain associated with surgery; this allows the kidney donor to get discharged early and resume his/her activities.

After surgery, the patients are managed in a dedicated Intensive Care Unit, where patients are looked after by a team of trained nurses, nephrologist and transplant surgeons. A well planned protocol based postoperative care helps in prompt recovery after the surgery. Transplant recipients are followed up on a regular basis by the transplant team.



Heart Transplantation

Heart transplantation has emerged as a viable therapeutic strategy for select patients with end-stage heart disease, offering extended survival and improved quality of life. Patients with severe heart failure have a 1- to 2-year mortality rate approaching 50%, despite advanced medical treatment. The first heart transplant in human beings was done in South Africa in 1967 by Dr. Christian Barnard; the patient lived for 18 days. Approximately 4000 heart transplantation procedures are performed annually worldwide. Long-term outcomes after transplantation have improved with the advances made in transplant candidate selection, surgical techniques, immunosuppressive regimens, and postoperative care. One year survival averages about 85%-90% and the 12 year survival rate is approximately 50% according to the International Society for Heart and Lung Transplantation (ISHLT) registry.

HIGHLIGHTS OF THE HEART TRANSPLANT PROGRAM AT AMRITA

The program started in January 2015 with our first transplant done on 5 January 2015. So far we have successfully done two transplants and have an active transplant waiting list.

COMPREHENSIVE HEART FAILURE CLINIC

Cardiac transplant patients are treated by an integrated multi-disciplinary team comprising cardiothoracic surgeons, cardiologists, critical care specialists, and other supporting services such as radiology, transfusion services, infectious diseases, microbiology, histopathology, nephrology and dedicated ICU staff.

Patients are cared for in a well-equipped 3 bedded transplant ICU managed by specially trained staff.

INDICATIONS FOR HEART TRANSPLANT EVALUATION INCLUDE:

- Cardiomyopathy
- Ischemic heart disease
- Hypertrophic heart disease
- Severe decompensated inoperable valvular heart disease
- Congenital heart disease
- Any other cardiac abnormalities that severely limit normal function and/or have a mortality risk of greater than 50 percent at two years.

- Assist Device dependent patients who meet criteria for transplantation
- Age younger than 60 years (will consider 60 to 70 years old on case-by-case basis)
- Life-threatening heart rhythm disorders that fail treatment
- Chest pain refractory to maximum medical and surgical therapy

TRANSPLANT WORKUP PROCESS

A cardiologist and coordinator will discuss with the patient and answer any questions. Depending on the medical history, additional physicians visits and tests will be carried out. Most evaluations will include:

- Blood testing
- Heart studies, which may include any or all of the following:
 - Echocardiogram
 - Electrocardiogram
 - Holter monitoring
 - Cardiac catheterization
 - Pulmonary function tests
 - Urinary system evaluation
 - Abdominal ultrasound
 - Chest x-ray
 - Vascular doppler studies
 - Dental exam, including x-ray
 - Complete physical exam

The patient may be discharged from the hospital before all the results are available, and some of the testing may be done as an outpatient.

After the workup process is complete, the case will be discussed in the heart team meeting and decision to list in the KNOS (Kerala Network For Organ Sharing) will be taken. Subsequently the patient will be counseled to relocate to a location close to the hospital.

HOW IS A HEART TRANSPLANTATION DONE?

Heart transplantation consists of three operations. The first operation is harvesting the heart from the donor. The donor is usually an unfortunate person who has suffered irreversible brain injury called "brain death". Very often these are patients who have had major trauma to the head, for example, in an automobile accident. The victim's organs, other than the

brain, are working well with the help of medications and other life support that may include a respirator or other devices. A team of physicians, nurses, and technicians goes to the hospital of the donor to remove donated organs once brain death of the donor has been determined. The removed organs are transported on ice to keep them alive until they can be implanted. For the heart, this is optimally less than four hours.

The second operation is removing the recipient's damaged heart. Removing the damaged heart may be very easy or very difficult, depending on whether the recipient has had previous heart surgery (as is often the case). If there has been previous surgery, cutting through the scar tissue may prolong and complicate removal of the heart.

The third operation is the implantation of the donor heart. This operation basically involves the creation of only five lines of stitches, or "anastomoses". These suture lines connect the large blood vessels entering and leaving the heart. Remarkably, if there are no complications, most patients who have had a heart transplant are home about one week after the surgery.

WHAT ARE THE COMPLICATIONS OF A HEART TRANSPLANT?

Our immune system attacks transplanted organs. This is what happens when organs are rejected; they are recognized as foreign by the body. Rejection are controlled with powerful "immunosuppressive" medications. If there is not enough immunosuppression, the organ can reject acutely. Even when it seems that there is no active rejection, there may be more subtle chronic rejection that consists of a growth of tissue, something like scar tissue, which causes blockage of the blood vessels of the heart. The blockage of the vessels is the process that ultimately causes the transplanted heart to fail. It is this chronic rejection that is the major limiting factor for the long-term success of heart transplantation. While immune suppression blocks rejection, because it suppresses the immune system, transplant patients are more susceptible to infection and cancers of various types.

POST TRANSPLANT CARE

Post transplant care involves:

- Serial biopsy from the transplanted heart
- Monitoring blood levels of immunosuppressant drugs



PEDIATRIC HEART TRANSPLANTATION

Heart transplantation is lifesaving in diseases of the heart when all other treatment modalities fail. Unlike many other organs, supporting a failing heart is not feasible for a lengthy time period. In such situations, heart transplantation remains the choice of treatment. The common indications for heart transplantation in children include diseases of heart muscle (cardiomyopathy) and incurable major structural abnormalities.

The success of the adult heart transplant program has encouraged us to initiate a pediatric heart transplant division. Currently, we have a robust pediatric cardiac surgery program with outcomes matching international standards. We operate on all age groups from newborns to older children and a wide range conditions. The cumulative experience at Amrita is of over 12,000 open-heart operations in newborns, infants and children over 17 years. The pediatric heart transplant team consists of pediatric cardiac surgeons, pediatric cardiologists, pediatric cardiac anesthesiologists and intensivists, perfusion technologists, cardiac pathologists and experienced and specialized pediatric cardiac nurses. It is supported by a robust infrastructure with a dedicated state-of-the-art pediatric cardiac intensive care unit.

Lung Transplantation

Lung transplantation is a life changing decision and for those carefully selected patients with end stage lung disease, has become an accepted therapy for those who have not benefited from available therapies. The treatment is highly successful, with more than 80% of patients surviving the first year and greater than 50% of patients surviving beyond five years. The quality of life of long-term survivors is excellent, with the majority returning to productive activities. These results are possible because of the development of specialized care teams and the application of rigorous patient-care protocols, both in the hospital and for the long term.

The lung transplantation service at Amrita is a multidisciplinary integrated service which derives its strength from the skills and expertise of its core lung transplant team which is fortunate to have trained in internationally reputed lung transplant units around the world. The world class support facilities including an ECMO, blood transfusion, pathology, microbiology, infection control, radiology services, intensivist services, allows us to expect the best possible outcomes for our patients.

INDICATIONS FOR LUNG TRANSPLANT

Potential recipients:

In general, we consider lung transplantation in persons with end stage lung disease who are less than 60 years of age for a double lung or heart-lung transplant, and less than 65 for a single lung transplant. However, there is no absolute age contraindication and we consider patients based on his/her physiologic age rather than strict chronological age. Long-term survival does favor younger patients as co-morbid illnesses increase with the aging process.

The following lung conditions will be considered:

- Obstructive Lung Disease
- Emphysema
- Alpha-1 Antitrypsin deficiency
- Obliterative Bronchiolitis
- Suppurative Lung Disease
- Cystic Fibrosis
- Bronchiectasis
- Interstitial Lung Disease
- Idiopathic pulmonary fibrosis
- Sarcoidosis
- Eosinophilic granulomatosis
- Occupational lung disease
- Hypersensitivity pneumonitis
- Drug toxicity
- Lymphangiomyomatosis
- Vascular Lung Disease
- Idiopathic pulmonary hypertension
- Eisenmenger's pulmonary hypertension
- Chronic pulmonary emboli unsuitable for PTE

CONTRAINDICATIONS TO LUNG AND HEART-LUNG TRANSPLANTATION

Absolute Contraindications

- Malignancy – within two years. For extracapsular renal, breast stage 2 or higher, colon Duke stage B or higher, or melanoma stage III or higher, wait 5 years.

- Irreversible secondary organ failure unless considered for a combined transplant
- Septicemia
- AIDS (HIV infection currently under reconsideration)
- Hepatitis B/C- if antigen positive and histological evidence of disease
- Continued abuse of alcohol, tobacco or other drugs
- Psychiatric history likely to result in non-compliance and or persistent non-compliance with medical therapy.

Relative Contraindications

- Coronary artery disease-must be able to revascularize, if for lung transplant only
- Intubated and ventilator dependent-if unable to ambulate
- Obesity BMI >30
- Chronic renal impairment with GFR <50ml/min, unless candidate for combined renal transplant
- Diabetes with end organ damage
- Severe osteoporosis (bone mineral density > 2 sd's less than predicted for age)
- Active peptic ulcer or diverticulitis

LUNG DONORS

Decision regarding the utility of the donor lung will be made by the harvesting and anesthetic team based on standard criteria preferentially from individuals between 18-64 years of age. These may include brain dead donors or Donation after Cardiac Death (DCD) donors. When possible, the ischemic time will be maintained to within 6 hours, however marginal donors may be considered at the discretion of the harvesting team.

Composite Tissue Allotransplantation

Composite tissue allotransplant is a relatively new concept in the spectrum of allotransplantation. This includes transplant of hands, face and abdominal wall and in rare instances, tissues like penis, uterus and trachea. Out of these, hand transplants have been done more commonly. Since the last 16 years more than 100 hand transplants have been done all over the world. The Composite Tissue Allotransplant team at Amrita performed India's first Hand Transplant on a 30 year old male on 13 January 2015 who lost both his hands in a train accident. This was followed by our second Bilateral Hand transplant 3 months later on 10th April 2015 on an Afghan soldier who lost his arms in a land mine explosion. These transplants have been billed as a breakthrough in the field of Composite Tissue Allotransplantation in the country



and is also the first hand transplant in the world done on colored skin.

Our CTA department has ambitious plans on abdominal wall transplant in association with the Gastrosurgery Transplant team along with face and tracheal transplant in future. Our CTA research program is associated with the Pittsburgh Hand Transplant group with a focus on immunomodulation.

Corneal Transplantation

Amrita Institute of Medical Sciences has been able to offer corneal transplantation to over 100 patients in a short span of time. Corneal transplantation or keratoplasty is the most successful organ transplantation known to medical science. Revolutionary changes in microsurgical techniques and materials have made it a highly rewarding exercise with success rates of 80 -90 % in most cases.

Cornea is a transparent structure like a watch glass, which forms the front part of the eye and has multiple layers. The light rays have to pass through cornea if it has to enter the eye. If the cornea is diseased, it no longer maintains its transparency. Hence the light rays do not reach inside the eye resulting in blindness. Corneal blindness or blindness due to corneal disease can be cured by corneal transplantation, in which diseased cornea is replaced by a normal cornea, obtained through eye donation.

Corneal blindness is a major cause of curable blindness in our country second only to cataract. It is estimated that, in India, at least 7 million people are corneal blind in at least one eye, of whom one million are blind in both eyes. The main causes of corneal blindness in India are

- Childhood Vitamin A deficiency often associated with measles
- Trauma
- Workplace injury
- Corneal scar following corneal infection
- Corneal edema following cataract surgery

It is a frustrating fact that nearly 95% of corneal blindness is avoidable. Prevention through health promotion strategies and

safety in workplaces is most important to deal with corneal blindness in a developing country like India. Once corneal blindness has occurred, in most cases, the only treatment option is corneal transplantation or keratoplasty.

Corneal transplantation or keratoplasty is a well-accepted treatment modality with about 45,000 procedures performed annually in the United States. In India the figure is around 10,000, mainly limited to major ophthalmic institutes.

Keratoplasty is done with any of the following objectives

- Optical - to restore the vision
- Therapeutic - done on an emergency basis, primarily to cure the corneal infection resistant to medical treatment in order to save the eye
- Tectonic - to restore the shape of the eye

Lamellar keratoplasty or selective replacement of pathological corneal layer has revolutionized the scene of corneal transplantation resulting in early visual rehabilitation. And automation (use of a microkeratome for lamellar cut) has brought further precision and refinement to lamellar keratoplasty minimizing the interface haze.

Presently, Amrita is the only center in Kerala to have automated lamellar keratoplasty system (Amadeus ALTK) and is useful in both anterior lamellar and endothelial keratoplasty.

Automated anterior lamellar keratoplasty

For corneal stromal disease, only the anterior stroma can be replaced, the dissection done precisely with a microkeratome, as in LASIK – called automated anterior lamellar keratoplasty. Automated anterior lamellar keratoplasty virtually eliminates interface haze—the main problem with manual dissection. As the endothelium is not replaced, there is almost no risk of rejection and need for long-term steroids.

Endothelial replacement

Descemet's stripping endothelial keratoplasty, the popular form of corneal transplantation for endothelial pathology like pseudophakic bullous keratopathy and Fuch's endothelial dystrophy can also be performed with ALTK system—Descemet's stripping automated endothelial keratoplasty (DSAEK).

Therapeutic keratoplasty can save the eye and can restore vision in many if done appropriately and early enough.

After corneal transplantation, multiple check-ups are required and steroid eye drops need to be used for at least a few months. Graft infection, graft rejection or rise in eye pressure are possible which needs immediate treatment. Eye pain, redness, watering, aversion to light or decrease in vision are warning signals which require immediate consultation with a trained eye specialist.

The number of corneal transplants performed in our country, more so in Kerala, is disappointingly low mainly due to lack of public awareness and poor communication between the donor and the transplant team. For proper utilization, the corneal tissue has to be taken from the deceased person within 6 hours by the eye bank personnel. The eye bank, which is usually attached to a major hospital, promptly collects the whole eye or cornea on being alerted, stores it and disperses it to the transplant surgeon for timely utilization. The ignorance of the lay public, commotion in the family at the time of demise, delay of eye bank personnel to reach the site, and limitations of storage, all result in wastage of many cornea.

Storage of the cornea in M-K medium is indeed advantageous. In M-K medium, a cornea can be kept for 72 to 96 hours which gives us enough time to perform corneal transplantation almost as a planned procedure. With the whole eye, usually stored in a moist chamber, transplantation has to be performed preferably within 24 hours since chances of wastage of tissue are high due to delay in completing the blood tests and in arranging the recipient.

Amrita Eye Bank

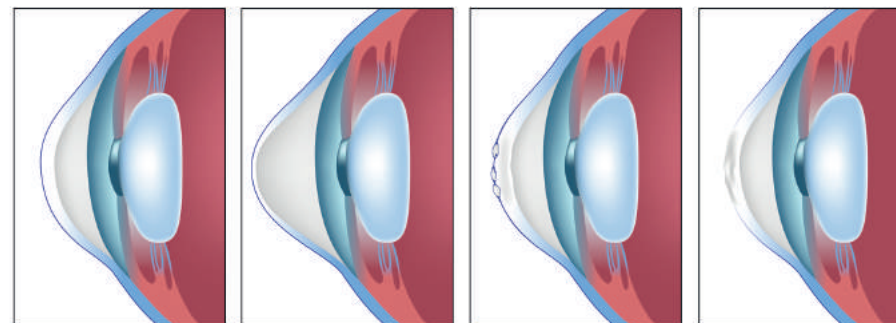
At Amrita Eye Bank, the donor cornea is preserved in MK medium in which nutrition of the cornea can be maintained for 4 days, making corneal transplantation a planned procedure. The state-of-the-art facilities at Amrita Eye Bank include specular microscopy and laminar flow hood.

Center for Aortic Diseases and Marfan Syndrome

A multi-disciplinary team approach at Amrita for treatment of aortic diseases and Marfan syndrome.

Amrita has been a center of excellence in the field of cardiovascular care for more than one and half decades. With the expertise of specialists and state-of-the-art imaging techniques, the heart team has performed more than 3000 aortic procedures during this period.

Common Corneal Conditions



Normal

Keratoconus

Bullous
KeratopathyCorneal
Scarring

Presently, there is no comprehensive dedicated program for Marfan syndrome in India. Death due to Marfan syndrome often results from the involvement of aorta and heart valves.

Diseases of the aorta, both acquired and of genetic origin, need evaluation and treatment by extremely skilled medical professionals from different medical specialties in a center with state-of-the-art infrastructure.

Center for Aortic Diseases and Marfan Syndrome at Amrita is a referral center for comprehensive treatment of diseases involving the aorta, which include endovascular treatment, hybrid procedures, percutaneous valve replacement and the entire spectrum of surgical interventions.

The Amrita Centre for Aortic Diseases and Marfan Syndrome will provide:

- Diagnosis
- Treatment
- Genetic workup in patients with familial disease of aorta like Marfan syndrome and bicuspid aortic valve

- Apart from Marfan syndrome the Center will diagnose and treat diseases such as Loeys-Dietz syndrome, Ehlers-Danlos syndrome and familial aortic aneurysm
- Counselling for women in reproductive age group
- Special antenatal care for Marfan syndrome complicated with pregnancy
- Periodic check-up for asymptomatic Marfan syndrome patients
- Care giver support

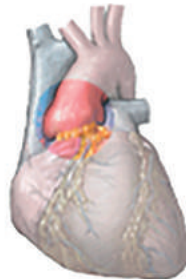
Pectus excavatum



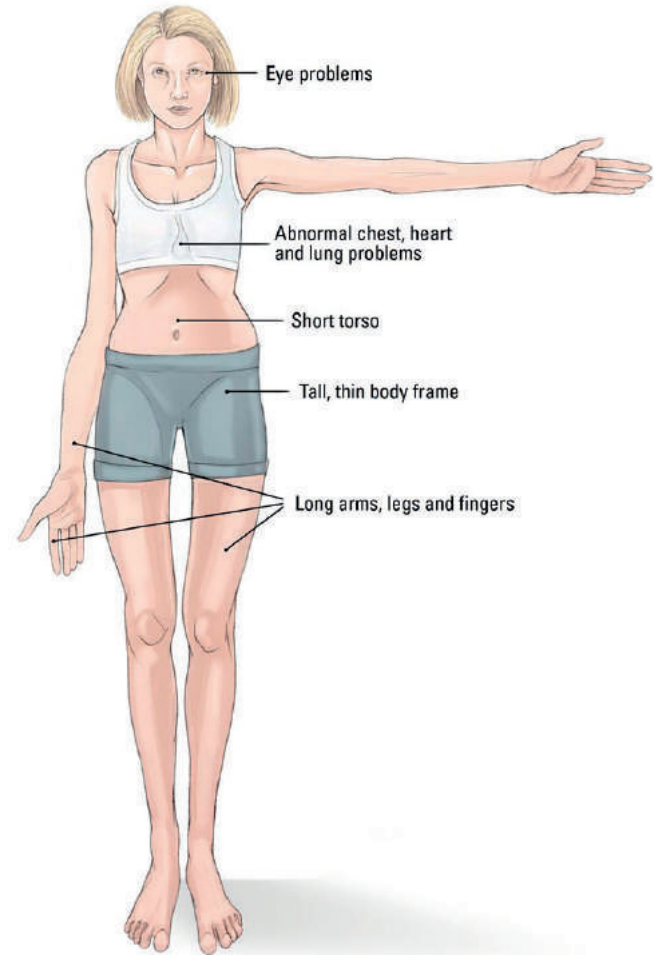
arachnodactyly



Dilation of aorta



Marfan syndrome



ANESTHESIOLOGY & CRITICAL CARE MEDICINE

THE DEPARTMENT OF ANESTHESIOLOGY AND CRITICAL CARE MEDICINE OFFERS CONSULTATION IN ALL AREAS OF ANESTHESIA AND CRITICAL CARE AS WELL AS CHRONIC AND ACUTE PAIN MANAGEMENT.

The Division of Critical Care Medicine runs a 29 bedded medical intensive care unit (MICU). All medical cases needing intensive care are admitted here. These include endocrinology, gastroenterology, internal medicine, nephrology, neurology, oncology, pulmonology, pediatrics, rheumatology, and skin and infectious diseases. Some surgical patients are also admitted here including general surgery, gynecology, neurosurgery, orthopedics, and trauma. The total number of patients admitted annually is approximately 1500.



All beds have individual multi-parameter patient monitors that have ECG, invasive pressures that include blood pressure, CVP, ICP, PAP etc., respiratory monitoring, temperature with features for storing data over a 24 hour period. The various mechanical ventilators that are available have all modes including SIMV, PRVC, PS, etc. Ventilators also provide ventilator waveforms and loops that help the intensivist in better titration and fine tuning of ventilatory management. Other ventilators like noninvasive ventilators and transport ventilators are also available.

Other facilities that are available at the bedside include various diagnostic procedures like ultrasound, ECG, ECHO, X-ray, EEG, ABG and various therapeutic procedures like haemodialysis, plasmapheresis, fiberoptic bronchoscopy, percutaneous tracheostomy, minitracheostomy, ultrasound guided paracentesis and other therapeutic procedures, USG guided arterial and central venous cannulation etc. The special features of staffing include 1:1 nurse patient ratio, 24 hour availability of physiotherapists and respiratory therapists.

We have two critical care training programs: The fellowship program of the National Board of Examinations, New Delhi and also the Diploma (IDCCM) of the Indian Society of Critical Care Medicine (ISCCM). The trainees are trained to do various procedures like insertion of invasive lines, intercostal drainage, various airway management techniques, percutaneous tracheostomy and advanced cardiac life support. Teaching programs are in place for the fellowship candidates. Journal clubs with articles from the recent journals are discussed.

ANESTHESIOLOGY

Services Offered :

Cardiovascular Anesthesiology

The Department of Cardiac Anesthesia and Intensive care is imparting anesthesia services to all types of cardiac surgical procedures (routine and emergency).

We conduct beating heart as well as bypass surgeries for CABGs, complex aneurysm repair, emergency aortic dissection repair as well as valvular surgical cases. Thoracic cases like pneumonectomy, lobectomy, and thoracoscopic cases are frequently done. We provide training in one lung

ventilation, bronchoscopy, and difficult airway management too. Annually we administer anesthesia to 1350 adult cases and 300 pediatric cardiac cases. Ours being a tertiary center, we get referrals from distant hospitals pertaining to complex redo cardiac pediatric as well as adult surgeries. The pediatric cardiac anesthesia section caters to anesthesia for varying kinds of surgeries from ASDs and palliative surgeries like Glenn shunt to complex taxing surgeries like Norwood. Ours is a well equipped, state-of-the-art 5 cardiac theaters, 12 adult ICU beds and 12 pediatric ICU beds. Both the ICUs are equipped with state-of-the-art latest ICU ventilators and central monitoring system with facilities for monitoring vital signs and various other invasive and noninvasive parameters including Arterial blood analysis.

We provide training to postgraduate students as well as anesthesia technicians and respiratory therapy students. We encourage research and pioneering spirit in the department. Our endeavor is to create leads in the field of anesthesia and we have been successful in this as many from this institute are well placed in various centers in and outside India.

Anesthesia for Neurosurgery and Orthopedic Surgery

Division of Neuro Anesthesia and Orthopedic Anesthesia caters to a wide variety of neurosurgical and orthopedic patients. The department deals with high risk patients including ASA PS 3 and 4.

The division anesthetizes neurosurgical procedures (for adults and children) including, intracranial and skull base tumor surgeries, intracranial vascular surgeries including aneurysm clipping, cranial and craniofacial reconstructive procedures (combined with maxillofacial surgeons), seizure surgeries, awake craniotomy, stereotactic procedures, trans-nasal trans-sphenoidal pituitary surgery, CSF rhinorrhoea repair, varied shunt procedures, neuroendoscopy, anomaly correction in newborns and trauma surgery.

The spine division of neurosurgery performs surgeries on both adults and children, including lumbar and cervical disc surgeries, spine decompression for trauma, complex spinal canal tumor surgery, and correction of degenerative diseases of the spine, and different spine stabilization procedures including occipito-cervical, and repair of myelomeningocele in the neonatal population.



Other procedures for which patients are anesthetized include repair of brachial plexus injury in adults and children, surgery for stroke including carotid endarterectomy, and interventional neuroradiology for aneurysm coiling, intracranial stent placement, and AVM embolization.

The Orthopedic Department also requires us to anesthetize a wide spectrum of patients, ranging from simple trauma related cases, pediatric orthopedics, correction of complex spinal deformities, arthroscopic surgeries and reconstructions, knee, hip, shoulder and spine arthroplasties, and surgery for bony malignancies.

In addition to anesthetic care of patients, the division also renders expertise in stabilization and management of critically ill orthopedic and neurosurgical patients in the neuro-intensive care unit. Airway management in patients with unstable cervical spine is facilitated by familiarity with intubation aids including flexible fiberoptic bronchoscopy (adults and children), ILMA, and Airtraq. Regional Anesthesia is practiced extensively to minimize patient discomfort. Continuous nerve block techniques are employed when indicated. The division uses ultrasonography and nerve stimulation as a routine to enhance success during procedures. The number of USG guided procedures exceeds 500 per year, and training of both faculty and postgraduates in ultrasound guided regional anesthesia is undertaken.

GI, Transplant (Liver and Kidney) and Urology

A team of more than 10 senior anesthesiologists are available to provide both preoperative evaluation, optimization and operative and postoperative care to the patients for transplantations of both liver and kidney. Amrita holds the coveted position for being the largest center for liver transplants in South India. More than 424 liver transplants have been successfully performed; the majority of the transplantations are done from living donors. In addition, newer techniques like auxiliary liver transplantation and ABO incompatible transplantation have been successfully performed. Amrita has also performed 19 transplants in children. The anesthesiologists are trained in the usage of the latest hemodynamic monitoring devices and coagulation monitoring in these patients.

Amrita is also a major center for renal transplantation largely from living related donors.

The gastro-surgical unit is one of largest referral centers in South India and has specialized in the treatment of gastrointestinal and hepatobiliary disorders. The anesthesiologists provide expert care in major surgeries with advanced hemodynamic monitoring including management of pain with thoracic or lumbar epidural analgesia. They are also trained to provide blocks under ultrasound guidance if needed.

The teams of anesthesiologists also provide anesthesia for vascular surgery both for abdominal aortic surgery and peripheral vascular diseases. A large number of procedures for vascular disorders are done under ultrasound guided limb blocks.

The team also provides anesthesia for a large number of laparoscopic surgeries including bariatric surgeries. The team is trained in fibreoptic intubations and airway management in difficult intubations. Specialized operating tables and equipment is available for this group of patients.

Pediatric Anesthesia

The anesthesiologists also provide services for pediatric surgical patients. A large number of neonatal surgeries are successfully performed and the patients are looked after in NICU which is equipped with state of the art ventilators and monitoring equipments. A number of laparoscopic surgeries including thoracoscopic procedures are performed and the anesthesiologists are trained in the intra and postoperative ventilatory management of these patients.

Urology

The Department of Urology performs a large number of surgeries and serves as a tertiary referral center. Besides routine prostatic surgery and percutaneous nephrolithotomies, the center handles a large number of renal malignancies and receives a number of referrals for endocrine related surgeries. The anesthesiologists are trained to handle these patients involving laparoscopic procedures for adrenal tumors including pheochromocytomas.

Anesthesia for Head and Neck/Plastic and Reconstructive Surgery

Section of anesthesia for Head and Neck surgery, onco-surgery, plastic and reconstructive surgery, podiatry and maxillofacial surgery caters to a wide range of cases. The cases taken care of under the maxillofacial

section consist of major facial trauma, craniofacial surgeries (usually combined with neurosurgery), reconstructive and cosmetic surgery in the syndromic patients (neonate to adults), cleft palate, cleft lip and pure cosmetic procedures in adults (Orthogranthic surgery).

Major head and neck surgeries include surgeries for major cancers of the head and neck region with reconstruction, craniofacial cancer surgeries and major vascular malformations of the head and neck region. This center has the reputation of doing the largest number of free flap reconstructions in all of India.

The plastic surgery section does major cosmetic surgeries, re-implantation of traumatic amputation, truncal reconstructions, abdominoplasty, major liposuction, brachial plexus surgery and reconstruction following cancer resection as well as traumatic tissue loss.

The Anesthesiologists managing this section are highly skilled in managing difficult airway situations, taking care of patients requiring long duration of anesthesia as well as the post-operative ICU care of the major surgical and trauma patients. Specialized airway equipments like Flexible bronchoscope suited for neonates, children and adults are part of their armamentarium in addition to the other special airway management equipment. They are also skilled in providing ultrasound guided regional anesthesia for major limb surgeries in patients with high risk factors. A major number of patients coming to the podiatry section belong to ASA grade II and above (the high risk group).

Obstetrics

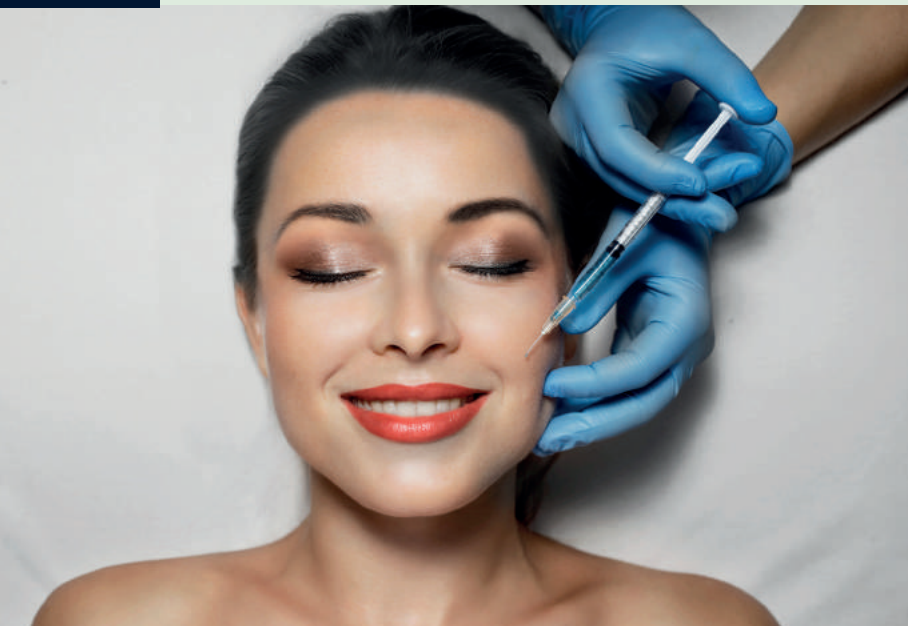
A tertiary referral center that provides a full range of obstetric-related care. Obstetric Anesthesia services are provided round-the-clock, seven days a week with three operating rooms with state-of-the-art facilities dedicated exclusively for obstetrics and gynecology. 20 to 25 surgeries are performed every day which includes laparoscopic and gynecology cases also. Around 100 patients receive labor analgesia every month. We provide care for a full range of obstetric – related surgical conditions. Commonly encountered pregnancy – related problems include pre- eclampsia, complex cardiac maternal conditions, prematurity and multiple gestations. The patients are approached by an interdisciplinary team that includes perinatologists, neonatologists, anesthesiologists and other medical and surgical consultants as needed. The anesthesiologists give intra-operative and post-operative intensive care to the patients.

DERMATOLOGY

THE DEPARTMENT OF DERMATOLOGY OFFERS PROCEDURES AND SERVICES, BOTH INVESTIGATIVE AND CURATIVE, PERTAINING TO GENERAL DERMATOLOGY, COSMETIC DERMATOLOGY AND VENEREOLOGY. COMPREHENSIVE CONSULTATION AND TREATMENT IS PROVIDED FOR BOTH OUTPATIENTS AND IN-PATIENTS COVERING ALL DERMATOLOGICAL CONDITIONS INCLUDING:

- General Dermatology
- Cosmetology
- Sexually transmissible diseases
- Leprosy
- Vitiligo
- Psoriasis
- Cosmetology

The Cosmetology Clinic has been functional since 7th November 2011 and is offering a variety of therapies ranging from laser hair removal, anti-ageing solution, skin rejuvenation, scar revision, mole excision and a variety of other therapies.



We are now equipped with the latest fractional Erbiun YAG laser from Alma—the Alma Harmony Laser, imported from Israel, which is one of the best lasers for skin rejuvenation and for anti-aging. It has other heads which can also provide painless hair removal for clients. The fractional laser can also offer solutions for acne scars, facial tanning, and age lines.

The Lumenis diode laser is an imported laser from the US and is the gold standard for hair removal.

We also have the Q-switched Nd YAG laser which can aid in mole excision and tattoo removal.

The other services offered are chemical peels for acne and pigmentation, TCA peels for acne scars and Microdermabrasion for skin polishing.

We are also introducing Botox and fillers for age lines which can also help in anti-ageing.

These facilities make our Cosmetology Clinic the one and only clinic in Kerala providing the best state-of-the-art facilities for aesthetics under one roof.

Acne Scars and Treatments

Acne scars can be an unfair reminder of the past. Not so long ago, someone with acne scarring had few options or hope for better looking skin. This was true even for light or moderate scarring. Thanks to advances in aesthetic medicine, times have changed. In other words, we don't have to live with acne scarring. We can do something about it! ALMA HARMONY PIXEL LASER may be the perfect solution.

Alma harmony pixel laser is an aesthetic laser treatment that can make acne scars a thing of the past. Unlike deep peels and other solutions, the downtime can be as short as a few days. The end result can be astonishing!

Anti aging solutions

Skin rejuvenation with cosmetic lasers can be one of the greatest tools in the battle against aging. Let's look at a few of the signs of aging that can make us appear older than we feel:

FINE LINES AND WRINKLES

Perhaps the biggest sign of aging. Fine lines and wrinkles can be caused by environmental factors, lifestyle choices such as smoking, sun exposure or even a genetic predisposition.

SCARRING

The acne of days gone by can leave skin pocked or deeply scarred. The scars can last a lifetime and become a source of displeasure with one's appearance.

ROUGH/UNEVEN TEXTURE

Remember the taut skin and even tone of youth? The layers of skin can degrade due to many reasons, including the passing of time. The Alma harmony pixel laser treatment can help to improve our appearance by addressing all of these concerns specifically one by one or as part of a combination therapy.

Laser Hair Removal

Laser Hair Removal treatment can now liberate us from daily shaving and tedious plucking. With the Light Sheer Diode Laser, we can forget about expensive waxing, too. This facility is available at the cosmetology clinic at Amrita and is the world's best laser for hair removal.

EMERGENCY MEDICINE

THE NEW AGE ER

THE LAST FEW YEARS HAS SEEN REVOLUTIONARY CHANGES IN THE FIELD OF EMERGENCY MEDICINE IN INDIA. IT HAS EVOLVED FROM THE "MBBS DOCTOR/CMO" MANAGED CASUALTY TO ER MANAGED BY TRAINED EMERGENCY MEDICINE PHYSICIANS. AMRITA HOSPITAL HAS BEEN THE TORCH BEARER OF THIS CHANGE WITH THE FIRST 3 YEAR POSTGRADUATE TRAINING PROGRAM (MD-EMERGENCY MEDICINE) IN KERALA. THE DEPARTMENT OF EMERGENCY MEDICINE HAS GROWN INTO A REPUTED CENTER FOR EMERGENCY CARE IN INDIA.

Facilities - "Our Armor to fight the diseases"

The department is visited by more than 25,000 patients per year.

FACILITIES:

- Beds-36
- Triage Area / Observation Area
- Adult Resuscitation Area
- Neonatal Resuscitation Area
- Decontamination Area
- Procedure Room
- Emergency Critical Care Unit
- Each of these areas are equipped with hydraulic/adjustable beds, compact and portable patient monitors, defibrillators, AEDs,

- Our 24 x 7 in-hospital specialty services include emergency dialysis facility, cardiac pacing and emergency endoscopy.
- Dedicated Ultrasonographic Machine for aiding diagnosis and also assisting emergency procedures.

Services

- Emergency Room is the "point of first contact" to the hospital at the time of any medical crisis
- Toxicological Emergencies: Snake Bite, Envenomation, Drug Overdose, Poisoning, etc.
- Any Infections/Sepsis : Treatment Protocols initiated in the ER as per international guidelines/standards.
- Cardiac Emergencies: Heart Attack (ACS), Heart Rhythm Problems (Arrhythmias), Cardiac Failure, etc.
- Neurological Emergencies: Acute Stroke, Seizures, Headaches, etc.
- Respiratory Emergencies: Severe Asthma/COPD, Pneumothorax, etc.
- Environmental Emergencies, Burns, etc.
- Surgical Emergencies



Accident/Trauma Care

Any age, any time, any health related problem be it medical or surgical, we are there to help. ER Team also plays a lead role in hospital cardiac arrest management (Code Blue)

Ambulance Services : Expertise on the Wheels

To transport critically ill patients to our center for expert care. The ambulances are Mobile Intensive Care Units with advanced monitoring facilities and ventilators.

The Amrita Hospital Mobile ICU can be utilized by the general public and also as per requests from other hospitals who wish to shift a patient to our center.

The "Advanced Care - Ambulance Team" also includes a trained doctor, emergency technician, and a nurse who are well equipped to transfer critically ill patients.

Amrita Hospital Ambulance Services has several achievements in the recent past including:

- Transport of donor liver from Thiruvananthapuram to Kochi in record time via road.
- Transport of a ventilated patient from Kochi to Ahmedabad.
- Transport of twin babies, both on ventilator, in the same ambulance from Alappuzha to Amrita Hospital.

These are just a few highlights from the nearly 200 critically ill patients whom we transport every month.

All equipped ambulances are fully air-conditioned, spacious and with meticulously designed interiors meeting international standards.

Salient Features Include :

- Uninterrupted power supply
- Cardiac Monitor
- Pulse Oxymeter (to check the oxygen level)
- ET Co2 monitoring
- Ventilator (respirator) for use in patients with respiratory failure
- Defibrillator
- Pacemaker if the patient has a "heart block" or Bradycardia.
- Ambu-box containing life saving medicines and equipments.
- The ICU ambulance is accompanied by an Emergency Physician, 2 Nurses and Ambulance Technician.



Supportive Services - Our Companions

- Clinical Toxicology: Part of the Poison Control Center (PCC), and offers unique facilities in the area of toxicology
- Blood Bank Services: 24 x 7 Blood and Blood products supply
- Pharmacy Services : 24 X 7 dedicated ER pharmacy
- Trauma Operation Theatre: Functioning 24 x 7 within the department complex.
- Radiological Services: CT / MRI and Interventional Radiology Support along with routine radiological imageries.
- 24 X 7 backup from Interventional Cardiology Team.

Academic and Teaching Activities - Training to create a better tomorrow

- MD Emergency Medicine Program
- BSc Emergency Medical Technology

Disaster Management and Rescue Missions - Against the odds

The department has actively taken part in the rescue and rehabilitation efforts during all the natural disasters which happened in the recent past. Its role in the health care support provided during the Gujarat Earthquake, the Kerala-Tamil Nadu Tsunami, the Andhra Floods and the Uttarakhand Floods was pivotal. Our ambulances and team were actively involved in the acute disaster management efforts.

ENT

OTORHINOLARYNGOLOGY

THE DEPARTMENT OF OTORHINOLARYNGOLOGY (ENT) IS ONE OF THE MOST WELL EQUIPPED DEPARTMENTS WITH EXPERIENCED FACULTY AND INSTRUMENTS. OTORHINOLARYNGOLOGY, AS IT STANDS NOW, IS NOT MERELY DEPENDENT ON ROUTINE OUTDOOR EVALUATION AND CONSERVATIVE MANAGEMENT AS IT USED TO BE IN THE PAST. THE DEPARTMENT HAS ADJUSTED WELL WITH THE ADVANCEMENT OF MEDICAL TECHNOLOGY.

With the advent of modern day telescopes, operating microscopes and lasers, the department now handles various ear-nose-throat and neck disorders efficiently and precisely. The department has state-of-the-art microscopes to perform micro ear surgeries including cochlear implant. There are nasal and nasopharyngeal endoscopes for diagnostics and video endoscopy facilities for all types of endoscopic sinus surgeries including transnasal pituitary and surgery for CSF Rhinorrhoea. Microlaryngeal surgeries and voice-improving phonosurgery are also performed.



There is a dedicated Voice Clinic, conducted weekly, to cater specifically to patients with voice issues. This includes the investigation modality of videolaryngostroboscopy. Salivary gland stone cases are being managed by the new modality of Sialendoscopy. Sleep disorders, especially snoring and sleep apnea, are growing in incidence. The department has recently taken the lead in setting up a multi-disciplinary 'Snoring Clinic'.

SERVICES OFFERED

The department offers a wide range of services covering all aspects of ENT.

Otology

Management of all ear diseases in adults and children including offering a wide range of surgical services like tympanoplasty, mastoidectomy, stapedectomy, cochlear implants and BAHA implants.

Management of CSF otorrhea and facial nerve paralysis are also addressed.

We are successfully running a cochlear implant program with a state-of-the-art audiology setup.

Sialology

We treat diseases of the salivary gland both medically and surgically. Surgeries include sialodochotomy, submandibular and parotid gland removal. Aesthetic parotidectomy is also being practiced. Endoscopic salivary gland surgery (sialadenoscopy) is available which takes care of early diseases without surgery.

Laryngology

Voice pathology: We provide solutions to voice problems with a dedicated voice clinic every Friday, ably supported by a speech pathologist. Our services match international standards with Stroboscopy and Doctor Speech being a part of the clinic. Surgeries like thyroplasty and other microlaryngeal surgeries are routinely performed. A dedicated swallowing clinic functions every Thursday where swallowing disorders are routinely dealt with.

Pediatric Otolaryngology

We manage all ENT problems in children like cochlear implantation and rehabilitation, endoscopic video assisted adenoidectomy, surgery for choanal atresia, congenital laryngeal problems like laryngomalacia, laryngotracheal stenosis and foreign body removal from bronchus and

esophagus. We are ably supported by pediatrics, neonatology, and anesthesiology departments.

Rhinology

The department manages most of the rhinological diseases involving sinusitis and benign masses by nasal endoscopy. We perform cerebrospinal fluid (CSF) rhinorrhoea repair and difficult frontal and sphenoid sinus surgeries routinely with superior results. We evaluate swallowing with procedures like FEES and videofluoroscopy. A dedicated therapy session ensures patient benefit.

Surgery on reconstruction of the airway includes Kashima's laser cordotomy, arytenoidectomy, laryngotracheoplasty and tracheal reconstruction and anastomoses. Benign tumors of larynx are removed endoscopically.

Audiology

Audiology offers wide range of services including PTA (Pure Tone testing), ASSR (Auditory Steady State Response), OAE (Otoacoustic Emissions), BERA (Brain stem evoked response audiometry) and auditory rehabilitation.

PROCEDURES PERFORMED

Outpatient Clinic Procedures Performed

- Nasal endoscopy
- Flexible fibre optic nasopharyngolaryngoscopy
- Microscopy of the ear
- Intratympanic gentamycin administration
- Myringotomy and Grommet insertion
- Stroboscopy
- Epley's Manoeuvre
- Cold caloric testing
- Positional testing

Audiology and speech therapy

- Pure tone audiometry and special tests
- Tympanometry
- Brainstem Evoked Response Audiometry (BERA)
- ASSR (Auditory Steady State Response)



- OAE (Otoacoustic Emissions),
- VEMP (Vestibular evoked myogenic potential)
- Behavioral audiometry
- Speech assessment and therapy
- Post cochlear implantation therapy

Surgery for deafness and discharging ears

- Myringoplasty
- Tympanoplasty
- Middle ear reconstruction
- Stapedotomy
- Facial nerve decompression

- Tumours of middle ear / mastoid system
- Cochlear implant surgery
- BAHA implant surgery

Surgery of the Nose and Para-Nasal Sinuses

- Functional endoscopic sinus surgery
- Endoscopic Dacryocystorhinostomy (DCR)
- Endoscopic repair of CSF (Cerebral Spinal Fluid) rhinorrhoea
- Septoplasty
- Rhinoplasty
- Arterial ligations (sphenopalatine, ethmoidal, maxillary and external carotid) for epistaxis
- Surgery for tumors of the nose and PNS
- Endoscopic skull base surgery

Surgery of the Throat and Neck

- Adenotonsillectomy
- Surgery for treatment of snoring (OSAS) such as Uvulo Palato Pharyngoplasty (UPPP) and
- Laser Assisted Uvulo Palatoplasty (LAUP)
- Surgery for vocal cord paralysis
- Tumors of throat and larynx
- Tumors of the structures of the neck
- Surgery for salivary glands
- Primary resection anastomosis for tracheal stenosis
- Laser excision of subglottic stenosis with stenting
- Laser excision of vascular tumors in the head and neck areas
- Sialendoscopy
- Phonosurgery
- Microlaryngeal surgeries
- Upper aero-digestive endoscopy for adults and children

DIVISION OF THYROID, PARATHYROID, & BREAST SERVICES

THE DIVISION UNDERTAKES SURGICAL TREATMENT OF THE DISEASES OF THYROID GLAND, PARATHYROID GLANDS AND BREAST DISEASES.

Goiter is a common problem in Kerala. There is an increasing incidence of thyroid cancer all over the world and is in our state also. Goiters may occur along with changes in the level of hormones. Some goiters and all thyroid cancers are treated through surgery. The division has an annual turnover of about 500 thyroid patients and is equipped to undertake treatment of all thyroid diseases. The rate of complication is very low and comparable with international standards. The division conducts regular interdepartmental discussions with the Department of Endocrinology and Department of Nuclear Medicine to decide the appropriate treatment.

Hyperparathyroidism is rare, and so the diagnosis is usually delayed. The patient may suffer from bone pain, fractures, renal stones and abdominal pain. Advanced laboratory services and scan facilities are required for correct diagnosis and treatment of hyperparathyroidism. Our institution is well equipped with all facilities for proper treatment of hyperparathyroidism. Parathyroidectomy is a delicate operation requiring trained surgeons and sophisticated equipment. We have successfully operated on 175 patients in the last 10 years.

Breast diseases are very common and form a bulk of surgical outpatient consultations. But breast cancers form only one third of these patients. Pain is not a typical feature of breast cancer. Painless breast swelling in women above 40 years requires proper assessment with a mammogram and needle biopsy. The division is supported by well-trained radiologists and pathologists in arriving at a correct diagnosis. The division conducts regular discussions with Radiation Oncology and Medical Oncology in planning and instituting proper management of breast cancer patients. The division encourages breast conservation whenever possible. We do undertake onco-plastic procedures so that the patient does not have to worry about disfigurement.



GERIATRICS

LIFE EXPECTANCY HAS INCREASED SIGNIFICANTLY IN THE LAST FEW DECADES. THE TREND IS LIKELY TO PERSIST IN THE COMING YEARS AND LIFE EXPECTANCY MAY WELL SURPASS 80 YEARS IN MOST COUNTRIES OF THE WORLD, INCLUDING INDIA.

Currently, more than 10% of Kerala's population is over the age of 65 years. At a 3.5% annual increase, this is the fastest growing segment of the state's population. Our society is rapidly undergoing change. Families are becoming nuclear. The vast majority of the young are moving away in search of jobs and careers. These include women who were traditional caregivers to the elderly. We are now facing a situation where the elderly are increasing in numbers and living longer while the number of care givers is rapidly decreasing.

The health needs of the elderly differ from the younger population. They need comprehensive care that, besides routine medical care tailored to the elderly metabolism, also must include social, psychological and functional interventions to improve their quality of life.

Geriatric care has to be necessarily holistic in approach involving multidisciplinary inputs. Diseases often manifest differently in the elderly and the approach to treatment differs considerably from the treatment in the young. There should also be a considerable emphasis on the preventive aspects. While the need of the hour is to keep the elderly healthy at home, today we see a trend of placing the disabled and frail elderly in so called "old age homes".

To meet this acute need of comprehensive geriatric care, Amrita Institute of Medical Sciences and Research Centre hosts a separate Geriatric Department with a team of healthcare personnel trained in Geriatric care - Geriatricians, Gerontological Nurses, Medical Social Workers, Gerontological Physiotherapists, Nutritionists, etc. Where necessary, specialists from various other departments in the hospital also participate in the medical and rehabilitative care of the patients.



This department is one of the first of its kind in the country and the first in Kerala. During a patient consultation, the various team members interact with the patient and his/her caregivers and advise them on various aspects of elder care. While investigating, diagnosing and treating specific diseases, the focus is always on the preservation of function and improving the quality of life. This means that the Geriatrician addresses the patient's psychological, social and environmental issues as well as his/her medical problems and also frequently works with the family or caregivers who are assisting the older person.

In today's high tech environment, another area of concern is medical decision making in elderly patients. What is appropriate and what is not? End of life issues are a major worry for the patient and relatives. The Geriatric team helps the patient and relatives make the right decision by educating them on the various options and consequences while taking into account patient autonomy (respecting the patient's wishes).

We Offer

- Comprehensive interdisciplinary assessment of the elderly
- Optimized medical treatment according to the age, medical status and patient input following counseling
- Life style advice including diet and exercise programs
- Comprehensive preventive care
- Counseling to family members and caregivers on care of the elderly
- Subspecialty referral where required
- Comprehensive interdisciplinary inpatient care where required
- Consult services for the elderly patients of other departments
- Help with medical decision making and end of life care

Geriatric Services

Assessment of the older patient

- Comprehensive Interdisciplinary assessment of the patient and his/her support systems.
- Geriatricians, trained nurses, medical social worker, physiotherapist and dietitian interact with patient and family members.
- Investigations appropriate for the elderly and tailored to the particular patient.

Preventive intervention

- Life style modification - Mental and Physical Activity, diet and fluid management, exercises, social interaction.
- Assessment of metabolic and other parameters and correction to prevent future complications.
- Supplements as appropriate to prevent certain geriatric diseases.
- Screening for certain common geriatric syndromes and cancers
- Vaccinations appropriate for the elderly.
- Regular follow up to reduce functional decline in the patient.

Treatment interventions

- Diagnosis, treatment and rehabilitation of present illness.
- Identification of various associated problems and suitable interventions to correct the problems and to improve quality of life and functional capacity wherever possible.
- Diagnosis and regular follow up of chronic conditions.
- Optimization of treatment and medications to benefit the patient as a whole and minimize the possibility of adverse effects.

Medical decision making

- Discussions regarding appropriateness of surgical and invasive procedures giving due consideration to the patient's present condition and life expectancy.
- Planning in advance for medical interventions at end of life - particularly with regard to Intensive care and use of ventilators, so that patient's wishes for the same are honored.
- Decisions regarding switching from aggressive curative care to comfort care in terminally ill patients.

Comprehensive geriatric health checkup program (Geriatric Package)

This program includes screening test for the functions of all major organs of the body.

- Prostate cancer screening for males.
- Breast and cervical cancer screening for females.
- Vaccination against tetanus and pneumococcal pneumonia

INTEGRATED MEDICINE

HOLISTIC MEDICINE PROVIDES AN EVIDENCE-BASED, MEDICAL APPROACH SYNCHRONIZING ALLOPATHIC, AYURVEDA, YOGA, NATUROPATHY AND HOMEOPATHY UNDER ONE ROOF AT THE CENTER FOR HOLISTIC MEDICINE.

Amrta echoes the statement, "the whole is more than the sum of its parts." Holistic medicine conceptualizes a unique blend of different systems to bring the balance of body, mind and spirit creating an ideal living space for an individual for perfect health. It emphasizes the need to look at the whole person, including analysis of physical, nutritional, environmental, emotional, social, spiritual and lifestyle values. Holistic medicine focuses on education and responsibility for personal efforts to achieve balance and wellbeing.

Features

- Wellness program
- Life style modification program
- Preventive health care
- Curative health care
- Integrated management of health disorders
- Health awareness program for educational institutions, NGOs, corporate companies etc.

Ayurveda

OUR SERVICES

- Panchakarma therapy
- Rejuvenation program
- Pregnancy care and post natal care
- Detoxification program
- Weight reduction program
- Karkidaka health care package



MAJOR PROCEDURES OFFERED

- Sarvanga abhyangam - General massage
- Sarvanga swedanam - Steam bath
- Patra potala swedanam - Herbal poultice treatment
- Podikizhi - Herbal powder treatment
- Njavara kizhi - Medicated rice poultice treatment
- Pizhichil - Full body oil stream treatment
- Shirodhara - Oil stream treatment on head
- Udwarthanam - Powder massage
- Vamanam - Induced vomiting treatment
- Virechanam - Purgation therapy
- Vasthi - Medicated enema
- Nasyam - Nasal therapy

Naturopathy

Naturopathy is an art and science of pure living. It is a drugless, safe, non-invasive, and evidence-based system of medicine, imparting treatments with natural elements based on theory of vitality, toxemia, and self healing capacity of the body and principles of healthy living.

PRINCIPLES OF NATUROPATHY

- Healing comes from the body within itself.
- Disease is the self purifying efforts of nature. It is due to the violation of nature's law.
- Every acute disease is the result of cleansing and healing efforts of nature. Suppression of these conditions by any means can lead to chronic diseases
- Naturopathy does not use any medicines. "Food is the medicine"
- Nature is the best healer
- Infections occur in the body because the toxins present in the body create an environment for the microbes to act
- Naturopathy have no side effects. It just follows Nature with the natural treatments of cleansing, external manipulation and rejuvenation

NATUROPATHY AND YOGA TREATMENTS OFFERED

- Acupuncture, acupressure, reflexology

- Naturopathic diet and naturopathic diet counseling
- Manipulative therapy: osteopathy, chiropractice, kellog's massage
- Yogic therapy
- Psychotherapy and counseling
- Relaxation techniques and meditation
- Hydrotherapy
 1. Spinal spray
 2. Hip bath
 3. Full immersion bath
 4. Chest pack
 5. Cold sponging
 6. Enema
 7. Gastro hepatic pack
 8. Hot fomentation
 9. Foot and arm bath
 10. Ice massage
 11. Kidney pack
 12. Wet sheet pack
 13. Steam bath
 14. Steam inhalation

REJUVENATION THERAPIES (SEASONAL) OFFERED

- Beauty spa + head and face massage
- Aromatherapy
- Hot stone massage
- Mud therapy



INTERNAL MEDICINE

THE DEPARTMENT OF INTERNAL MEDICINE OFFERS GENERAL MEDICINE AND PRIMARY CARE. IT IS ONE OF THE PREMIER DEPARTMENTS OF AMRITA, BRINGING TOGETHER AN ELITE CADRE OF CLINICIANS, INVESTIGATORS AND EDUCATORS.

Working in concert with colleagues in subspecialties at Amrita, the first priority is to provide patients with the highest level of primary care. The Department is supported by the latest diagnostic facilities that include Microbiology, Serology, Pathology, Diagnostic and Interventional Radiology and Nuclear Medicine. The presence of all the major subspecialties at Amrita enables the department to provide comprehensive care to a patient with multiple problems without fragmentation of care and with the ability to optimize medical treatment, thus improving quality of life.

The Department is embedded in a remarkable basic science environment at the Health Sciences Campus, Kochi with a collaborative culture that affords numerous opportunities for interdisciplinary and translational research.

Features

- Providing leadership in general internal medicine and healthcare delivery
- Delivering exemplary, patient-centered, efficient and effective general medicine care
- Encouraging preventive medicine and health promotion
- Providing consultative care for patients on non-internal medicine services

Services offered

- Evaluation and treatment of multi-system diseases
- Critical care, ICU and ventilator care
- Diagnosis, treatment and follow up of diabetes, blood pressure, lipid disorders, etc.
- Diagnosis, treatment and prevention of infectious diseases
- Prophylactic vaccination for adults

Specialty Clinics

- HIV Clinic



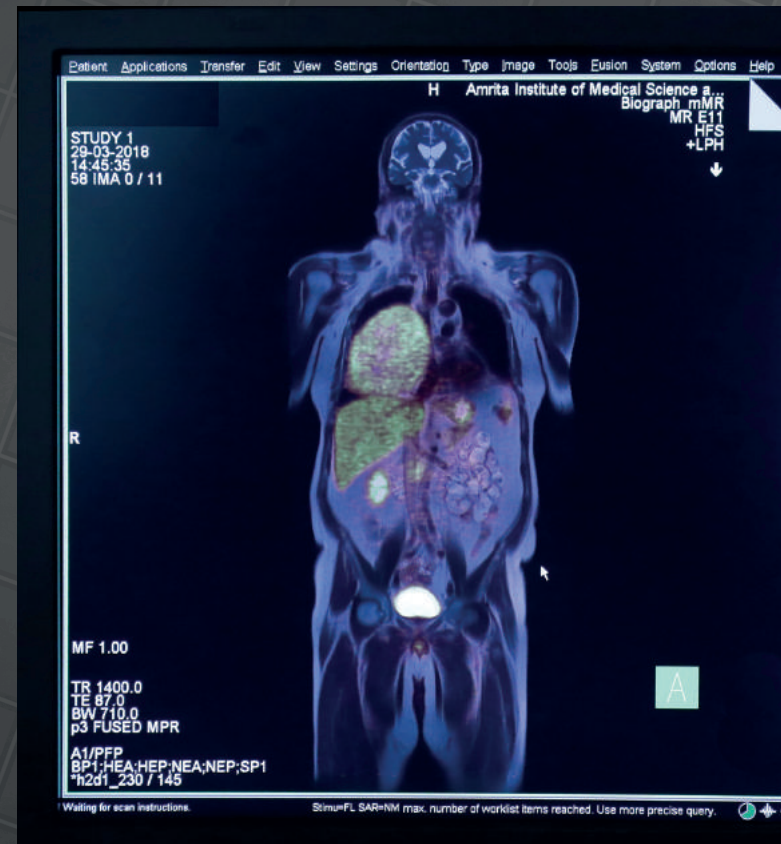
MEDICAL PHYSICS

THE DEPARTMENT OF MEDICAL PHYSICS PROVIDES SCIENTIFIC AND TECHNICAL SERVICES TO THE FOLLOWING DEPARTMENTS:

- Department of radiation oncology
- Department of radiology
- Department of nuclear medicine
- Other radiation users in Amrita

The unit is comprised of eight medical physics faculty and has responsibility for the areas of radiation dosimetry, quality control of all radiation producing equipment, treatment planning systems, software control, acceptance testing and commissioning of radiation producing equipment, maintenance of all radiation producing and radiation measuring equipment in proper calibration, and radiation safety.

Medical physics provides clinical radiotherapy physics services to approximately twelve hundred new cancer patients a year and also monitors accurate delivery of all treatments in radiation oncology.



NEPHROLOGY

THE DEPARTMENT OF NEPHROLOGY PROVIDES COMPREHENSIVE HEALTH CARE FOR PATIENTS WITH DIFFERENT TYPES OF RENAL (KIDNEY) DISEASES. ACUTE AND CHRONIC RENAL DISEASES CAUSED BY DIABETES MELLITUS, HYPERTENSION, STONE DISEASE, INFECTIONS, HEREDITARY ILLNESS AND POISONS ARE DIAGNOSED AND MANAGED.

Services offered

OUTPATIENT AND INPATIENT SERVICES

Highly qualified and experienced physicians look after patients with various types of kidney diseases. The physicians are ably supported by a committed team of nurses, physician assistants, medical social workers and a renal nutritionist.

Treatment for Kidney Failure

Patients with a severe degree of kidney failure cannot lead a comfortable life with medications and dietary restrictions alone. They need a treatment modality known as dialysis, a procedure to purify the blood by removing toxic substances.

The term 'chronic renal failure' denotes a permanent loss of kidney function. When a person has suffered an irreversible loss of more than 90% of kidney function, the patient is diagnosed as having end-stage renal disease. Patients with end-stage renal disease undergo lifelong maintenance dialysis or a kidney transplant.

The department offers two types of dialysis; hemodialysis, in which the patient's blood is filtered by an artificial kidney and peritoneal dialysis, wherein a soft tube called a catheter is used to fill the abdomen with a cleansing liquid called dialysis solution. Those with end-stage renal disease are given the option of either hemodialysis or Continuous Ambulatory Peritoneal Dialysis (CAPD).

KIDNEY TRANSPLANTATION SERVICES

Kidney transplantation is the treatment of choice for patients who have end-stage renal disease, wherein they have permanently lost over 90% of their kidney function. The only two options available to such patients are kidney transplantation or life-long dialysis.

The Department of Nephrology coordinates the comprehensive kidney transplantation program. All essential departments and laboratory support are provided under one roof. A state-of-the-art hemodialysis unit prepares patients for the transplant surgery. The unit has the latest computerized dialysis machines and monitors to ensure patient safety. The most well-equipped and modern operation theaters provide a safe surgical procedure for patients where experienced and qualified anesthesiology, urology and vascular surgery teams work together.

Well-planned protocol-based postoperative care helps in prompt recovery after surgery. Transplant recipients are followed up on a regular basis by the transplant team.

HEMODIALYSIS UNIT

In this state-of-the-art facility, patients are continuously monitored by modern electronic devices to provide smooth and comfortable treatment with a greatly reduced risk of complications.

The dialysis therapists work closely with the nephrologists, the trained staff nurses, and medical social workers to provide comprehensive care. There are also facilities for plasmapheresis, which is a procedure to remove toxins and unwanted proteins from the blood of patients who have auto-immune diseases.

Diagnostic Facilities

The well-equipped clinical laboratories and imaging services offer the necessary facilities for investigating patients with kidney diseases. A powerful MRI, high-speed Spiral CT Scanner, and Gamma Camera provide clear images and functional renal evaluation.



NUCLEAR MEDICINE

THE DEPARTMENT OF NUCLEAR MEDICINE OFFERS A FULL RANGE OF NUCLEAR MEDICINE AND PET-MRI SERVICES. ALL NUCLEAR MEDICINE INVESTIGATIONS AND THERAPEUTIC PROCEDURES WITH REFERENCE TO SUBSPECIALTIES OF MEDICINE AND SURGERY ARE AVAILABLE IN ONE LOCATION.

This department is equipped with state-of-the-art equipment like variable angle dual head gamma camera and SPECT CT camera. Nuclear medicine imaging or scintigraphy is performed with a gamma camera. It uses minute amounts of radioactive material to scan different organs. As physiological changes precede anatomical derangement, nuclear medicine imaging provides early diagnosis of various disease conditions. To name a few of Nuclear Medicine diagnostic and therapeutic procedures:

- CVS
- Myocardial perfusion scan – to look for myocardial ischemia and viability
- MUGA scan – to check ejection fraction and myocardial contractility
- Genitourinary system
- DTPA/ MAG3 scan – To assess GFR, PUJ obstructions
- DMSA cortical scan – To look for ectopic kidneys/cortical scars
- CNS – Tc ECD / HMPAO scan – To see cerebral perfusion, localization of seizures
- Thyroid (Evaluation of hyperthyroidism)
- Parathyroid scans (Hyperparathyroidism evaluation)
- Neuroendocrine tumors – Pheochromocytoma
- Therapy – Low dose & High dose ¹³¹I therapy, MIBG therapy
- Gamma probe guided surgeries – for parathyroidectomy, sentinel node detection and localization in head and neck, gynecological cancers

Nuclear medicine is equipped with a state-of-the-art PET-3Tesla MRI scanner. It provides superior diagnostic information for patients with cancer, ischemic heart disease and certain neurologic conditions. In the three decades since its development, PET has been demonstrated to be a clinically proven and safe method for imaging a variety of disorders. By performing two exams at once – rather than sequential MR and PET exams – we can shorten acquisition times by up to 50%. Not only does this boost work flow, productivity and efficiency; it can reduce costs, may lead to faster diagnoses, and ensure patient and staff satisfaction. This is not to mention faster results for referring physicians.

PET-MRI is a whole-body imaging procedure, is cost-effective and is used in the staging and follow-up for most cancers, including lymphomas, lung, colorectal, gynecological, head, neck and breast cancers. It is also used to evaluate treatment response after chemotherapy and radiotherapy. Mid-cycle PET-MRI is useful to ascertain if the patient is responding to chemotherapy or not, so that regimes can be modified. It is also used in Radiotherapy planning. PET is able to discover these changes in their earliest stages, often before any symptoms appear. With this information



DUAL HEAD GAMMA CAMERA

on early developing cancers, effective treatment plans can be initiated sooner. PET can sometimes eliminate the need for other invasive procedures and, by correctly staging cancers, may prevent unnecessary surgical procedures.

Nuclear Medicine Imaging or Scintigraphy utilizes a dual head gamma camera to record the physiological activity of selected organs or body systems. This imaging is fundamentally different from magnetic resonance imaging (MRI) and computed tomography (CT), for these methods only convey anatomic information. In most diseases, physiological changes precede anatomic changes, so scintigraphic evidence of a disease process can be diagnosed at an earlier stage.



MEDICAL IMAGING CENTER

THE MEDICAL IMAGING CENTER IS AMONG THE FINEST OF INTERNATIONAL CENTERS. THE LATEST HIGH PERFORMANCE EQUIPMENT TOGETHER WITH A HOSPITAL-WIDE, ALL DIGITAL, IMAGING, ARCHIVAL AND RETRIEVAL SYSTEM ESTABLISHES AMRITA AS AN IMPORTANT REFERRAL SITE.

Amrita has established the first filmless hospital in Southeast Asia. All radiology images are stored in a computer image archive and are available within seconds on any of the computers conveniently located throughout the hospital. This state-of-the-art technology facilitates rapid communication and diagnosis. Patient care is enhanced in critical areas like the ICU and operating theaters, where time is of the essence.

Our digital equipment includes:

- 256 Slice Cardiac CT Scanner
- Spiral CT Scanner
- Radio Fluoroscopy with Digital Subtraction Angiography
- Color Doppler High-Resolution Ultrasound Scanner
- Mammogram with Tomography
- 3-Tesla Silent Scan Magnetic Resonance Image Scanner
- Gamma Camera with a wide variety of isotope scanning capabilities
- PET 3-Tesla MRI scanner
- GE Voluson E10 4D ultrasound system

Procedures using imaging equipment for guidance (Interventional Radiology) reduce hospital stays and costs, reduce the need for major surgery, and can save lives. Hundreds of patients have benefited from interventional procedures like guided biopsy, abscess drainage, nephrostomy, angioplasty, and embolisations.

Our **3 Tesla Silent Scan MRI** scanner with quantum gradients is among the most advanced equipment in India. This scanner is very fast, requiring only 15 minutes for a routine scan, greatly enhancing patient comfort. Capabilities include diffusion imaging for hyperacute stroke detection, proton spectroscopy for tumor evaluation, MRCP for non-invasive liver, gallbladder and pancreatic imaging, and functional MRI studies for brain mapping and epilepsy localisation. The medical community in Kerala now has access to neuro, orthopedic, and body imaging at an affordable cost.

The **256 Slice Cardiac CT Scanner** is the ultimate CT solution for cardiovascular and whole body imaging. It fuses the latest and fastest multislice technology with dedicated clinical applications delivering unprecedented image quality. It offers the highest performance to meet the requirements of cardiac and cardiovascular diagnosis by utilising innovative workflow concepts.

GE Voluson E10 4D ultrasound system is for spectacular 2D and 3D/4D images with increased penetration. Matrix Transducer eM6C – the world's first commercially available curved electronic matrix 4D probe, delivers ultra-fast volume rates, flexible imaging formats and excellent resolution.



GE VOLUSON E10 4D ULTRASOUND SYSTEM



3 TESLA SILENT MRI



256 SLICE CARDIAC
CT SCANNER

AMRITA FERTILITY CENTER

THE DEPARTMENT OF REPRODUCTIVE MEDICINE –
AMRITA FERTILITY CENTER – PROVIDES A TOTAL FERTILITY SOLUTION
UNDER ONE ROOF.

Located at M G Road, Atlantis, Kochi with easy accessibility to patients, our team is dedicated to the cause of helping couples combat and overcome their fertility management issues. We offer comprehensive innovative evidence based fertility treatment with discretion. Our individualized treatment plans are customized to specific fertility problems at highly affordable cost without compromising on quality. The unique combination of cutting edge science and personal touch is what sets Amrita Fertility Centre apart.

Facilities Offered

DIAGNOSIS AND COUNSELLING

- Advanced fertility consultation and assessment
- Advanced fertility pelvic ultrasound
- Saline sonosalpingography (SSG)
- Detailed sperm assessment
- Advanced hystero-laparoscopic surgery
- Fertility & sexual counselling
- PCO clinic and nutritional counseling
- Recurrent pregnancy loss counseling and treatment
- Preconception and genetic counseling



**Amrita Institute of Medical Sciences
& Research Centre**

AMRITA Family Centre

Call: 70340

TREATMENT

- Ovulation induction/intra uterine insemination (IUI)
- Sperm donor program
- In vitro fertilization (IVF)
- Intracytoplasmic sperm injection (ICSI)
- Semen cryopreservation
- Oocyte and embryo donor program
- Embryo cryopreservation and frozen embryo transfer (FET)
- Sperm retrieval – PESA/ TESA/ Micro TESA
- Treatment for sexual dysfunction

UNIQUE FEATURES

- Advanced technology with state-of-art facilities in the lab
- Fertility preserving measures for oncology patients
- Amrita Fertility Centre with the help of its allied departments like molecular biology, nanosciences, genetics and fetal medicine aims at research in the field of gametogenesis and implantation helping patients with multiple IVF failures.



OBSTETRICS AND GYNECOLOGY

THE OBSTETRICS AND GYNECOLOGY DEPARTMENT PROVIDES MODERN COMPREHENSIVE DIAGNOSTIC AND TREATMENT MODALITIES IN A CARING ENVIRONMENT FOR WOMEN THROUGHOUT ALL SEASONS OF LIFE.

Our specialized medical team offers advanced maternity services for normal and high risk pregnancies, postpartum and family planning services, infertility screening and treatments, and all endoscopic gynecological operations in addition to conventional gynecology surgeries and medical therapies. In addition, the department manages high-risk pregnancy by prenatal diagnostic testing like chorionic villus sampling, amniocentesis, fetal color Doppler and velocimetry studies. Cancer screening for perimenopausal women using colposcopy and pap smear and HPV – CO Testing.

The Department is the first to perform laparoscopic ovarian transposition in Kerala. We have performed three laparoscopic ovarian transposition for ovarian conservation in young patients undergoing treatment for pelvic malignancies. One rare case of advanced first trimester rudimentary horn pregnancy was managed successfully by laparoscopy. Tubal reconstructive surgeries were performed free of cost for eight 2004 Tsunami victims, out of which two conceived and delivered soon after.

Services Offered

OBSTETRIC SERVICES

Ours is a tertiary care center, well equipped for handling all types of high risk pregnancies and emergencies related to pregnancy and labor. We have the back up of a well equipped NICU with all advance life support systems. Besides the routine obstetric care for uncomplicated pregnancies, specialized care is provided in high risk cases. This includes:

- Management of fetal abnormalities with close cooperation of departments of pediatric cardiology, pediatric surgery and neonatology. This includes fetuses with intrauterine growth restriction, those with salvageable structural anomalies such as congenital diaphragmatic hernia, PUJ obstruction, posterior urethral valve, congenital cardiac defects, duodenal atresia, etc.
- Evaluation and Management of recurrent miscarriages.
- Screening and management of preterm labor and PPROM
- Management of critically ill obstetric patients - HELLP syndrome, APH , eclampsia, obstetric shock.
- Management of pregnancies complicated with maternal disorders like hypertension, diabetes, cardiac diseases, collagen vascular disorders, hematologic disorders, etc.
- Management of pregnancies associated with gynecologic conditions such as fibroids, ovarian tumors, prolapsed uterus etc.

LABOR ROOM - 24 HOUR SERVICE

Services are available in the labor room with obstetricians and a team of well-trained staff 24/7. Intrapartum monitoring with electronic devices is

routinely provided. All our gynecologists are well experienced in operative deliveries. Delivery is attended by the qualified gynecologist on duty.

ANTENATAL SERVICES FOR HIGH RISK PREGNANCIES

Our antenatal clinic helps manage complicated pregnancies for women with hypertension, diabetes, multiple pregnancy and heart disease complicating pregnancy, intrauterine growth restriction (IUGR), pregnancy with renal and hepatic failure, etc. Intensive fetal monitoring facilities including cardiotocogram (CTG), obstetric ultrasonography, high resolution fetal echocardiography and color Doppler velocimetry provide essential diagnostic information for treatment of complicated cases.

GYNECOLOGIC SERVICES

Our surgical team is performing all routine and complicated surgeries related to female genital tract. Minimally invasive surgical procedures include:

- Uterine surgeries - myomectomy, rudimentary horn excision, adenomyomectomy, total laparoscopic hysterectomy, laparoscopic assisted vaginal hysterectomy.
- Tubal surgeries - adhesiolysis, tubal surgeries for ectopic gestation, salpingectomy.
- Ovarian surgeries - follicular puncture, ovarian biopsy, cystectomy, adhesiolysis, ovariectomy.
- Hysteroscopic procedures - septum resection, myomectomy, polypectomy, tubal cannulation.

SPECIAL FACILITIES

- Disorders like primary amenorrhea, hirsutism, hyperprolactinemia, polycystic ovarian disease, premature menopause are dealt with by special coordination between the gynecologist and endocrinologist.
- Interventional radiological procedures such as uterine artery embolization available for the treatment of uterine fibroids.
- Gynopsychiatric consultation : Psychologic support for patients with gynecological ailments such as chronic pelvic pain, post menopausal syndrome, infertility etc.



DIAGNOSTIC TESTS AND PROCEDURES

Cervical cancer screening by PAP smear and HPV DNA testing

All patients are screened for cervical neoplasia by Pap smear collection. An Ayre's spatula is used to scrape cells from ectocervix and then a thin smear is prepared on a glass slide. The smear is immediately fixed and sent for cytologic analysis. Any abnormality of Pap smear is further evaluated with colposcopy.

Colposcopy and colposcopy-guided biopsy

Colposcopy is the procedure by which the cervix is visualized under magnification by using a colposcope. It is usually indicated once there are abnormal cells detected on Pap smear testing. It helps to identify the abnormal areas on the cervix and to direct the biopsy from those specific areas.

LEEP biopsy

LEEP utilizes a thin wire loop to remove the cervical transformation zone through electrocautery. It allows samples to be collected for additional tissue analysis and treats the condition in the same sitting.

Cryocauterization

This is a simple and safe procedure to treat cervical erosion and does not require any anesthesia. A cryoprobe is first cooled by nitrous oxide and then touched to the abnormal cervical area. This freezes and kills the cells, resulting in the sloughing of the abnormal tissue. The patient is sent home the same day.

Ultrasound-guided procedures

In addition to the routine pelvic and obstetric scan, various ultrasound-guided procedures are done on a routine basis. This includes sonohysterography and sonosalpingography, where saline is instilled in the uterine cavity and the fluid helps in outlining the intracavitary uterine pathology and also to establish tubal patency in infertile patients. Ultrasound-guided amniocentesis is done to procure a sample of amniotic fluid for metabolic and chromosomal analysis in patients who have bad obstetric history or inherited disorders.

Pipelle sampling

Endometrial biopsy is taken by Pipelle device. It is a 2-mm slender plastic curette. It is introduced in the uterine cavity and a strip of endometrium is obtained for histopathology. This is a painless and quick procedure which has replaced the conventional D&C. Endometrial biopsy is used in the assessment of abnormal uterine bleeding in perimenopausal patients for the assessment

of the endometrium during tamoxifen therapy and for the investigation of amenorrhea or infertility. In women, the combined use of pipelle sampling and ultrasound has a high detection rate for endometrial carcinoma.

Specialty Clinics

ADOLESCENT GYNECOLOGY CLINIC

Menstrual problems, non-specific lower abdominal pain, anatomical and developmental abnormalities, genetic abnormalities, etc. are dealt with.

MENOPAUSAL CLINIC

Each patient undergoes a thorough mental and physical evaluation and assessment. If indicated, hormonal treatment to meet the patient's individual requirements is arranged.

INFERTILITY CLINIC

The couple is evaluated for various male and female factors. Male factor evaluation is done in conjunction with urologists. Facilities for controlled ovarian stimulation with intrauterine insemination are currently available. Patients requiring further assisted reproductive techniques are referred to our Amrita Fertility Center in Ernakulam.

WELL WOMEN CLINIC

Special health care package is available for women in the perimenopausal age group. They are screened for cervical and breast malignancies by Pap smear testing and mammogram. Transvaginal ultrasound is done for endometrium and ovarian screening. Dexa scan is done for women at risk for osteoporosis.

FAMILY WELFARE CLINIC

Postpartum clinic provides advice on contraception. We have facilities for insertion of intrauterine devices and laparoscopic sterilization. If indicated, Medical Termination of Pregnancy (MTP) services are also available.

CANCER SCREENING CLINIC

Patients with abnormal pap smears are further screened by colposcopy and early lesions are treated by cryocauterization or Loop Electrode Excision Procedure (LEEP)

FETAL MEDICINE & PERINATOLOGY

PERINATOLOGY, ALSO KNOWN AS MATERNAL-FETAL MEDICINE, IS CONCERNED WITH THE SPECIALIZED CARE OF THE MOTHER AND FETUS IN COMPLICATED, HIGH-RISK PREGNANCIES.

The Perinatology Division at Amrita is an integral component of the Department of Obstetrics and Gynecology and is committed to provide comprehensive, state-of-the-art diagnosis and treatment for conditions affecting the expectant mother and fetus. The Perinatology division provides diagnostic and consultative services focused on high-risk obstetrics. The experienced faculty provide a full range of ultrasound services, including antepartum scans in the first, second and third trimesters, Down syndrome screening, Fetal ECHO, 3D/4D ultrasound, and ultrasound-guided procedures.

The division also is skilled in the management and counseling of pregnancies complicated by fetal abnormalities, including growth disorders, inherited diseases, and structural malformations. Specialized scans for multi-fetal pregnancies are also routinely done.

Scheduled prenatal diagnostic consultation and targeted ultrasound examinations are available through the division six days a week. Invasive diagnostic and therapeutic procedures such as amniocentesis, chorionic villus sampling, umbilical cord blood sampling, intra uterine transfusion and multifetal pregnancy reduction are performed four days a week.

In liaison with allied specialties like pediatric genetics, pediatric cardiology, pediatric neurology and pediatric surgery (including urology, neurosurgery and cardiac surgery) and neonatology, the Perinatology Division also offers therapies for conditions like fetal anemia, congenital heart diseases, diaphragmatic hernias, bowel and renal abnormalities, certain complications affecting twin pregnancies and the like.

Pregnancy is truly a blissful, natural process. Nevertheless, there may be complications arising during pregnancy that may put the baby's health at risk. Therefore, every expectant mother would do well to attend this clinic in order to ensure the well being of her baby and herself.



NEONATOLOGY

THE DIVISION OF NEONATOLOGY UNDER THE DEPARTMENT OF PEDIATRICS WAS STARTED IN AMRITA IN 2002. THE NEONATAL INTENSIVE CARE UNIT (NICU) SERVES AS A TERTIARY CARE REFERRAL CENTER FOR ALL MEDICAL AND SURGICAL PROBLEMS IN NEWBORNS UP TO THE FIRST 4 WEEKS OF LIFE.

Preterm infants from 24 weeks gestation onwards are managed in this unit. Because of the presence of this unit and the availability of pediatric subspecialists in every discipline here, this unit serves as one of the largest referral centers for a large number of high risk obstetric patients and neonates. The NICU has 22 beds with 16 intensive care and 8 intermediate care beds. The high risk deliveries are attended by a team of physicians trained in neonatology and nurses. The unit is equipped to manage every newborn critical illness with trained staff except ECMO.

All modalities of ventilation including HFOV and INO therapy are routinely carried out in this unit. In critically ill newborns, even major surgeries (CDH repair, laparotomy for NEC) are performed in the NICU itself. Although we prefer to have maternal transfers (in-utero transport), our transport team transports infants to our unit in dedicated transport incubators with ventilators. Occasionally, we have also attended deliveries in referring hospitals to resuscitate and transport infants to our center. We have a very cordial relationship with our obstetric and maternal fetal medicine consultants which prepares us to anticipate and deal with any sort of emergency in the delivery room.

There are more than 500 infants admitted to this NICU annually. Nearly half of the infants admitted to this unit are from maternal (in-utero) transports. A large percentage of infants are also transported to this unit as neonatal transports. We also receive infants from neighboring South Indian states and a few infants from outside India as well.

The outcome of infants is comparable to large international databases such as the one from Vermont-Oxford network. Naturally, inborn infants have a slight edge over out born infants in outcome with lower morbidity and mortality.

Our philosophy is in family centered care with health care providers (physicians, nurses, physical/occupational therapists, social workers) working as a team with the explicit goal of achieving a near perfect survival without residual handicaps. The pediatric subspecialists provide the needed support for us in this endeavor. As several of our referred patients have extremely complex medical and surgical problems, it will not be surprising to see that an infant is taken care of by several consultants in unison. This team work approach is the reason for the successful outcome of our patients.

The backbone of the ICU is a team of extremely dedicated nursing staff who are always willing to take up additional responsibilities at anytime 24/7, three hundred and sixty five days of the year.

In our eagerness and dedication to help sick newborns and their distraught parents, we have taken a pledge to never refuse an admission to our unit. We also believe that if an infant can be managed at their local

community hospital, we should transfer the infant back to that referring hospital with referring physician's input. We recognize that periodic communication with the referring physicians is very important and tend to keep them abreast of the infant's clinical course.

Our energetic and enthusiastic social worker works with every patient's family and provides the much needed emotional support during their hospital stay which is highly appreciated by everyone. We also tend to involve parents (if they are ready) at an early stage in their infant's care which facilitates early discharge and shorter length of stay. In addition to this, we encourage parental bonding early on during the infant's hospitalization and encourage Kangaroo care as much as possible. We are also in the process of implementing NIDCAP (Newborn Individualized Developmental Care).

We recognize that our responsibility towards the NICU graduates does not end when they are discharged home. We reassess them at regular intervals for developmental evaluation and enroll them in the early intervention program if needed. This busy neurodevelopmental clinic also receives outside referrals from infants discharged from NICUs of other hospitals.

Our Resources and Accomplishments

- 22 bed NICU with 16 intensive care beds
- Round the clock availability of a neonatologist in the NICU to attend to the high risk deliveries and emergencies in the NICU and elsewhere in the hospital
- Facilities to transport sick neonates (trained staff and ambulance with all required equipment)
- Perinatology services and Fetal therapy unit
- Pediatric Subspecialty support – Pediatric Surgery, Cardiology, Neurology, Nephrology, Endocrinology, Hematology, Genetics, Orthopedics, Neurosurgery, Radiology, a dedicated metabolic and cytogenetic laboratory
- Neurodevelopmental and early intervention clinic



GENERAL PEDIATRICS

THE DEPARTMENT OF GENERAL PEDIATRICS PROVIDES COMPREHENSIVE OUTPATIENT AND INPATIENT CARE FOR SICK INFANTS AND CHILDREN UP TO THE AGE OF 18 YEARS. THE DIVISION ATTEMPTS TO PROVIDE A "MEDICAL HOME" CONCEPT IN THE CARE OF CHILDREN.

This model provides primary preventive pediatric care which addresses areas of well baby check-ups, immunizations, developmental assessments, nutritional assessments, healthy life style and proper physical activities.

Bone marrow transplantation is one of the latest additions in the service. The division also provides consultations to other sub-specialists for comprehensive pediatric care in-house and through telemedicine for those outside this institution.



Pediatricians are assigned to work in the following areas on a rotational basis and are available 24/7, 365 days a year.

- Pediatric Outpatient Clinic (OPD) which functions 7 days a week
- Diagnostic Clinic
- General Pediatric inpatient unit which includes an 8-bed Pediatric Intensive Care Unit
- Immunization Clinic
- Certified baby friendly hospital

A multidisciplinary team of general pediatricians, subspecialty consultants, pediatric nurses, nutritionists and social workers complement the comprehensive approach to general pediatric care and subspecialty services to children with special needs. Various procedures are done in the hospital for sick children. Some of them are bone marrow biopsy, lumbar puncture, and ascetic tapping.

OUTPATIENT SERVICES

Outpatient clinic functions on all days including Sundays. Immunization is given on all days in the immunization clinic.

The OP clinic is conducted by two units headed by senior pediatric medical faculty.

Rheumatology Clinic on to diagnose and keep on follow up chronic rheumatological problems of childhood.

INPATIENT FACILITIES

We have a 60-bedded general ward as well as private rooms for children who require inpatient care. There is a 4-bedded pediatric ICU with advanced monitoring and ventilator facilities managed by senior faculty members with a team of residents. All pediatric procedures (diagnostic and therapeutic) are done in our department. We have excellent backup of various pediatric subspecialties: Pediatric Cardiology, Pediatric Neurology, Pediatric Gastroenterology, Pediatric Genetics, Pediatric Surgery, Pediatric Endocrinology and Pediatric Hematology. The department also conducts free medical camps, and peripheral clinics on a regular basis. School health camps are conducted once a month to screen for common medical problems of school going children.

PEDIATRIC GENETICS

DEPARTMENT OF PEDIATRIC GENETICS AT AMRITA IS THE FIRST OF ITS KIND IN KERALA. WE PROVIDE COMPREHENSIVE EVALUATION AND TREATMENT FOR CHILDREN AFFECTED WITH VARIOUS GENETIC DISORDERS.

We offer the basic chromosomal analysis and metabolic workups for the delineation of genetic conundrums. Another major service is the counseling of parents who have children with genetic problems. We offer prenatal diagnosis to couples who are carriers of chromosomal anomalies, single gene disorders, enzyme deficiencies, metabolic disorders and skeletal dysplasias. We have a close liaison with other departments in Amrita and with centers of excellence in the UK and Glasgow to provide comprehensive care for our genetic patients.

We Offer Diagnostic and Treatment Facilities for—

Chromosomal Disorders

NUMERICAL ANOMALIES

The most common chromosomal disorder encountered is Down syndrome (Trisomy 21). In this condition, instead of the normal forty-six chromosomes, the affected people have forty-seven chromosomes and an additional chromosome 21 constitutes the excess chromosome. The condition usually occurs in babies born to elderly mothers, especially women over thirty-five years old. This is the most common form of Down syndrome, constituting ninety to ninety-five percent (of non disjunction type).

Younger couples can also have babies with Down syndrome. Hence, it is highly imperative to check the karyotype of the baby to classify the type, as around five percent of babies would be having a translocation type of Down syndrome where there is swapping of materials between two chromosomes. The parents of these babies should be karyotyped for detection of translocation in either of them, which would be highly beneficial for future counseling in the next pregnancy. Mosaics constitute a small percentage of Down syndrome, where the patient has two sets of chromosomal patterns in their body, one normal and the other with Trisomy 21. This occurs in:

- Turner syndrome
- Klinefelter syndrome
- Trisomy 13
- Trisomy 18

STRUCTURAL ANOMALIES

- translocations
- inversions
- deletions
- duplications

MICRO DELETIONS

- Velocardiofacial syndrome, Williams syndrome
- Wolf Hirschhorn syndrome
- Smith Meganis syndrome
- 1p 36 deletion syndrome



SYNDROMIC DISORDERS

The delineation of several syndromes according to their clinical features is very important for counseling the parents regarding future intervention programs and for possible prenatal diagnosis in future pregnancies. Some of the common syndromic disorders are:

- Tuberous sclerosis
- Neurofibromatosis Type I
- Noonan syndrome
- Fragile X syndrome
- Cornelia de Lange syndrome
- Prader willi syndrome
- Syndromes with craniostenosis – Apert, Crouzon, Carpenter
- Smith Lemli Opitz syndrome
- Goldenhar syndrome
- Ectodermal dysplasia
- CHARGE association
- VACTRAL anomaly
- Marfan syndrome
- Ellis van Creveld syndrome
- Kabuki make up syndrome
- Russel Silver syndrome
- Syndromes with associated deafness – Usher syndrome, Waardenberg, Pendred, Apert, Stickler syndrome
- Neurocutaneous syndromes

SKELETAL DYSPLASIAS

This constitutes a group where the children have a short stature associated with bony deformities. Getting characterization is very important, as a few types have specific therapies and it is important for prenatal genetic counseling.

- Achondroplasia
- Hypochondroplasia
- Osteogenesis imperfecta
- Metaphyseal dysplasias
- Familial rickets
- Spondyloepiphyseal dysplasia congenital

STORAGE DISORDERS

Children with neurodevelopmental delay or regression with visual or hearing impairment and physical bony deformities constitutes this group, including:

- Mucopolysaccharidosis - Hurler, Hunter, Morquio, Sanfilippo
- Glycogen storage disorders
- Niemann-Pick disease, Gaucher's disease
- GM1 gangliosidosis

NEURODEGENERATIVE DISORDERS

- Metachromatic leukodystrophy
- Sialidosis
- Hallervorden Spatz syndrome
- Ataxia Telangiectasia
- Frederich's ataxia
- Hereditary ataxias
- Sandhoff disease
- Tay Sach's disease

PRENATAL DIAGNOSIS

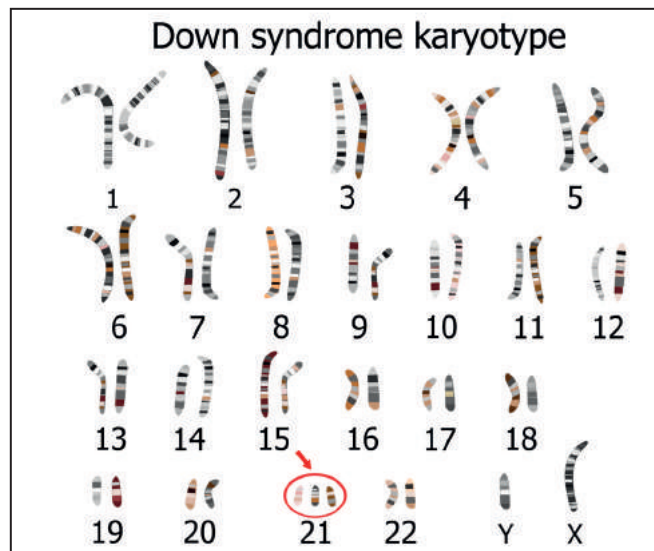
This group encompasses the most important beneficiaries of the services of this department, which are:

- Couples having a previous baby with Down syndrome
- Couples where either of a parent is a translocation carrier
- Couples having a previous baby with a neural tube defect
- Couples with children having mental retardation, storage disorders
- Couples having a previous baby affected with spinal muscular atrophy
- Elderly pregnant women, especially over thirty-five years old
- Couples where there is neuromuscular disorders in an elder child, like Duchenne muscular dystrophy
- Couples who are consanguineous and are carriers of enzyme defects - Thalassemia
- Those with sickle cell anemia, pyruvate kinase deficiency

- Couples with babies having inborn errors of metabolism
- Couples with children affected with neurodegenerative disorders
- Couples with a history of recurrent miscarriages and those who have conceived following treatment for infertility

ADULT GENETIC SERVICES INCLUDE:

- clinical diagnosis is offered to adult genetic disorders, and the confirmation of diagnosis is offered with the help of the mutation study of a DNA sample for future management and counseling
- evaluation of primary amenorrhea
- evaluation of couples with infertility
- couples with recurrent abortions are tested for any chromosomal carrier state
- Huntington's chorea
- myotonic dystrophy
- Ehlers Danlos syndrome
- evaluation of familial cancers–familial adenomatous polyposis, familial breast cancer, familial colon cancers
- multiple endocrine neoplasias (MEN)



PEDIATRIC SURGERY

THE DEPARTMENT OF PEDIATRIC SURGERY TREATS CHILDREN FROM DAY ONE TO EIGHTEEN YEARS OF AGE. ALL THE FACILITIES TO TAKE CARE OF CHILDREN NEEDING SURGERY ARE AVAILABLE UNDER ONE ROOF.

A well-experienced team of doctors is available to take round-the-clock care of the children. All types of open and endoscopic procedures are performed in the department. Excellent supportive care in the form of a tertiary care NICU is available for sick and critical neonates, plus a fully equipped pediatric surgical ICU with pediatric ventilators and 7x24 anesthetist backup.

Features

- Neonatal Surgery
- Pediatric Urology
- Laparoscopy/Thoracoscopy
- Pediatric Chest Surgery
- Pediatric Cancer Surgery
- Pediatric Trauma



- Prenatal evaluations and counseling
- Postnatal diagnostic assessments
- Multi-system evaluation for anomalies, tumors and trauma
- Hyperacute Stroke ICU staffed with modern monitoring facilities and trained specialist staff
- Pediatric radiology services
- Pediatric pathology services

Procedures Performed

NEONATAL SURGERY

With the availability of modern amenities and support from our neonatal team and a well-equipped NICU, all types of newborn surgeries are performed by the department for congenital problems, e.g. esophageal atresia, diaphragmatic hernia repair, intestinal obstruction, ano-rectal malformations etc.

PEDIATRIC UROLOGY

A wide spectrum of diseases affecting kidneys, bladder and the genital systems are treated including pelvi-ureteric junction obstruction, posterior urethral valves, Exstrophy-Epispadias complex, hypospadias, ambiguous genitals etc.

LAPAROSCOPY AND THORACOSCOPY

Laparoscopy for a variety of abdominal problems like appendicitis, gastro-esophageal reflux, cysts, ambiguous genitals etc. are performed. Thoracoscopy is being implemented for empyema, lung resection and biopsies.

PEDIATRIC CHEST SURGERY

Surgery for congenital disorders of lungs like cysts, Lobar emphysema etc., are being performed. Esophageal problems including replacement of esophagus, mediastinal tumor are undertaken regularly. Bronchoscopy for diagnosis of airway diseases and removal of foreign body is also carried out.

PEDIATRIC TUMORS

Treatment is provided for Wilms' tumor, neuroblastoma, sacrococcygeal teratoma, ovarian tumors etc.

Facilities

- Dedicated pediatric surgical ward with qualified and trained staff
- Modern monitoring equipment like pulse oximeters, infant warmers, infusion pumps, etc.
- Well-equipped operation theaters with temperature control, miniature cystoscopes, 3mm laparoscopic instruments, pediatric bronchoscopes, patient warmers, etc.
- Fully equipped pediatric surgical ICU with pediatric ventilators and round the clock anesthetist back up is available
- NICU with modern ventilators, infant warmers apnoea monitors etc.

OPHTHALMOLOGY

THE DEPARTMENT OF OPHTHALMOLOGY PROVIDES A WELL-EQUIPPED FACILITY FOR THE COMPLETE EXAMINATION, DIAGNOSIS, AND TREATMENT (BOTH MEDICALLY AND SURGICALLY) OF ALL OCULAR DISEASES IN BOTH ADULT AND PEDIATRIC PATIENTS.

The department is comprised of a dedicated and well-qualified team of healthcare professionals with excellent support from nursing and administrative staff. Eye disorders can be diagnosed and treated at Amrita, including cataract, glaucoma, strabismus and amblyopia, ocular trauma, refractive disorders, cornea and external diseases, lachrymal drainage disorders, uveal diseases, and retinal disorders.

We have the finest equipment available in ophthalmic care including:

- Humphrey field analyzer
- An ultrasound A scan (Amplitude modulation scan) and B scan (Brightness scan)
- AG laser and Visupac 450 digitized fundus camera for retinal imaging
- Fluorescent angiography and optical coherence tomography (Syscan Version IV)
- 532mm laser for retinal diseases

Our Services

RETINAL SERVICES

All retinal diseases are evaluated and managed. Many treatments are done as outpatient procedures, including:

- **Digital retinal photography:** an ideal tool for documentation and follow up and can also give an accurate assessment of the progression of the disease.
- **Fundus fluorescein angiography** is performed on a daily basis in order to diagnose and manage all vascular and neurological abnormalities of the retina. It is an integral part of retinal OPD practice
- **Ocular ultrasonography:** a noninvasive investigation performed in some cases for which evaluation is required for retinal tumors, vitreous hemorrhage and intraocular foreign bodies
- **Optical coherence tomography:** another noninvasive investigation that can be used to study the cross sectional anatomy of the retina. It is useful in the diagnosis, management and follow up of almost all macular diseases
- **Laser photocoagulation:** done on a daily basis with the Zeiss Visulas system. It is used in the management of diabetic retinopathy, age related macular degeneration, vascular blocks and many other retinal disorders. Screening of preterm neonates for ROP (retinopathy of prematurity) and others for any congenital abnormality and treatment are routinely performed
- **Retinal surgery:** our team is well equipped with an Accurus vitrectomy machine, facilities for endolaser and cryopexy, and a wide angle surgical viewing system which is one of the latest innovations in retinal surgery. Retinal surgeries being performed include scleral buckling, pars plana vitrectomy, complicated procedures for retinal detachment, intraocular foreign body removal, and proliferative diabetic retinopathy

CATARACT SERVICES

We are equipped with an AMO signature, a higher-end phaco-emulsification system that minimizes tissue damage during cataract

surgery. Micro incision cataract surgery [MICS] is also available for cases in which the wound size is even smaller. The department also has Accurus and Storz – Protégé phacoemulsification systems. Intraocular surgery is done with a Zeiss OPMI Lumera surgical microscope and the finest titanium surgical instruments. All types of intra ocular lenses [IOL], including foldable IOLs, toric IOLs and multifocal IOLs are routinely inserted with excellent results. Availability of day care surgery (operation without admission) makes it more convenient for the patient. Opening up opaque membranes that sometimes form after cataract surgery can be done in the clinic with our YAG Laser.

GLAUCOMA SERVICES

The glaucoma clinic provides comprehensive care for glaucoma patients. Every suspected case of glaucoma undergoes diagnostic tests including pachymetry, applanation tonometry, visual field analysis, gonioscopy, optic disc evaluation, and optical coherence tomography. Patients are managed medically and surgically with regular follow-ups. An advanced YAG laser is used for the treatment of narrow angle and other types of glaucoma.





LASIK

AMRITA (CORNEA) EYE BANK

At Amrita Eye Bank, the donor cornea is preserved in an MK medium in which the nutrition of the cornea can be maintained for four days, making corneal transplantation a planned procedure. The state-of-the-art facilities at Amrita eye bank include specular microscopy and laminar flow hood.

AMRITA LASIK SERVICES

Amrita lasik services offers a state of the art LASIK facility. LASIK is a procedure that eliminates the need for wearing glasses or contact lenses for clear vision. It does so by precisely reshaping the cornea with the help of a laser. Lasik technology is safe and time-tested. We take every possible effort to make sure that the procedure is perfectly safe for your eyes. The service is offered in association with Carl Zeiss, a world leader in manufacturing high precision optical instruments.

SQUINT CLINIC

The squint clinic provides methodical assessment for the diagnosis of various types of squints followed by medical management or surgical treatment.

COMMUNITY SERVICES

Ophthalmology camps are conducted with the objective to provide free intraocular lens implantation surgery for low-income individuals with cataracts who are unable to afford cataract surgery. Members of the department have shown tremendous dedication in participating in these eye camps. Approximately fifty camps are conducted every year, during which eleven thousand patients are seen and fifteen hundred cataract surgeries are performed.

VITREO RETINAL SURGERY

VITREO RETINAL SERVICES OFFER COMPREHENSIVE MEDICAL AND SURGICAL MANAGEMENT OF ALL VITREO RETINAL DISEASES WITH CUTTING EDGE TECHNOLOGY AND AT AN AFFORDABLE COST.

Common diseases like diabetic retinopathy, vascular blocks, age related macular degeneration and retinal detachment are seen in specialized clinics of retina. Close collaboration with key departments like endocrinology, nephrology, neonatology and internal medicine helps the patient get appropriate, timely and personalized retinal as well as medical management services the same day. The right mix of clinical services, clinical research, education and community services are provided by the vitreo retina services. Daily OPD and procedure facilities reduce the waiting time of patients from long distances.

Why See a Retina Specialist?

- Diabetes more than 10 years
- Hypertensives more than 10 years
- Age over 60
- Chronic renal failure
- Vascular blocks
- Sudden dimness of vision
- Sudden visual field loss
- Flashes
- Floaters
- Ocular injuries
- Intraocular tumors
- Retinal detachments
- Age related macular degenerations
- ROP and failure to fix eyes on objects properly
- Collagen vascular disorders
- Systemic vasculitis
- Posterior uveitis
- Chronic CSR
- Cataract surgery complications
- Systemic diseases of vessels or nerves

Features

- Kerala's first Anti VEGF monoclonal antibody treatment to the eye.
- No injection, sutureless retinal surgery on OPD basis with 25 gauge high speed vitrectomy system
- Complete Retinal imaging and evaluation facility with FFA, USG, UBM, OCT and electrodiagnosis
- Laser therapy for ARMD, diabetic retinopathy, vascular blocks and other diseases Wide angle viewing system for vitreous surgery

Disorders Treated

PROCEDURES AND EQUIPMENTS

OPD procedures frequently done

- Indirect Ophthalmoscopy- To have a detailed 3 dimensional view of the retina till the periphery. The patient is asked to lie down and with an indirect ophthalmoscope, we look at the periphery of the

retina. Sometimes, it may be needed to press on the lids to see the extreme periphery. It is painless, but may cause slight discomfort as bright light is shone into the eyes. We use the Heine Indirect ophthalmoscope from Germany for this purpose.

- Contact and noncontact stereo biomicroscopy - This is done for a detailed 3D examination of the macula and optic nerve and to look at the vitreo retinal interface. The 90 D lenses for noncontact biomicroscopy and the superquad and transequator are from VOLK.
- Digital fundus camera and imaging – We can take serial pictures to evaluate any subtle changes that may occur with time. A key for all diseases in which we may require observation. We use Zeiss FF 450 plus camera for this purpose.
- Fundus Fluorescein angiography- The corner stone of medical retinal diagnosis. Here a dye is injected into the veins of the hand



and serial pictures are taken with the fundus camera. The patient will sit with the chin and forehead apposed against the machine. We use Zeiss FF 450 plus camera for this purpose

- Optical coherence tomography- A revolution that has improved our understanding of all retinal diseases. This offers an anatomic diagnosis at tissue level and is also nicknamed, bloodless histopathology. This machine gives us anatomic details of the microscopic retina with a resolution of 7 microns. We use a Zeiss OCT 4 machine.
- Ultrasonography and ultrasound biomicroscopy- Standard care for retinal diagnosis in hazy media like cataract and vitreous hemorrhage. An ultrasound biomicroscopy offers view to the extreme periphery of the retina like pars plana and ora serrata as well as the anterior segment and angle structures. We use an Appaswamy machine for USG.
- Humphrey visual field examination- This method of examination is automated visual fields which can offer great help in the functional quantification of the defects in visual function caused by macular pathologies.
- Short wavelength automated perimetry - Blue on yellow perimetry can have more accuracy than white on white fields in the diagnosis of specific conditions.
- Green laser photocoagulation – We use 532 double frequency YAG laser to treat the retina using a Zeiss Visulas machine.
- Laser indirect Ophthalmoscopy- Is used when we want to laser the extreme periphery, ROP, recent post operative cases etc.
- Photodynamic therapy- Special laser therapy for ARMD and CNVM.
- Visual evoked potentials - Electrophysiology will help us determine whether vision is there in infants, in cases with neurological illnesses etc.

Surgical Retina Procedures Frequently Done

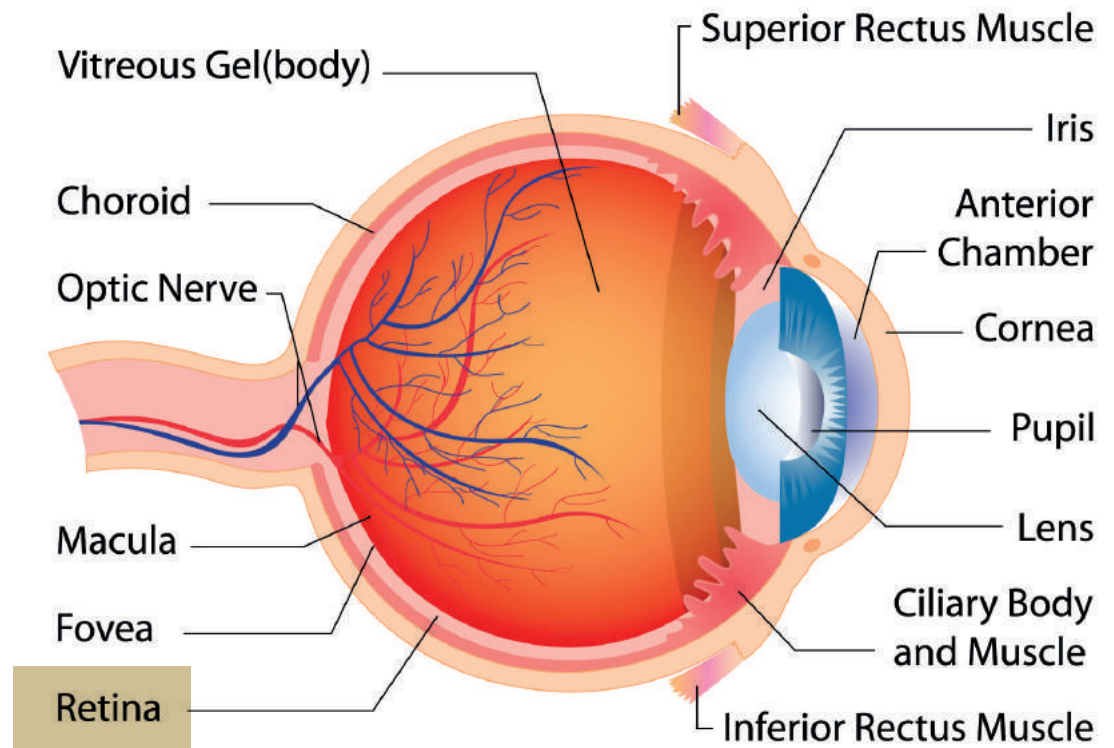
- Scleral buckling surgery
- Pars plana vitrectomy
- Vitreo retinal surgeries for PVR and RD
- Diabetic vitrectomies

- Macular hole surgery
- Epiretinal membrane peeling
- Endophthalmitis vitrectomy
- Dropped nucleus and IOLs
- Retained intraocular foreign body removal
- Subretinal bleed removal
- Silicone oil removal
- Submacular surgery
- Intravitreal device insertion
- Intravitreal injections

Specialty Clinics

- Diabetic retinopathy clinic
- Pediatric retina clinic
- Surgical retina clinic
- ARMD and macula clinic
- Common Retinal Symptoms
- Sudden loss of vision
- Sudden loss of visual field
- Dimness of vision
- Central dark spot in front of the eye
- Flashes of light
- Black floats in front of eye
- Distortion of letters on reading
- Transient loss of vision
- Failure to improve vision after cataract surgery
- Difficulty to read
- Seeing things smaller
- Seeing things larger
- Diminished vision from childhood
- Nightblindness
- Day blindness
- Photophobia
- Constriction of visual fields
- Trauma to the eye
- Severe pain in the eye
- White reflex in the eye

ANATOMY OF THE EYE



PHYSICAL MEDICINE & REHABILITATION

REHABILITATION IS THE TERTIARY PHASE IN THE TREATMENT OF ALL HUMAN SUFFERINGS. OUR PHYSIATRISTS DETERMINE TREATMENT PLANS FOR THE REHABILITATION OF PATIENTS AFTER ACUTE PROBLEMS ARE SETTLED.

Physiotherapists and occupational therapists carry out the work of rehabilitation as directed by the physiatrist. The major work of this department is completed in association with the departments of orthopedics, neuro medicine, neurosurgery, plastic surgery, paediatrics including neonatology, and other medical and surgical departments

Services Offered:

- Stroke and hemiplegic rehabilitation
- Spinal cord and brain injury rehabilitation
- Treatment for musculoskeletal and repetitive strain injuries
- Pediatric neuromuscular rehabilitation
- Ergonomic assessment and correction advice



PULMONARY MEDICINE

THE DEPARTMENT OF PULMONARY MEDICINE UNDERTAKES THE PREVENTION, EARLY DETECTION, DIAGNOSIS, AND TREATMENT OF PULMONARY DISEASES IN CHILDREN, ADOLESCENTS, AND ADULTS.

Comprehensive pulmonary medicine programs include specialized treatment of specific diseases such as asthma, chronic obstructive pulmonary diseases, sleep-disordered breathing, interstitial lung diseases, cystic fibrosis, occupational lung diseases, pulmonary rehabilitation, tuberculosis, lung cancers and a dedicated smoking cessation program.

Diagnostic facilities include pulmonary function testing, exercise testing, allergy testing, diffusion studies, flexible video bronchoscopic investigation, BAL and endobronchial stenting, spiral and higher resolution CT imaging guided biopsies, ventilation perfusion scans for pulmonary embolism and thoracoscopic procedures. The department renders facilities for investigation and management of all sorts of infective and non-infective pulmonary diseases. Revised National Tuberculosis Program (RNTCP)—This is a unit under the control of the District Tuberculosis Office, Ernakulam, working at the campus. Free microscopy and DOTS therapy are extended to deserving patients.

Features

- Asthma Care Program
- Asthma and COPD Clinics with an Amrita Asthma Education Program conducted fortnightly
- COPD Rehabilitation Clinic
- Allergy and Immunotherapy Clinic
- Smoking Cessation Clinic including counseling and pharmacotherapy intervention services
- Sleep Disorder Clinic
- Fibreoptic Video Bronchoscopy Study

Services Offered

The Department of Pulmonary Medicine encompasses eight specific basic programs, each focusing on a general category of pulmonary disease.

- Bronchial asthma
- COPD
- Sleep-disordered breathing
- Interstitial lung disease
- Cystic Fibrosis
- Occupational lung disease
- Pulmonary rehabilitation
- Tuberculosis (pulmonary and extra pulmonary)

Outpatient Services

PATIENT EDUCATION AND REHABILITATION

A number of out-patient programs are available at the Department of Pulmonary Medicine for patients suffering from advanced emphysema, asthma



and chronic bronchitis. These programs include pulmonary rehabilitation, trans tracheal oxygen, and nutritional support. The Smoking Cessation Program is under the direction of physicians and therapists experienced in the treatment of nicotine dependence.

ASTHMA SELF-MANAGEMENT PROGRAM

Asthma patients who are treated on an out-patient basis are periodically scheduled for group presentations about asthma, including different types of the disease, common symptoms, frequently used medicines, inhalers, and accessory equipment. Patients are shown how to use peak-flow machines and are taught self-management techniques for their use at home.

COPD REHABILITATION SERVICES

Services include education about COPD and physical therapy. Patients can benefit from pulmonary rehabilitation. If they have emphysema, asthma, or chronic bronchitis, a team of healthcare professionals with various specialties staff the Pulmonary Rehabilitation Program. The team consists of a pulmonary physician, a clinical nurse specialist, an exercise physiologist, a respiratory therapist, a dietician, and a social worker.

SMOKING CESSATION CLINIC

Services offered include an initial consultation with a Pulmonologist regarding smoking habits. Patient education is provided, and the motivation to stop smoking is discussed. Pharmaceutical intervention may be offered where appropriate; counseling is also offered to patients attending the clinic and on a follow-up basis as needed.

INPATIENT SERVICES

The Department of Pulmonary Medicine works in coordination with the Cardiovascular Thoracic Surgery Department and the Department of Neurosciences to ensure the highest quality of care for patients with pulmonary problems. The Department of Pulmonary Medicine consists of a dedicated and well-qualified team of healthcare professionals.

COMPREHENSIVE THORACIC SURGICAL PROGRAM

The Department of Thoracic Surgery conducts all surgical procedures related to lungs, chest wall, mediastinum, and the esophagus.

INNOVATIVE SURGICAL TREATMENTS FOR PATIENTS WITH EMPHYSEMA

Patients with emphysema are being treated at the Department of Pulmonary Medicine with an innovative technique known as volume reduction surgery, which results in less effort in breathing and reduced dyspnoea.

Diagnostic Tests Offered

PULMONARY FUNCTION TESTS

Pulmonary Function Tests (PFT's) are useful in diagnosing various lung disorders. They also measure the degree of impairment due to disease. The progression of a disease and the effectiveness of treatments can be carefully observed with regularly scheduled testing. Pulmonary Function Tests are also used frequently to assess preoperative risk and are done supervised by chief respiratory technician.

FLEXIBLE VIDEO BRONCHOSCOPIES

Flexible Video Bronchoscopic investigation and treatment provides an out-patient Bronchoscopy service. Bronchoscopies are useful in the investigation of such problems as coughing or an abnormal chest x-ray and are performed under local anesthetic. A modern endoscopy suite with fluoroscopy is available for out-patient and in-patient bronchoscopies. A fiberoptic Bronchoscopy system with video and photographic capability is used for performing bronchoscopies, which helps in the complete visual assessment of air passages and in making an accurate diagnosis of infection, cancerous changes, and also in obtaining biological samples for pathological examinations.

EBUS (ENDOBONCHIAL ULTRASOUND)

EBUS (Endobronchial ultrasound) is ultrasound combined with Bronchoscopy to obtain images in and around the bronchial tree or the lungs. This is an advanced diagnostic technology that provides real-time imaging of abnormalities inside the chest.

The greatest benefit of using EBUS for evaluating the central airway is that the patient can potentially avoid having to undergo a more invasive surgical procedure and can eliminate the need for additional phases of testing. In addition, because EBUS is performed under conscious sedation,

patients recover quickly and can generally go home the same day. There are several indications for endobronchial ultrasound (EBUS).

- Staging of lung cancer
- Diagnostic evaluation of endobronchial lesions, peripheral pulmonary nodules, mediastinal abnormalities lymphadenopathy)
- Guidance of endobronchial therapy

SPIRAL AND HIGH RESOLUTION CT



A number of out-patient programs are available at the Department of Pulmonary Medicine for patients suffering from advanced emphysema, asthma and chronic bronchitis.

Spiral and High Resolution CT Computed Tomography (CT) imaging, also known as 'CAT scanning' (Computed Axial Tomography), provides high resolution imaging for cases of lung diseases, mediastinal diseases, and chest wall tumors. The software for spiral CT creates a CT endoscopy and a CT bronchoscopy, as well as a continuous helical acquisition which provides a 3-D volume scan allowing a radiologist to better localize very small tumor.

SCINTIGRAPHY TEST

The Ventilation Perfusion Scan done in the Department of Nuclear Medicine is extremely useful in the detection and localization of pulmonary thromboembolisms as well as primary and secondary tumors.

EVALUATION OF BREATHING DISORDERS AND CHRONIC RESPIRATORY AILMENTS

EVALUATION AND TREATMENT OF SLEEP DISORDERS

The latest facilities are available for evaluation of Sleep Apnea in collaboration with the Department of Neurosciences.

Procedures Done

- Spirometry (PFT)
- Diffusion capacity of carbon monoxide (DLCO)
- Lung volume (FRC, TLC)
- Six minutes walk test (6 MWT)
- ABG
- Allergen sensitivity tests
- Fine needle aspiration biopsy (FNAB)
- Pleural aspiration and biopsy
- Lung biopsy
- Bronchoscopy
- Whole lung lavage (WLL)
- Intercostal tube drainage and pigtail drainage Pleurodesis
- Polysomnography (Sleep study)
- Ventilation Perfusion scan
- Multidetector CT scan (MD CT)
- Pulmonary angiogram
- CT guided Lung biopsy
- CT guided pigtail therapy (pleural)
- Oxygen titration
- CPAP titration
- Pulmonary rehabilitation for COPD and ILD patients
- Bronchial artery embolization for Hemoptysis

Specialty Clinic

Department of Pulmonary Medicine is conducting Quit Tobacco Clinic as a part of the activities of Anti Tobacco Movement at Amrita (ATMA). It is a comprehensive program motivating people to quit tobacco use and in which the patient, family members, doctor, medical social worker and the psychologist are involved. The program involves a combination of problem identification and solving, patient education, counseling and medication. Medication support is provided to avoid withdrawal symptoms as and when required. The intervention is done both at individual and group levels. People from all walks of life like students, employees, professionals, businessmen and unskilled laborers are attending this clinic and enjoy the benefits of smoking cessation.

RHEUMATOLOGY & CLINICAL IMMUNOLOGY

THE DEPARTMENT OF RHEUMATOLOGY AND CLINICAL IMMUNOLOGY AT AMRITA IS UNIQUE IN MANY WAYS. IT IS THE ONLY ACADEMIC RHEUMATOLOGY DEPARTMENT IN KERALA AND THE ONLY CENTER IN SOUTH INDIA WHERE QUALIFIED ADULT AND PEDIATRIC RHEUMATOLOGISTS WORK TOGETHER TO PROVIDE COMPREHENSIVE, STATE-OF-THE-ART CARE TO ALL ARTHRITIS AND AUTOIMMUNE DISEASES.

We undertake both routine and specialized laboratory investigations required to diagnose and treat all common and unusual rheumatological conditions. Our orthopedic team helps the patients with arthroscopies and joint replacements as and when required. Excellent ancillary support with full-fledged physiotherapy and occupational therapy departments make the care for arthritis patients complete.

Features

- Comprehensive arthritis care
- Exclusive pediatric rheumatology clinic
- State-of-the-art immunological laboratory
- Intensive care services
- Biologic therapy

Services Offered

- Adult rheumatology OPD
- Pediatric rheumatology OPD
- Intra-articular injections
- Inpatient care
- Laboratory evaluation of rheumatological conditions

Disorders Treated

- Rheumatoid arthritis
- Juvenile arthritis
- Systemic Lupus Erythematosus (SLE)
- Scleroderma (systemic sclerosis)
- Osteoarthritis
- Gout
- Back and neck pain (Spondylitis)
- Ankylosing spondylitis
- Psoriatic Arthritis
- Vasculitis
- Fibromyalgia
- Sjogren's Syndrome
- Auto inflammatory conditions
- Antiphospholipid syndrome
- Behcet's syndrome



Specialty Clinics

- Childhood arthritis clinic
- Rheumatoid clinic
- SLE (Systemic Lupus Erythematosus) clinic
- Scleroderma clinic
- Early arthritis clinic

SPEECH PATHOLOGY & AUDIOLOGY

CLINICAL SERVICES OF SPEECH PATHOLOGISTS AND AUDIOLOGISTS COMMENCED AT AMRITA IN 1999. THEY FUNCTIONED AS DISCRETE UNITS IN DEPARTMENTS OF NEUROLOGY, EAR, NOSE AND THROAT (ENT) AND HEAD AND NECK SURGERY UNTIL A SEPARATE DEPARTMENT OF SPEECH PATHOLOGY AND AUDIOLOGY WAS CONSTITUTED IN JULY 2011.

The Department is currently full-fledged with state-of-the-art facilities and can be considered as one of the best equipped in the country. The department works closely with the Departments of ENT, Neurology, Head and Neck Surgery, Neurosurgery, Radiology, Pediatrics, Clinical Psychology, Physical Medicine and Rehabilitation, Pediatric Genetics, and General Medicine.

Services Offered

The department offers comprehensive range of services covering all aspects of speech pathology and audiology.

A. Diagnostic Audiology

The department has facilities to assess peripheral and central auditory pathways and vestibular system. Infant hearing screening programs have been initiated.

CLINICAL SERVICES INCLUDE:

Puretone audiometry

Puretone audiometry is one of the most basic tests to identify hearing threshold levels of an individual enabling determination of degree, type and configuration of hearing loss. It provides basic inputs regarding site of lesion.

Speech audiometry

Speech audiometry comprises of tests such as Speech Reception Threshold (SRT), Speech Discrimination Score (SDS), Speech Detection Threshold (SDT), Speech Discrimination in Noise (SDIN) and Performance-Intensity for Phonetically Balanced words (PIPB). SRT and SDT are useful indices for estimating reliability of puretone audiometric thresholds. SDS provides information regarding speech discrimination ability. SDIN and PIPB are reliable tools for differentiating cochlear versus retrocochlear pathology and are very sensitive for auditory nerve lesions.

Behavior observation audiometry

The behavior observation audiometry test is particularly useful for estimating degree of hearing sensitivity in infants. Based on behavioral responses, thresholds are assessed.

High frequency audiometry

High frequency audiometry is useful for early detection of hearing loss in pathologic conditions such as presbycusis, Noise Induced Hearing Loss, ototoxicity and tumors affecting auditory pathway.

Central auditory tests

Central auditory tests comprises examinations such as Dichotic Digits Test and Gaps-in-Noise test. These tests are effective for unraveling pathologies related to the auditory nerve and central auditory system.



Immittance audiometry

Immittance audiometry is comprised of tests such as tympanometry, acoustic reflexometry, Acoustic Reflex Latency Thresholds (ARLT), Acoustic Reflex Decay (ARD), Eustachian tube function tests and middle ear resonant frequency estimation. Tympanometry helps to identify pathologies related to external ear and middle ear. The facility for multiple frequency tympanometry helps in evaluation of neonates and infants. An estimation of acoustic reflex thresholds provides objective means of differentially diagnosing cochlear versus retrocochlear pathology (up to caudal brain stem). ARLT and ARD are additional confirmatory tools for retrocochlear lesion. Eustachian tube function can be assessed in intact and perforated tympanic membrane cases. Resonant frequency estimation provides additional clues to differentially diagnose middle ear disorders.

Otoacoustic Emission (OAE) evaluation

OAE is a useful tool to assess cochlear outer hair cell functioning. Facilities to perform Distortion Product OAE, Transient Evoked OAE and contralateral suppression of OAE are available. Contralateral suppression measurements provides inputs regarding efferent auditory pathway functioning. Infant hearing screening program have also been initiated by performing OAE screening.

Auditory Brain stem Response (ABR)

ABR is an electrophysiological tool to assess functions of the auditory nerve and brain stem auditory pathway. To estimate hearing threshold in cases like congenital atresia of ear canal, bone conduction ABR is available.

Auditory Steady State Response (ASSR)

The ASSR electrophysiological tool provides frequency specific information regarding hearing sensitivity. It is also vital for site of lesion estimation of central auditory pathway.

Middle Latency Response (MLR) and Late Latency Response (LLR)

MLR and LLR electrophysiological measures are useful for assessment of sub-cortical auditory pathway and auditory cortex respectively.

Vestibular Evoked Myogenic Potential (VEMP)

VEMP is an important tool for assessment of symptoms such as dizziness/imbalance. Facilities to perform C-VEMP and O-VEMP are available. It evaluates functioning of saccule and utricle of vestibular system.

B. Rehabilitative Audiology

The department has facilities to do trial and fitting of comprehensive range of digital and programmable hearing aids, cochlear implant mapping and Auditory Verbal Therapy. Clinical services include:

Trial and fitting of hearing aids

Hearing aids of all types with the latest technology from various companies are available. Aids are programmed using a Hearing Instrument Programmer (HIPRO). For properly setting hearing aid gain and measuring the electroacoustic characteristics of hearing aids, an insertion gain optimizer and hearing aid analyzer are available.

Ear mould lab

Hearing aid fitting is only complete if it is coupled with a custom ear mould. The department has a full-fledged, ultra violet ear mould lab with facilities to make both hard and soft ear moulds. Custom made ear protection devices are also available.

Cochlear implants

A cochlear implant is a very effective management tool for hearing impairment, particularly with bilateral, profound sensorineural hearing loss. The department is involved in cochlear implant pre-operative evaluation and counseling, intra-operative Neural Response Telemetry, electrical auditory brain stem response evaluation, cochlear implant mapping and auditory verbal therapy.

Bone-Anchored Hearing Aids (BAHA)

BAHA are primarily suited to people who have conductive hearing loss and unilateral Sensorineural Hearing Loss. The department is involved in determining candidacy, proper fitting and follow up support.

Speech and Language Assessment and Intervention

The department has facilities to treat and determine the pathophysiology associated with speech, language, voice, fluency, articulation and swallowing disorders. Apart from therapy materials and speech and

language tests for differential diagnosis, the department has:

Dr. Speech software for diagnostic application and intervention

Dr. Speech evaluates vocal function estimates of hoarseness, harshness, breathiness, regularity of vocal fold vibration and glottal closure time. Dr. Speech includes seventy voice-activated video games to provide real-time reinforcement of a client's attempts to produce changes in pitch, loudness, voicing, voicing onset, maximum phonation time, sound, vowel tracking and phonetic exercise.

Electroglottograph (EGG)

An EEG is used for monitoring of variations of vocal fold contact.

Facilities and Equipment

The department has nine acoustically treated, sound proof rooms, eight cubicles for speech language intervention and an ultraviolet ear mould lab.

Acoustically treated sound proof rooms

The rooms are comprised of two audiology suite rooms (double room), one audiology lab, one hearing aid trial room, two electrophysiological rooms and one room for immittance audiometry. In addition, there is one speech lab and one recording room.

- Grason Stadler Incorporates (GSI)-61 clinical audiometers
- Entomed audiometer
- GSI-38 immittance audiometer
- GSI Tymptstar immittance audiometer
- Intelligent Hearing System OAE, ABR, electrical ABR, MLR, LLR and VEMP
- Fonix FP-35 hearing aid analyzer
- Hearing instrument programmer
- Dr. Speech and EGG
- PRAAT software (scientific software program for the analysis of speech in phonetics)
- Cochlear implant from the company 'Cochlear'
- Digital and programmable hearing aids of various international brands
- Otoscopes

STROKE MEDICINE

THE DIVISION OF STROKE AT AMRITA HOSPITAL IS THE FIRST DEDICATED DEPARTMENT IN INDIA TO PROVIDE THE MOST COMPREHENSIVE STROKE CARE.

The department provides care exclusively for stroke patients starting from the onset (hyper acute phase) to the rehabilitative and follow-up phase. It also carries a continuous care program for life after stroke, including vascular risk reduction clinic and integrated stroke rehabilitation. Using the most modern facilities for imaging, learned expertise and skill mix, the team uses the best evidence-based methodologies and most modern approaches in the management of stroke.

HOSPITAL CARE

The patients with stroke can make a help call to the help line number (7034028560) where ambulance service is offered. The trained EMT staff will bring the patients to the acute stroke care team. Amrita offers free ambulance service to all stroke patients informed through the stroke hotline.

EMERGENCY DEPARTMENT CARE

Acute stroke imaging and round the clock stroke neurology service. Perfusion diffusion imaging services are available.

STROKE UNIT CARE

Stroke unit involves a dedicated ICU and a stroke in-patient ward with a team of dedicated doctors and multidisciplinary experts including stroke specialists, neurologists, neurosurgeons, neurophysiotherapists, occupational therapists, speech and language pathologists, swallowing therapists, clinical psychologists, clinical pharmacologists, medical social workers, physician assistants and neurovascular interventionists. The department provides state-of-the-art care in stroke management.

ENDOVASCULAR STROKE THERAPY

State-of-the-art neurointervention cath lab with endo-vascular treatment facility.

Intra arterial thrombolysis and stent retrieval (solitaire).

TELESTROKE SERVICES

Amrita stroke services has provided expert advice for acute stroke patients across the Kerala rural district hospitals since January 2014. The department also runs stroke a TIA tele-clinic with a pan-African network. Any hospital in the world can get stroke care advice from Amrita Hospital Stroke Department if there is a connectivity.

INTEGRATED CUSTOMIZED REHABILITATION PROGRAM

This valuable service is offered by only Amrita Stroke Center where stroke patients at any stage are benefited in terms of quality of life. There is a full neuro-assessment, plus rehabilitation planning setting realistic goals for further rehabilitation. There is an integration of ayurveda, yoga, medication, art and music therapy in this center.

The department actively participates in ICMR (National Center for Disease Informatics and Research) projects and has an active representation at the National Research Advisory Panel for Stroke (ICMR). Research into stroke causation is currently underway.

We Offer

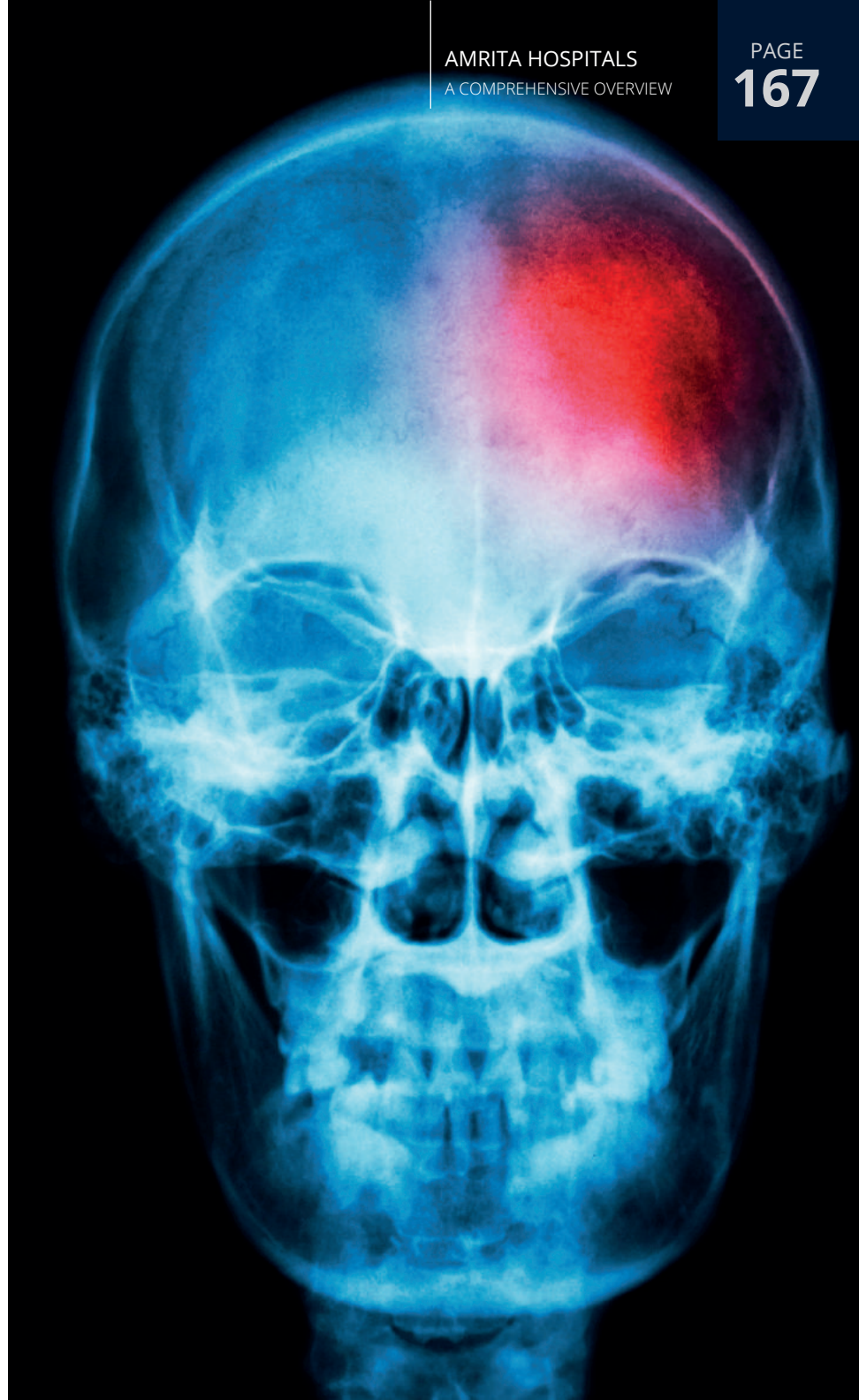
- Free 24x 7 pre-hospital ambulance service to emergency
- 24 x7 Stroke Thrombolysis and Endovascular Service
- 24 x 7 Stroke Prevention (Rapid Access Ministroke) Service
- 24X7 Emergency Stroke Ambulance Service
- Hyperacute Stroke ICU staffed with modern monitoring facilities and trained specialist staff
- Stroke Followup Clinic
- Outpatient Stroke Rehabilitation
- Spasticity Therapy (including Botox for spasticity)
- Anticoagulation Advisory Service and follow up Service

Procedures/interventions performed

- Carotid endarterectomy
- Carotid stenting Intracranial interventions (Stenting, aneurysmal treatment, AV malformation treatment)
- PFO closure 24 x 7 Stroke Thrombolysis including Intra-arterial thrombolysis
- Emergency Hemicraniectomy

Diagnostic Services

- 256 slice CT and CT Angiography
- 3 Tesla MRI, MR Angiography
- Transcranial Doppler
- Functional MRI; MR Spectroscopy
- PET-MRI and PET-CT scanners
- SPECT scanner
- Modern Doppler Ultrasound
- Vascular Lab with C-arm Dyna CT scanner
- Functional Endoscopic evaluation of Swallow
- Trans-oesophageal echocardiography
- Holter/REVEAL device for hidden arrhythmias



UROLOGY & RENAL TRANSPLANTATION

THE DEPARTMENT OF UROLOGY OFFERS COMPREHENSIVE FACILITIES FOR THE DIAGNOSIS AND TREATMENT OF GENITOURINARY PROBLEMS IN ADULTS AND CHILDREN.

A highly qualified and experienced team of dedicated urologists and resident surgeons are available 24 hours a day. The latest state-of-the-art technology and equipment are available. The faculty sub-specializes in the fields of Pediatric Urology, Uro-oncology, Laparoscopic Urology, Endourology, Andrology, Female Urology, Neuro-urology and Reconstructive Urology. Along with the support of the Nephrology services, more than 400 renal transplantation operations have been successfully performed.

Features

- Comprehensive Uro-oncology services
- Upper and Lower Tract Endourology
- Laboratory Services for Microbiology and Biochemistry
- Laparoscopic surgery
- Renal Transplantation and Access Surgery
- Urolithiasis - Medical and Surgical Management

Services Offered

ENDOUROLOGY

Endoscopic treatment of stones and diseases of the kidney, ureter, bladder, prostate and urethra is performed through natural openings in the body avoiding the pain associated with open operations.

LAPAROSCOPIC UROLOGY

Keyhole surgery to remove and reconstruct urinary organs avoiding pain and long bed rest associated with open surgery. Nephrectomy, radical and partial nephrectomy, stone extraction, correction of hydronephrosis due to PUJ obstruction and re-implantation of the ureters are performed. More than 200 laparoscopic live donor nephrectomies and over 130 (the largest Indian experience) laparoscopic adrenalectomies have been successfully performed. We are one of the few centers in India who performs laparoscopic radical prostatectomy regularly for organ confined prostatic cancer.

UROLOGICAL ONCOLOGY

The Department of Urology has a separate division for urological malignancies. The cancers of kidney, bladder, prostate, ureters, adrenals, testis and penis are taken care of by this section. A subspecialty clinic in Uro-oncology is a unique venture in India. Being a research institute with state-of-the-art infrastructure, we have a highly focused team for the care of urological cancers. In cases where multimodality treatment is required, our institution has medical oncologists, radiation oncologists, state-of-the-art radiology, pathology and nuclear medicine departments, all under one roof. There are facilities for brachytherapy, conformal radiotherapy, Intensity-Modulated Radiation Therapy (IMRT) and therapeutic nuclear medicine procedures. The Uro-oncologists, radiation oncologists, medical

oncologists and Uro-pathologists discuss the cases and make combined decisions on the management of all the cases at the Tumor Board. Follow up and further management are done as per the current protocols.

KIDNEY CANCER

Surgeries like laparoscopic and open radical nephrectomies are the mainstay of treatment in kidney cancer. Complicated surgeries that require IVC exploration in locally extensive kidney cancers, open and laparoscopic partial nephrectomies (nephron sparing surgeries), and immunotherapy for advanced renal cancers are regularly done.

PROSTATE CANCERS

Diagnosis of prostate cancer by TRUSS-guided multicore biopsy, and staging by bone scan, PET-MRI, MD-CT have greatly improved the detection of early disease and improved the outcome. Laparoscopic prostatectomy, conformal radiotherapy, IMRT and brachytherapy all are routinely performed here.

BLADDER CANCER

The gold standard for the treatment of advanced bladder cancer is radical cystectomy with orthotopic neobladder reconstruction. After removal of the diseased bladder, the bladder is reconstructed with a loop of intestine in the same sitting so that the patient is able to pass urine naturally. The quality of life is greatly improved as the patient is free from using a pouch to collect urine and the resultant social embarrassments. In a certain subset of patients, bladder preservation is done with the help of chemo radiation after endoscopic resection of the tumor.

TESTICULAR CANCER

Survival after testicular cancer has recently improved after the use of multimodality approach. This requires individualized treatment decision and care involving chemotherapy, radiation, surgery and protocol based follow up. Reconstructions using prosthesis are also available to add to the quality of life.

ADRENAL TUMORS

Keyhole surgery has replaced open adrenalectomy as there is better visualization and enhances early recovery. We have the largest

series of laparoscopic adrenalectomies in India. Retroperitoneoscopic adrenalectomy is done only in a handful of centers in the world with Amrita being one.

PENILE CANCER

Partial or total penectomy and radical lymph node dissection is the standard treatment in carcinoma of penis. Recent advances in the treatments have reduced the treatment morbidity considerably. With the help of the plastic surgery team, the penis can be reconstructed from a forearm flap which makes the life of these unfortunate people comfortable. They can have a normal sex life with the help of penile implants.

LAPAROSCOPIC SURGERIES IN URO-ONCOLOGY

The laparoscopic surgery has changed the surgical concept in Uro-oncology. Most of the open surgeries like radical nephrectomy, nephro ureterectomy, radical prostatectomy and radical cystectomy are now done more and more with minimum morbidity and early return to work.

PEDIATRIC UROLOGY

Expertise for the surgical reconstruction of congenital defects of the urinary tract either by open surgery or laparoscopy is available. Hypospadias, vesico ureteric reflux, hydronephrosis, stone disease, urethral valves, etc. are routinely corrected at Amrita. The neonatal anesthesia and ICU support facilities are excellent. We are the only center in South India that has an active pediatric laparoscopic urology program.

RENAL TRANSPLANTATION AND ACCESS SURGERY

Renal transplantation is routinely performed once or twice a week with a dedicated transplant ICU. Laparoscopic kidney retrieval, vascular access and fistula creation are also done routinely. The hospital is involved in a cadaveric multiorgan retrieval and transplantation program in association with SORT (Society for Organ Retrieval and Transplantation), a voluntary NGO in Kerala.

FEMALE UROLOGY AND NEURO-UROLOGY

Treatment of women with incontinence of urine and management of

urinary problems in patients with neurological disease or injury is practiced as a sub-specialty. "Life tech Janus IV" urodynamic equipment available at the center correctly aids in managing these patients. Expertise for sling operations, TVT (TransVaginal Tape), TOT (TransObturator Tape), SPARC (SupraPubic Arc sling) and augmentation and continent urinary diversion procedures are available.

ANDROLOGY

Evaluation methods for erectile dysfunction including pharmaco-cavernosometry, pharmacocavernosography and procedures like penile implantation surgery are done regularly.

GENERAL UROLOGY

Stones in the kidney, ureter, bladder, common diseases of the urethra (stricture), prostate (cancer, enlargement) and bladder are routinely treated. All the advanced treatment options for stones in the kidney and other parts of the urinary tract are available. The latest "Dornier Compact Delta" ESWL machine is available for the most effective crushing of stones without surgery.

ANCILLARY SERVICES

Advanced urological imaging, pathology, microbiology, nuclear medicine, anesthesia, cardiology, nephrology, oncology and pediatric services contribute to complete a team approach to our patients.

Facilities

OUTPATIENT PROCEDURES

The outpatient department has facilities to take care of all office urology procedures. It is supported by trained staff including two staff nurses, blood draw facilities, full-fledged procedure rooms, dedicated X-ray machines, ultrasound equipment, etc.

URO RADIOLOGY

Ultrasound machine: The department has its own B-K ultrasound machine apart from the facility available in Radiology to do ultra sound guided procedures like TRUSS guided prostate biopsy, percutaneous nephrostomy, ultrasound guided aspirations, etc. It has a dedicated TRUSS probe for accurate prostate biopsy to diagnose prostate cancer. The department has

a separate radiology suite for doing procedures like MCU (micturating cystourethrogram) and RGU (retrograde urethrogram). It is supported by a radiology department with all modern equipment including:

- CT: MD CT (Siemens sensation 64) , Siemens CT scan
- MRI: GE HD xT, Magnotom symphony classic
- Most modern invasive radiology suite
- Ultra sound section having 4 ultra sound machine
- A mobile USG and X ray unit
- Image guided radio frequency ablation equipment
- Siemens double head Gamma camera: Used for all procedures including diagnostic services like bone scan, DTPA scan, DMSA scan, MAG3 and therapeutic procedures in carcinoma prostate.

URO DYNAMICS

Two uroflow meters and Labourie Janus urodynamics machines are used for assessing the urine flow and evaluating neurogenic bladder

FLEXIBLE CYSTOSCOPY

Two Karl Storz flexible cystoscopes are used in the evaluation of hematuria to rule out bladder malignancies and in the follow up of bladder cancer to diagnose early recurrence. They help to avoid anesthesia during routine cystoscopy as the procedure is painless.

EXTRA CORPOREAL SHOCK WAVE LITHOTRIPSY (ESWL):

A Dornier compact sigma lithotripter is used for extra corporeal lithotripsy.

Procedures Performed

LAPAROSCOPIC UROLOGY

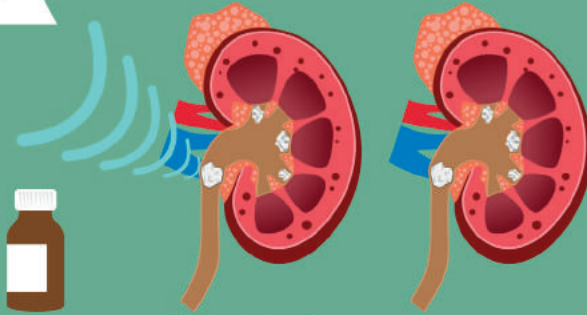
The department is recognized as one of the apex centers in laparoscopic urology. Both laparoscopic and retroperitoneoscopic surgeries including:

- Laparoscopic and retroperitoneoscopic adrenalectomy
- Laparoscopic and retroperitoneoscopic nephrectomy and radical nephrectomy, laparoscopic nephron sparing surgeries
- Laparoscopic pyeloplasty
- Laparoscopic radical prostatectomy
- Laparoscopic donor nephrectomy

KIDNEY STONES



TREATMENTS



Medicine

Ultrasound
shock waves

CAUSE OF KIDNEY STONES



Not drinking
enough fluids



Genetic



Overweight



Medication



Foods



See a doctor



SYMPTOMS



Vomiting



Backache



Fever



Painful urination



Blood in
the urine

ENDO UROLOGY

- Percutaneous nephrolithotomy PCNL
- Ureteroscopy
- Flexible ureteroscopy and laser lithotripsy
- Transurethral Resection of the Prostate TURP
- Transurethral Resection of Bladder Tumor TURBT
- Endopyelotomy and retrograde endopyelotomy

ONCO UROLOGY

Prostate Cancer

- Open and laparoscopic radical prostatectomy
- Intensity Modulated Radiation Therapy (IMRT) and Conformal Radiotherapy
- Hormonal treatment
- Chemotherapy
- Radio isotope treatment

Kidney Tumors

- Radical nephrectomy: open and laparoscopic
- Nephron sparing surgeries: open and laparoscopic
- Radio frequency Ablation (RFA)
- Immunotherapy

Testicular Tumors

- Inguinal orchiectomy
- Retroperitoneal lymph node dissection
- Chemotherapy and radiotherapy

Bladder Cancer

- Radical cystectomy and conduit
- Orthotopic neobladder
- Bladder preservation

Penile Cancer

- Penectomy and penile reconstruction

RECONSTRUCTIVE UROLOGY

- Vesico ureteric reflux : STING therapy, laparoscopic and open ureteric reimplantation.

- Urethral stricture : Perineal urethroplasty, Buccal mucosal graft urethroplasty, Transpubic urethroplasty.
- Pelvi uretric obstruction : Laparoscopic and open pyeloplasty Endopyelotomy.
- Female urology : TVT (TransVaginal Tape), TOT (TransObturator Tape), SPARC (SupraPubic Arc sling) surgery, Reconstructive surgery for Vesicovaginal fistula (VVF) and Urovaginal fistula (UVF).

ANDROLOGY

- Pharmaco cavernosography and cavernosometry
- Penile prosthesis implantation
- Penile vascular reconstruction
- Surgeries for Peyronie's Disease

PEDIATRIC UROLOGY

- Pediatric pyeloplasty: Lap/open
- Pediatric adrenalectomy: Lap/open
- PUV fulgration
- Ureteric reimplantation: (Lap/open) and STING surgery
- Hypospadias repair

Specialty Clinic

- Pediatric Urology
- Uro-Oncology Clinic

Outreach Program

PROSTATE CANCER DETECTION CAMP

We have started periodic prostate cancer detection camps in places near to the hospital. They are conducted free of cost including the investigations for cancer detection

AMRITA CLINICAL LABORATORY SERVICES

BY CONTINUOUSLY INTRODUCING NEW AND IMPROVED TESTS, TECHNOLOGY AND SERVICES, AMRITA CLINICAL LABORATORY SERVICES HAS ESTABLISHED A REPUTATION AS A LEADING INNOVATOR IN THE CLINICAL LABORATORY SERVICE.

Diagnostic testing is essential to the basic management of patient care, allowing physicians to detect disease earlier, make diagnoses, prescribe therapies and monitor results. The Amrita Clinical Laboratories and Reference Center offers public access to a diverse menu of laboratory services. The labs are equipped with state-of-the-art, fully automated chemistry and hematology analyzers. Comprehensive testing capabilities include more than 600 clinical diagnostic tests covering various fields of medical specializations some of which are not offered elsewhere in Kerala. Bi-directional interfacing of analyzers with the Laboratory Information System (LIS) in the lab enables to reduce errors and improve the turnaround time of reporting.

Participation in external proficiency testing programs such as BIO-RAD Laboratories (USA) ensures reliability and reflects the accuracy and precision of tests conducted. Amrita Labs have been awarded a Gold Seal Commendation consecutively since 1998, which reflects the quality standards maintained there. The laboratory ensures the highest quality standards in a setting conveniently located within the hospital, we offer service at a price considerably lower than the prevailing market price.

Laboratory Quality Policy

The laboratory services carry out its medical testing activities meeting the requirements of ISO 15189:2003, NABL Specific Criteria, Regulatory Authorities. They are dedicated and committed to provide diagnostic services, giving top priority to the quality of the results for all the samples received by the laboratory.

The laboratory services take adequate measures to ensure that quality care is given to all patients without any distinction. The services offered by the laboratory are fine-tuned to ensure that utmost care is taken so that the results are reliable, accurate and dependable.

Testing and Analysis

The laboratory services provide a rapid and comprehensive analysis of the chemistry and cellular components of blood and body fluids. This is achieved by accurate random access spectrophotometric chemistry analyzers, specialized immuno-analyzers, automated coagulation analyzers and automated CBC and 5-part differential hematology instruments. These instruments directly interface with Amrita Laboratory Information System. Results after verification by competent staff can be viewed at all terminals located in wards and outpatient departments. Automated workflow is the standard procedure in the laboratory. Automation allows for the standardization of test procedures, eliminates operator variation and increases the speed, accuracy and precision of the analysis.

The leadership, growth and continuing development of the laboratory services are provided by a highly competent staff of MDs and PhDs, many with international degrees in Pathology, Microbiology, Biochemistry, Molecular Biology and Transfusion Medicine. They include:



COBAS AUTOMATED LAB SOLUTION

- Pathologists board-certified in anatomical and clinical pathology
- A pathologist with special training in transfusion medicine and immuno-hematology
- A pathologist with special training in laboratory hematology
- Board certified microbiologists with specialized training in kidney pathology
- Molecular geneticist

Amrita Labs participates in an international external control program. The staff continuously strives to improve quality and maintain the highest standards in laboratory practice. They continue to upgrade instruments and to interact with clinicians regarding introduction of new test parameters. In addition, educational programs and ongoing training are conducted to maintain a well-qualified technical staff.

Cobas Automated Lab Solution

Today, laboratories are challenged to deliver reliable and high-quality diagnostics, while at the same time, ensuring efficient analytical work flow. To meet these demands, the fully automated lab solution COBAS MODULAR PLATFORM, has been developed. It is an intelligent and flexible solution based on a common architecture that delivers tailor-made solutions for diverse workloads and testing requirements. The COBAS MODULAR PLATFORM is designed to reduce the complexity of laboratory operations and provide efficient and compatible solutions for network cooperation.

PRODUCT CHARACTERISTICS

- High speed: From 170 to 1,200 immunoassay tests/hour and 2,000 to 9,800 clinical chemistry tests/hour depending on configurations
- Up to 280 reagent channels
- More than 120 clinical chemistry and more than 100 immuno-chemistry assays

BENEFITS OF MAXIMIZED PRODUCTIVITY AND EFFICIENCY:

- Maximizes throughput and consolidation power without compromising work flow
- Manages peak times efficiently
- Improves sample turnaround time and availability

- Consistent and predictable turnaround times for smooth laboratory operation

Digital Pathology Solution

Digital Pathology Solution is a virtual microscope which is used by converting a physical slide into a digital slide. This can be viewed, managed and analysed using a computer monitor with provided software. Digitization helps clinicians take informed decisions and discuss and assess treatment options, resulting in more accurate, better, faster, cheaper diagnosis and prediction of diseases like cancer. This will also help the pathologists to collaborate with other pathologists across the globe by just a click of the mouse for a second review or consultation in real time.

The digital data of the slide along with the molecular pathology data will help in providing the prescriptive medicine for cancer treatment. Fast turnaround times will aid in pursuing new ways of collaboration and knowledge sharing. Processing immunohisto-chemistry slides, which normally is very time consuming, can now be done immediately, helping pathologists invest their precious time in quality reporting.

Intellivue Critical Care and Anesthesia (ICCA)

ICCA helps by providing advanced clinical decision support software and structured documentation and analysis tools across the care continuum. This will help in removing the floor sheet which is used in ICUs, and the data from the equipment (anesthesia, ventilator, patient monitor, syringe pump, infusion pump) will be fed directly into the server electronically. Thus, the ICU becomes a paperless ICU or E-ICU. All the data will be electronically maintained centrally which will help in taking informed decisions by the management and helps the clinicians to transform the clinical data into actionable information for diagnostic purposes. Future plans for this project will help clinicians treat patients remotely. This will help in standardizing the documentation in the ICU.

The Departments That Comprise Amrita Labs

- Biochemistry
- Pathology
- Microbiology and Serology
- Metabolic Disorders
- Toxicology and Poison Center



COBAS AUTOMATED LAB SOLUTION

- Human Cytogenetics
- Molecular Diagnostics
- Transfusion Medicine
- Hematology
- Virology

Biochemistry and Hematology

The Biochemistry and Hematology laboratory services provide a rapid and comprehensive analysis of the chemistry and cellular components of blood and body fluids. This is achieved by accurate random access chemistry analyzers, specialized immuno-analyzers, automated coagulation analyzers and automated CBC and 5-part differential hematology instruments. These instruments directly interface with Amrita Laboratory Information System. Results after verification by competent staff can be viewed at all terminals located in wards and outpatient departments. Automated work flow is the standard procedure in the laboratory. Automation allows for the standardization of test procedures, eliminates operator variation and increases the speed, accuracy and precision of the analysis.

Pathology

Histopathology and Cytopathology are the science concerned with the study of microscopic changes in diseased tissues, body fluids etc. Here the tests like biopsy, FNAC, immuno-histochemistry etc are done. Automated tissue processing and a highly skilled staff in the histopathology laboratory ensure excellent quality tissue sections and a rapid turnaround time for reporting biopsy results. The renal pathology services of Amrita are used by nephrologists throughout Kerala.

Microbiology and Virology

Microbiology and Serology labs provide services for the diagnosis of infectious diseases of a bacterial, viral, parasitic, fungal or tubercular nature. In addition to routine diagnostic methods, automated systems aid in the rapid detection of infectious agents in blood or body fluids. Serological investigations are also performed for a variety of infectious agents including viral agents such as HIV and Hepatitis viruses. Automated systems for identification of microorganisms and their susceptibility to

antimicrobials further expedite reporting which may be life saving for patients.

Metabolic Disorders

The Metabolic Disorders Laboratory offers facilities rarely rendered in India. The Amrita Metabolic Disorders Lab provides general neonatal screening and detection of various metabolic disorders. A unique feature of the laboratory is the active interaction with the clinicians, translating into reliable diagnosis and better management.

Toxicology and Poison Control Center

The Toxicology and Poison Control Centre offers unique facilities in the area of toxicology to all hospitals, government doctors, private practitioners as well as the lay public of Kerala State. It is for the first time that such a department has been started in a hospital in Kerala. In less than a year, the Centre was officially recognized by World Health Organization (WHO) as an authorized Poison Control Centre. The facilities offered are Toxicological analysis of blood, urine, stomach contents, water samples etc. and treatment for all kinds of poisoning. The department utilizes a software package from USA which has information on more than



800,000 poisonous substances encountered worldwide. This enables the department to answer any query on poisons or poisoning in a matter of seconds via e-mail, phone or fax.

Human Cytogenetics

The Department of Human Cytogenetics is involved in research, academic activities and provides state-of-the-art genetic diagnostic services to the patients attending Amrita and other hospitals. Currently performing a comprehensive list of cytogenetic studies including fluorescent in situ hybridization (FISH), amniotic and chorionic villi cell culture and bone marrow cytogenetics. The laboratory is equipped with color imaging and computerized Karyotyping system, which not only enables a broader spectrum of our services, a substantial shortening of turn around time of the results, but also provides the referring physician with higher quality of results. This FISH (Fluorescence in Situ Hybridization) technique efficiently enables cytogeneticists to identify various numerical and structural alterations.

Molecular Diagnostics

Molecular Biology has revolutionized by the concept that most of the human diseases have a genetic basis. Gene manipulation and recombinant DNA technology has rapidly increased the sophistication of molecular investigations. The genetic disorders and the presence of pathogens causing various infectious diseases can be diagnosed using nucleic acid sequence as tools. It is possible to perform HLA typing or compare allele profile for organ/stem cell transplantations, establish the relatedness between individuals or simply detect the presence or absence of a particular gene using sequence based typing methods. The Molecular Biology lab offers tests under the broad categories like HLA tissue typing for transplantation programs, gene testing, cancer genetics, identification of the specific pathogens, DNA isolation from



amniotic fluid and blood samples. These tests are performed by PCR based methodologies such as RT PCR and PCR-RFLP.

Transfusion Medicine / Blood Bank

Blood banking and Transfusion medicine are an important aspect of Amrita. The Blood Bank meets all the blood product requirements that the high volume of surgeries demand. In addition, they provide blood components to other health care facilities in the area. Stringent procedures are used for screening out infectious diseases in the blood donor population. Computers are used in the Amrita Blood Bank for record keeping, quality control, and blood inventory and test results. Test orders, test reporting and specimen collection are also computerized.

Advanced gel technology is used for blood grouping and crossmatching. We have the facility to identify antibodies to minor red cell antigens (like Kell, Kidd, C, E etc) which has the potential to cause haemolytic disease of the newborn and haemolytic transfusion reaction. The monitoring of antibody levels by Coombs titration and ABO isoagglutination titration is also performed in our lab.

CENTER FOR DIGITAL HEALTH (CDH)

THE DIGITAL REVOLUTION HAS DRAMATICALLY CHANGED SOCIETY AND INDIA IS AT THE FOREFRONT OF THIS MOVEMENT.

For a variety of reasons, despite the enormous volumes of data generated in healthcare and the sometimes life-and-death nature of the field, healthcare systems and providers have been slow to adopt information technology as an adjunct to help them manage data to the best advantage. Amrita is a leader in healthcare education, research and information technology and seeks to build on this foundation of expertise to address crucial problems of healthcare organisation, delivery and outcomes assessment that exist in India today by starting a Centre for Digital Health based at the Kochi campus of Amrita Vishwa Vidyapeetham.

Amrita intends to be a leader in imparting state-of-the-art education to learners at all levels of training and wishes to attract the best students and faculty to our institution. In pursuit of this goal, AIMS has established the CDH which is a center of excellence for the provision of multidisciplinary medical education of an international standard. It focuses on improving patient care at the bedside by a judicious combination of enhanced basic and advanced clinical skills, procedural aptitude, development of electronic medical records, and the use of point-of-care decision support modalities. These facilities are available not only to the students and faculty at AIMS, but also to trainees and physicians from elsewhere in India and abroad.

The following components of CDH function synergistically to build outstanding programs in medical training, procedural skills, applied medical informatics, continuing medical education, clinical practice, research and medical humanities. Though the challenges are many, the potential rewards to our society and profession are great.

Core components of CDH

DIVISION FOR MEDICAL INFORMATICS

Medical Informatics is the science that deals with medical information, its structure, acquisition, and use. This relatively new field is grounded in the principles of computer science, information science, cognitive science, social science, and engineering. This division addresses specific areas within this broad scope of practice, seeking to collaborate with internal and external groups in the refinement of a comprehensive electronic medical record system, clinical databases, and development of point-of-care decision support systems to enhance patient care in real-time outpatient and inpatient settings.

DIVISION FOR MEDICAL MULTIMEDIA

The multimedia group develops educational materials for both clinical and pre-clinical trainees ranging from fundamental concepts and procedures in medicine to those that are cutting-edge developments in patient care. This division also works with other departments at AIMS to develop strong multimedia-based education programs.

CENTER FOR ADVANCED SURGICAL EDUCATION (CASE)

CASE is one of the key components of CDH. It imparts advanced surgical

training, including cadaveric lab facilities in an operating room environment supported by world-class infrastructure. AIMS provides cutting-edge audio-visual support to CASE to enhance the learning environment.

The lack of such facilities has a negative impact on the training of Indian surgeons, as well as in the care of patients. Both groups either go abroad if affluent or suffer the consequences. AIMS is committed to addressing this imbalance and believes that CASE will be a significant step in the right direction.

CASE houses two operating tables, a seminar room, procedural, bone and endoscopy skills workstations and a multimedia library. Adjacent labs and lecture halls provide additional resources for the successful conduct of educational symposiums and workshops. Virtual reality facilities are also under consideration. CASE has cutting-edge audio-visual support to enhance the learning environment.

LEARNING RESOURCE CENTRE (LRC)

CDH has an LRC that complements the advanced surgical skills taught at CASE. The LRC includes a clinical skills lab, computer-based learning stations and dedicated classroom space. The skills lab currently has 20 imported models and mannequins, which will allow trainees at all levels of training to practice invasive and non-invasive diagnostic and therapeutic procedures. AIMS trainees will be able to practice with these devices on their own, as well as in the setting of structured educational classes. Trainees from other institutions as well as practising physicians at other hospitals or in the community can also attend scheduled CME programs at both CASE and the LRC tailored to various skill levels. Computer software programs relating to a wide range of topics are also part of the LRC. The LRC will host student evaluation sessions as well as faculty training programs. A core part of the LRC is a top of the line computerised cardiopulmonary simulator that can mimic any heart or lung sound to perfection, and transmit the sounds to even large groups of learners with infrared technology.

TELEMEDICINE

Telemedicine reduced to its simplest form is connecting geographically separate healthcare facilities via telecommunications, video, and information systems. It is the use of telecommunications technology

to provide, enhance, or expedite healthcare services by accessing off-site databases, linking clinics or physicians' offices to central hospitals, or transmitting x-rays or other diagnostic images for examination at another site. Healthcare professionals can make use of these linked telemedicine medical devices in the evaluation, diagnosis, and treatment of patients in other locations. These devices are enhanced through the use of telecommunications technology, network computing, and video-conferencing systems.

Amrita is one of the few medical institutions in India chosen by the Indian Space Research Organisation (ISRO), Government of India, to participate in its pilot "Telemedicine Project" which provides Tele-consultations to remote locations in India such as the Lakshadweep Islands and Leh-Ladakh. It is a vibrant department, active in medical care, education and research. We have Tele-education programs such as CME, conferences and workshops with world-class institutions such as the University of Southern California in Los Angeles, Beth Israel Hospital at Harvard University, Johns Hopkins University, Division of Digestive Diseases, the University of Illinois, Chicago, Division of Gastroenterology and Sanjay Gandhi Postgraduate Institute of Medical Science, Lucknow. Now, more than 32 centers in India are connected from Amrita.



TELEMEDICINE

COMMUNITY SERVICE OUTREACH PROGRAMS

AMRITA HAS WON ACCLAIM FOR ITS HIGHLY SOPHISTICATED SURGICAL AND DIAGNOSTIC CAPABILITIES. NOW MANY DEPARTMENTS ARE BEING APPRECIATED FOR THEIR ROLE IN PROVIDING FREE OR LOW-COST COMMUNITY-BASED PROGRAMS AND MEDICAL CAMPS.

Outreach medical services, health awareness campaigns, and projects for the poor in the remote parts of Kerala ensure that Amrita facilities reach the wider community of Kerala. Since opening its doors in 1998, Amrita and its satellite hospitals and clinics have treated more than 7.6 million patients. During that time, we have provided more than US\$ 95 million (Rs. 617 crores) worth of charitable medical care. More than 4.33 million patients received completely free treatment.

Over and above its existing charitable care in

October 2017 Amrita announced it would provide to 1940 economically challenged people, free care including 200 heart surgeries, 70 neuro surgeries, 20 kidney transplants, 50 head-and-neck surgeries, 50 major gastrointestinal surgeries, 50 urological and nephrological surgeries, 500 dialysis treatments and 1,000 cancer treatments.

SERVICE PROJECTS AT A GLANCE

- Health awareness training program for school students and teachers
- Special awareness program on tobacco, drugs, alcohol abuse and de-addiction
- Oral health education program
- Basic cardiac life support for policemen
- Palliative care training for students
- Volunteer's training program
- Tribal and rural organizer's training program
- Cancer education
- Clinical services
- More than 100 free medical camps annually throughout India
- Free health screenings in remote areas providing preventative healthcare
- Free palliative in-home care for the terminally ill
- Telemedicine for hospitals and more than 40 remote centers across India and in parts of Africa
- Curable blindness camps
- Rheumatic Fever/Rheumatic Heart Disease Research Project
- Amrita Mobile Medical Assistance Training of hundreds of tribal villagers as healthcare workers
- Amrita Diabetic Welfare Association
- Five branch hospitals (three in Kerala, one in Karnataka and one in Andaman Island) provide free care
- AIDS care-home in Trivandrum and cancer hospice in Mumbai
- Providing 100,000 women with training to become in-home nurses in more than 6,000 self-help groups
- Disaster Response

Medical Camps

Several departments in Amrita regularly undertake to conduct free medical camps. These include but are not limited to General Medicine and General Surgery (health check up, minor treatments and minor operation), Gynecology (free checkup, free deliveries, maternity assistance), Endocrinology, (diabetic detection), Cardiology (screening and referral to AIMS for cardiac surgeries and further treatment), Head and Neck (screening for oral cancer and cleft surgeries), Ophthalmology (free cataract and glaucoma surgeries), Dental (extractions, cleaning, dentures, basic treatments, etc.).

The camps are completely free and meant especially for the poor and needy. Medical consultations, lab tests, and follow-up consultations are all provided. In addition, free medicines are supplied and also free transportation of patients from the camp site to Amrita and back, if needed. There may also be medical exhibitions at the camp site with posters, placards, banners, leaflets and handouts. Health awareness classes are conducted by experts with audio visual aids and charts. Counseling is provided, sometimes in conjunction with self help groups and other community based organizations.



In addition, the Pediatrics Department conducts health programs at schools. ADWA, the Amrita Diabetic Welfare Association, joins hands with the Endocrinology Department to offer education for regulation of the disease of diabetes. Early cancer detection programs are conducted, for both men and women (prostate, ovarian and breast cancers). Blood donation camps are organized by the ABCD Forum, the Amrita Blood Collectors and Donors Forum. Free immunization drives administer polio vaccines and triple antigens to infants and children.

Home Care Program

Many terminally ill patients are too sick to come to the hospital regularly. The home care unit is therefore a vital component of the palliative care service. Most private hospitals are not interested in providing such a service since it is not financially remunerative. All services are provided free of charge to all patients and free medicines are also offered specifically to poor patients.

Curable Blindness Camps

Bimonthly free cataract surgery camps are conducted offering a ray of hope to the poor and needy, striving to overcome the huge backlog of cataract blindness in various parts of Kerala. In the camps consultations, medicines and treatment are provided for free. After completing 40 camps, we have screened more than 10,000 people and given free operations to over 1000 patients. Our target plan is to expand to 1000 free cases per month.

Amrita Mobile Medical Assistance

The first Amrita Mobile Medical Assistance camps were conducted in the tribal villages of Idukki and Wynad. The indigenous people are very poor. At each camp, about 300 patients attend, some walking great distances, and arrive full of hope for immediate hospital treatment. The patients are screened for any major disease and referred to Amrita for further management. For the rest of the people, free medicines and healthcare education are provided. We have also extended our service to other areas in Kerala like Alappuzha and Trichur districts.



ICMR Rheumatic Fever/Rheumatic Heart Disease Research Project

The Jai Vigyan Mission Mode Project on Control of RF/RHD under the Department of Science and Technology (Govt. of India) has been established to support the application of science and technology to directly benefit the economically weaker sections of society. The Indian Council of Medical Research (ICMR) has identified Amrita as one of the three national nodal centers for the Registry, the other centers being PGI, Chandigarh, and CMC, Vellore.

Amrita Diabetes Welfare Association

The Amrita Diabetic Welfare Association (ADWA) is an independent organization established through the Amrita Endocrinology Department to help sufferers become aware of what they must do when they become diabetic. Among the charitable activities of ADWA are:

- Diabeat, a regular quarterly journal on Diabetes
- Free insulin for poor patients whose need for insulin is mandatory but are unable to afford it

- **Diabetes Education in School Program** – This program aims to bring about lifestyle changes at an early age and target the coming generations in a preventative program
- **Counselling centers** run voluntarily by diabetic patients who are ADWA members, providing counselling to diabetics in the locality with regard to diet, lifestyle modification, and education about all aspects of diabetes
- **Medical camps** conducted periodically to provide consultation, treatment advice and education
- The department also holds Amrita Diafest, an exhibition on diabetes awareness which features medical exhibitions, cultural programs, competitions, debates, film shows and expert medical check ups and various other programs to give an opportunity to learn more about this silent killer.

Telemedicine

Amrita has set up one of the most extensive telemedicine networks in the country. The network makes available lab facilities, X-rays, ultrasound, tele-ophthalmology, etc. to patients in remote areas. The network serves not only all the Amrita satellite hospitals, but also several government and other hospitals located in remote areas, striving to bring better healthcare to all. Amrita telemedicine van is a common sight in medical camps conducted in rural and tribal areas.

Disaster Response

Amrita disaster relief teams have conducted hundreds of medical camps during disasters such as the 2004 tsunami, floods, epidemics and earthquakes.

Earthquake Assistance – In January 2001, during the Gujarat earthquake, 15 doctors and paramedical staff were airlifted to Anjar and Bhuj. They examined thousands of patients and performed more than 100 surgical procedures, and treated severe orthopedic injuries. Medical help was provided to the people of Gujarat for more than 6 months. During the Nepal earthquake in April 2015, Amrita arranged 100,000 doses of anti-tetanus injections.

Tsunami Relief – When the hospital learned of the December 2004 tsunami disaster, six ambulances were dispatched along with medical

teams to coastal areas hardest hit by the killer waves. One fully equipped ambulance with doctors and nurses went out each day to Vypin Island where many trauma cases needed medical attention. A 24-hour medical center was set up on the island with doctors, other resources and medicine. Additional ambulances and medical staff went to Karunagappally in Kerala and to Nagapattanam in Tamil Nadu. When the tsunami struck, over 30,000 patients were treated in nearly a hundred camps all over Kerala and Tamil Nadu.

Chikungunya epidemic – In 2007, when the chikungunya epidemic broke out, 35,000 patients received free treatment.

Floods – During Mumbai floods in 2005, medical teams treated more than 50,000 patients and distributed \$1 million in medicines. In 2008, nearly 50,000 patients in Bihar availed the free and specialized services made available to them during the Bihar flood relief activities organized by the Mata Amritanandamayi Math. When cyclone Aila struck West Bengal in 2009, our doctors were there to help. Two critically ill patients could be saved due to their timely intervention. Medical camps ran for 10 days, with our doctors treating approximately 3,000 people, dispensing more than US\$ 2,000 worth of free medicine.

In June 2013, flash flooding and landslides devastated the Himalayan state of Uttarakhand. Our first team of volunteers, including doctors, medics and nurses, reached the scene within days. They provided free medical consultations and medicine to approximately 8,000 disaster refugees in the first 20 days of July. Aside from at the base camp, our volunteers also traveled to a number of remote villages to provide medical care.



AMRITA CENTRE FOR NANOSCIENCES AND MOLECULAR MEDICINE (ACNSMM)

RECENT ADVANCES IN NANOSCIENCES AND AND MOLECULAR MEDICINE HAS CREATED AN EXPLOSION OF POTENTIAL APPLICATIONS IN THE FIELD OF MEDICAL SCIENCES AND ENGINEERING, INCLUDING NEW MEDICINES AND DIAGNOSTIC SYSTEMS, ENERGY AND ELECTRONICS.

ACNSMM is at the forefront of many of these areas. In the biomedical applications of nanotechnology, ACNSMM is one of the top Institutes in India because of its close integration with the super-specialty hospital, Amrita Institute of Medical Sciences (AIMS), and its strong emphasis on clinical applications. In recognition of this, the Ministry of Science and Technology, Government of India, has designated the Centre as a Thematic Unit of Excellence in Medical Bio Nanotechnology.

In the energy area, ACNSMM is the only Centre in India that is fully integrated with manufacturing capability of different types of solar modules along with R&D in storage integrated solar modules. The solar division of ACNSMM is also a recognized Centre by the Ministry of New and Renewable Energy (MNRE) of the Government of India. The Centre has state-of-the-art facilities in biomedical and energy areas and, in this respect, is the only facility in India offering such a comprehensive R&D environment.

ACNSMM is an independent Centre under the Amrita University with both research and academic components. The Centre offers three Master of Technology programs: one in Nanomedical Technology, one in Nanotechnology and Renewable Energy and one in Molecular Medicine. We are one of two Centres in India offering an MTech degree in Molecular Medicine. In total, there are over 60 students currently doing MTech and about 75 PhD students in various advanced research and product development areas. All PhD students are fully supported in their research through grants and fellowships. Both MTech and PhD students have a thesis requirement and all students therefore get extensive experience in hands-on research, experience in advanced equipments and research methodology.

In the biomedical area, some of the leading focus areas of research are in the development of natural tissues and organs through tissue engineering, using biodegradable scaffolds, design and development of drug delivery systems for cancer, neuro-degenerative diseases, pain management and infectious diseases, and the development of new imaging and diagnostic tools using nanotechnology. In the energy area, quantum dot-based dye sensitized solar cells are under investigation, as also is the development of advanced long-life batteries and pseudo-capacitors and solar integrated storage technologies.



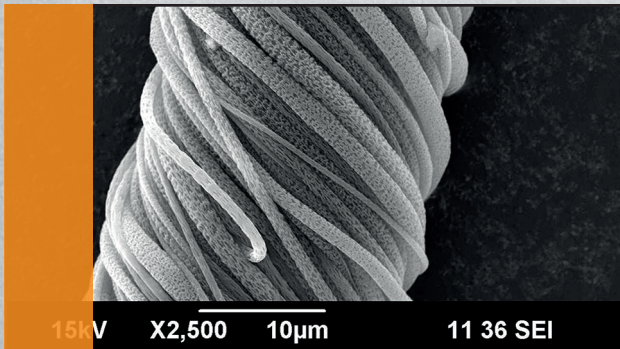
RESEARCH PRODUCTS



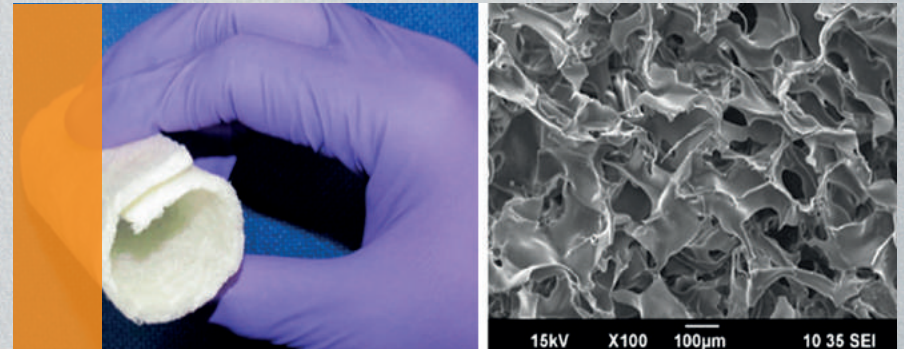
LED Lamps



Home Lighting



Nano yarn and fabric



Wound healing bandage gels and patch



AMRITA HOSPITALS, FARIDABAD (DELHI-NCR)

The foundation stone for the Mata Amritanandamayi Math's new 2200 bed Amrita Hospitals Faridabad was laid on May 9, 2016 by Chief Minister of Haryana Shri. Manohar Lal Khattar. Spread across nearly 100 acres in Sector 88, this will benefit not only this industrial city but also surrounding regions like Palwal and several districts of UP.

With a planned facility of 2,200 beds, the Amrita Institute of Medical Sciences & Research Centre is set to become the largest hospital in Delhi-NCR, and will feature the complete range of specialties, super-specialties and Centers of Excellence. These will include a heart institute, an institute for high-precision cancer diagnosis and therapy, organ transplantation, an advanced center for neurosciences and epilepsy, an institute for diabetes and metabolism, a center for liver and biliary diseases, an institute for minimally invasive and robotic surgery, a burn unit, a center for bone and joint diseases, an advanced center for lung diseases and transplantation, an institute for

physical medicine and rehabilitation, a center for spinal disorders, an advanced laboratory for molecular diagnostics, an advanced center for medical imaging, and interventional radiology, among others.

The hospital will also have a strong focus on mother-and-child healthcare, he said. It will include a highly specialized multidisciplinary Children's Hospital with maternal and fetal medicine and all pediatric subspecialties, including pediatric cardiology, heart surgery and transplantation, rheumatology, endocrinology, pulmonology, neurosciences, pediatric genetics, gastroenterology, pediatric orthopedics and pediatric and fetal surgery.

The new hospital would also dedicate an entire block to conducting original research, particularly with a focus on finding low-cost solutions to healthcare problems to make medical care more affordable to the common man.

The hospital would become a teaching hospital under Amrita Vishwa Vidyapeetham.



AMRITA
VISHWA VIDYAPEETHAM

www.amrita.edu

A Vision that sets Higher Benchmarks in Education

Amrita Vishwa Vidyapeetham is emerging as one of the fastest growing institutions of higher learning in the country. A young university, it was founded in 2003. In its sixth year, it became the youngest institution to be accredited 'A' grade by the NAAC, India's higher education institution assessment body.

Amrita has emerged as one of the top ranked institutions in India as per the world's prestigious Time Higher Education & Rankings. The vision that propels Amrita to create trail-blazing success and growth arises from a deeper understanding of life; that the core purpose of education is to kindle the light of compassion, the quest for knowing more and the willingness to apply these to create a better tomorrow. A future which promises happiness, peace, harmony and prosperity for all.

In a short span of 15 years, Amrita has established several academic and research collaborations with the world's top universities like Stanford, Harvard, Yale, University of Chicago, Princeton, Cornell, Oxford etc. to name a few.

15 SCHOOLS 207 PROGRAMMES 1700 FACULTY 20,200 STUDENTS

1:12 FACULTY STUDENT RATIO 180+ INTERNATIONAL PARTNERS 12,000 PUBLICATIONS Rs.500 CRORES RESEARCH FUNDING

GLOBAL UNIVERSITY RANKINGS 2018

Top 500 Globally in
International Outlook
Industry Income
Clinical and Health
No. 1 Private University in India
2018



Top 250 in BRICS
AND EMERGING ECONOMIES



RANK #168 in ASIA
No. 1 Private University in India
2018



RANK #140 in BRICS
No. 1 Private University in India
2018



RANK #8
University Rankings
India 2018



National Institutional
Ranking Framework

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