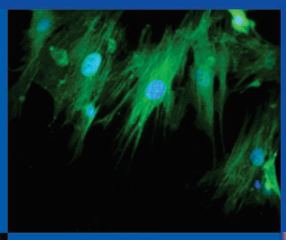
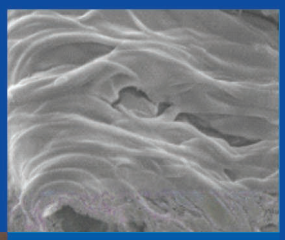
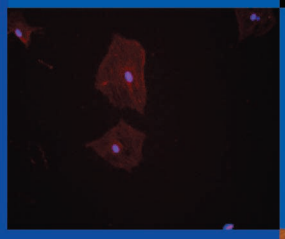
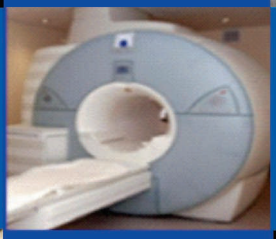
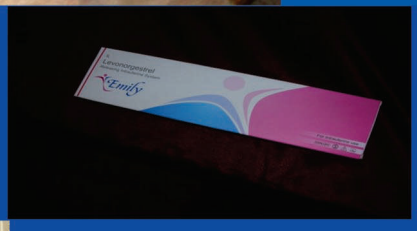
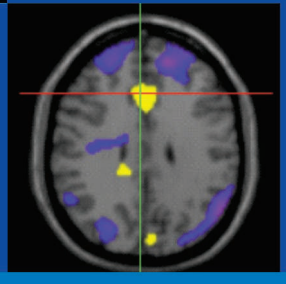
Annual Report
2012-13








Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum
Thiruvananthapuram, Kerala, India - 695 011

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY

THIRUVANANTHAPURAM – 695011, KERALA

Annual Report

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Sree Chitra Tirunal Institute for
Medical Sciences and Technology
Trivandrum - 695011

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SCTIMST

Contents

History

The origin of the Institute dates back to 1973 when the Royal Family of Travancore gifted a multistoried building for the people and Government of Kerala. Sri. P.N. Haskar, the then Deputy Chairman of the Planning Commission, inaugurated the Sree Chitra Tirunal Medical Center in 1976, when patient services including inpatient treatment got under way. The Biomedical Technology Wing followed soon at the Satelmond Palace, Poojapura, again a gift from the Royal Family, 11 km away from the Hospital Wing.

The concept of amalgamating medical sciences and technology within a single institutional framework was regarded sufficiently important by the Government of India to declare the center as an Institute of National Importance under the Department of Science and Technology by an Act of Parliament in 1980, and name it as Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum.

Dr. Manmohan Singh, the then Honorable Finance Minister, Government of India, laid the foundation stone of the third dimension of the Institute, the Achutha Menon Center for Health Science Studies (AMCHSS), on June 15, 1992. The AMCHSS was dedicated to the nation by Dr. Murali Manohar Joshi, the then Honorable Minister of Science and Technology and Human Resource Development, Government of India, on January 30, 2000.

New hospital complex foundation stone laid by
His highness Padamanabhadasa Uthradam Thriunal Marthandavarma. Maharaja of Travancore on 12-7-2012

Our Mission

- Promote research and development in biomedical engineering and technology
- Deliver high quality patient care in selected specialties and subspecialties
- Develop innovative postgraduate training programs in advanced medical specialties, and biomedical engineering and technology
- Participate in public health reforms through research, training and interventions

Our Vision

- Become a global leader in medical devices development, high quality patient care, and health science studies by 2020

डॉ. आर. चिदम्बरम्
भारत सरसार के प्रमुख वैज्ञानिक सलाहकार
एवम्
डी.ए.इ. - होमी भाभा प्रोफेसर

Dr. R. Chidambaram
Principal Scientific Adviser to the Govt. of India
&
DAE - Homi Bhabha Professor

सत्यमेव जयते

विज्ञान भवन एनेक्सी
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MESSAGE

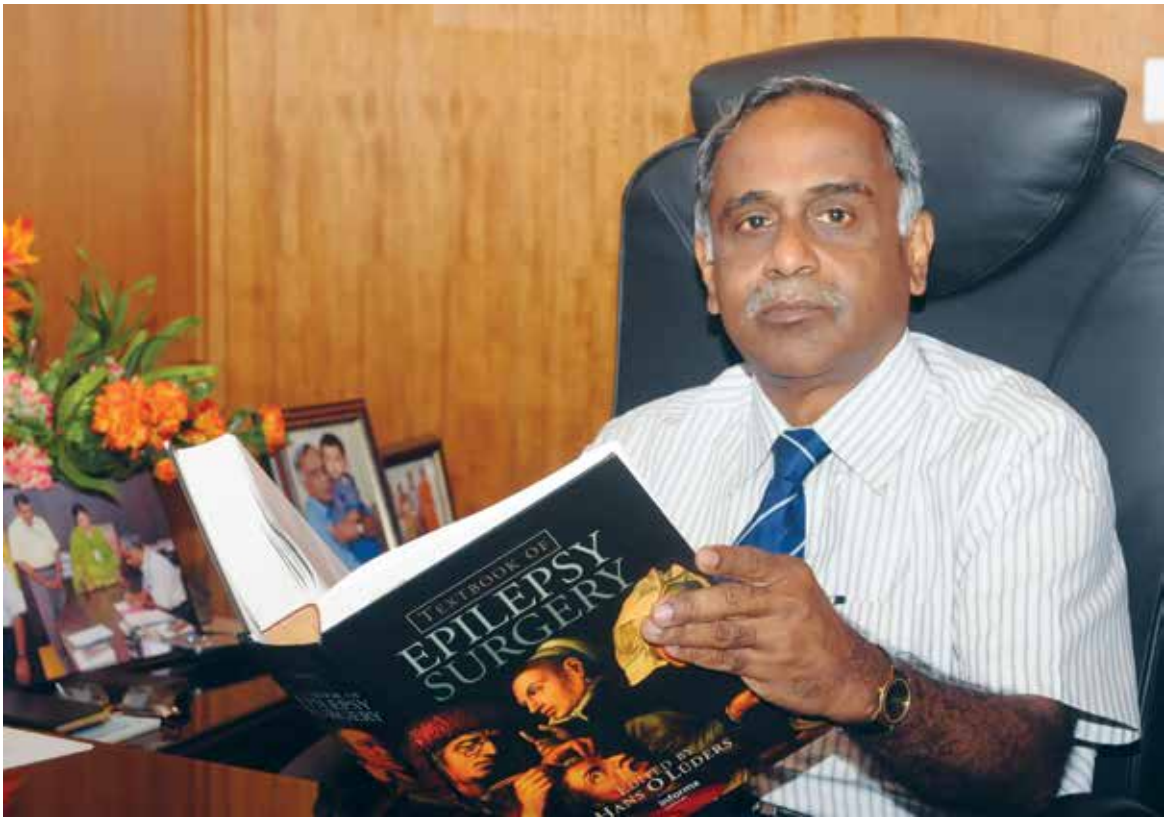
During the Year 2012-2013, Sree Chitra Tirunal Institute for Medical Sciences & Technology , Trivandrum, continued to be one of the leaders in the country in medical education and research and in health care delivery, particularly in the super-specialized cardio and neuro areas, while maintaining its unique national position in developing medical devices. In new initiatives for health care delivery, the one for translational nanomedicine for solid tumor therapy using nonviral vectors for therapeutic gene and siRNA delivery for glioma targeting is worthy of special mention. The Intermediary Care unit in the paediatric cardiac services, the rehabilitation clinic and the neuro intervention center are among the additions to patient care. Considering the continuously increasing patient demands, the foundation stone for the New Hospital Block was laid by His Highness Padmanabhadasa Uthradom Tirunal Marthanda Varma. The institue also took the first step towards setting up of an exclusive Research Park for Medical Technologies at a new campus at Thiruvananthapuram.

Under the SCTIMST-SIDD Hub for development of cardiopulmonary devices, the first project for development of infant membrane oxygenators and arterial blood filters was initiated. Production of novel nano-composites of Lactoferrin-conjugated Gallium and Silver Quantum Dots for biomedical applications was initiated as an Indo-UK project. The Institute continued to strengthen its partership with industry. The hormone-releasing intrauterine 'EMILY' device, developed jointly with HLL Lifecare Ltd, was launched at Bangalore. The Calcium Phosphate Cement bioceramic product "BioGraft CPC" was launched at Shimla by the industry partner IFGL Refractories Ltd, Kolkatta. The know-how of oral delivery of low molecular weight heparin using nano-particles was transferred to Eris Lifesciences, Ahmedabad. A partnership agreement was signed with Infosys, Bangalore, for collaboration in innovative medical technologies. The bioavailability of heparin delivered as oral heparin nanoparticles was evaluated and a Memorandum of Understanding was signed between Eris Lifesciences Pvt. Ltd and SCTIMST for R&D of oral delivery of Low Molecular Weight heparin using nanoparticles. It is worth mentioning that twelve new patents were filed by the institute and four were sealed.

Scientific seminars and international collaboration are important aspects of research and development today. Research collaboration with Network Excellence for Functional Biomaterial (NFB) at the National University of Ireland, Galway, Ireland, in the specific area of mammalian-derived scaffolds was initiated. An MoU for research collaboration was signed between Monash University, Australia, and the Institute and a graduation ceremony of ASCEND (Asian Collaboration for Excellence in Non-Communicable Diseases) was also held. The Institute is a leader in the public health area. Sri. C. Achutha Menon Centenary Seminar was organized by Achutha Menon Centre for Health Science Studies. E-connectivity is essential today and the Institute is making good use of the optical fibre-based National Knowledge Network. The Institute is establishing a nationwide network of registries on management of acute coronary event (MACE REGISTRY) and Comprehensive Heart Failure Intervention Programme with the support of ICMR.

The Institute's success, besides facilities and doctors, is driven by scientific, engineering, administrative and paramedical staff and by nurses. I am very happy that Smt. K. Sudarsa, Chief Ward Sister of the Institute, received the prestigious "National Florence Nightingale Award" from the President of India.

R. Chidambaram



From Director's Desk

One more year has gone by. It is with more satisfaction, compared to last year, that I am writing this message about the achievements during the third year of my directorship. Overall, all the three wings of the Institute surged ahead with patient care, research and development and academic activities. The individual departments and divisions have narrated their achievements during 2012-13; I wish to highlight a few of them.

The President of the Institute, Dr. R. Chidambaram, inaugurated the newly constructed fifth and sixth floors of the Achutha Menon Center. The fifth floor with all the facilities expected out of the Academic Division of this Institute, and the sixth floor with the Director's Office and related facilities are worthwhile additions that can impress visitors from the best centers in the world. Dr. Chidambaram also inaugurated the new Board Room in the sixth floor, named as the G. Parthasarathi Board Room, to commemorate the 100th Anniversary of the first President of the Institute. To honor Dr. Noshir H. Wadia, the third President of the Institute, the Conference Hall in the fifth floor has been named after Dr. Wadia. This year's Institute Day gave us an opportunity to honor our donor, High Highness Padmanabhadasa Sree Uthradom Thirunal Marthanda Varma.

The plan for building a medical block, surgical block and a car park in the newly acquired area of land is almost complete, and work is likely to start soon. Once the hospital buildings are completed, with the addition of nearly 500 beds, the Institute will be able to expand its hospital services. The multi-storey car park will ease the car parking problems faced by the employees and patients to some extent.

The Engineering Block, under construction in the Biomedical Technology Wing for the last few years, is finally completed. It is with immense pride and satisfaction that I am announcing that Dr. Valiathan, the Founder Director of the Institute, has kindly consented to have the Engineering Block named as Dr. M.S. Valiathan Medical Devices Building. With increasing number of students and academic activities, the shortage of class rooms is a constant complaint received by the Academic Division. To address this problem, four class rooms with state of the art facilities have been opened in the Library.

I do understand that providing infrastructure alone will not impart progress. Institutions do not work by themselves, but are made to work by the dedicated employees who are striving for their advancement. Dear colleagues, let me thank each and every one of you from the bottom of my heart for your dedication and support in advancing the Institute to a higher standing.

Sincerely,

K. Radhakrishnan

HIGHLIGHTS OF THE YEAR

- The hormone-releasing intrauterine "EMILY" device, developed jointly with HLL Lifecare Ltd, was launched at Bangalore
- The Calcium Phosphate Cement bioceramic product- "BioGraft CPC" was launched at Shimla by the industry partner IFGL Refractories Ltd, Kolkota
- The know-how of oral delivery of low molecular weight heparin using nano particles was transferred to Eris Lifesciences, Ahmedabad
- Under the SCTIMST-SIDD Hub for development of cardiopulmonary devices, the first project for development of infant membrane oxygenators and arterial blood filters was initiated
- Research collaboration with Network of Excellence for Functional Biomaterials (NFB) at the National University of Ireland, Galway, Ireland, in the specific area of mammalian-derived scaffolds was initiated
- Ms Anna Soubry, MP and Health Minister, UK, visited the Institute along with a delegation from the British High Commission with the aim of increasing co-operation in collaborative health research
- Several Memoranda of Understanding for partnerships with industry were signed, the notable among which includes the partnership with Infosys, Bangalore, for collaboration in innovative medical technologies
- The bioavailability of heparin delivered as oral heparin nanoparticles was evaluated and a Memorandum of Understanding was signed between Eris Lifesceince Pvt. Ltd. and SCTIMST for R&D of oral delivery of Low Molecular Weight Heparin using nanoparticles
- Translational Nanomedicine for solid tumor therapy was initiated using non-viral vectors for therapeutic gene and siRNA delivery for glioma targeting
- Production of novel nano-composites of Lactoferrin-Conjugated Gallium and Silver Quantum Dots for Biomedical Applications was initiated as an Indo-UK project
- Twelve new patents were filed and four were sealed
- To strengthen Industry-Institute partnership as well as to encourage medical device industry in India, the Institute took the first step towards setting up of an exclusive Research Park for Medical Technologies in a new campus at Trivandrum
- Foundation stone for the New Hospital Block was laid by His Highness Padmanabhadasa Uthradom Thirunal Marthanda Varma
- Establishing nationwide network of registries on management of acute coronary event (MACE REGISTRY) and Comprehensive Heart Failure Intervention Program are projects being carried out with the support of ICMR
- Intermediary Care unit in paediatric cardiac services, rehabilitation clinic and neuro intervention center are among the additions to patient care
- Expansion of Non-invasive Brain Stimulation Lab for diagnostic, therapeutic and research purposes with research funding by Dystonia Medical Research Foundation, USA
- Sri C. Achutha Menon Centenary seminar was organised by Achutha Menon Centre for Health Science Studies
- An MoU for research collaboration was signed between the Monash University, Australia, and SCTIMST and a graduation ceremony of ASCEND (Asian Collaboration for Excellence in Non-Communicable Diseases) was held

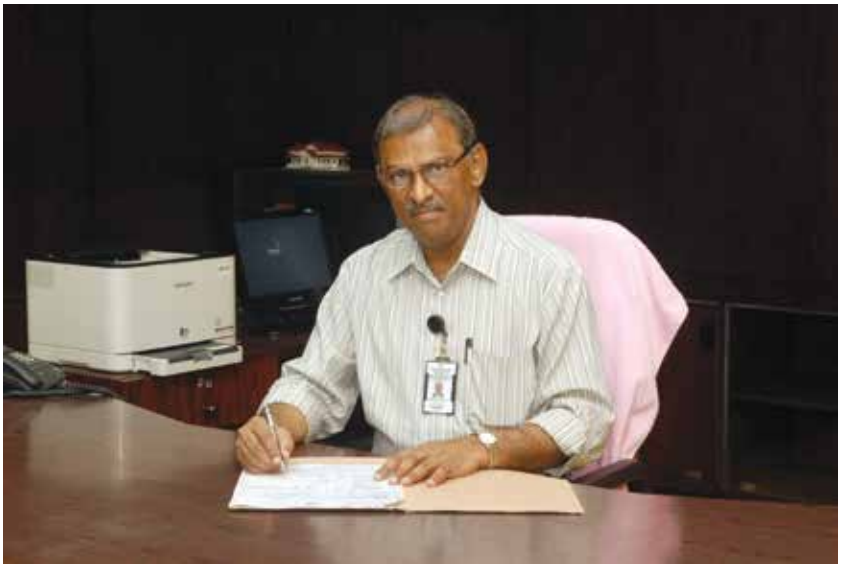
HOSPITAL WING

Mission

- Improve patient health outcome
- Increase patient satisfaction
- Decrease medical errors, costs and waste
- Serve the underserved

Vision

- Be a global leader in high quality patient care and in postgraduate training programs in cardiovascular, thoracic and neurological diseases by 2020.



From the Desk of Medical Superintendent

As in the past few years, the rising trend of patient turn-out continued this year too - and more acutely so. There has been a 50% increase in OPD patients in past 3 years. However, due to the economic constraints faced by our nation and the resultant governmental restraints, we could not keep pace with the needed infrastructure developments. We hope to address these soon and offer better amenities to our supreme patrons. Efforts are on to expand our facilities and add more amenities in near future.

We could marginally increase our bed strength by adding an important jewel to our cap, by opening a Neuro Intervention Care unit, under the aegis of Imaging Sciences and Interventional Radiology. This and the Pediatric Cardiac Surgical units have remarkably augmented their services and have offered yeoman service by straining their every sinew to reduce the waitlist for procedures from months to weeks. Other mainline services continue their premium care, ably assisted by the support services.

There has been a remarkable increase in financial support to our indigent patients from various governmental schemes. These schemes have been a big boon in mitigating their suffering.

We could partially succeed in the computerization efforts to reduce workload on our staff and improve efficiency. Old medical records, which have been digitized, are already made available online for prompt patient care. Efforts are on to complete the remaining aspects of generation of Electronic Medical Records soon.

A satisfied worker is the very foundation on which Institutions rise and grow. We have the blessing of a steadfastly loyal cadre of staff who have toiled with devotion to achieve excellence in all spheres. As we cross three decades, we look upon them with pride.

R. Sankarkumar

DEPARTMENT OF HOSPITAL ADMINISTRATION

The hospital services continued to provide high quality patient care to patients from all over India and other countries. There was significant increase in the number of patients who got admitted in the hospital and the patients who reported for follow up. The departments have tried their level best to optimally utilize the available resources by increasing the bed turnover. In order to facilitate treatment of patients belonging to lower socio demographic profile, financing schemes of Govt of Kerala were increasingly relied upon. Efforts were made to improve the infrastructure required for the hospital, like planning for a new hospital block, comprehensive centers for stroke, interventional Radiology etc. Various training programmes for the staff were organized for continuous in-service education. Projects and committees were started to address issues like costing of patient services, development of Hospital Manual, uniform policy, service matters, construction of buildings etc.

Routine Activities

This year, there were 16723 new registrations and 10851 admissions (Chart 1) . The credibility of the Institute is apparent from the fact that 1,33,686 patients reported for follow up review (Chart 2). Based on socio-economic background, 6.96% of the patients were provided free treatment and 59.45% patients were offered subsidized treatment. The bed occupancy rate increased from 83.74% to 85.51%.

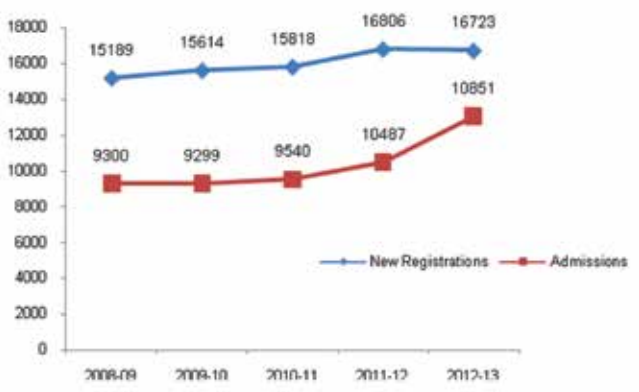


Chart 1- New Registrations & Admissions from 2008

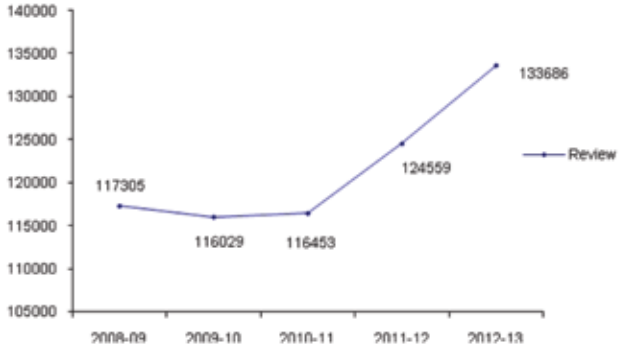


Chart 2- Patients on Follow up review

Medical Records Department maintains patient records and also participates in the management of services

Details of registered patient

1	Patients registered	16723
2	Admissions	10851
3	Medical records made available for review	133686
4	Record based case analysis	4786
5	Scanning of records for automation purpose	128388

Nursing Service

The nursing service department maintains excellence in patient management by constant updating through staff development programmes, incorporating evidence-based practice and promotion of research and higher education. Nursing service has extended beyond the walls of the hospital towards home care practices. For improving home care management, regular structured patient and family education program on home care management after surgery was introduced in all surgical wards. Two public interactive sessions on home care and rehabilitation was organized for patients who underwent valve replacement surgery and Neuro surgery. The objective is to establish a patient and family centered approach of care delivery aimed at preserving optimum family integrity and life style modification.

Organized one day zonal workshop in SCTIMST on meeting the information needs of the patient.

Nurses manual second edition was released on 6th may 2012.

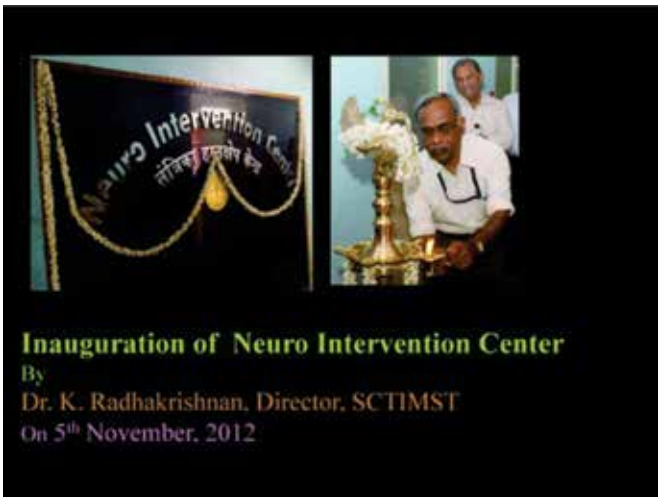
Nurses participated in various continuing Nursing Education programs and also presented papers at National Conferences and won awards.

Smt. Sudarsa K, Chief Ward sister - Neurosurgery ICU received the prestigious "National Florence Nightingale Award" from the President of India.

One Nurse was awarded Ph.D in nursing. Four Nurses obtained post graduate degree in Nursing (M.Sc.) and 4 of them obtained MBA (hospital management). Certificate in nursing administration was obtained by 10 nurses.

New Initiatives During the year

- New Hospital Block Foundation stone was laid by His Highness Padmanabhadasa Uthradom Thirunal Marthanda Varma on 12th July 2012.
- A proposal for Modification of OPD & Link building is in under process.



- Neuro intervention center was inaugurated by Dr. K Radhakrishnan, Director, SCTIMST on 5th November 2012
- Initiated computerization of purchases in Dietary
- Introduced monthly supervisory meeting from December 2012.Director inaugurated the meetings in December 2012

Research

The students from the University of Kerala and MG University had undertaken projects in Hospital Administration. The homograft programme was successful in implantation of

cadaveric valves in patients. A project on Telemedicine and Health Education was carried out with the support of Planning Board, Govt. of Kerala. The project aims to transmit CME Programmes organized at Medical Colleges, Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST) and Regional Cancer Centre (RCC) to doctors working in various hospitals of the state and tailored to the needs of doctors in secondary and primary care centers. Communication networks facilitate virtual classroom teaching. A connecting link to the National Institutes and International Institutes facilitate scientific interaction of doctors.

The Project on Telemedicine has gained momentum with the National Knowledge Network connectivity.

Important events organized during the year

Institute Day celebrations 2012 were held on 5th May 2012 at AMC Auditorium, SCTIMST. Dr. K Radhakrishnan, Director, SCTIMST presided over the function. Shri K. M. Chandrasekhar IAS (Rtd), Vice Chairman, State Planning Board, Government of Kerala was the Chief Guest and delivered a talk on "Role of Leadership in Development of Organizations". Shri T. P. Sreenivasan IFS (Rtd), Executive Vice Chairman, State Higher Education Council, Government of Kerala was the Guest of Honour and delivered a talk on "India's Place in the World". Faculty members, Senior Residents and students participated in the programme.

- Children's day was celebrated at the Institute in collaboration with Kerala Social Security Mission, the providers of Thalolam scheme for the treatment of children under the age group of eighteen. Competitions for Painting, Light Music and Cinematic song were arranged for the patients.

Talks by eminent personalities with interactive sessions were arranged. The concluding session of the programme was presided over by the Director, SCTIMST with Dr. Gopinath Muthukad, Magician, as the Chief Guest. A one-day training programme for Administrative staff on Purchase and Stores was organized on 9th February 2013 at Auditorium II, SCTIMST. . Experts from Central Excise, Commercial taxes, State Bank of Travancore, National Informatic Centre, M/s Balmer Lawrie, AG's Office were the resource persons. This was followed by a panel discussion.

- Navathi Pranamam to the Maharaja, His Highness Padmanabhadasa Uthradom Thirunal Marthanda Varma was offered on 16th March 2013 along with the Institute day celebrations. Dr. K Radhakrishnan, Director, SCTIMST presided over the function. His Highness Padmanabhadasa Uthradom Thirunal Marthanda Varma inaugurated the function and delivered the inaugural address. Dr. M S Valiathan, Founder Director, SCTIMST, addressed the gathering with a talk on Chitra Institute- a Royal Gift to the nation and Dr. M G Sasibhooshan, Former Director, Kerala State Literacy Mission Authority delivered a talk on "Social implications of Royal family's contribution to the people of Kerala".

Mr. Vimal Subramanian, KNOWLEDGE ECONOMY ADVISER, British Deputy High Commission and a team of officials from the British High Commission visited the Institute in November 2012 to explore the possibility of initiating collaborative programmes in the area of research, training and patient care. Internally funded Research Projects on "Clinical Application of Cryopreserved Homograft Valves in Cardiovascular Surgery" is in progress in collaboration with the Department of cardiovascular and thoracic surgery and the Department of Microbiology.

List of Supervisory Staff attached to Medical Superintendant's Office

Hospital Administration:

Dr.Sankarkumar. R MBBS, MS, MCh(CVTS), FAMS FIMSA Medical Superintendent

Dr. S.K. Jawahar. MBBS, Dip NB, LLB, MHA

Administrative Medical Officer

Nursing

Dr. Sudhamani Amma MSc Nursing, PGDHRM, PhD-Nursing Superintendent (Acting)

Ms. Remadevi. S Deputy BSc. Nursing and Nursing Admn.-Deputy Nursing Superintendent (Acting)

Ms. Valsala Kumari C. BSc. Nursing and Nursing Admn.-Sr..Nursing Supervisor

Ms Saraswathy Amma C. Post-basic BSc Nursing, Nursing Administration and MHRM-Sr.Nursing Supervisor

CSSD

Ms. Sujamani R. Nair Chief Ward Sister

Infection control and biomedical waste management

Ms.Gracyamma Bridget BSc.Nursing (IGNOU), Certificate course in Hospital Infection Control - Infection Control Unit & Bio medical Waste Management-

Infection Control Nurse

Construction Wing

Mr. Shanmughom Asari. C B.E Civil Construction Engineer

Mr. Gopinathakurup.G Diploma in Civil Engineering Asst. Engineer

Ms. Usha O.K Technical Assistant Civil-A

Dietary

Ms. Leena Thomas BSc Nutrition, PG Diploma in Nutrition & dietetics, Senior Dietician

Ms. Jyothi Lekshmy. S MSc. Nutrition Asst. Dietician

Laundry

Mr. Umesh Sankar. S Diploma in Textile Technology and B.Com Laundry Supervisor

MSW

Dr. Jayachandran. D MA (Sociology), MA (Psychology), PhD Senior Medico Social Worker

Ms. Rosamma Manuel –B MSW, LLB

Medico Social Worker

Medical Records

Mr.Thampi. N.G BSc., BMRSc, MA, MBA Senior. Medical Records Officer

Varghese P.J. Medical Records Officer -D

Pharmacy

Ms. Rosily Joseph BSc, D Pharm Pharmacist (Gr.I)

Ms. Deepa K Nair Pharmacist B

Reception

Mr. Sali.V BSc, LLB, Senior. Receptionist Cum Tel. Opr

Security

Mr Prasannakumar K, Security officer

Mr Hemath Kumar R.P. Asst Security Officer

Transport -Mr. Saji. M.S Transport I/C

DEPARTMENT OF ANESTHESIOLOGY

In addition to patient service, the department has well-structured academic programme with active participation of residents and faculty in departmental and inter departmental academic activities. Hands on training helps to improve the clinical skills of residents..

The Anesthesiology department has two specialities- Cardiac anesthesia and Neuroanesthesia.

NEUROANESTHESIA

Operation Theater: The staff of the Neuroanesthesia division are primarily involved in the perioperative care of the patients undergoing neurosurgical procedures. Neuroanesthesia division has got state of the art anesthesia equipment and monitoring systems that aid in perioperative care of the patients. Two echo machines in the department help in detection of venous air embolism, hemodynamic instability, management of cardiac patients with neurosurgical patients and procedures in sitting posture. Transcranial Doppler is also routinely used in monitoring the cerebral blood flow.

Radiological Suite: In addition to services in operation theaters, anesthesia services are provided to patients in radiological suite for diagnosis and therapeutic procedures like stenting, coiling of aneurysms, AVM embolization, tracheal stenting, vertebroplasty. Anesthesia services are also provided for laser ablation of tumors in CT room, various diagnostic procedures in CT and MRI. In addition neuroanesthesia is actively involved in pulmonary function analysis of respiratory compromised patients.

Intensive care: Neuroanesthesia division is actively involved in the postoperative and intensive care management of critically ill patients. In the ICU, we are involved in the ventilator care, performing invasive procedures like arterial lines, central venous catheterization, lumbar drainage, percutaneous tracheostomy. Transthoracic echo is done by us to monitor the hemodynamically unstable patients admitted in neurosurgical ICU. Transcranial Doppler, EEG monitoring, also form an integral part of our ICU management. Neuroanesthesia division provides respiratory, hemodynamic, fluid and electrolyte, arterial blood gas analysis, pain and sedation management and interdisciplinary consultations in the ICU.

Anesthetic and intensive care of stroke patients

Stroke is one of the leading causes of morbidity and mortality in the world. Our institute has recently started acute stroke care unit where Neuroanaesthetists are

part of the stroke team. We are actively involved in the acute phase as well as sub-acute phase of stroke. We are involved during the initial assessment and stabilization in the intensive care unit, safely undergo MRI and during intra-arterial thrombolysis, a specialized procedure done in radiological suite where we monitor and provide sedation and pain relief. We are involved in the ventilatory care, hemodynamic management, sedation of critically ill stroke patients. In addition, we provide anesthesia and perioperative management of patients taken for decompressive craniectomy. Our team is actively involved in the neurovascular meetings conducted every Wednesday in the management of patients with cerebrovascular disease.

New initiatives during the year

Intraoperative Evoked Potential Monitoring

Intraoperative evoked potential monitoring is a highly specialized procedure, which helps in the monitoring functions of the brain intraoperatively. Its use brings improved care, shortens ICU and hospital stay. Few centers in India only have facility for monitoring evoked potentials. Monitoring requires modification in the technique of anesthesia and the procedure is carried out without use of muscle relaxant. Patients who are at risk of neurological damage like aneurysms, CP angle tumors, posterior fossa tumors, spine surgeries are increasingly managed with evoked potential monitoring at our institute. Increasing number of patients undergo monitoring, helping in improved neurological outcome and shortened hospital stay.

Day Care services For MRI Procedures

Many neurologically ill patients' especially children and elderly undergo Magnetic Resonant Imaging (MRI) of the brain and spinal cord to aid in diagnosis and management. They require anesthesia for maintaining immobility. Till recently, patients requiring anesthesia were admitted to the hospital and the procedure was carried out on an inpatient basis. A new Programme of Day care for MRI procedures has been started. All the patients are assessed for fitness in the special MRI OPD clinic being conducted every day from 3-4 pm. These patients come to the MRI suite on the day of procedure, undergo MRI under sedation. After recovery, patients will be discharged from recovery room to their home.

Recently, we evaluated the statistics of day care MRI, which showed that there was steady increase in the number of patients undergoing MRI. In this group 90% of patients were administered day care anesthesia.

Pain Services

Neuroanesthesia department has been actively involved in the management of acute pain services including postoperative pain. We have facility for patient controlled analgesia. With the recognition of increasing incidence of chronic pain syndromes in the population, Pain clinic has been inaugurated recently to address the plight of these patients. A team of experts from anesthesia, neurology, neurosurgery, neuroradiology and Occupational Physiotherapist manages pain clinic.

Research activities

A prospective, randomized, pilot study on 'Comparison of the effects of Mannitol & Hydroxy Ethyl Starch Vs. Hypertonic saline & Hydroxy Ethyl Starch on blood coagulation and platelet function in neurosurgical patients presenting for elective surgery' is in progress.

Studies were carried out to assess the outcome of tracheostomy as well as aspiration pneumonia in the neuromedical intensive care unit. Perioperative cardiac outcome in patients undergoing neurosurgery and the cardiac function in those treated with mannitol compared to hypertonic saline were evaluated. The effect of levobupivacaine scalp block and dexemedetomidine in patients undergoing neurosurgery were evaluated.

Faculty members presented papers and lectures were delivered at conferences.

Dr S Manikandan conducted a workshop on "Transcranial Doppler" Criticare 2013 at Hyderabad. The staff and students won awards for their presentations at conferences

ANESTHESIA AND PERI-PROCEDURAL CARE

Procedures Done	Total Number
Anesthesia in Neuro-Surgery	1248
Anesthesia for interventional Neuroradiology	210
Anesthesia for MRI	280
Percutaneous Tracheostomies	80
Neurosurgical ICU ventilatory care	430
Stroke ICU ventilatory care	48
Neuromedical ICU ventilatyory care	102
Others	400

ANESTHESIA AND PERI-PROCEDURAL CARE
CARDIAC ANESTHESIOLOGY
ANESTHESIA AND PERI-PROCEDURAL CARE

PROCEDURE	Number
Adult heart surgeries, and thoracic and vascular operations	1343
Pediatric open and closed heart cases	719
Procedures in Cardiac Catheterization laboratory under general anaesthesia	479
Procedures in Electrophysiology laboratory under general anaesthesia:	34
Cardiac Magnetic Resonance Imaging under general anaesthesia	91
Cardiac CT under General anaesthesia/sedation & monitored anaesthesia	37
Endovascular stenting of aortic aneurysm in Digital Subtraction Angiography laboratory sacular aneurysm	18
Others	32

Research

Studies were carried out on intraoperative transesophageal echocardiographic evaluation of the effect of isoflurane and sevoflurane on_left ventricular diastolic function, and Preoperative Glycosylated haemoglobin levels for prediction of perioperative hyperglycemia, insulin requirement & prolonged hospital stay in patients with ischemic heart disease undergoing coronary artery bypass grafting. Studies are in progress on the intraoperative changes in pulmonary venous Doppler flow profile before and after the surgical closure of atrial septal defect, ventricular septal defect and injection of phenylephrine for the treatment of intraoperative cyanotic spell.

Using intraoperative 2D and real-time-3D transesophageal echocardiography in patients without aortic valve disease, left ventricular outflow tract area was compared and intraoperative hemodynamic performance was evaluated for Chitra heart valve prosthesis in the mitral position. Response to Sevoflurane and Desflurane when used for device procedures in Cardiac Catheterization laboratory was compared.

An externally funded project for development of Video Laryngoscope for Tracheal Intubation is carried out in collaboration with CDAC.

An industry-collaborated project is in progress for the design and manufacture of a portable resuscitation trolley with Lakshmi Technology And Engineering Industries Ltd, Coimbatore, Tamil Nadu.

A medical electrical safety analyzer was developed in BMT Wing and a clinical investigator from the department evaluated the different electrical equipments in the operation suites.

COMPREHENSIVE PAIN CLINIC

- Comprehensive multidisciplinary pain clinic has completed 1 year on 31st March 2013. We run OPD services on Friday 2 p.m. onwards. A multidisciplinary team comprising consultants from the departments of Physical Medicine and Rehabilitation, Neurosurgery, Radiology, Anesthesiology and Neurology are involved in patient care. Patient management decisions are taken based on a broad consensus. Interventional Pain Management in patients with chronic pain conditions is expected to develop as a Comprehensive Pain Care Centre along with peripheral centres and networking. Community based programmes and collaboration with other Pain Centers e.g. Regional Cancer Center, Pallium India is envisaged. Indigenous technology development such as Spinal Cord Stimulator (SCS) implantation and Implantable Intra Thecal Drug Delivery systems (ITDDS) is planned.

Services offered and procedures performed:

- Trigger point injection
- Musculo-skeletal infiltrations
- Transforaminal injections
- Sacro-iliac joint interventions
- Selective dorsal root ganglia radiofrequency ablation
- Facet joint interventions
- Epidural steroid injection
- Radiofrequency ablation in Trigeminal neuralgia
- Radiofrequency ablation of Stellate ganglion in CRPS
- Ozone therapy

Clinical service at a glance

- Total patients seen in the clinic: 399 (New registrations: 198, Review: 199)
- Major interventions performed (under fluoroscopy-trans foraminal, sacro-iliac joint injection, facet joint injection, stellate ganglion block/RF, gasserion ganglia RF ablation, intra-discal ozone injection): in 44 patients
- Minor interventions performed (nerve block, plexus block, musculo-skeletal injections/infiltrations, trigger pint injections): in 30 patients

Academic activities

A CME was organized on 9th December 2012 on the Management of Chronic Pain, attended by 90 participants from various parts of the state. The objective of this CME was to spread awareness regarding the prevalence, types, diagnosis, investigations and treatment options of different chronic non-cancer pain conditions among doctors belonging to different medical and surgical specialities.

- Translation of the most commonly used disability rating scale for low back pain: the Roland-Morris disability questionnaire to Malayalam and its validation among native Malayalam speakers.

A clinical study to evaluate the comparative efficacy of transforaminal epidural steroid injections with conservative treatments in patients with single level lumbar radiculopathy (ongoing).

Seminars and workshops organised

1. A Continuing Medical Education Programme on Pain Management was organized by the Multidisciplinary Pain Clinic team of SCTIMST on 9th December 2012.
2. Airway intervention Workshop: Hands-on-session using mannequins on 5/1/2013:
   a) Percutaneous tracheostomy using forceps.
   b) Percutaneous tracheostomy using RHINO
   c) Percutaneous cricothyroidotomy using Seldinger technique.

Staffs and students have presented papers and also won the best paper award at the meeting held at PGI Chandigarh.

Staff details:

Dr. R.C.Rathod, MD- Professor Senior Grade & Head of Department

Dr. (Mrs.) Rupa Shrinivas, DA, MD, Dip.NB, PDCC- Professor

Dr. Thomas Koshy, DA. MD, PDCC Professor

Dr. Shrinivas V. Gadhinglajkar, MD, PDCC Professor

Dr. Prasant kumar Dash, MD, PDCC Professor

Dr. P.K.Neema, MD Additional Professor

Dr. S.Manikandan, MD Additional Professor

Dr. P.Gayatri, MD, FRCA Additional Professor

Dr. P.R.Suneel, MD Additional Professor

Dr. K.P.Unnikrishnan, MD Additional Professor

Dr.Subrata kumar Singha, M.D Associate Professor

Dr.Satyajeet Misra, M.D Assistant Professor

Dr. Smita P, MD, DM Assistant professor

Dr. Nilay Chatterjee, MD, DM Ad-hoc Assistant Professor

Mrs. K.V.Bhuvaneswary Scientific Assistant Upto 30/11/2013

Mr. Binu Thomas Scientific Assistant from 01/12/2013

DEPARTMENT OF BIOCHEMISTRY

The Central Clinical Laboratory (CCL) is engaged in round the clock clinical diagnostic services employing sixteen technical assistants and two scientific officers. Three main sections of the CCL are; biochemistry, hematology and clinical pathology. Fully automated state-of-the-art equipments serving CCL include Dade-Behring/ Siemens RXL, Olympus AU 400 Clinical Chemistry analyzers, Beckman 5 part and IRIS I-COUNT differential hematology analyzers, Roche U 411 urine analyzer and Amax (Germany) coagulation analyzer.

The Central Clinical Laboratory performed a total of 7,57,627 tests during this year in Biochemistry, Hematology and Clinical Pathology. This amounts to an increase of nearly 10% over the figure for last year.

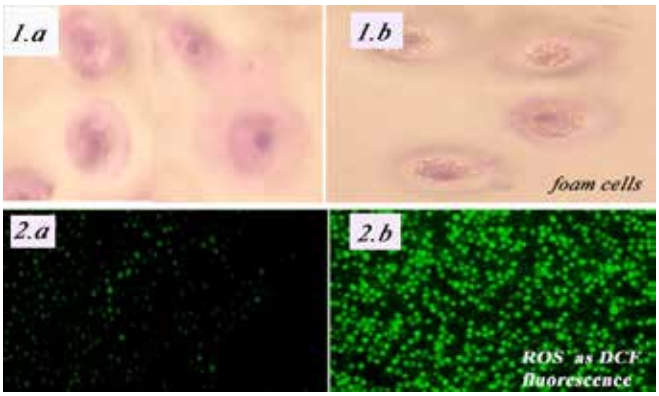
A new 5 part differential hematology analyzer, (IRIS I-COUNT) was obtained on reagent rental basis in the central clinical laboratory.

Research Activity

Anti-Gal binding site on Lp(a): Binding site specific immune complex between plasma anti -galactoside antibody (anti-Gal) and lipoprotein(a) [Lp(a)] was reported as a major pathway for Lp(a)-mediated vascular pathology. We further observed that though the heavily O-glycosylated region in Lp(a) binds to anti-Gal, the serine / threonine rich sequence that holds O-glycans but not O-glycans per se are responsible for the binding.

Larger Lp(a) molecules attach more LDL molecules: Most Lp(a) molecules in plasma were found to attach LDL molecules non-covalently. The number of LDL molecules per Lp(a) increased geometrically with Lp(a) size.

Larger the Lp(a), the more masked is its apo B subunit:. Accessibility of antigenic and glycan epitopes of apo B subunit in Lp(a) for antibodies and lectins respectively was blocked to an extent proportional to its apo(a) size. Larger Lp(a) molecules were recognized more by tissue lectins.



Dysfunctional HDL induced foam cell formation in macrophages[Fig.1] and oxidative stress in monocytes [Fig.2]. Cells treated with functional HDL[1.a & 2.a] and dysfiunctional HDL[1.b & 2.b]

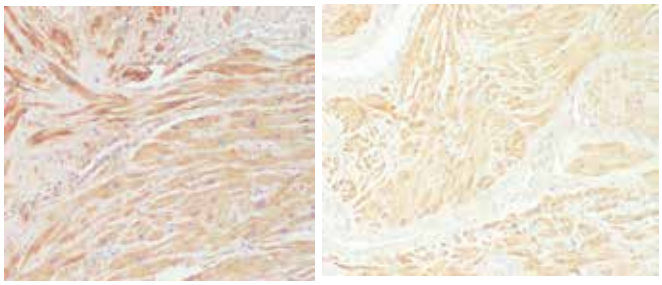
Fluorescence enhancement as a measure of ligand occupation: Fluorescence of several human plasma antibodies increased upon antigen binding, offering a means to detect and quantitate specific ligands.

Functional characterization of high-density lipoprotein [HDL] and atherogenesis: Though HDL is popularly known as an atheroprotective and potential life saving molecule all HDL particles are not functionally similar. Our recent study showed that majority of patients with coronary heart disease and healthy subject with systemic inflammation [high hsCRP] carry dysfunctional HDL. Unlike normal HDL dysfunctional HDL is found to be pro-oxidant in cultured monocyte/macrophages, as it induces intracellular reactive oxygen species and foam cell formation- the key players in atherogenesis (Figure). This study reveals that human HDL exhibits variable functional ability, which cannot be predicted from the level of HDL-cholesterol. Characterization of functional HDL showed an enrichment of triglycerides, phospholipids, lipid peroxides, and diminished activity of paraoxonase-1, compared to functional HDL, which might render the particle dysfunctional and pro-oxidant. Functional assay of HDL could lead to improved predictive accuracy of cardiovascular disease risk associated with circulating HDL. This indicates the need for novel therapeutic approaches to prevent the transformation of functional HDL to dysfunctional form.

Oxidized-HDL and pro-atherogenic response in macrophages: High prevalence of dysfunctional HDL could be a contributing factor to the excessive risk of coronary heart disease in subjects. A study was conducted to investigate the influence of both native HDL and oxidized HDL (oxHDL) on human monocyte/ macrophage functions relevant to atherogenesis. HDL loses its atheroprotective functions and exerts pro-inflammatory response by releasing TNF- and matrix metalloproteinase [MMP-9] as well as promotes oxidative stress[ROS] in human monocytes/macrophages, through the activation of NADPH –oxidase system and ERK1/2 MAPK pathway. Unlike native HDL, oxHDL might promote matrix degradation by enhancing the release of MMP-9 from arterial monocytes/macrophages, favoring atherosclerotic plaque destabilization and rupture. The generation of oxHDL in vivo may be regarded as possibly pro-inflammatory and atherogenic.

Coronary artery disease in the young: This study carried out in collaboration with the Dept. of Cardiology, showed that among the conventional risk factors, high prevalence of cigarette smoking, diabetes mellitus and low HDL-C were observed in CAD patients. In the case of thrombotic risk factors, a significant increase was observed in the percentage of platelet activation and the blood levels of Lp(a) and fibrinogen. About 90% of the CAD patients were found to have increased platelet activation (a high risk factor for recurrent CAD) and 40% have high Lp(a). This indicates the need of future prospective studies in order to establish the significance of lowering platelet activation with respect to the reduction of cardiovascular events.

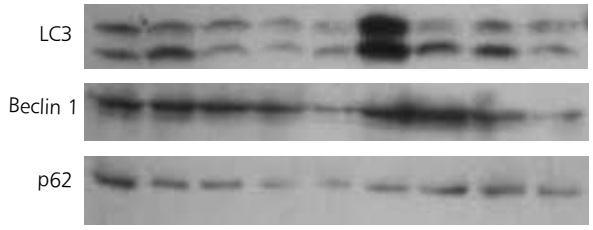
Small dense Low-density lipoprotein [sdLD] and insulin resistance: Insulin plays a central role in the development of MS-dyslipidemia characterized by high TG, reduced HDL and elevated sd-LDL, which is known as the atherogenic lipid triad. Overproduction of the hepatic TG-enriched very-low-density lipoprotein (VLDL) causing high generation of sdLDL is recognised as an important and early complication of hepatic insulin resistance. Inview of this ,a preliminary study is initiated aimed at evaluating the importance of sdLDL and other anthropometrics variables, such as waist circumference and BMI; in the prediction of



Immunohistochemistry of 3- nitrotyrosine (A) and NRF2 (B) in human right atrial appendage tissue sections..

insulin resistance state among healthy subjects. Detecting insulin resistance at early ages provides a useful approach for prevention and treatment by life-style modification and by pharmacological interventions.

Analysis for presence of Glioma Stem Cells and autophagic status of human glioma patients :. The study includes identification and characterization of Glioma Stem Cells (GSCs) and autophagic status of human glioma. The presence of glioma stem cells (GSCs) and the inherent resistance of glioma to apoptosis (type I programmed cell death) affect the therapeutic regimen. Autophagic status of different grades of glioma has been analyzed by western blotting for autophagy markers (LC3 and p62) at the tissue level and also by doing an autophagic flux assay in glioma derived cells. The study



Immunoblot of autophagy markers (LC3, beclin 1 and p62) in 9 different right atrial appendage tissue samples.

has shown the presence of GSCs and also that autophagy is not impaired in different grades of glioma.

Cellular and biochemical changes in type 2 diabetic heart: The altered metabolic events in type 2 diabetic heart leads to increased production of reactive oxygen/ nitrogen species. The present study focused on the status of oxidant induced- protein modifications (carbonylation, 3- nitrotyrosine and cysteine S- nitrosylation) in type 2 diabetic human right atrial appendage tissue samples. It is observed that each patient showed different levels of protein modifications indicating varying response to oxidative stress (NRF2 levels). Further works like analysis of mitochondrial oxygen consumption and oxidative phosphorylation enzyme activity assays are required to find the role of mitochondrial metabolism in heart disease.

Myocardial autophagic status in diabetic and non-diabetic conditions: In diabetes, it is not known whether autophagy is protective and necessary for the survival of cardiac myocytes or if it mediates cell death during stress condition. In type 2 diabetes, hyperinsulinemic condition may cause the reduction of autophagic rate in cardiomyocytes but in later stage, hypoinsulinemic condition can be linked to autophagic upregulation. When chronically elevated or constitutive, excess autophagic activity can be lethal to cardiomyocytes. Therefore it is possible that impaired autophagy may naturally contribute to insulin resistance in later stages account for the myopathy in type 2 diabetic heart.

Two Ph.D students defended their theses. Two PhD theses were submitted for evaluation.

Faculty and students presented papers at conferences.

A PhD student won an award for the best oral presentation in a Conference.

Staff details:

Dr P.S.Appukuttan, Ph.D	Professor & Head
Dr.N.Jayakumari, Ph.D	Professor
Dr.G.Srinivas, Ph.D	Scientist D
T.A.Thomas, MSc.	Scientific Assistant
K.K.Jayasree, M.Sc.	Scientific Assistant
Geetha,M. MSc.	Scientific Assistant

DEPARTMENT OF CARDIOLOGY

In the academic year 2012-2013, the Department of Cardiology continued to provide state-of-the art patient care, along with research and academic programmes. Apart from the ongoing training programmes (4 DM trainees, 3 post-DM trainees and 3 cath lab technical trainees/year), during this period, the department conducted various workshops, initiated new research programmes, and published in many international journals. In view of the enhanced opportunities for training of postgraduates, the number of DM trainees has been enhanced to 6 every year from this academic year.

Patient care

The main thrust of the Department of Cardiology is to offer various interventional treatment options for coronary artery disease, valvular heart disease, congenital heart disease and rhythm management for various dysarrythmias and most of these interventions are an effective alternative to more expensive and morbid surgical procedures.

Procedures	Number
New Registration OP	7283
Review and follow up	45,712
Inpatients	3,994
Outpatient related investigation	
ECG	36,670
Exercise stress tests	1,445
2D echo Doppler studies	28898
Dobutamine stress echo	14
Holter	1225
HUT tests & trans esophageal echo studies	410

Three fully functional cardiac catheterization laboratories including a dedicated Cardiac Rhythm Management Lab has widened the scope of cardiac intervention program in the pediatric and adult cardiac patients shortening the waiting period for various interventional procedures.

The department is in the process of acquiring one top of the line 3D echo machine and three high-end echo Doppler systems to augment the diagnostic capabilities for all cardiac patients including relevant follow up studies to optimize patient care.

ADULT CARDIOLOGY AND INTERVENTIONS

The newly initiated Comprehensive Heart Failure Management and Rehabilitation program is identified as the thrust area for the Cardiology Department for the coming year. An area has been earmarked for the Heart Failure inpatient ICU facility and this will be commissioned later this year with all modern facilities.

IVUS and FFR guided percutaneous coronary interventions has become the standard of care in the management of coronary artery disease. The number of PCIs guided by FFR had gone-up last year. With the availability of better hardware, coronary interventions have become safer and more effective. The department is in the process of acquiring Optical Coherence Tomography (OCT) imaging system, which will help in optimizing PCI.

Dr Bijulal S, Assistant Professor, had training for 5 months under the Commonwealth academic staff fellowship in Leeds General Infirmary, Leeds ,UK- October 2012- February 2013 on Trans-catheter aortic valve implantation(TAVI) and he is expected to initiate this program in the Institute.

INTERVENTIONAL PROCEDURES

Diagnostic Procedures				
Cardiac Catheterization				182
Coronary Angiogram				1654
Electro Physiology Study				60
Total				1896

Interventional Procedures				
ASD Device Closure				245
PDA Device Closure				77
PDA Coil Closure				28
VSD Device Closure				8
RSOV Device Closure				1
Balloon Aortic Valvotomy				10
Balloon Pulmonary Valvotomy				21
Balloon Mitral Valvotomy				147
Balloon Atrial Septostomy				25
CoA Dialatation				8
Others				36
Coronary Intervention			PCI	658
	With IABP	7		
	With IVUS	28		
	With FFR	77		
	With Rotablation	7		

Radio Frequency Ablation				
	With 3D Mapping Ensite	46	RFA	257
	With 3D Mapping Carto	43		
Total				1521

Pacemaker Procedures	
Pacemaker Implantation	184
ICD Device Implantation	33
CRT Device Implantation	15
ILR	5
Total	237

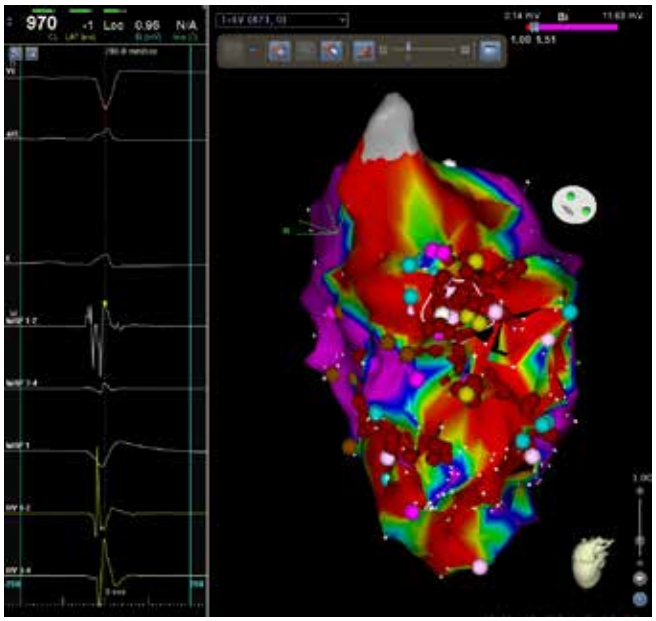
Grand Total				3654

Cardiac Electrophysiology

The cardiac electrophysiology division helped the institute to maintain its leadership position as one of the best clinical centers in the country for management of cardiac arrhythmias and sudden cardiac death. The focus of the division has recently been on expanding the expertise in VT ablations. In 2012, we performed nearly 350 ablations and electrophysiology procedures, one of the largest in the country. The number of device implantations was close to 250, including ICDs and cardiac resynchronization devices for heat failure. Our device clinic follows up nearly two thousand cases every year. The institute has been using the 3D electroanatomical mapping systems , CARTO 3 and Eniste Velocity to aid in complex ablation procedures. This year we plan to upgrade the electrophysiology lab with a newer fluoroscopy system with integrated fluro reduction strategies for enhanced patient benefit and procedural success. We also plan to upgrade the device follow up clinic to better cater to our patients and to maintain a database of our device cases. The electrophysiology division is also the most sought after training facility in the country for post doctoral training in cardiac electrophysiology. Cardiology residents and fellows from other institutions in the state also visit the department for observership and short duration in house training. SCTIMST is also the leader in this country for its research outputs in this field. The department has numerous ongoing projects to improve our knowledge base and innovate with newer treatment strategies.

Dr Anees Thajudeen, Assistant Professor, is undergoing one year Fellowship in Cardiac Electrophysiology, at the Cedars Sinai Medical Center(UCLA) Los Angeles, CA, USA and his return will further enhance the capabilities of the cardiac rhythm management program.

The department organized several workshops/ conferences during the year.



Three dimensional mapping of Myocardial Infarction Scar for ablation of Ventricular Tachycardia

Pediatric cardiology

The pediatric cardiology wing of our cardiology department caters services to entire spectrum of congenital heart disease patients from "fetus to adult". Advancement in imaging and intervention has occurred in recent years. The spectrum of device closure cases has broadened from ASD, PDA to ASD, VSD, PDA, CAVF, and RSOV. In addition, interventions for post op complications have improved the surgical outcomes. In association with congenital heart surgeons and anesthetists, the number of procedures (elective and emergency) for critically ill newborns with CHD has increased. Diagnostic echocardiography and interventions were provided round the clock. The emergency neonatal procedures include balloon atrial septostomy, ductal stenting and balloon valvotomies. We are now focusing on developing a comprehensive infant neonate clinic.

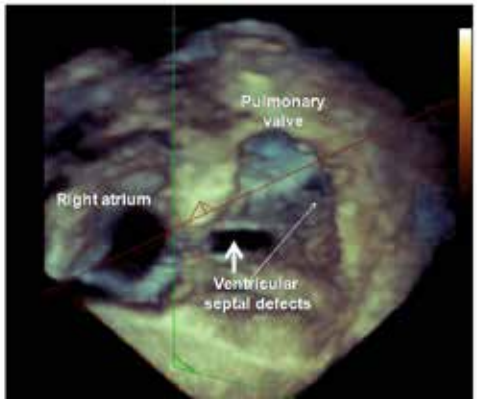
From academic point of view, pediatric forum is being organized every week. This serves as an academic feast for residents and a continuing medical education for the Faculty.

The surgical meeting conducted every weekend has given a new dimension to decision making in complex congenital lesions with valuable inputs from pediatric cardiologists, cardiac surgeons and radiologists regarding management of individual patients. The residents and fellows in the

department are trained to interpret cardiac MRI and CT images in the radiology meet conducted every week. In collaboration with the pathology department, anatomical demonstration of cardiac anomalies with autopsy specimens was also organized.

The department has several ongoing projects. During the ACVS conference in Aug 2013, a live telecast of a successful closure of a complex atrial septal defect was widely appreciated nationwide. Coarctation stenting workshop was conducted in 2012 and is now a routine procedure.

Three dimensional echo reconstruction of the interventricular septum showing a large (thick) and a small ventricular septal defect (thin arrow)



Research

Research projects - Ongoing

1. Trivandrum Heart Failure Registry along with Comprehensive Heart Failure Intervention Program is being carried out with support from ICMR.
2. The other study supported by ICMR is the "Pilot study for establishing Nationwide network of registries on management of acute coronary event" (MACE REGISTRY) and.
3. The study on Coronary Artery Disease in the Young is supported by the Kerala State Council for Science Technology and Environment.
4. Does Non-Regression of Pulmonary Hypertension following Balloon Mitral Valvotomy correlate with BMPR2 Mutations? This is a study supported by the Pulmonary Vascular Research Institute, UK.
5. Community Interventions for Health, Primary prevention program at the community level for the prevention of non communicable diseases after a baseline survey in association with Achutha Menon Centre For Health Science studies, sponsored by the Oxford Health Alliance.
6. Quit Tobacco India Indonesia; Multi centric project which runs tobacco cessation programs as well as efforts to include tobacco cessation modules to undergraduate curriculum in association with Achutha Menon Centre For Health Science studies and Arizona University in United States.
7. Kerala Diabetes Prevention Program. A community intervention program for the primary prevention of Diabetes in high risk subsets with impaired glucose tolerance conducted in association with Achutha Menon Centre For Health Science studies in collaboration with Monash University Australia.

CONFERENCES ORGANISED

1. "Simulator based coronary intervention training program for Fellows" in SCTIMST, December 18&19, 2012,.
2. "Heart failure symposium" in Trivandrum on November 26th, 2012. Two faculty from the US, Dr Mark Huffman from North Western University and Dr Jignesh patel from Cedar Cinai Institute delivered lectures in the symposium.
3. "Heart failure week" and "Patient education event".

   During Heart Failure week 2013(Feb 10-16), a patient education event was organized on 13th February. It was a well-attended and very interactive meeting. Patients could clarify their doubts about various aspects of heart failure.
4. Coronary Total Occlusion (CTO) workshop with Dr Eisho Kyo, Japan-

   April 2012 in SCTIMST.

Academic Staff

Dr. Jaganmohan A Tharakan, MD,DM
Professor & Head

Dr. Thomas Titus, MD, DM, FRCP(L), FRCP(E),FACC
Professor

Dr. Ajitkumar. V K MD, DM
Professor

Dr. Sivasankaran. S, MD, DM Dip. NB
Professor

Dr. Krishnamoorthy. K.M, MD, DM, FACC
Additional Professor

Dr. Harikrishnan. S, MD, DM, FRCP, FACC
Additional Professor

Dr. Narayanan Namboodiri KK, MD. DM, DNB, FIC
Associate Professor

Dr. Bijulal S MD. DM
Assistant Professor

Dr. Anees Thajudeen MD. DM.
Assistant Professor

Dr. Sanjay G MD, DM
Assistant Professor

Dr Venkateshwaran S MD, DM
Assistant Professor

Dr Abhilash S P MD, DM
Assistant Professor

FELLOWS

Dr Raghuram A Krishnan – Adult Cardiology & Interventions

Dr Shunmuga Sundaram. P – Cardiac Electrophysiology

Dr Kiron S – Pediatric Cardiology

DEPARTMENT OF CARDIOVASCULAR AND THORACIC SURGERY

The department performs all elective and emergency surgeries in patients as young as newborns to critically ill fatal conditions such as aortic dissection. The last year has been a positive one with significant strides taken in the direction of becoming the leading Cardiovascular and thoracic unit in the country. The unit has increased the volume and spectrum of clinical work during the last year with an addition of three more faculty members. Intermediary Care unit in the Paediatric cardiac services was set up Cardiac Surgery.

Total procedures done	1807		
Adult cardiac	1088	Pediatric cardiac	719
CABG	457	ASD	112
DVR	68	VSD	81
AVR	128	TOF	144
MVR	180	BDG	44
SVASD	38	TAPVC	29
OSASD	37	ASO	28
MV REPAIR	29	CAVCD	12
AORTIC DISSECTION	11	VSD+AV REPAIR	10
BENTALL	13	COA	19
RE-OP	13	PA BANDING	17
VSR	2	BT SHUNT	11
OPCAB	28	OTHERS	78
OTHERS	84	ADDITIONAL PROC	93

Workshop organised:

A live workshop on Video Assisted Thoracoscopic Surgery was organised by Dr Agasthyan Thirugnjanam from NUS hospital Singapore. Dr. Balasubramoniam KR, Assistant Professor, underwent training in Video-Assisted Thoracoscopic Surgery for a duration of one month at National University Hospital at Singapore in the month of January 2013.

VASCULAR SURGERY

SURGERIES PERFORMED	NUMBER
Hybrid Aortic Arch	5
Ascending Aorta to left CCA bypass	1
Type III Aortic Dissections	3
Carpentiers Thromboexclusion	1
Thoracic Aortic Aneurysms	3
Thoracoabdominal Aortic Aneurysms	7
Carotid Endarterectomy	32
Carotid Aneurysm	2
Carotid Body Tumor	5
Blaisdell procedure	1
Coarctation of Aorta	4
Division of Kommerell's diverticulum	1
Abdominal Aortic Aneurysms	22
Aorto-SMA bypass	1
Aorto-Renal bypass	1
Aorto-bifemoral bypass	6
Femoro-Popliteal bypass grafts	3
Femoro-femoral bypass grafts	2
Femoral pseudoaneurysm	1
Popliteal artery aneurysm	1
AV fIstula jump grafts	2
Dacron wrapped CIA (RCC)	1
TOTAL	105

THORACIC SUGERY	NUMBER
Lobectomy	29
Pneumonectomy	5
Mediastinal mass	11
Maximal Thymectomy	4
Sternal tumor-Excision & reconstruction	1
Chest wall reconstruction	3
Plunging Goitre	2
Thoracic Outlet Syndrome	1
Cervical node excision	1
Achalasia Cardia - Hellers cardiomyotomy	1
Lymphoblastoma –axilla	1
Wedge resection of lung	2
Thoracotomy – Biopsy	3
Thoracotomy – Backout	3
TOTAL	67

AORTIC STENT GRAFT PROCEDURES	Number
Hybrid TEVAR procedures	5
Elective TEVAR	3
Emergency TEVAR	3
EVAR	1
TOTAL	12

MAJOR OPERATIONS	237
AV FISTULA CREATIONS	59

RESEARCH

Homograft Valve Bank: As a part of the programme, total of 17 homograft valves were implanted. Harvesting and storage protocols were standardised. This is the only functioning homograft valve in the State.

Heart failure program: Institute is registered with the Kerala Network of Organ sharing (KNOS) as a centre for cardiac transplantation. A Cadaveric-renal donor harvest procedure was performed.

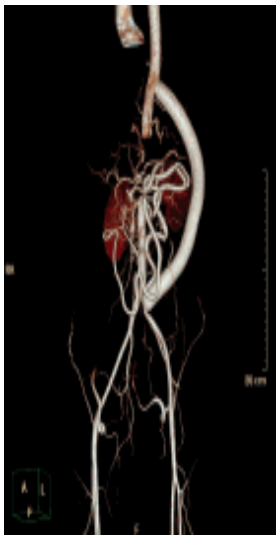
Steroids in Cardiac Surgery: This is a multicentric trial for evaluating the efficacy of steroids in patients undergoing cardiac surgery.

Hydrogel coated large diameter Chitra graft underwent successful in vivo pig implantation in 33 experimental animals.

Faculty members presented papers at conferences and received awards.

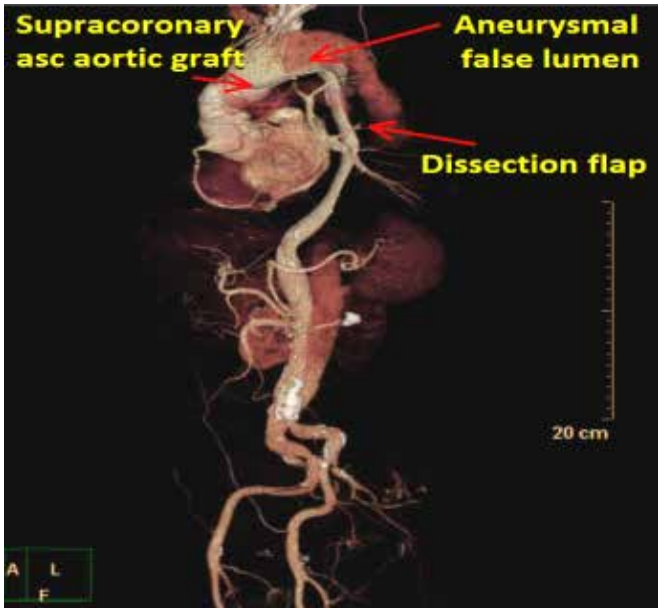
Abdominal Aortic Coarctation in adult before and after Thoracic Aorto-Abdominal aorta bypass using Polyester Vascular graft

PRE-OP: Middle Aortic Syndrome due to extremely rare Abdominal Coarctation of Aorta in adult with extensive collaterals



POST-OP
Neo-Extra anatomic Aorta from Descending Thoracic Aorta to Aortic bifurcation using Polyester (DACRON) graft

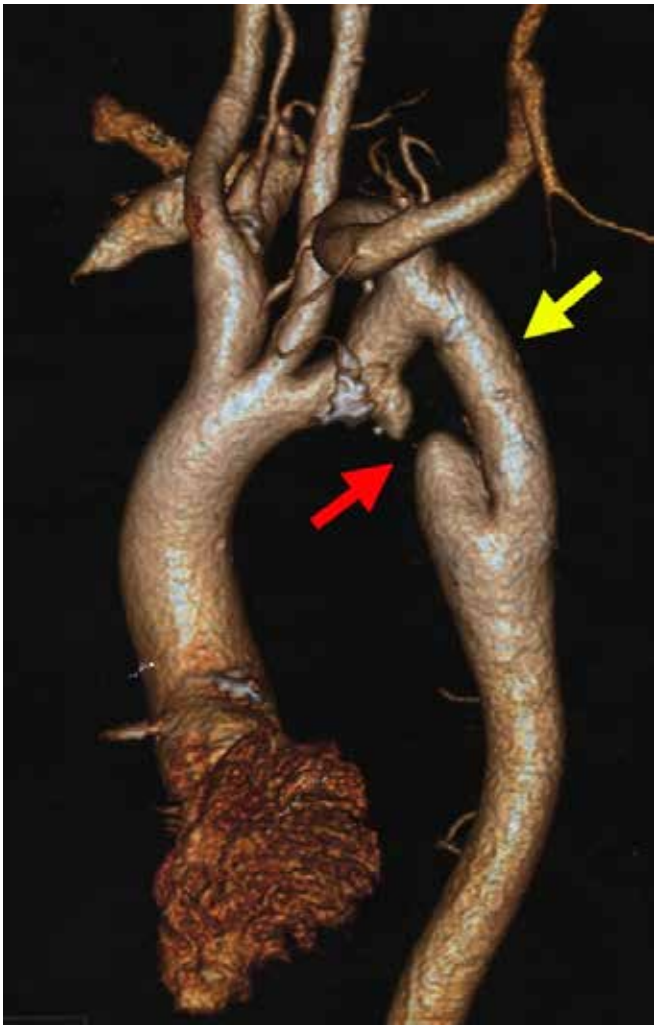
CASE 2: Residual Arch and DTA Dissection with impending Rupture following open repair of Stanford Type "A" Aortic Dissection.



Preoperative CT Angiogram showing the patent supracoronary ascending aortic graft with dissection starting from the arch extending upto the right CIA. The size of the aneurysm measured 8 cms.

HYBRID REPAIR
Check CT Angiogram following successful completion of the Hybrid procedure - the grafts from the Ascending Aorta to the B/L CCA's and left Subclavian artery are patent along with the excluded portion of the aneurysm following the deployment of the Aortic Stent graft

HYBRID REPAIR
Check CT Angiogram following successful completion of the Hybrid procedure - the grafts from the Ascending Aorta to the B/L CCA's and left Subclavian artery are patent along with the excluded portion of the aneurysm following the deployment of the Aortic Stent graft



CT Aortogram showing patent bypass using Chitra Vascular Graft Prosthesis performed 14 yrs. Ago (yellow arrow) for coartation of aorta in adult (red arrow)

Faculty

Prof. K. Jayakumar M.S, M.Ch.
Professor Senior Grade and Head

Prof. R. Sankar Kumar M.S, M.Ch.
Professor Senior Grade

Prof. M. Unnikrishnan M.S, M.Ch.
Professor Senior Grade

Dr. Praveen Varma P. K. M.S, M.Ch.
Additional Professor

Dr. Baiju S. Dharan M.S, M.Ch.
Associate Professor

Dr. Vivek V. Pillai M.S, M.Ch.
Associate Professor

Dr.Varghese T.Panicker M.S, M.Ch
Assistant Professor

Dr. Thomas Mathew M.S, M.Ch
Assistant Professor

Dr. Balasubramoniam K. R. M.S, M.Ch
Assistant Professor

Dr. Sabarinath Menon M.S, MCh
Assistant Professor

Post Doctoral Fellow

Dr. Bineesh KR M.S, MCh

DIVISION OF CELLULAR AND MOLECULAR CARDIOLOGY

Understanding the mechanisms mediating cardiac remodeling and strategies for prevention of adverse remodeling remain the area of research in the Division.

Status of ongoing activities:

Cardiac fibroblasts in myocardial remodeling – molecular mechanisms

The ability to proliferate in response to mitogenic stimulation, retained throughout adult life, and the relative resistance to apoptosis that can potentially result in over-expression of the fibroproliferative response post injury make cardiac fibroblasts a key determinant of myocardial remodeling associated with hypertension, cardiac hypertrophy, reperfusion injury and heart failure. Surprisingly, although the cardiac myocyte has been a focus of intensive research since the early 1980s, knowledge of the cell and molecular biology of the cardiac fibroblast is relatively less advanced. Against this backdrop, the molecular mechanisms involved in cell cycle progression and apoptosis resistance in cardiac fibroblasts have been an area of active investigation in this laboratory over the past several years.

Mechanisms regulating G1-S transition in cardiac fibroblasts:

This laboratory has identified p44/42 MAPK as a positive regulator of G1-S transition in cardiac fibroblasts. A battery of investigations revealed that mitogenic stimulation of cardiac fibroblasts leads to activation of p44/42 MAPK while inhibition of p44/42 MAPK in mitogenically-stimulated cells promotes accumulation of cells in the G0/G1 phase, with a corresponding reduction in the number of cells in the S phase. Alterations in the expression of cell cycle regulatory elements that are critically involved in G1-S transition, such as cyclin D1, cyclin A, p21, p27 and Skp2, correlated well with the activation status of p44/42 MAPK. Using RNA interference and over-expression approaches, this laboratory has uncovered the central role of Skp2 and Foxo3a in cell cycle progression in cardiac fibroblasts.

Mechanisms underlying apoptosis resistance in cardiac fibroblasts:

Cardiac fibroblasts are resistant to several pro-apoptotic factors that prevail in the diseased myocardium. Resistance to death signals may, in the short-term, enable these cells to play a central role in tissue repair following myocyte loss but, in the long-term, facilitate their persistence in the infarct scar, resulting in disproportionate stromal growth and pump dysfunction. Surprisingly, the molecular basis of apoptosis resistance in cardiac fibroblasts remains unclear. This laboratory focuses on mechanisms underlying cardiac fibroblast resistance to oxidative stress-mediated apoptosis. Evidence generated during the year through a combination of gene expression assays, RNAi-based gene silencing strategy, enforced gene expression and analysis of cell survival-related signaling pathways suggested that ERK1/2-dependent activation of NF-B and consequent induction of cIAP-2 may protect cardiac fibroblasts from oxidative damage.

Regulation of AT1 expression in cardiac fibroblasts

The Angiotensin II receptor, AT1, is a clinically relevant molecule that mediates the multiple effects of Angiotensin II on dfferent cell types. Although Angiotensin II has been a subject of incisive investigations the world over for several decades, very little is known about the regulation of AT1. This laboratory has initiated studies on the modulation of AT1 expression in cardiac fibroblasts under conditions of altered redox status. Preliminary studies show that p44/42 MAPK and the redox-sensitive transcription factor, AP-1, are positive regulators of AT1 gene expression.

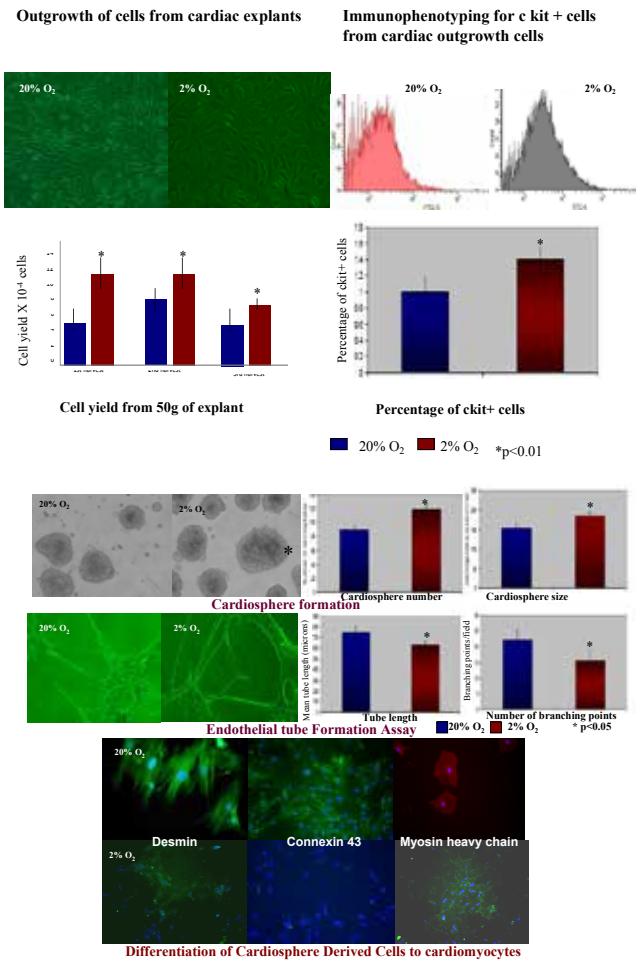
Ex vivo expansion of stem cells under physiological oxygen levels stimulate proliferation and maintain stemness:

Cell based therapy for tissue regeneration following myocardial injury has not met with the anticipated success. Poor survival of transplanted stem cells due to changes following ex-vivo expansion and lack of vascularization are implicated as the cause for the poor outcome. Given the somewhat marginal results of transplanting various stem cells into diseased hearts, the search for factors that appear to promote survival of transplanted cells and also division and survival of native heart cells, is a critical area of research.

In normal practice, cells are cultured at the atmospheric oxygen level (20%) which is significantly higher that the tissue levels of oxygen (5%). Further, stem cells are maintained in niches where the oxygen levels are lower (2%). Presuming that expansion of stem cells for transplantation at tissue levels of oxygen will be advantageous the properties of cardiac stem cells cultured in tissue levels of oxygen were assessed.

Cardiac stem cells were isolated from the right atrial appendage excised during insertion of cannula in patients undergoing coronary artery bypass graft. The explants were cultured following the traditional method; in 20% oxygen (atmospheric oxygen levels) and 2% oxygen (Simulating oxygen level in cardiac stem cell niche). The outgrowth of c-kit positive cells (stem cells) from the explants was two-fold higher yield at lower oxygen levels (Fig. 1). Additionally, the size and number of cardiospheres formed were significantly higher (Fig. 2). Flourimetric analysis using DCFDA showed lower oxidative stress in cells cultured in 2% O2. The tendency to differentiate to cardiomyocytes as well as angiogenesis was higher in cultures at atmospheric oxygen, implying that lower oxygen levels help to retain stemness. This leads to the inference that expansion of cardiac stem cells under physiological oxygen levels is expected to increase the efficiency of transplantation for myocardial regeneration.

Isolation and culture of resident cardiac stem cells (ckit + cells) from outgrowths of cardiac explants cultured in the presence of 20% O2 and 2% O2.



Medium chain triglycerides prevent adverse cardiac remodeling in Spontaneously Hypertensive Rat- Hypertension-induced pathological cardiac hypertrophy is an important risk factor for cardiac failure. In the hypertrophic heart, there is a switch in energy substrate preference from fatty acids to glucose. Shift in energy metabolism from predominantly fatty acids to glucose is considered to play a significant role in the development of cardiac hypertrophy and its progression to failure. A study was carried out in Spontaneously hypertensive rats (SHR) to examine whether stimulation of fatty acid metabolism by supplementation with medium chain triglycerides (MCT) can restore fatty acid metabolism and prevent adverse remodeling in SHR. The feed of 6-month old SHR was supplemented with medium chain triglycerides (5%) for 6 months. Restoration of fatty acid metabolism as assessed by the expression of medium chain acyl-CoA dehydrogenase was enhanced in response to treatment. The redox status of cardiac tissue, hypertrophy index and lipid profile were unaffected by the treatment. The level of calcineurin, one of the key signaling molecules involved in pathological cardiac remodeling was down regulated in treated animals. The study leads to the conclusion that supplementation of MCT in the diet can prevent adverse cardiac remodeling.

The research work is carried out with the help of externally-funded research projects from DBT, ICMR, DRDO and KSCSTE:

Dr Shivakumar continued to serve as member of the Project Review Committee of the Indian Council of Medical Research.

Mereena George was registered for Ph D during the year.

Staff details

R.Renuka Nair , M.Sc.,Ph.D- Scientist G – Senior Grade

K. Shivakumar- M.Sc., Ph.D- Scientist G

Sreeja Purushothaman, M.Sc. Ph.D Project Investigator, KSCSTE

Remani K. B.Sc. MLT- Technical Officer

Susan Mani –B.Sc. MLT, M.Sc. -Technical Assistant

CLINICAL ENGINEERING

The Division of Clinical Engineering is involved in the following 3 activities.

1. Patient care/Service/Management,
2. Academic/ Teaching/Training,
3. Research/Projects

Service

Mr. Koruthu P Varughese Engineer G and Mr. Manoj G S, with one supporting staff is in charge of maintaining the complete electronics installations in the Institute.

Mr. Mohanlal G, Engineer G, with a team of 20 supporting staff is in charge of maintaining the complete electrical installations, Mechanical/Fitting items and audiovisual items in the Institute.

Mr. Madhusoodanan Pillai B, Engineer F with a team of 15 supporting staff is in charge of maintaining the A/C, Plumbing, Medical Gas pipeline system & Telephones in the Institute.

The division has identified all Equipments and Furniture of the institute in stock and fixed Bar-coded Identification stickers with the help of each department on all items.

Academic activity

Division of Clinical Engineering is conducting training programme for Degree, Diploma and NCVT students in the department.

Orientation classes are taken for MTech students.

The staff presented papers at conferences

The Division gives orientation classes to M.Tech (Clinical Engineering) students of the Institute.

RESEARCH

Koruthu P Varughese did a six-sigma project on Item coding for hospital equipments with the help of Indian Statistical Institute, Bangalore.

Initiated implementation of the project on item coding and asset register preparation for revamping equipment maintenance and inventory control.

Staff details

K.Vijayakumar. B.Sc; B.Sc(Engg); MHA	Engineer G and Head till Nov. 2012
ELECTRONICS	
KORUTHU P VARUGHESE B.Sc(Engg); PGDEDT; PGDCA; MBA	ENGINEER 'G' and Head from Dec 2012
MANOJ G S	ENGINEER B
ELECTRICAL	
MOHANLAL G B.Tech, DOTT, MBA	ENGINEER 'G'
GANESH P	JUNIOR ENGINEER (ELECTRICAL) - B
SATHEESH KUMAR N	TECHNICAL ASST. (ELECTRICAL)--B
SABU.K.S	TECHNICAL ASST. (ELECTRICAL)--B
AIR CONDITIONING	
MADHUSOODANAN PILLAI.B B.Sc(Engg); PGDCA, MBA	SCIENTIST ENGINEER F
KRISHNA PRASAD K	TECHNICAL ASSISTANT (MRAC) - A

COMPUTER DIVISION

The division was involved in activities related to Graphical User Interface based Software development, installation, website development and updating, network management, tender publishing, training students and staffs. It also facilitated OMR evaluation, hardware and software maintenance of all programs, maintenance of PACS clients and storage backup. The division maintains 12 high-end servers with an uptime of 99.98%. This was supporting 1100 computer hardware devices including servers, PCs, thin clients, printers, routers, wireless access points, gateway security appliance and switches.

The division made major progress with the expansion of system environments as follows: -

NEW INITIATIVES

Online Leave Application Implementation in Hospital Wing

Online application and processing for the selection of Senior Residents and students for Academic Division – New Software development and implementation of Application registration to selection of candidates.

Online billing for IP Patients – Automation of Patient Charge Account statement and integration with new Billing Schemes.

Service management system for Division of Clinical Engineering with online registration of service calls from user departments – New software development for call registration and monitoring at all levels of DCE.

SMS service for patient care – Appointment software of Medical Records got integrated with SMS for informing patients appointments and postponements in advance.

E- Register, E- Posting for Department of Anaesthesia – New software was developed for making Anesthesia register online.

Dspace – Research publications of the Institute was made

available and scanned copies of theses are being uploaded along with other reports.

Moodle – Integrated Moodle as a e-learning resource for MPH course

THE COMPUTER DIVISION DEVELOPS SOFTWARE AND PROVIDES HARDWARE FOR ROUTINE ADMINISTRATIVE AND HOSPITAL ACTIVITIES.

NEW PURCHASES

Switches for networking Cisco 2960	5 nos
PC Core I5	45 nos
Thin client Itona D 35S	15 nos
Printer HP 1020 plus	6 nos
Printer HP P 1606DN	1 no
Vacuum fluorescent display	3 nos
Printer TVSE MSP450	2 nos

The staff periodically attended training programs for updating their software and hardware skills. They also offered training to inhouse staff and students.

STAFF MEMBERS

Mrs. G. Geetha, B. Tech (E&C), M. Tech (CS)- Scientist G

Mr. Suresh Kumar B, B. Tech (CS), M. Tech (CS)- Engineer C

Mr. Rejith L .R. MCA, MBA- Programmer A

Mr. Saji K. S. B. Tech (CS)- Programmer A

Mr. Manoj M, Diploma in Computer Engg, BSc Programmer A

Mr. Anish R, Diploma in Computer Engg, BCA- Programmer A

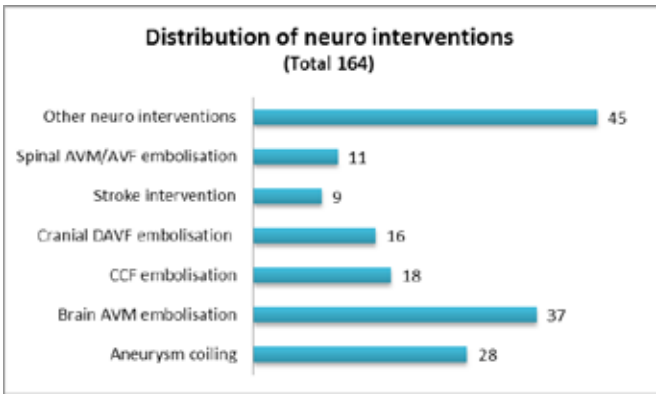
Mr. Sakilnag P.S. B.Tech (CS)- Programmer A

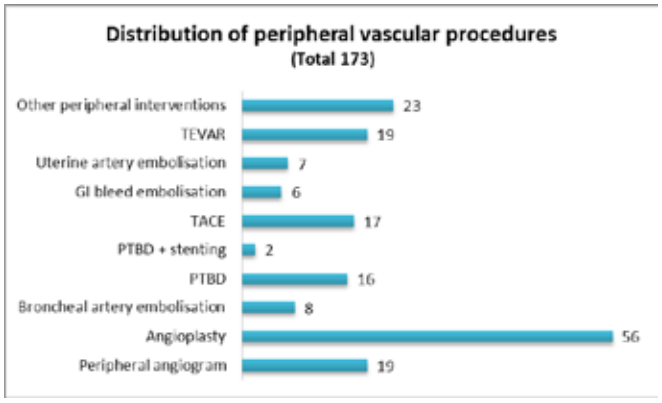
DEPARTMENT OF IMAGING SCIENCES AND INTERVENTIONAL RADIOLOGY

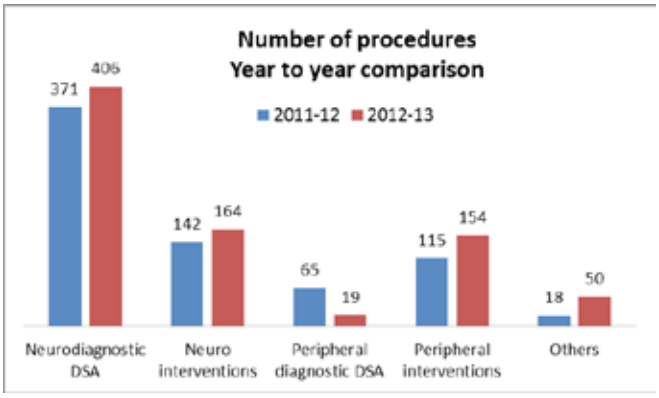
The department with facilities of 1.5 tesla MRI scanner, 256 slice CT scanner, Doppler ultrasound machine and digital subtraction angiography interventional radiology suite caters to imaging and interventional radiological management of large number of patients with neurological & vascular diseases who come to the hospital in an emergency/ out- patient basis. In addition the department offers subspeciality training in neuroradiology, cardiovascular & interventional radiology. Research in the areas of medical image processing, functional MRI & brain computer interface is also ongoing.

There is an increase in the number of cases as apparent from the graph given below.

Procedure	No.
4 vessel angiogram	388
Spinal angiogram	18
Aneurysm coiling	28
Brain AVM embolisation	37
CCF embolisation	18
Cranial DAVF embolisation	16
Stroke intervention	9
Spinal AVM/DAVF embolisation	11
WADA	7
BOT	9
Other neuro interventions	29
Peripheral angiogram	19
Angioplasty	56
Broncheal artery embolisation	8
PTBD	16
PTBD + stenting	2
TACE	17
GI bleed embolisation	6
Uterine artery embolisation	7
TEVAR	19
Other peripheral interventions	23
Palliative procedures for pain	26
Ba/Flouroscopy/sinusogram	24
Total number of cases	793







INTERVENTIONAL RADIOLOGY

OPD New Cases	287
OPD Review Cases	1222
Total Admissions	378
General ward	245
Neurointerventional ICU	133

New Initiatives

Neuro intervention center

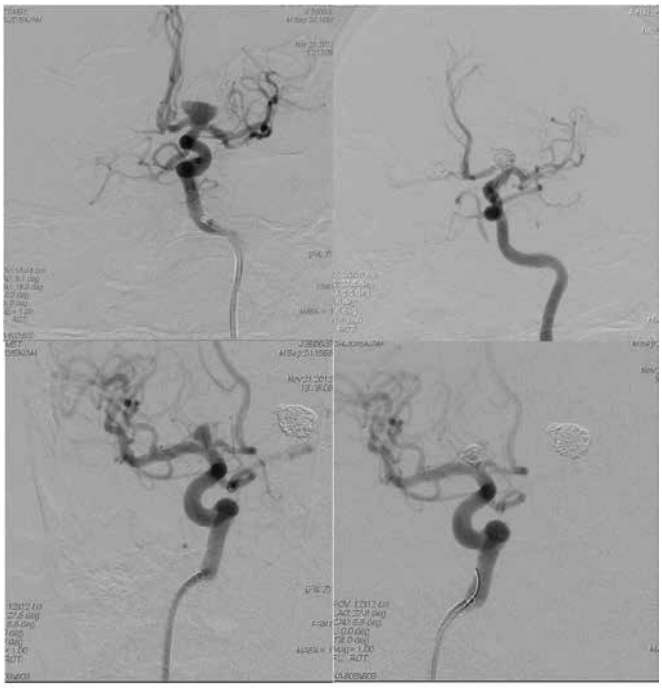
Dedicated inpatient facility for Neuro endo vascular procedures as an inhouse project was started in November 2012.

Interventional neuroradiology is a growing discipline, and fascinating field of modern medicine that originated with the success of treatment of cerebral aneurysms with the detachable coils, embolisation of arterio venous malformations, carotid stent placement, intracranial angioplasty and stent placement, and acute ischemic stroke therapy. Availability of dedicated neuro interventional facility has resulted in timely management of complex neurovascular diseases and has helped in postdoctoral training and research activities. . This facility is the first of this kind in India for management of neurovascular diseases. There was an increase in the number of procedures after starting this neuro intervention facility without any procedure related mortality or morbidity.

The following new procedures were started : Inferior petrosal sinus sampling using desmopressin challenge. Balloon assisted coiling for intracranial aneurysms using Sceptor. Balloon tipped guide catheter assisted mechanical thrombectomy for acute ischemic stroke. Intra arterial Milrinone for post SAH vasospasm treatment. Intracranial AVM embolization using Apollo detachable tip catheters. Dedicated stentriever (solitaire FR) for acute stroke interventions.

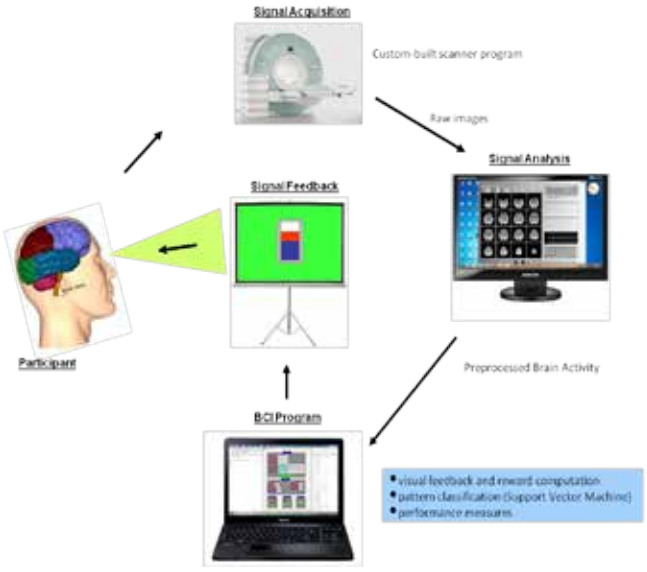
NEURO INTERVENTION CENTER

NEUROINTERVENTIONAL TREATMENT : BILATERAL ICA BIFURCATION SACCULAR ANEURYSMS, SINGLE STAGE COILING USING STENT AND BALLOON ASSISTANCE



RESEARCH ACTIVITIES

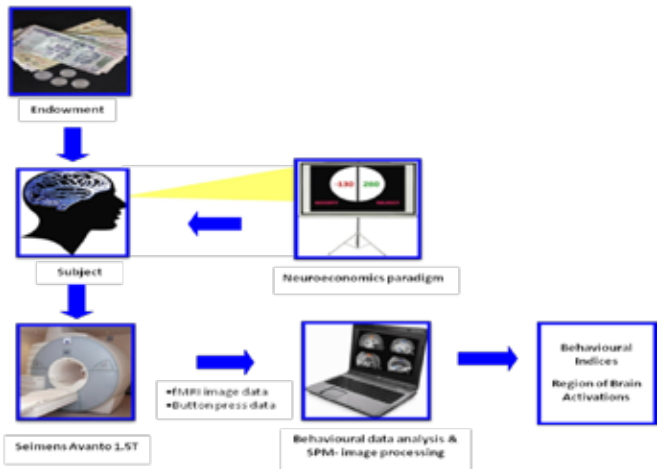
Self-Regulation of Broca's Area (right inferior frontal gyrus) using Real time FMRI in Post Stroke Aphasia patients. The study is based on the hypothesis that patients with expressive Aphasia can learn to self-regulate (up-regulate) the BOLD signal in Broca's Area with real time fMRI neurofeedback of a correlated BOLD signal from the Broca's as well as Wernicke's areas. Acquired up-regulation will lead to an improvement in expression of language (OR amelioration of expressive Aphasia). Real-time fMRI (Rt fMRI) allows generation of brain activity information from the MR scans in a time period of 1-3 seconds. Advances in computing and faster image processing algorithms enable completion of the processing of image data within shorter time periods to generate the maps of brain activity. This data can then be fed back to the person being scanned to form a neurofeedback loop which has shown promising results for self-regulation of BOLD activity in specific brain regions. Further the brain activity data can be used for brain state classification for developing brain computer interfaces (BCI) for communication and control.Last year, in a project funded by DBT, we were able to develop this fMRI based neurofeedback system.



REAL TIME FMRI BASED NEUROFEEDBACK SYSTEM DEVELOPED AT SCTIMST IN COLLABORATION WITH DR. SITARAM RANGANATHA, UNIVERSITY OF TUBINGEN, GERMANY

Neurobiological Marker for Population Differences is a Neuroeconomic Investigation with anxiety and depression patients contrasted with normal population Neuroeconomics study at SCTIMST is in collaboration with Dr. Chandrasekhar Pammi, Center of Behavioral and Cognitive Sciences, University of Allahabad. Decision making and loss aversion is varied across populations with respect to the presence of rewards and by the effect of behavioural pathologies. In general for healthy individuals, loss aversion coefficient is 2 or above. The current understanding is limited with loss aversion study engaging different pathological groups. The aim of the project is to find novel biomarkers, which are able to explain diverse behaviour of loss aversion and decision-making and its correlation towards brain activation. This is attained with the help of neuroeconomic-fMRI session, which involves choice selection on variably rewarded gambles. The behavioural indices and fMRI images of anxiety and depression patients were acquired and contrasted with those of healthy volunteers. The study can make significant contribution towards understanding the risk taking behaviour of people with various behavioural disorders.

fMRI based neuroeconomic system developed at SCTIMST



Collaborations - National, International, Industry

Industrial collaboration:

With Siemens Healthcare India, the department collaborated for a study on Arterial spin labeling and T1 perfusion imaging in characterizing brain tumor, double inversion recovery sequence for focal cortical dysplasia

detection and non-contrast angiogram for detecting renal artery stenosis.

With Philips Healthcare, a study on blood brain barrier permeability imaging in perfusion CT of acute stroke to predict hemorrhagic conversion was carried out.

Faculty

- Dr. T. R. Kapilamoorthy DMRD, MD, PDCC, MAMS
  Professor and Head
- Dr. C. Kesavadas DMRD,MD, MAMS, MNASc
  Professor
- Dr. Bejoy Thomas MD, DNB, PDCC
  Additional Professor
- Dr. Jayadevan E. R. DMRD,MD,DNB,DM
  Assistant Professor
- Dr. Santhosh Kumar K. MD, PDCC
  Assistant Professor

Supporting Staff

- Geethakumari.V DRT
  Senior Scientific Assistant
- Medini.G DRT
  Junior Technical Officer
- Alex Jose.D DRT, DAMIT, BSc (Rad)
  Technical Assistant – B
- Sheeba Kumari. R DRT, DAMIT
  Technical Assistant - B
- Johnson.C DRT, DAMIT, BSc (Rad)
  Technical Assistant - B
- Krishna Kumar.N DRT, BSc (Rad)
  Technical Assistant - A
- Vikas. K. N DRT, DAMIT, BSc (Physics)
  Technical Assistant - A
- Mahesh.P.S DRT, BSc (Rad)
  Technical Assistant - A
- Joyi.K DRT, BSc (Rad)
  Technical Assistant - A
- Sandhya .V.S DRT
  Technical Assistant - A
- Babunath.B DRT, DAMIT, BSc (Rad)
  Technical Assistant - A
- Suseela D GNM (General Nursing & Midwifery)
  Chief Staff Nurse
- Sosamma Philip BSc (Nursing), Cert. in Nursing
  Admin.-Chief Staff Nurse
- Kunhiraman MSW
  Junior Social Worker - A

DEPARTMENT OF MICROBIOLOGY

The Department provides antibiotic stewardship and molecular diagnostic services, thereby providing accurate and quick reports on all specimens sent to the laboratory. Mycology, Virology and Serology are carried out routinely. The department also maintains the viral culture facility. The department extends training to MD and MSc Microbiology students from other institutions.

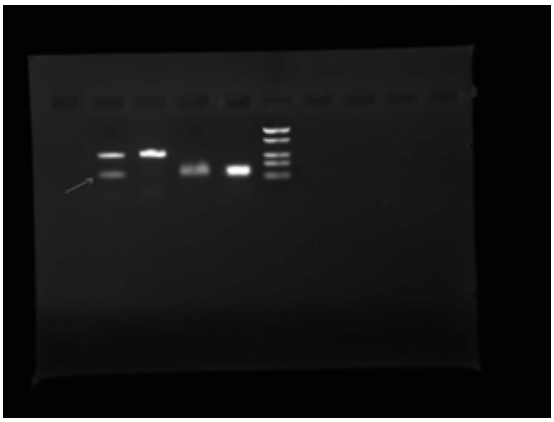
Bacteriology: Infective endocarditis was detected among 17 patients and were followed up till discharge and advice given for appropriate antibiotic therapy. Among them, 8 were of-lytic Streptococci, one case of Corynebacterium urealyticum, one case of non-lytic Streptococci due to a rare species of Gram positive cocci, Vagococcus fluvialis(Identified by VITEK), that was resistant to all routine antibiotics, two of them of Staphylococcus aureus, one of Enterococcus faecalis, one of Enterococcus gallinarum resistant to Vancomycin, one Stenotrophomonas maltophilia and one of them with Candida parapsilosis (byVitek). There were 5 prosthetic valve infections.

An interesting case of acid fast bacilli seen in a lung tissue from a patient who had undergone ATT and become sputum negative for tuberculosis.

Hospital-acquired infection control:To control the hospital-acquired infections, efforts are made to computerize the procedure. Improved awareness and better sample collection has led to better diagnosis and treatment. Interventions were made-

a) to make CLA-BSI better detected by increasing sampling of blood with Cannula
b) to reduce infections during Deep brain stimulation. Three cases of Staphylococcus infections were managed successfully
c) to reduce infections in pacemaker insertion . A case of severe Pseudomonas infection was managed successfully.
d) Continued support to the HICC and ICT in managing data and containing spread of infection.

Molecular diagnostics: TB PCR detected 7 cases of tuberculous meningitis (Fig.1. Gel electrophoresis – shows the positive band for MTB in a CSF sample)



New initiatives during the year: Know your lab (KYL) - A series of interactions with the nurses and doctors who send specimens to the various labs so that specimen collection is made more efficient. This was then extended to include the new batch of residents who joined in Jan 2013.

Three new technical assistants were being trained in all the techniques in the various sections

Research

As a part of Homograft valve programme, 14 successful implants. The department checks the tissue for sterility and preserves it in liquid Nitrogen after harvesting from bodies that come to the Forensic Department of Medical College, Trivandrum. The medical sociologists of the department counsel and obtain consent from the relatives.

A project has been initiated to find the prevalence of different resistance phenotypes among the bacterial isolates from hospital-acquired infections.

Ms Molly Antony, Scientist F, has been awarded PhD in Biotechnology from Kerala University under the guidance of Dr. V.Thankamani and the topic was "Phytochemical and Bioactive properties of Alstonia scholaris"

Staff details

1. Dr.Kavita Raja, DCP, MD, MPhil(Clin.Epidem) – Professor and Head
2. Dr.Molly Antony, MSc, DMV, PhD – Scientist F
3. Dr.Muraleedhar Katti MSc,PhD, FISCD – Associate Professor
4. Smt.Sujatha – BSc. MLT Scientific Assistant
5. Smt.Gracy Varghese BSc, MLT (CMAI) – Scientific Assistant

DEPARTMENT OF NEUROLOGY

The Neurology Department has different subspecialties aimed at providing comprehensive care to the patients. In 2012-13, the number of new patients attending Neurology clinics recorded an increase of 7.6% and the number of admissions also rose by 7.4%. The average hospital stay was 6 days and mortality rate diminished to 1.25 % compared to 1.44% in the previous year.

NEUROMUSCULAR DISORDERS SUBSECTION

The subsection caters to the evaluation, investigations and management of patients with diseases of muscles, nerves, plexus and anterior-horn cells of the spinal cord. Besides the work up of patients in the out-patient clinics and in-patients in the wards, this subsection also runs a Specialty clinic on Tuesdays to follow up their disease status and response to treatment.

Patient Management Conference:- A multi-disciplinary approach to manage complex and difficult- to- treat neuromuscular cases, with careful evaluation, discussion and formulation of strategy in the form of targeted modalities of treatment, regular follow-up and active rehabilitation to enable the patient to make the best use of one's motor and physical ability and cope up with the residual deficits and disabilities. This session is conducted once a week with a team of 3 neurologists with focused interest, 1 psychiatrist, 1 neuro nurse, speech therapists, physiotherapists, occupational therapist and 1 medico-social worker. In the current year, 52 cases were discussed.

Group Sessions :- Group therapy is conducted for 1 to 2 hours before each review clinic for patients with specific diseases like Myasthenia Gravis. Supervised by the neuromuscular consultant, Neuro-nurse and senior Medico-Social worker, patients discuss their problems, clear their doubts and interact with other similar patients. This reinforces their confidence, thereby reducing their stress, guilt and frustration. During these sessions they also receive updated information on their illness.

Clinico-Pathological meetings are conducted once in 2 weeks, where discussions on muscle, nerve and skin biopsies of patients with neuromuscular diseases confirm the diagnosis made on clinical and electrophysiological parameters. Pathologists from the Institute as well as the neighboring institutions participate in this session.

ACTIVITIES

Neuro Muscular Review clinic attendance	1279
Large Volume Plasma Exchange	180
Small Volume Plasma Exchange	75
High Dose IV Immunoglobulin	120
Thymectomy in Myasthenia Gravis	16
Lab Studies	
Electro Neuro Myography (ENMG)	1188
EMG	441
RNS	113
VEPs	194
BAER	64
SSEP	39
Genetic tests	15
Muscle and Nerve Biopsy	33

Research

Genetic studies in Duchenne Muscular Dystrophy especially on Single Nucleotide Polymorphism (SNP) to evaluate its association with severity and Steroid responsiveness has been initiated in collaboration with Rajiv Gandhi Center for Biotechnology, Trivandrum.

Long-term Clinical Outcome Study of patients with Myasthenia Gravis based on their immunological profile in Anti-Acetyl choline Receptor and Anti- Muscle specific Tyrosine Kinase antibody.

International, multi-center, double blind, randomized, parallel-group trial of Interferon 1a versus Daclizumab in Remitting Relapsing Multiple Sclerosis (RRMS)- Protocol 205MS 301- is going on, sponsored and funded by Biogen Idec, Basel, Switzerland.

Studies have also been initiated on Silent period in Carpal tunnel syndrome, Diabetes and syringomyelia and cognitive aspects in Multiple Sclerosis.

The other projects include: Standardisation of temperature measurements in the EMG laboratory, Standardisation of F wave parameters in nerve conduction studies, Family and genetic studies in Myotonic dystrophy patients, Mortality studies in the neuro medical ICU, Inching technique and 2nd Lumbrical/interossei latency difference in the diagnosis of Carpal tunnel syndrome and Clinical studies in Prion Diseases. Registry of follow up patients attending the Neuromuscular clinic, for the utility of services and Computer database of the biopsy studies in patients with neuromuscular studies were prepared.

Completed projects include clinico-radiological correlative study in multiple sclerosis – and MUNE in Motor neurone Disease, Trigeminal Nerve RNS in diagnosis of Myasthenia gravis, Clinico electrophysiological correlation in Diabetic Neuropathies and SSPE Natural History study.

Acute Flaccid Paralysis Program: This program, under National Polio Surveillance Project, Govt of India, a WHO initiative, has identified the Neurology dept SCTIMST as a nodal center. Accelerated strategies were adopted to ensure interruption of wild Poliomyelitis transmission. From 2012, once India was declared free of wild Polio infection, this project has now initiated studies on immuno-logical and serological clues for antecedent events and associations in Guillain-Barre' Syndrome.

R. MADHAVAN NAYAR CENTER FOR COMPREHENSIVE EPILEPSY CARE

R. Madhavan Nayar Center for Comprehensive Epilepsy Care (RMNC) provides comprehensive care for all types of adult and pediatric epilepsies to patients from all parts of India and the neighboring countries. It is the main center for epilepsy surgery in India and South-east Asia. The mission of the RMNC is: (1) To provide comprehensive medical, surgical, psychosocial and occupational care for patients with epilepsy with a special emphasis on the surgical treatment of medically refractory epilepsies; (2) To undertake advanced clinical and basic science research in various areas of epilepsy; and (3) To enhance epilepsy awareness among the primary care physicians and general public.

Patient care:

The center conducts two epilepsy clinics every week and provides neuropsychological and occupational counseling along with medical advice to all the patients.

Service	Number of patients
Clinic attendance	6380
EEG	3609
Video-EEG	1214
Electrocorticography	93
Intracranial electrode placement	06
Vagal nerve stimulation	03
Wada test	09
Epilepsy surgery	99

Facilities offered

Medical Treatment
Psychosocial intervention
Speech and occupational therapy
Surgery for intractable epilepsy
Routine EEG
Digital Video EEG
Intraoperative Electrocardiography
Intracranial monitoring
Cortical stimulation and mapping
Functional MRI
EEG-Functional MRI
SPECT and PET

In addition, 1087 patients attended the two outreach epilepsy clinics at Ansar Hospital, Perumpilavu and PHC, Changaramkulam which are run on first and third Sundays of every month. The epilepsy monitoring unit has six Video-EEG units for the diagnosis and presurgical evaluation of epilepsies. The center has all the advanced facilities for the comprehensive care of all types of epilepsies (as given in the table). Center also provides special epilepsy care for women in the reproductive age group through Kerala Registry of Epilepsy and Pregnancy (KREP). KREP also runs a special clinic for women with epilepsy in the Maternal and Child health hospital (WCH), Thycaud, Trivandrum

Four fellows completed postdoctoral fellowship programme in epilepsy this year, which is presently offered only at this Institute.

Public awareness and welfare: Two epilepsy camps were conducted at Thiruvalla and Alappuzha on 29/07/2012 and 28/11/12 respectively. Patients attending these camps were educated about epilepsy and were provided with medical advice and free medicines. Additionally, four issues of "Prateeksha" a magazine for people with epilepsy

were published by the epilepsy self help group this year. National Epilepsy Day was observed on 17/09/2012 by arranging a public function and a painting competition for children with epilepsy.

Prominent activities

1. Quantitative evaluation of the single photon emission computed tomography (SPECT) and positron emission tomography (PET) were included in the presurgical evaluation of epilepsy. This has improved the yield of these investigations in epilepsy source localization.
2. The study about the antiepileptic drug withdrawal following extratemporal epilepsy surgeries was published in prestigious journal "Neurology". This is one of the few studies available in this area and helped in rationalizing the AED management following extratemporal surgeries.
3. The study highlighting that there is no association between febrile seizures and SCN1A polymorphism in south Indian patients with mesial temporal lobe epilepsy and hippocampal sclerosis.
4. The center conducted a five-day epilepsy workshop at Bogatty Palace, Kochi in December 2012. The workshop was attended by 60 Neurology residents and faculty members from all over the world. This was based upon the unique modular approach of self teaching and was well appreciated by the participants.
5. An international workshop on EEG-fMRI was conducted on 29.04.2012. It was attended by the Dr. Louis Lemieux (UCL Institute of Neurology, Queens square London), and Dr.Robert Stormer (Technical support in-charge, Brain products, Germany).

Research activities

Following research activities are being actively pursued at RMNC:

Study of the long-term outcomes of epilepsy surgery including seizure, psychological and quality of life outcomes.

Study of the antiepileptic drug profile of patients following epilepsy surgery.

Genetics of drug resistant epilepsy.

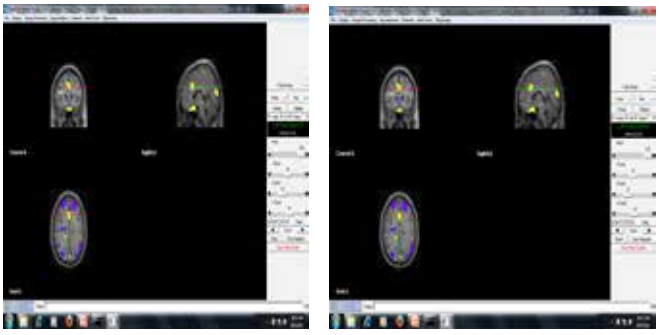
Clinical, electrophysiological and pathological differences within temporal lobe epilepsy.

Advanced imaging techniques in patients with refractory epilepsy.

Knowledge, attitude and practice of epilepsy in different community groups.

Development of cost-effective models of presurgical evaluation suitable to the developing world.

Use of Ictal-Interictal SPECT Analysis by SPM in a patient



with MRI negative mesial frontal lobe epilepsy clearly shows area of hyperperfusion over the mesial frontal region.

COMPREHENSIVE CARE CENTER FOR MOVEMENT DISORDERS

The Comprehensive Care Center for Movement Disorders provides high quality and comprehensive medical and surgical treatment to patients with Parkinson's disease (PD) and various other movement disorders. In addition, the center trains senior residents in Neurology and offers post-doctoral fellowship course in Movement Disorders and PhD program. The centre also conducts clinical, genetic, neurophysiological and neuropharmacological and basic science research, with a vision to become an internationally recognized referral, training and research center for Movement Disorders.

Routine Activities:

Movement Disorder Clinic: The weekly clinic is conducted by Movement Disorder Specialist, psychologist, social worker, movement disorder nurse and physiotherapist. The clinic provides comprehensive care to patients with movement disorders referred from all over India, including medical

and surgical treatment, counseling, neuropsychological and psychiatric evaluation and advice on physiotherapy and rehabilitation.

Botulinum Toxin Clinic: This clinic is devoted to the treatment of focal and segmental dystonia, hemi-facial spasm, post-stroke spasticity etc. The involved muscles are identified and injected using special equipments including Electromyography (EMG), by specialists with vast experience in the procedure.

Movement Disorder Surgical Program: The Center is the pioneer of Deep Brain Stimulation (DBS) surgery for Parkinson's disease in India. The surgical procedures are done using state of the art techniques like Micro-Electrode Recording (MER) and image guidance (Surgical Planning System and Neuronavigation System). DBS treatment is also offered to patients with intractable Tremor and Dystonia. The Centre is also well experienced in lesioning surgeries like MR-guided radiofrequency lesioning of 'Globus Pallidus' for Parkinson's disease, and Stereotactic Thalamotomy for Essential Tremor.

Non invasive brain stimulation and motor physiology lab: This fully equipped lab run by the center is engaged in various internationally and nationally funded research projects using modern research tools like image- guided Transcranial Magnetic Stimulation (TMS). It also performs activities like tremor analysis and back averaging studies and offers TMS-based treatment in selected conditions. The lab has research collaboration with Dr. Sabine Meunier and Dr. Traian Popa, Neurophysiologists from Hospital Sal Petriere, Paris, France and the ongoing programs are supervised by them.

The following Table shows the clinical activities of the Center in this year

Procedure	Number performed
Movement Disorder Clinic consultations / reviews	1595
Botulinum Toxin Injections	187
Deep Brain Stimulation Surgeries and Neurostimulator Replacements	22
Deep Brain Stimulation programming sessions	63
Transcranial magnetic Stimulation	394

Achievements and New Initiatives

The in-house and international collaborative research activities of the Center have resulted in many break-through observations, published in international, high impact medical journals. These include the negative effects of acute dopaminergic medication doses on cortical plasticity in patients with Parkinson's disease (with important implications in the pathogenesis of motor complications of Parkinson's disease), and alterations in cerebellar sensory processing, contributing to the maladaptive plasticity of the primary motor cortex. The new initiatives include projects on the genetics of impulse control disorders in Parkinson's disease and of restless leg syndrome, and those in basic motor physiology, addressing pathophysiology of dystonia and cerebellum-motor cortex interactions in shaping motor output (Listed below). The project entitled "Encoding of interhemispheric interactions in mirror dystonia: a window to the physiology of dystonia" has been approved for funding by the Dystonia Medical Research Foundation, USA (DMRF). Another new initiative is aimed at validation of the Malayalam version of Montreal Cognitive Assessment for use in patients with Parkinson's disease with mild cognitive impairment.

The center is involved in a number of externally funded projects and international clinical trials. The newly initiated research projects include: (1) "Encoding of interhemispheric interactions in mirror dystonia: a window to the physiology of dystonia." (2) "Cerebellar modulation of the pre-motor cortex in shaping the motor output"; (3) "Validation of the Malayalam version of the Montreal Cognitive Assessment scale and a prospective evaluation of mild cognitive impairment in Parkinson's Disease using the Malayalam version (MoCA–M)". "Association of dopamine receptor (DRD2, DRD3), glutamate receptor (GRIN2B) and serotonin transporter (5HTTLPR) gene polymorphisms in Parkinson's Disease patients with impulse control disorders while on dopamine agonist therapy." The projects are supported by Research grants from India and abroad.

Internally funded research projects during this year:

"Elucidation of molecular interactions between autophagic pathways and alpha-synuclein accumulation in a cell model with endogenous expression: relevance to sporadic Parkinson's disease".

"Study of factors promoting aggregation of alpha synuclein and their influence on the clearance mechanisms in an endogenous cell model with relevance to pathogenesis in Parkinson's disease."

"Non-Invasive Cerebellar inhibition by Transcranial Magnetic Stimulation for the treatment of Levodopa-induced dyskinesias in Parkinson's disease."

"Plasticity of the motor cortex in motor fluctuations and dyskinesias of Parkinson's disease".

Ten year -outcome of bilateral sub-thalamic nucleus Deep Brain Stimulation in Parkinsons Disease.

Seminars/ Workshops Organized: The center organized awareness classes and interactive session for patients with Parkinson's disease and their caregivers, in connection with the World Parkinson Day, on April 11, 2012.

Other Important Events:

Inauguration of the World Parkinson's Day-2012, at SCTIMST, on 11th April 2012 by the renowned poetess and social activist, Smt. Sugatha Kumary Teacher.

Patients and caregivers attending the awareness classes held in connection with the World Parkinson's Day- 2012.

Comprehensive Stroke Care Center

Comprehensive Stroke care centre treats hyperacute and acute strokes and intracerebral hemorrhages, providing comprehensive rehabilitation services to stroke survivors and implementing secondary preventive strategies, including patient and public education. The seven bedded ICU has state of the art amenities, for care of acute stroke patients. The team includes stroke neurologists, neurosurgeons, interventional neuroradiologists, vascular surgeons, stroke nurses, physiotherapist, occupational therapist, speech therapist and medical social worker as well as a neuropsychologist. Patient management conferences are held, where all the difficult to treat patients are discussed and decisions taken by consensus. In addition, multidisciplinary meetings are conducted where rehabilitation team discusses the various aspects of patients recovery and continued care and plan the pathway of rehabilitation.

A videofluroscopy program was started in Jan 2013 for patients with post-stroke dysphagia. This will help in planning swallowing exercises and to decide on the need for PEG

Annual statistics is given below

	Procedure	Numbers
1	Stroke clinic	2890
2	ICU admissions	438
3	Thrombolytic therapy	23
4	Carotid revascularization	32
5	Decompressive surgery	12
6	ICH evacuation	4

Research

A study on "International Stroke Perfusion Imaging Registry (INSPIRE)" is a collaborative study between John Hunter Hospital, University of New Castle, and SCTIMST.

A study on "Factors influencing return to work after stroke is in progress. This is a collaborative study between Harvard medical school, Boston and SCTIMST.

The other studies include, "Autonomic dysfunction in first ever ischemic stroke- short term cardiovascular and neurological outcomes" and "Video Fluoroscopic assessment of efficacy of swallowing exercises for the patients with post stroke dysphagia."

A study on "Development of a computer based language therapy software (Malayalam version) for post stroke patient with aphasia and finding its efficacy compared to conventional speech therapy" has received funding from the Centre for Disability Studies.

Ms.Megan Reyan Philippa, (medical student from the Sydney University, Australia), did a study on "Communication to stroke Carers and post stroke mood disorders" and .Mr Bryant Bonner (medical student from Harvard Medical school) did a study on "Return to work after stroke."

Faculty presented papers in different conferences.

Meetings organized

Along with Department of Physical Medicine and Rehabilitation a Workshop on Post Hospital Stroke Physiotherapy was organized on 15th July 2012 at for physiotherapists.

In addition, the faculty gave educative lectures in different hospitals in the city and a programme on Stoke was also telecast on 29th October, the World Stroke day.

Started bedside functional electrical stimulation(FES) for patients with stroke in November 2012. In addition FES protocols has been developed by our stroke rehabilitation team.

COMPREHENSIVE CENTRE FOR SLEEP DISORDERS

The Comprehensive Center for Sleep Disorder (CCSD) of the Department of Neurology was started at the Biomedical Technology Wing in May 2009, with a mission of providing diagnostic support, patient care, research, training and education of the public about the sleep disorders. This is the first comprehensive care program of its' kind in the country catering to people with all forms of sleep disorders through a disciplined approach. It thereby maintains a cohesive interface with other subspecialties in Neurology as well as other disciplines in medicine.

Routine activities:

Comprehensive Center for Sleep Disorder has three bedded sleep lab with facilities for polysomnography (PSG), continuous positive airway pressure (CPAP) titration, Multiple Sleep Latency Test(MSLT), maintenance of wakefulness test (MWT) and Suggested Immobilization Test (SIT).Patients are seen in sleep clinic and in addition to medical consultation, undergo neuropsychological evaluation; psychiatric counseling and dental sleep

evaluation. All patients on CPAP are re-evaluated on Thursdays once every three months in CPAP review clinic. Group sessions moderated by social worker are conducted for patients for over thirty minutes prior to sleep clinic.

Designated Activities:

Total number of OPD attendance	808
Total number of PSGs	275
Total number of CPAP trials	112
Total number of MSLT	16

Research Projects

Completed projects include, prevalence of sleep disorders in the general population, epworth sleepiness score validation in South Indian population, formulation of new sleep apnea clinical score and its correlation with OSA severity, prevalence of Sleep disorders in Heavy motor vehicle drivers in Trivandrum city, contribution of SDB in the manifestations of ADHD in children, and Neuropsychiatric manifestations of patients with OSA and its improvement after CPAP treatment.

The staff members presented papers in different conferences.

A workshop was conducted at the Department of Neurology, G B Pant Hospital, New Delhi on 30th of March for post graduate students and technologists, covering the topic of sleep and its disorders by Dr. Sapna, Dr. Pournamy& Dr. Pragati.

Dr Asha Gopinathan- was Principal Investigator of the Project " Creating a dendritic simulator" under the DST-WOS-A scheme .The aim of this project was to utilise the compact difference scheme as an alternate to spectral methods to solve various equations pertaining to conduction in dendrites in the brain. This is being done as the compact scheme has spectral-like resolution, yet is much more easier to solve. The simulators that are currently being utilised by neuroscientists – NEURON, GENESIS, MOOSE among others use some variant of the central difference schemes to solve the various equations. The study has shown that compact scheme can be used to solve the cable equation, is robust, has sixth order accuracy and gives good fit. The resolving efficiency of the compact scheme for first and second derivatives at any given error is higher than that of the central scheme of the same order. It can be used to solve the Hodgkin-Huxley equations and gives good results for cylindrical and tapering dendrites.

She was invited to attend the Telluride Neuromorphic Engineering workshop that dealt with the principles of neuromorphic engineering.

Faculty

Dr. K. Radhakrishnan, MD, DM, FAMS, FAAN- Director & Professor Senior Grade

Dr. Muraleedharan Nair MD, DM Professor & Head

Dr. C. Sarada MD, DM Professor

Dr. Sanjeev V. Thomas MD, DM FAMS, FANA- Professor

Dr. Asha Kishore MD, DM Professor

Dr. Abraham Kuruvilla MD, Dip Am Boards Additional Professor

Dr. Sylaja P. N. MD, DM Additional Professor

Dr. Ashalatha. R MD, DM Associate Professor

Dr. Rathore Chaturbhuj Gopalsingh MD, DM Associate Professor

Dr. Sajith S. MD, DM Associate Professor

Dr. Syam K. MD, DM Assistant Professor

Dr. Ramshekhar N. Menon MD, DM Assistant Professor

Dr. Sapna Erat Sreedharan MD, DM Assistant Professor

Dr. Aley Alexander Ph. D Neuropsychologist

Ms. Sunita Justus Neuropsychologist

Ms. Priyanka Suresh Speech & Language Therapist

Ms. V. S. Lekha Medical Social Worker

Dr Pragati Agrawal MD Consultant in Sleep Medicine/ Pulmonologist

Dr P.R Mary MD Psychiatrist

Ms Chitralekha MA Psychologist

Mr Unnikrishnan JP MAMSW PGDHM, M.Phil Program co-ordinator cum Social worker

Prof. V Mohan Kumar- PhD. FAMS- Visiting Professor

Dr Krishnan Subramaniam BDS Visiting Faculty, Dental Sleep Medicine

Dr. Asha Gopinath- Ph.D. Principal Investigator

Neuro-technologists

Mr Anis C. A

Ms Shana Nair

Mr Amith krishnan

Mr Rejith R

P. M. Aswathy

Mr. Amal M G - Coordinator & Data Manager

Ms. Nisha Sreedharan- Physiotherapist

Ms. Vidhu A B - Occupational Therapist

Ms. Ann Mary Roy- Speech Therapist

Mr. Ratheesh B - Nutritionist cum Project Fellow

Lincy Phillip- Occupational Therapist

Social workers

Venugopal A

Preetha G

Nandini VS

Shalini KR

Pradeep MJ

Anees CA

DEPARTMENT OF NEUROSURGERY

Neurosurgery department recorded increase in number of patients seeking surgical care this year and most of them required complex procedures. The goals of the department including dedication to providing advanced and timely surgical care to patients, education of residents and developing through clinical research were upheld.

The clinical services of the department including out-patient clinics, intensive care for in-patients and operative procedures in all fields of neurosurgery including skullbase, vascular, epilepsy, neuro-oncology and minimal access neurosurgery functioned in a coordinated manner five days a week; alternate working Saturdays were utilized for planning the surgical strategy for patients who were awaiting surgery along with inter-departmental neuro radiology discussion.

Academic activities in the department includes teaching, rounds, bed-side case discussions, journal discussions and seminars. Four neurosurgery residents successfully completed MCh Neurosurgery training and four new residents joined the department. The department also offered training in the form of observership to many residents from other institutions in India. Faculty and residents of the department actively represented the institute in various international and national conferences and workshops. Significant research work was performed both within the department and as inter-departmental projects – STEC, TDF funded and as part of multi-center international randomized controlled trials.

A summary of the operative procedures done during the last year are as follows

Table : 1

Intracranial aneurysms	163
AVMs	01
Cavernoma	08
Vestibular schwannoma	47
Other CP angle tumors	32
Microvascular decompression	13
Pituitary tumors	41
Craniopharyngioma	20
Spinal tumors	59
Cervical degenerative disease	49
Lumbar degenerative disease	37
AAD	12
Chiari malformation	40
Gliomas	230
Meningiomas	126
Colloid cyst	12
Pediatric and adolescent posterior fossa	42
Epilepsy Surgery	99
Movement disorder	17
Endoscope assisted procedures	53
Others	255
Total	1356

Prof Girish Menon established a Department of Neurosurgery in Klerksdorp-Tshepong hospital, Northwest Province, South Africa and performed over 250 surgeries there and was involved in training neurosurgery residents.

Number of clinical trials are in progress.

Staff Details

Prof. N. Suresh Nair
Professor Senior Grade & Head
Dr. Girish Menon R
Professor
Dr. Mathew Abraham
Associate Professor
Dr. Easwer H. V.
Associate Professor
Dr. Krishna Kumar K.
Associate Professor
Dr. Gopalakrishnan C. V.
Assistant Professor
Dr. George. C. Vilanilam
Assistant Professor (Tenure)
Dr. Jayanand Sudhir
Assistant Professor (Adhoc)

DEPARTMENT OF PATHOLOGY

Dr. Sandhyamani took over as Head of the Department of Pathology since the beginning of November, 2012, and initiated major changes for improved patient care, research and academic activities, particularly academic development programmes for Faculty and Technical Staff and reorganization of the labs in the Department. Regular Clinico-Pathological Conferences were introduced and conducted, weekly with CVTS Department and monthly, with Cardiology Department, on important and interesting cases. These were very popular and well appreciated by the clinical Residents and Faculty. Weekly Neuropathology Case Discussions and demonstrations were continued. The Department actively participated in conducting "Know Your Lab" series of lectures for clinicians, residents and nurses, organized for improving patient services. Since most of the technical staff was newly recruited in the department, they were posted by rotation in each Lab in the Department for training in various techniques. New tests in immunohistochemistry (particularly cancer biomarkers and for muscle diseases) were standardized and introduced. Comprehensive detailed easy-to-use lab manuals were created for all laboratory techniques followed in the Department, to ensure consistent high quality of tests for better patient services. Table 1 indicates the list of common investigations carried out during the year 2012- 2013.

The Pathology Department received a Tissue Processor, from Dr. Annie John, Scientist E, of the Electron-microscopy Division, BMT Wing, for processing tissues for Electron-microscopy, especially of endomyocardial biopsies as part of Cardiac Transplantation and Heart Failure Programmes, besides small tissue biopsies such as neuro-navigational or Tru-Cut biopsies and cell-blocks from fluids sent for cytological examination.

Studies on rheumatic valve disease were continued by the PhD student with Institute Fellowship. Histochemical procedures demonstrated the presence of Gram-positive cocci-like structures and masses of pyroninophilic polyanionic material (degraded proteoglycans) within the vegetations in excised cardiac valves with rheumatic disease.

Dr. Santhosh Kumar joined the Department as a Fellow of the DST's Fast Track Scheme for Young Scientists, under the mentorship of Dr. Sandhyamani. He has been working on fluorescence characterization of lung and other chest tumours, for developing rapid and accurate diagnostic techniques.

List of diagnostic investigations carried out in the Department

Histopathology (Neuro, Cardio-Vascular &Thoracic Biopsies)	517
Rapid Cytology / Frozen Sections	458
Muscle Biopsy	71
Cytology	103
Autopsy	2
Reference Biopsies	65
Immunology Tests: (on an average)	330/month

Lab Manuals were prepared for the Pathology Department, SCTIMST, for techniques in routine and Muscle Histochemistry, Immunohistochemistry, and Immunology.

Staff

Dr. V.V. Radhakrishnan, MD, FAMS - Professor (Senior Grade) & Head till October 2012

Dr. S. Sandhyamani, MD, FAMS, FICP- Professor & Head

Dr. Neelima Radhakrishnan, MD, DNB-Ad-Hoc Consultant

Dr. Amita R., MD, DNB- Ad-Hoc Consultant

Ms. Sushama Kumari P., BSc, MLT - Junior Scientific Officer

Mr. James T., MSc, MLT- Junior Scientific Officer

Ms. Neena Issac, MSc, MLT- Technical Assistant A

Ms. Resmi S.R., BSc, MLT -Technical Assistant A

Dr. Santhosh Kumar, PhD (Biophysics), MAMS- DST-SERB Fast Track Fellow

DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION

The Physical Medicine & Rehabilitation (PMR) department currently offers support services to the clinical specialties.

1. During the year 2012 – 13, the patient care services were:

Sl No	Clinical specialty	No of sessions
1	Neurosurgery	2829
2	Cardiac Surgery	7058
3	Paediatric Cardiac Surgery	4103
4	Neuromedicine	2676
5	OPD	4251
6	Neuromuscular	48

2. The working time of the Physiotherapy wing under PMR has been extended by two hours daily. Now the section works from 8 am to 6 pm. One more physiotherapy session has been added for patients in the CHICU.
3. A Rehabilitation Clinic has started functioning from April 2012. The clinic functions from 8 am to 10 am on Tuesdays and Wednesdays. It receives patients with rehabilitation needs.
4. The PMR actively participates in the Pain Clinic
5. The staff presented papers at conferences and also served as examiners for the BPT programme and adjudicator for PhD thesis
6. Workshops:

a. The Department of PMR collaborated with the Comprehensive Stroke Centre to conduct a workshop on Post-Hospital stroke Physiotherapy on 15 July 2012 at SCTIMST

b. The PMR collaborated in the CME on Pain Management held under the auspices of the Pain Clinic on 9 December 2012 at SCTIMCT

Dr U Nandakumaran Nair	MBBS,	Visiting Professor
Deepa.G.	DPMR,	SR. Physiotharapist
Dr. Vijesh P.V	DNB, PhD	Physiotharapist – A
Aji K		Physiotherapist – A
Rahool S.,		Physiotherapist - A
Jijimol George		

DEPARTMENT OF TRANSFUSION MEDICINE

The Department aims at attaining 100% repeat voluntary blood donations to attain safety and adequacy of blood and components to all patients.

Patient service

Total Blood donors 7967

Components prepared

RBC	- 7742
FFP	- 7015
Platelets	- 3738
Cryoprecipitate	- 502
Pheresed platelets	- 31

Patients supported

In-house	
Interventional	- 1553
CVTS Adults	- 1450
Pediatric	- 724
Neurosurgery	- 1382
Outside	- 4700

Compared to the previous year, there was 17.7% increase in blood collection and26.6% increase in component separation, and increase in blood usage for in-house patients. Services to outside patients are continuing. Strict quality assurance is followed to maintain safety and quality of all blood components.

As an initiative for accreditation, quality policy and manual were prepared. Blood Bank logo was released by Director, Dr K Radhakrishnan. The Quality Management system as per NABH norms was implemented. Management Review Committee was constituted.

- The Department continued to conduct training for Medical Officers on Modern Blood Banking Technology in the State and Orientation program was conducted for senior officers of Drugs Control Department on 21st Aug 2012, organized by KSACS. Eight Medical Officers in two batches from State Govt. Service underwent training program on Modern Blood Banking Technology
- The staff presented papers at National and International Conferences

NEW INITIATIVES

- Transfusion Medicine Dept. participated in 'Know Your Lab' lecture series which helped the user departments to understand the facilities available in other departments.
- More plasma components are harvested for fibrin glue production on a larger scale.

Programs organized

- CMEs were organized on behalf of Hospital Transfusion Committee. Dr Rema Menon, Apollo Hospital, Chennai, gave a talk on 'Leukoreduction in Cardiac Surgery' and Dr Moinak Banerjee from Rajiv Gandhi Center for Bio-Technology gave a talk on 'HLA & Disease Association' on 28/09/2012 at SCTIMST.
- October 1st National Blood Donation Day was celebrated by felicitationg repeat regular blood donors and donor organizers. Dr Jaisy Mathai gave the welcome address. Event was presided over by Director with release of Logo 'Heart to Heart with Care'. Key note address was given by Dr D Babu Paul and felicitation was offered by Dr Renuka Nair. Dr PV Sulochana proposed the vote of thanks. Program was followed by a talk on Epilepsy by Dr Sanjeev V Thomas, Professor of Neurology.
- Management Review Committee meeting on Accreditation was held on 04/12/2012 at the Department of Transfusion Medicine.
- Hospital Transfusion Committee met thrice in the Department of Transfusion Medicine 2012

  Media Program was conducted to bring awareness as well highlight the importance of voluntary blood donation
- Guidelines for the use of blood and components were prepared on behalf of HTC and uploaded on the website for reference.
- International Women's Day was observed at VSSC by organizing a mobile blood collection unit exclusively for female donors.
- All staff members attended the in- house program on 'Biomedical Waste Management'
- Dr Jaisy Mathai arranged a talk on Vigilance "Transparency in Public Procurement" by Dr KRS Krishnan
- Chitraseal, fibrin sealant/fibrin glue prepared in collaboration with BMT Wing is being used for patients in Cardiac and Neurosurgery
- Six mobile camps are conducted monthly for blood collection and discussions are going on, for in house collection in SCT vehicle.

Staff details

Dr Jaisy Mathai , MBBS, DCP	Scientist G & HOD
Dr Sulochana PV , B.Sc., MBBS	Scientist G
Dr Sathyabhama S B.Sc., MBBS	Scientist F
Dr Usha Kandaswamy, MSW, Ph.D	Scientific Officer MSW
Ms. Vimala Kumary	Senior Staff Nurse
Ms Sheela Devi KS B.Sc. MLT	Scientific Officer
Ms Sindhu PN M.Sc. MLT	Jr.Scientific Officer
Ms Baby Saritha G B.Sc., CBBT	Senior Technical Asst.
Mr Sivakumar S B.Sc., CBBT	Senior Technical Asst.
Ms Jyoti M B.Sc., CBBT	Technical Asst. B
Mr Sunil K.P B.Sc, MLT	Technical Asst. B
Ms.Sindhu .M.S B.Sc., DBBT	Technical Asst A
Ms.Renjini. P B.Sc., DBBT	Technical Asst.A
Ms.Manju K.Nair B.Sc., CBBT	Technical Assistant A
Ms.Preethy Prakash B.Sc., DBBT	Technical Assistant A

Ms Anna Soubry, MP and Health Minister, UK, visited the Institute along with a delegation from the British High Commission with the aim of increasing co-operation in collaborative health research

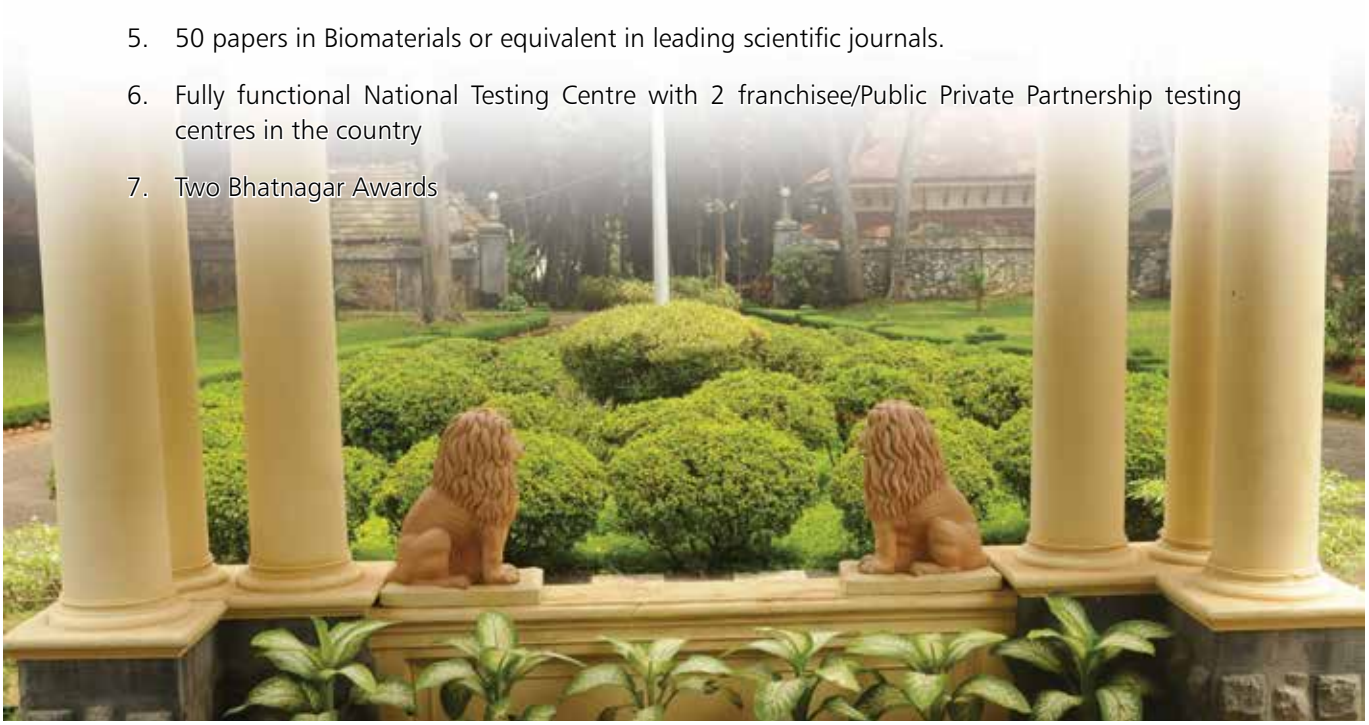
BIOMEDICAL TECHNOLOGY WING

Mission

To deliver high quality healthcare technology through innovation in science and education.

Vision 2020

1. 50% self sufficiency
   a) 20% self sufficiency through externally funded R&D
   b) 20% self sufficiency through testing services
   c) 10% self sufficiency through technology transfer
2. 30 new technologies including 5 tissue engineered products
3. Two technology transfers to multi national companies
4. Fully functional incubator and 2 industry sponsored R&D Centres.
5. 50 papers in Biomaterials or equivalent in leading scientific journals.
6. Fully functional National Testing Centre with 2 franchisee/Public Private Partnership testing centres in the country
7. Two Bhatnagar Awards



From the Desk of the Acting Head of Biomedical Technology Wing

The year 2012-13 was a year of transformation with the initiation of major activities including building partnerships. The Institute took the first step towards setting up of an exclusive Research Park for Medical Technologies at a new campus at Trivandrum. Land for this has been identified at the proposed Life Sciences Park of Kerala State Industrial Development Corporation. This initiative will strengthen Industry-Institute partnership as well as encourage medical device industry in India to develop novel and affordable medical devices for the country.

The following two products developed by the Institute moved closer to the market through their official launch by the industries.

- The hormone-releasing intrauterine "EMILY" device developed jointly with HLL Lifecare Ltd took place on 18th October 2012 at Bangalore.
- The Calcium Phosphate Cement bioceramic product- "BioGraft CPC" at Shimla by the industry partner IFGL Refractories Ltd, Kolkota, on 12th October 2012.

Several MoUs for partnerships with industry were signed, the notable among which include the partnership with Infosys, Bangalore, for collaboration in innovative medical technologies. The know-how of oral delivery of low molecular weight heparin using nano particles was transferred to Eris Lifesciences, Ahmedabad. Under the SCTIMST-SIDD Hub for development of cardiopulmonary devices, the first project for development of infant membrane oxygenators and arterial blood filters got started. Research collaboration with Network of Excellence for Functional Biomaterials (NFB) at the National University of Ireland Galway, Ireland, in the specific area of mammalian-derived scaffolds was also initiated during the year.

A visit by Ms Anna Soubry, MP and Health Minister, UK, to the Institute along with a delegation from the British High Commission took place on 15th Feb 2013, which is expected to increase cooperation in collaborative health research.

The long cherished need for creation of additional space and infrastructure is nearing fruition with the major works getting completed for the new engineering block. It is now ready to be occupied by various engineering divisions and laboratories.

The Quality Management System and Accreditation of testing services is now established over a decade and the third cycle of assessment was carried out by the audit team from COFRAC, France. Internal policies were changed to encourage and support internal requests for pre-clinical studies of product development projects and research activities of PhD students.

The Product development is progressing at a faster pace with the completion of preclinical trials for precoated large diameter Vascular Graft, which avoids the need for precotting of the Graft. The TiN-coated Coronary Stent is getting ready for pre-clinical trials under NMITLI project of CSIR. Most of the research projects progressed well and many are progressing towards pre-clinical stage.

In order to augment faculty strength, a new Chitra High Value Fellowship Scheme was introduced under which seven young Scientists/Engineers were offered positions in various disciplines.

All academic programmes at BMT Wing progressed well, including M. Tech Clinical Engineering (Joint programme with IIT Madras and CMC Vellore) and M. Phil. in Biomedical Technology.

Over 100 research publications with an average impact factor of about 3.0 have been published signifying the growth of high quality and competitive research in the BMT Wing. During the year, 12 new patents were filed and 4 were sealed.

Consistent with its mandate, the BMT Wing strove, during the year, integrate various disciplines for the development commercialization of medical products R&D , testing services, human resource development and encouraging the growth of medical industry in India.

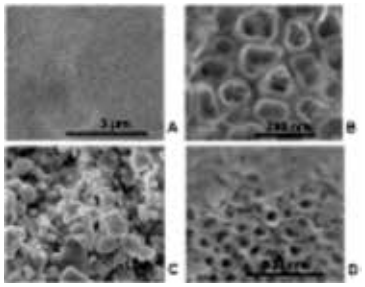
C.P. Sharma

BIOMATERIALS / BIOLOGICAL RESEARCH AND DEVELOPMENT ACTIVITY

Bioceramics Laboratory

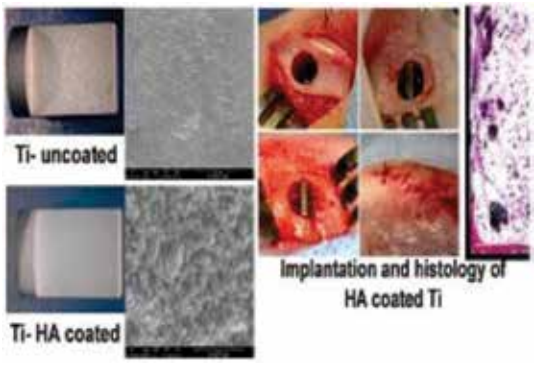
Pulsed laser deposition of bioactive ceramic on surface nanostructured titanium as delivery implants- as drug carrying new generation implants.

The application of pulsed laser deposition of hydroxyapatite has been explored together with the anodic oxidation of titanium substrate, for drug delivery applications. The 'nanowells' were created at the titanium substrate, which are able to carry drug moieties. The thin capping layer of HA helps to control the delivery of the drug and acts as bioactive interface for osseointegration. The two fold benefit of this unique structure has been demonstrated by gentamicin as a model, in which, higher quantity of the drug was loaded and delivery occurred for longer duration compared to hydroxyapatite coated bare implants.



(A,B) Surface features of nanostructured titanium, (C) Pulsed laser deposited HA on titanium, and (D) interface of HA deposited nanostructured titanium.

Bioactive ceramic coatings on Titanium bone implants were successfully developed by pulsed laser deposition (PLD) and studied for the in vivo functionality. Depositions of hydroxyapatite, bioactive glass, tricalcium phosphate, etc. on titanium based substrates were explored to design single composition as well as gradient/layered bioactive material coatings. The bioactive ceramic coated titanium implants were found to be well integrated with the host bone, when implanted in rabbits, with out any undesirable side reactions.



Iron Oxide nano particles

The homogeneous nano size iron oxide embedded hydroxyl apatite magnetic composite were successfully developed by in situ co- precipitation method. The heterogeneous nucleation of iron oxide and hydroxyapatite in basic medium and crystals growth various weight percentage of magnetic nano composite were analyzed through different physicochemical characterizations. And it confirmed that the phase pure formation magnetic nano composite formation. Magnetization and hyperthermia studies give encouraging results and the details were presented at the meeting

Nano hydroxyapatite for treatment of caries

It was found that a nano apatite paste developed in the lab effectively caused enamel remineralization of surface lesions and caused occlusion of dentine tubules, which are 2 main factors for regression of incipient caries. Thus n-HAp may be employed as an effective alternative to fluoride-containing dentifrice. Since the remineralizing efficacy of topical fluorides is strictly dependent on the availability of calcium and phosphate ions, n-HAP dentifrices are strongly recommended to xerostomic patients with diminished amounts of saliva. Also as evident from the results, n-HAp has the potential to occlude dentin tubules and, as such, may be useful for the treatment of dentin hypersensitivity, and should be investigated in the future

Biophotonics and Imaging Laboratory

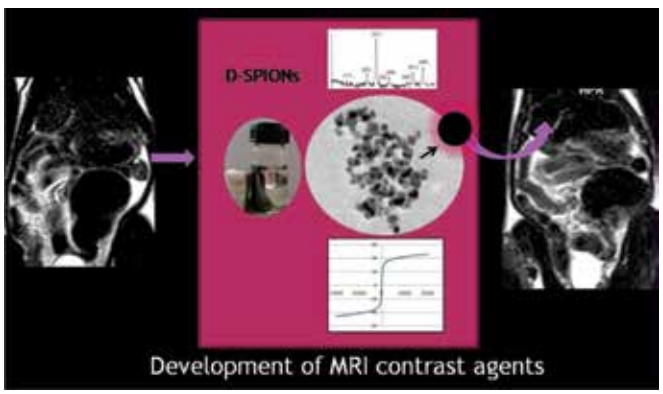
The biomedical application of magnetic nanoparticles is attaining more interest due to its wide use in the areas of imaging, therapy and drug delivery. Of the three applications, disease diagnosis gains more importance and Magnetic Resonance Imaging modality gathered more acceptance because of the absence of ionizing radiation. For better disease diagnosis, contrast agents with good biocompatibility and target specificity have to be developed.

We have developed superparamagnetic iron oxide and zero valent iron nanoparticles as contrast agents for MRI. Towards this, the surfaces of the nanoparticles were modified with different biologically compatible systems with different functionalisation. The physicochemical characterisations of all the synthesized nanoparticles were determined using size and phase analysis. Magnetic property was also evaluated in each case to determine the magnetic saturation point. Magnetic relaxation rate studies have also been studied which determines the suitability of the material for using them as contrast agents for Magnetic Resonance Imaging. The biocompatibilities

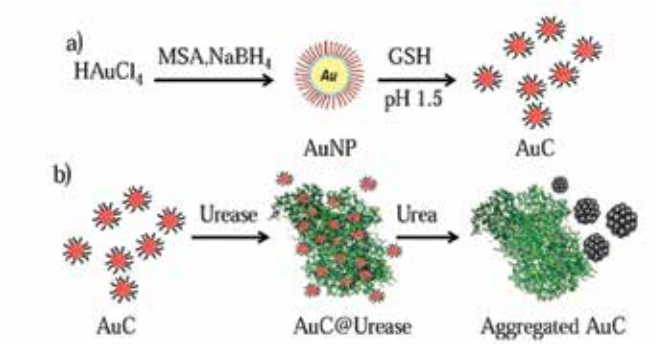
of the nanoparticles were evaluated by measuring the cytotoxicity and the hemocompatability. In vitro evaluation of superparamagnetic iron oxide and zero valent iron nanoparticle revealed its suitability to use MRI as T2 and T1 contrast agents respectively. The application of the system for MRA is in progress.

The in vivo evaluation of the efficacy of superparamagnetic iron oxide nanoparticle in liver fibrosis is in progress. For this liver fibrosis models were developed in rat. Initial studies on the fibrosis models are encouraging. Blood parameters and fluorescence spectroscopic analysis supports the successful development of animal model. SGOT and SGPT values of the fibrosis induced animals ranged from 195 U/L and 60 U/L to 1810 U/L and 1446 U/L respectively in the 6th week. The biochemical changes evaluated using fluorescence spectroscopy included changes in FAD, phospholipids, hemoglobin and porphyrin etc. in the different stages of development of liver fibrosis and compared with the normal values. We have also looked into the biochemical alterations in other organs like lungs, heart, kidney, spleen, and brain due to the effect of fibrosis.

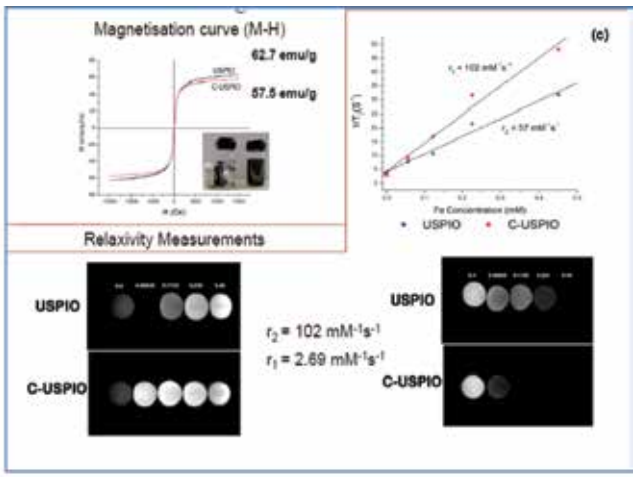
In another study we have developed gold nanoclusters for NIR optical imaging and sensing of biologically important analytes. Gold based quantum clusters having size less than 2 nm were synthesized and the physico-chemical characterizations were done. The developed system is tuned to emit in the NIR region to make it an ideal candidate for in vivo fluorescence imaging. Cyto compatibility and blood compatibility studies show that the developed material is non cytotoxic and hemocompatible. Glutathione protected gold clusters were used for the real time analysis of blood urea from the whole blood without the separation of sera. The sensor is proved to be highly selective for the detection of urea and also more sensitive and less time consuming.



Another cluster is used for the in vivo targeted tumour imaging with the help of tumour targeting ligand. In vitro and in vivo studies show that the material can be effectively used for early tumour imaging and diagnosis.



Mechanism of urea sensing using gold nano cluster



Magnetic characteristics bare and citrate coated ultrasmall superparamagnetic iron oxide nanoparticles

Biosurface Technology

Under CHVF the research focus is on immunomodulation using therapeutic delivery systems for acute and chronic diseases related to neurology and cardiology, which are the principal focus area of SCTIMST. The said delivery systems deliver the therapeutic agents to control, pacify or activate cellular or tissue response and, that can be used as diagnostic, prophylactic, therapeutic or interventional agents either alone or in combination with other implants. The delivery systems are optimized to deliver living and synthetic, molecular, nano and micro-agents with potential physical and chemical properties, as a gradient, basally, pulsatile or in sequential manner to manipulate biological signal transduction for a desired biological response.

The details of various programs are as follows,

Program: Design and development of supra-molecular drugs

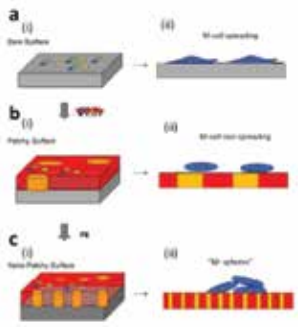
Supramolecular drugs is an emerging area, where the safety and efficacy of therapeutic drug molecules can be modulated by supramolecular approach.

- Developed an analog of curcumin (PolyC) with liquid nature and potential thermo-responsive properties and they form nanoparticles with better antibacterial activity than curcumin.

- Proposing that these PolyC nanoparticles could be loaded with the parent drug or with other drugs for delivering the drugs in chronic diseases like neurological disorders, cardiac hypertrophy and cancer.

Program: Immune cell niches and other nanotechnologies:

Surface engineering is an area of intense research to improve the biological response to biomaterials and medical implants.



- Developed patchy dynamic surfaces for conversion of macrophages (M-cells) to Macrophage spheres "(M-sphere)" for immunomodulatory applications.
- Proposing that these surface coatings can be used in neurological and cardiac implants to reduce implant mediated inflammation.

Program: Designing materials with pharmacological properties

Pharmacologically active materials for controlled local biological response are the slogan of 3rd generation biomaterials.

- Developed self-dividing catalytic ceramic particles with antibacterial properties.
- Proposings the material as a potential candidate for cranioplasty implant surface coating, as well as for antibacterial coating in dental fillers, orthopedic implants and urinary catheter.

Green synthesis of gold nanoparticles for targeted drug delivery

Curcumin's anticancer activity is well established. However, its poor bioavailability hinders its therapeutic use. We have attempted to develop a novel delivery system for curcumin that can deliver curcumin in to the cells. Stable gold nanoparticles were synthesized utilizing curcumin as a reducing agent and a stabilizing agent. Curcumin stabilized gold nanoparticles were stable at room temperature for over 180 days, and released curcumin only in the physiological condition (pH 7.4 and 37°C). Physicochemical characterizations of these nanoparticles (~8.5 nm) were performed. Temperature dependent release of curcumin was demonstrated. Its apoptotic effect on C6 glioma cells and its cellular uptake was demonstrated. The results clearly indicate the utilization of Curc-gold nanoparticles system for stabilization of curcumin and as a potential delivery system for cancer therapy.

Green synthesis of gold nanoparticles using ascorbic acid as a reducing agent was attempted. For imparting stability in physiological conditions, polyvinyl pyrolidone (PVP) was added as a stabilizing or capping agent. Rapid synthesis of these gold nanoparticles took only less than one minute of synthesizing time and had an average particle size of 6 - 9 nm. These nanoparticles were stable for over six months at the physiological condition and did not induce any platelet activation or complement activation. These biocompatible nanoparticles also exhibited sensing capability to Fe2+ ions when studied with various divalent metal ions. Studies on anticancer drug delivery are being attempted.

Dental Products Laboratory

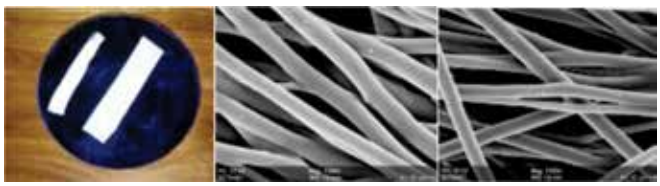
1. Toxicological evaluation of a new dental restorative composite containing `Diphenyl [2,4,6-trimethyl benzoyl] phosphine oxide [TPO] as photoinitiator

   The project got an extension for 6 months initially and for a further 3 months. During this time, the toxicity tests were completed and the pulp and dentine test on 3 dogs were also completed. After 7, 28 and 70 days, the restored tooth samples were taken out and subjected to histopathology studies

whose results are still awaited. The last sample was given for histopathology in August 2012. The project came to a close in February 2013.

2. Development of hemostatic scaffold using biodegradable polymer and biomimetic extracellular matrix components for healing of chronic dermal wounds

   During the last year, four batches of PLGC terpolymer were synthesized under the same monomer ratio of (Lactide: glycolide: caprolactone (7:1:2)) but at two different duration of synthesis (6h & 24h). The polymers were characterized using H1NMR, FTIR and GPC techniques. The polymer sheets that were electro spun at the optimized conditions were further characterized to evaluate their mechanical properties using UTM and morphology using SEM. The degradation studies of the electro spun polymers were analyzed for duration of 45 days in PBS of pH7.4 at 37oC and the results were evaluated by estimating loss in mechanical properties, weight loss, changes in surface morphology and molecular weight. Degradation studies are continuing for duration of 60, 90 and 120days.



(a) (b) (c)

Fig 1. Electrospun samples (a) and the SEM images of (b) non degraded and (c) degraded PLGC electrospun samples

Fig 2. The electrospun samples of (a) non degraded and (b)degraded PLGC under mechanical loading

3. Quantum dots as drug carriers for cardio-vascular applications

   The project which was initiated in January 2010 and was completed in March 2013. Studies undertaken during the final year were

Urokinse-Core/Shell Conjugate and in-vitro clot lysis

Drug Binding: Quantitative spectrophotometric determination of urokinase has been done by Lowry Protein assay method in order to determine the conjugated amount of drug with the CS.

Conjugate Characterization: Drug conjugation is confirmed by absorption, fluorescence, IR spectroscopy and SDS PAGE. Conjugate fractions are represented by peaks with overlapping fluorescence and absorption spectra. Free biomolecule fractions are represented by peaks with no fluorescence, but absorption at 280 nm. In view of the potential utility of Q-dots formulation for pharmaceutical applications, stability is significant for long-term storage. Stability study was carried out by dissolving UK-CS conjugate in at -20 oC for 7 days to assess the change in absorption at 280 nm.

Clot Formation and Clot Lysis: Clot was fabricated by using 40 mg/ml fibrinogen and 6 IU/ml thrombin at 37o C. Clot was incubated with UK/CS conjugates (35 μg). Free UK 35 μg was applied to the clot as a positive control. Clot applied with PBS also used as control. Clot lysis was quantified by using D-Dimer assay kit. Images of clot lysis were captured at different time durations (1, 3 and 6 hrs) (Fig. 1 A). Clot lysis was also expressed as the relative reduction in clot weight (%) of digested clot (Fig. 1 B).

Fig.1A: In vitro fibrin clot lysis assay at different time durations

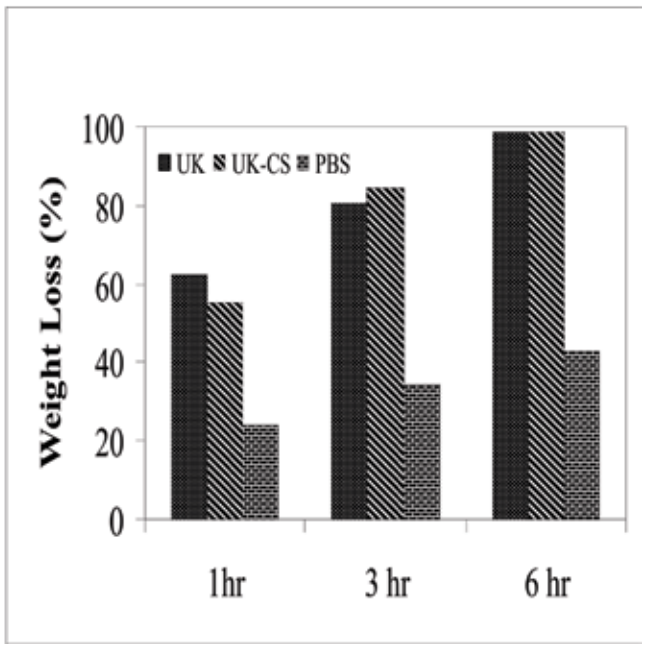


Fig.1B: The weight loss percent and thrombolysis of clots after exposure to bare UK, UK0CS conjugate and PBS as control.

4. Bioengineered hybrid skin substitutes for burn wounds

Optimisation of the PCL-GA scaffold was carried out and work on the silicone hydrogel was undertaken successfully. Various formulations were tested by hydrolysis of the silane and copolymerising with hydrogels like NVP and HPMA. Properties such as thermal degradation, swelling capacity, degradation etc were studied. Sheets with excellent strechability and strength were prepared. Discussions with clinical partners are under progress.

Silicone based hydrogel

5. Development of bioactive bone cements based on organically modified ceramic resin

The TDF project came to a conclusion in March 2013. Objective was to develop potentially bioactive cement capable of strengthening the mechanical retention of the implant by allowing direct bone apposition. A bone cement based on ormocer resin and HAP/PMMA-PS copolymer filler with good mechanical properties, remineralization ability, low shrinkage and low exotherm with non-cytotoxic character has been developed which needs to undergo toxicity studies.

6. Development of smart dental composites consisting of calcium containing resins and fillers

Our objective is to develop visible light cure smart restorative composites based on calcium containing inorganic-organic hybrid resins with high refractive index and fillers like, calcium hydroxide, zirconium oxide, calcium carbonate, tricalcium silicate/calcium chloride, hydroxy apatite and /or silica along with conventional fillers such as silanated quartz/ radiopaque glass which can enhance dental remineralization by releasing calcium and phosphate ions depending on the pH of the surroundings which controls dental decay. Visible light cure composites prepared using these novel resins with combinations of various fillers showed excellent physico mechanical properties in terms of diametral tensile strength, depth of cure, flexural strength, water sorption, solubility and Vickers hardness. They showed exceptionally lower polymerization shrinkage compared to purely organic resin based composites. Preliminary studies using SEM proved the remineralization ability of the resin.

Division of In vivo models & Testing

A process for covalently binding heparin to decellularised tissue such as bovine pericardium, bovine saphenous vein and bovine jugular vein was developed. Preliminary experiment on the above is completed. Activity of the covalently linked on decellularised tissue was demonstrated even after 3 months storage in a liquid sterilant.

Fig.1: Heparin covalently linked Decel BP, Fig.2: Demonstration of Heparin on Decel BP

Fig.3: Heparin retention in Heparined-DecelBP following 60 minutes sonication

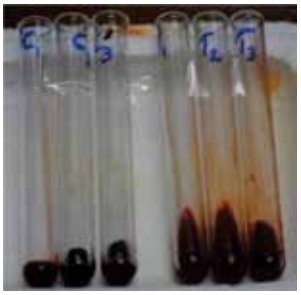


Fig.4: Anticoagulant activity of heparin linked Decel BP

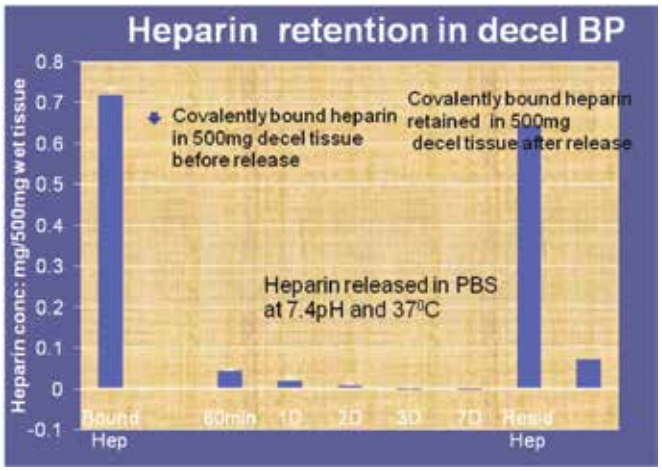


Fig 5: Chart showing retention of heparin after 7 days incubation in PBS.

Division of Laboratory Animal Science

Support was given by offering informal training as well as technical services such as Oral intubation and gavaging in day old rat pups and adult rodents to the scientist at Sleep Center, tail vein cannulations in adult rats and injection of dye for MRI, & induction of a tumour cell line based cutaneous tumor model in mice to the scientist of Biophotonics and imaging laboratory, and anesthetizing followed by gastric intubation and gastric delivery of "Oral Heparin" in rabbit model to the scientist at Bio-surface Technology. Students were also offered technical services in the form of cardiac puncture and whole blood collection in anesthetized rats, aseptic olfactory bulb isolations, bone marrow aspirations, Induction of diabetes and intraperitoneal implantation in diabetic rats for evaluating a stem cell based replacement for Beta cells of pancreas etc. and arterial cannulation for aseptic collection of blood from rabbit median auricular artery for the Institute of Animal Health and Veterinary Biologicals, Palode.

Routine activities include maintenance of micro and macro environment for small laboratory animals, observation for signs of health of various colonies, monitoring of room level relative humidity and temperature, periodic verification of light intensity, noise levels, water quality which requires an external third party assessment as well as an internal assessment of potability. Water is also assessed for its contaminant levels with heavy metals and pesticides. Animal feed quality checkups with fungal toxin analysis, heavy metal and pesticide level contamination, and for nutritional levels (proximate principles). Animals are bred for supply as per rising demands year to year. Surplus animals are given to CPCSEA registered organizations for research purpose on a pre-fixed rate through the accounts division. Animal health monitoring is also done based upon state of art procedures, and DLAS makes use of Experimental pathology, as well as Microbiology division's services for this. Technical assistance to support research is also given upon request from scientists. This includes simple procedures like blood collection, oral gavage, and complex procedures like timed pregnancy, and interventional animal models. The training imparted bi-annually to research scholars to induce to the field of research using animals includes many videos, and demonstrations to aid them to research using small laboratory animals, and scientific and humane handling of small laboratory animals.

Experimental pathology

Development of Skin Graft Substitutes for Wound Healing Applications from Mammalian Derived Extracellular Matrix: Externally sponsored research project No. BT/PR15461/MED/32/167/2011, dated 16 January, 2012 by the Department of Biotechnology, Government of India

Implant Biology

Histopathology Laboratory

Studies continued on clinically retrieved heart valves and orthopaedic implants as part of a DBT sponsored project.

Histological and molecular investigation in periprosthetic tissue and physical examination of material surface were carried out around metal plates and screws resident for more than twelve months in the body without any overt clinical problems. Results of this study demonstrated

changes of metal corrosion and wear debris initiated continued chronic inflammatory reaction to stainless steel fracture plates and nails with involvement of endothelial cells, macrophages, TLR-4 and presence of a hypoxic environment, months after clinical evidence of healing (MPhil project).

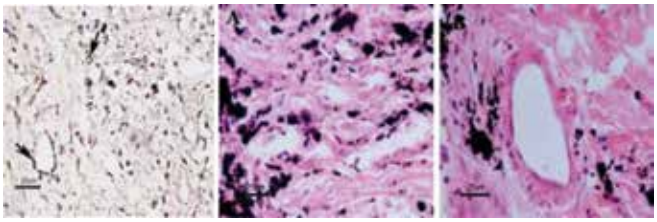


Figure 5 Immunohistochemical localization of TLR-4 in endothelial cells (arrow) and Macrophages (astericks) in the periimplant tissue of retrieved stainless steel implant.

Initial work on an animal model of breach of blood brain barrier for study of nanomaterial-macrophage interactions was carried out (PhD research).

Tissue Culture Laboratory

Fabrication of a prototype of bioreactor for bioartificial liver

Tissue Culture Laboratory is involved in developing a prototype bioreactor for bioartificial liver. The project funded by the Department of Biotechnology was successfully completed in 2012. A prototype of the bioreactor based on hollow fiber configuration was fabricated in collaboration with Device Testing Laboratory, BMT Wing. The bioreactor was evaluated for its functional performance using primary cultured hepatocytes as well as human hepatic cell lines. Another aspect of the project was to find alternate cell source of hepatocytes for biomedical applications. To find sufficient cells in BAL an alternate cell was proposed and identified differentiated bone marrow mesenchymal stem cells (MSCs) as cell source. MSCs were differentiated to hepatocyte lineage which was characterized by hepatocyte specific markers. Initial efficacy studies of differentiated cells in regeneration of induced liver damage in rats are promising.

Construction of a tissue engineered myocardial patch by cell sheet engineering technology from umbilical cord mesenchymal stem cells

Tissue culture lab also initiated research on construction of a tissue engineered myocardial patch by cell sheet engineering technology. This unique scaffold free approach uses thermoresponsive culture surface and intendes to help restoration of mechanical activity of infarcted heart muscle. Mesenchymal stem cells are a potential source of cells for developing in vitro myocardial tissues. Hence the laboratory is optimizing differentiation of stem cells to myocardial lineage in combination with its culture on thermoresponsive culture surface.

Cell sheet engineering on electrospun scaffolds for efficient cell supply in skin tissue engineering

Isolation and characterization of primary murine epidermal keratinocytes from dorsal skin of adult mouse was standardized. The role of ECM on primary keratinocytes and modulations of growth factors in the culture medium were also analyzed. The keratinocytes were positive for cytokeratin-1 marker and negative for cytokeratin-14. Cell isolation and characterization from neonatal mice skin were also studied. Keratinocyte cultured on thermoresponsive substrate can be retrieved as cell sheet (Figure 6).Polyethylene terephthalate (PET) based material modified with thermoresponsive poly(N-isopropylacrylamide)-co-glycidyl methacryrale polymer (TRP) was selected as the base substrate for cell culture. Human keratinocyte cell lines were transferred to new tissue culture polystyrene (TCPS) by temperature variation and a stamping tool (Figure 7). The transferred cell patches were viable, spread and grow as normal (Figure 8). Scaffold free keratinocyte cell sheet construct was also obtained from modified PET sheets. In large area defects skin tissue engineering requires an appropriate porous scaffold as a basement for the cells. This study tries to develop polymeric scaffold synthesised by electrospinning method to use as a supporting substrate for the keratinocyte construct.

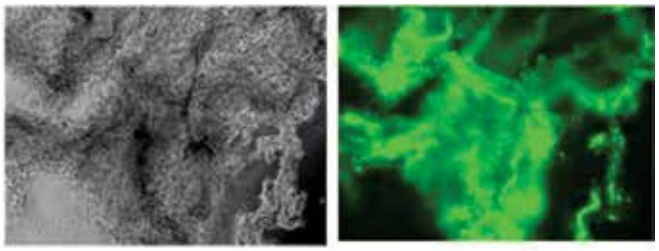


Figure 6 A. Retrieved keratinocyte cell sheet from TRP-TCPS. B. Viability of cell sheet (green) confirmed by FDA staining

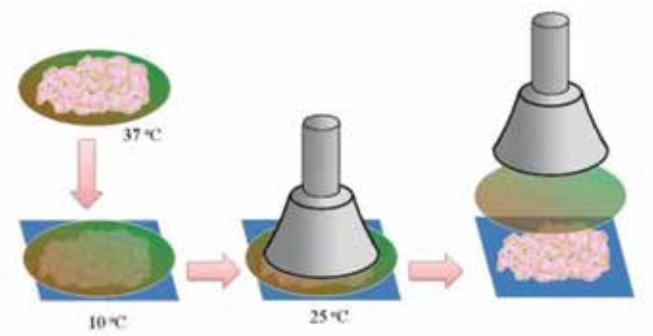


Figure 7 Illustration showing cell sheet transfer of keratinocytes from PET-TRP to TCPS using stamping tool.

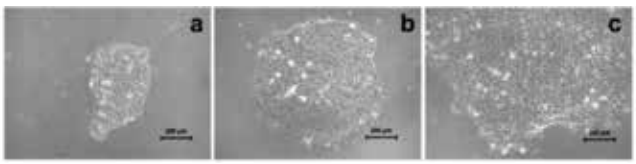


Figure 8 Cell sheet growth observed on (a) 1 day, (b) 7 days and (c) 12 days after transfer.

Development and Feasibility study of Polymeric Scaffolds for Tissue Culture Under Simulated Microgravity

Gravitation force has immense effect on tissue structure and function. The effect of microgravity on various cell functions can be studied with the concept of tissue culture under microgravity using specially designed bioreactors. Rotary Cell Culture System is a bioreactor that simulates microgravity. HepG2 cells were maintained under microgravity for 6 days together with polymeric scaffolds (Figure 9). Hepatocyte function was evaluated by estimating albumin and urea synthesis.

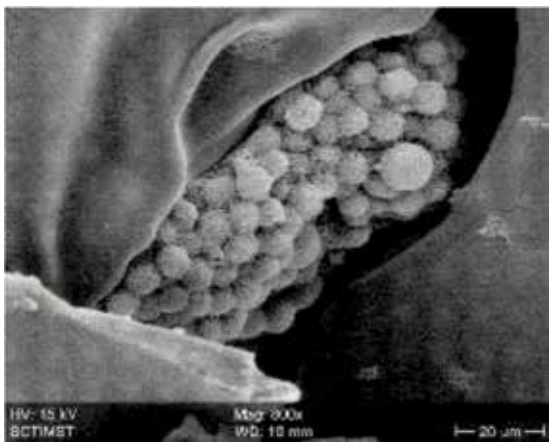


Figure 9 Hepatocytes under microgravity with scaffolds formed spheroids and filled in the pores of the scaffold.

Tissue engineering of a carrier free corneal endothelial construct towards transplantation for endothelial --Keratoplasty

Endothelial keratoplasty is the current mode of treatment of corneal endothelial dystrophies and has the advantage of replacing only the diseased endothelium while leaving the other corneal layers intact. The post operative visual acuity outcomes are promising; however the inadequate supply of donor corneas still continues to be a major setback. To overcome the same the use of in-vitro cultured corneal endothelial cells as an alternate source is being researched. This project proposes to generate a carrier free corneal endothelial cell sheet via the use of an in-house developed thermo- responsive polymeric substrate (Figure 10). To this end the methodology for rabbit corneal endothelial cell isolation has been standardized and in-vitro culture conditions have been optimized. The isolated and cultured cells have been characterized for corneal endothelial specific markers by both immunofluorescence staining and RT-PCR. These isolated cells have been successfully maintained in cultures for long durations. Cultures were also established on NGMA coated dishes. This in house developed polymer served as a substrate for the generation of carrier free corneal endothelial cell sheets by its inherent thermoresponsive property. The cell sheets thus generated have been characterized morphologically for intact cell-cell contact by scanning electron microscopy. Functionality of these cell sheets are being assessed by immunofluorescence and RT-PCR.

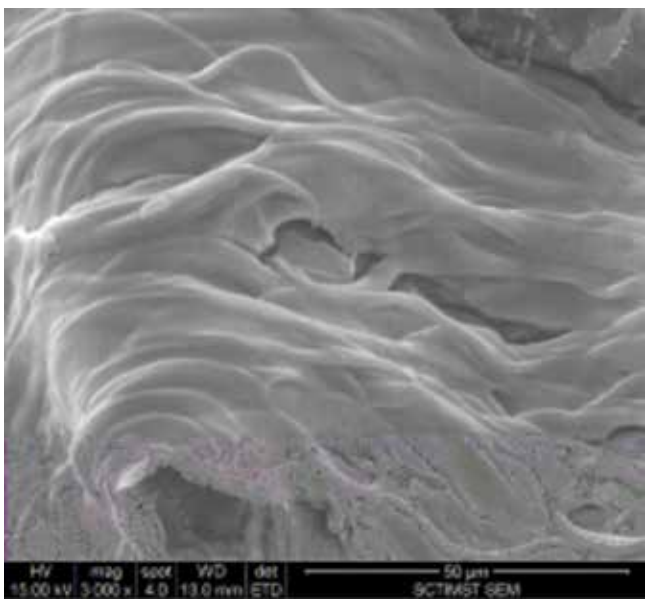


Figure 10 Scanning Electron Microscopy image of the rabbit corneal endothelial cell sheet retrieved from NGMA surface.

Transmission Electron Microscopy Laboratory

Project 1: Bone Tissue Engineering Using Adipose Stromal cells on 3D porous bioactive ceramic scaffolds (Advanced National Centre of Excellence in Tissue Engineering – ANCETE) SCTIMST

The development of a radio-opaque ceramic substitute helped in assessment on intra-surgical placement and long term follow up with direct clinical implications. Efficacy of the tissue engineered Strontium incorporated ceramic substitute has been evaluated in rabbit models with 15mm segmental defect in the mid-diaphysis of ulna bone.

Bench to Bedside translation

A. Proof of Concept of Bare material in Clinics: Clinical studies using Chitra hydroxyapatite bioactive glass ceramic composite (Chitra-HABG) in seven patients proved that iliac crest structural reconstruction can be improved to a greater extant. (Manoj MK, Jose Francis, Varma HK, Sreeganesh K. Kerala Journal of Orthopaedics Volume 25, 2012).

B. Proof of concept of Material with Cells 'Combination Product' in Clinical Trials: Tissue Engineering towards Clinical Orthopaedics – Project entitled - Treatment of Large Segmental Bone Defects with Custom Made Triphasic Hydroxyapatite Scaffolds loaded with Autologous MSCs in children (Dr.Vrisha Madhuri,Dr Vikram Mathews, Dr Alok Srivastava, Dr Sridhar Gibikote (CMC Vellore); Dr H K Varma, Dr. Annie John (SCTIMST)). Project submited in 2009; Ethical Approval obtained – 2013. Clinical Trials to start using scaffold with cells 'Combination Product'recommended by DBT Task Force. Cell culture technology transfer done and standardized at the GMP facility at CMC, Vellore. Patient trials to start shortly.. (IEC approval – February 2013)

Project 2: Cell-Based Tissue-Engineered Fabrication of Osteochondral Constructs (Advanced National Centre of Excellence in Tissue Engineering – ANCETE) SCTIMST

The study aimed at understanding adipose-derived stromal cell differentiation mediated hydroxyapatite-based scaffolds that mimic underlying bone structures to optimize, control & address surface cartilage defects. The promising results open a unique pathway for future studies in in Osteo - chondral Interface Engineering. Procedures for surgical implantation, implant design and cell loading were developed. The cell-loaded scaffold indicated integration into the joint tissue with a clear overburden of cartilage tissue. But with the bare scaffold, low tissue integration can be observed with a distinct lack of overgrowth by cartilage tissue.

Cellular type compartmentalization was demonstrated using goat adipose derived mesenchymal stem cells (GADMSC's) within the scaffold by tracking cells using cytoplasmic membrane staining of viable cells (Figure 11). Vital to the success of the construct is the ability to place or "seed" aptly two different differentiated stem cells at choice spots on the scaffold - chondrogenically-induced cells (CG) occupying the top layer and osteogenically-induced (OR) cells occupying the bottom layer (Figure 12). The ability to seed, locate cells within a scaffold in the growth phase provides an opportunity to track, study and integrate this knowledge to the design of superior technologies.

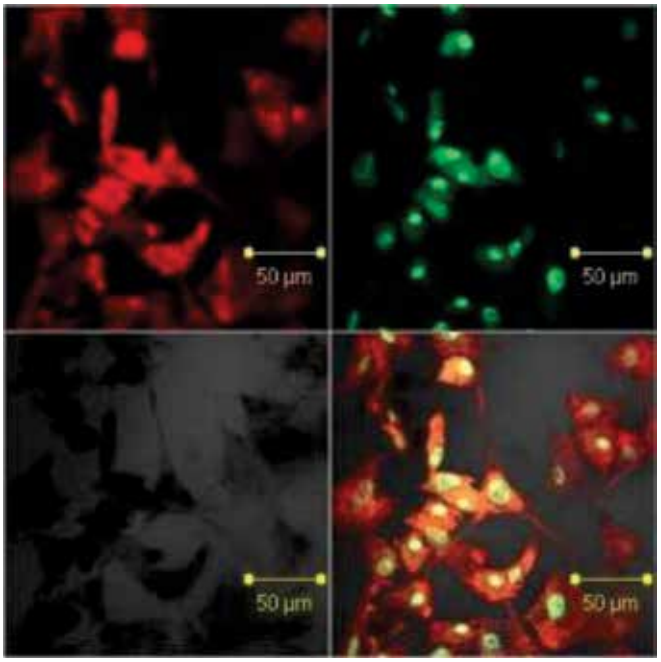


Figure 11 GADMSC's were stained with PKH 26 and counterstained with Acridine Orange. Cells imaged in overlay mode exhibited red cytoplasmic staining, along with generalized acridine orange staining. Normal morphology of cells was confirmed using a Carl Zeiss LSM 510 META in DIC mode.

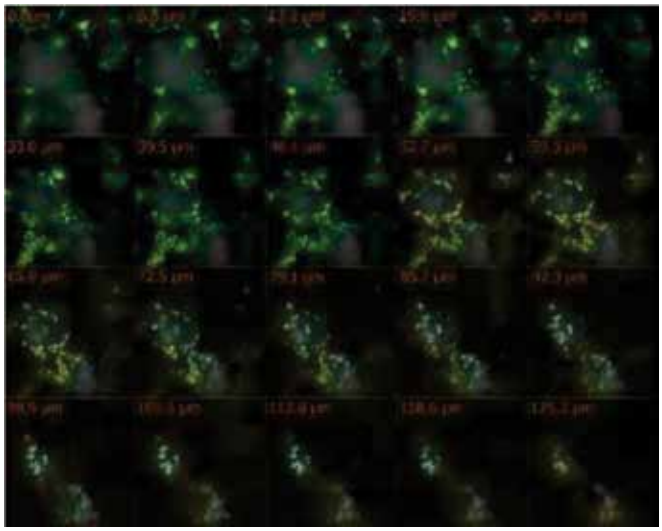


Figure 12 Cell Tracking of dual cell loaded single construct- OR cells & CG cells seeded on a ceramic scaffold & visualized using a Carl Zeiss LSM 510 META.

Bench to Bedside translation

A. Proof of Concept – Bare material without cells

As a proof of concept study the usage of material in a site similar to the proposed Osteochondral junction was carried out in the Maxillofacial Reconstuction using Ceramic HASi Units (Surgeon: Prof. Dr.R.Manikandhan, MDS, FDSRCS (Eng), FFDSRCS (Ire), Chennai, Tamilnadu – 5 patients). This brings in clinical acceptance prior to combination product with cells application. The CT scan image when evaluated quantitatively indicates the integration of the ceramic substitute into the surrounding tissues.

B. Combination Product' (cells on materials) trial:

Yet to be initiated. Research Scholar has been trained in "Ethics in Health Research" as part of ongoing preparation for preliminary clinical evaluation.

Project 3: Regeneration of Intervertebral discs – A tissue engineering approach.

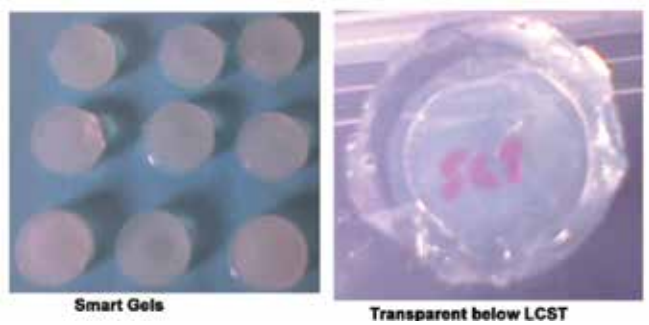
Degeneration of the intervertebral disk (IVD) is a major pathological process implicated in low back pain and is a prerequisite to disk herniation. Main anatomical structure implicated in low back pain is the IVD and the pathogenic process is its degeneration, which predisposes disk herniation.. The rabbit disc degeneration model has been successfully established (Figure 13) to assess the effect of cell therapy for IVD regeneration.

Figure 13 Radiograph of New Zealand White Rabbit degenerative vertebral column showing prolapse of Disc at L5/L6 – 7 days post physical injury.

Laboratory for Polymer Analysis

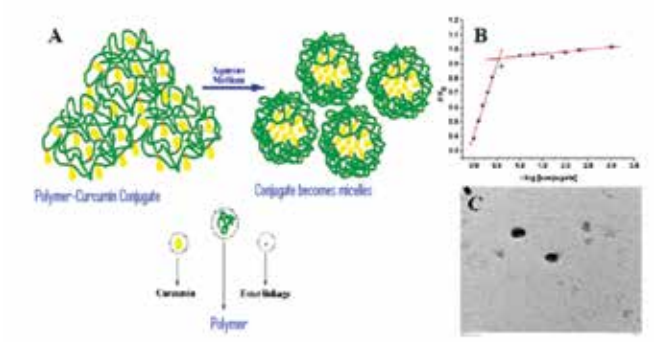
The laboratory's main focus, as in the last year, was on the creation of new materials for drug delivery and sensing applications. The high light of the major findings during this period are sketched below.

Visible light induced rapid gelling thermoresponsive multifunctional polymeric formulations have been synthesized and characterized.



This rapid gelling formulation can be removed from application site easily by lowering the temperature. The formulations are found to release drug in a sustained fashion. These formulations have extensive potential to design new generation materials for wound management.

During the last year, the laboratory synthesized and characterized drug conjugates of varied features such as enhanced aqueous solubility, stability and fluorescence which in fact could be used in tracking drug delivery to predetermined destination. Newly synthesized, highly biocompatible, non-immunogenic and biodegradable polymer-curcumin conjugate was found to self assemble in aqueous media forming nanosized micelles with a hydrodynamic diameter of 459 ± 0.32 nm. The critical micelle concentration for the conjugate was determined to be 0.25 mg/mL. Zeta potential of the micelles was found to be - 45.4 mV (at pH 7.4, 25 ^{o}C) indicating their excellent stability.



Schematic presentation of the micellization of Polymer-curcumin conjugate in water (A), CMC determination of conjugates by emission spectroscopy of 1-Pyrene carboxaldehyde probe and Plot of F/F0 Vs – log [conjugate] (B), TEM images of conjugate micelles (C).

Non metallic, water soluble and biocompatible quantum dots have been synthesized. Novel drug conjugates were created by anchoring drugs and q dots onto polymers such as HA. By layer by layer approach, nano structures carrying the drugs and fluorescent moieties were synthesised. By further functionalizing, these entities were found to be responsive to ions such as Ca.

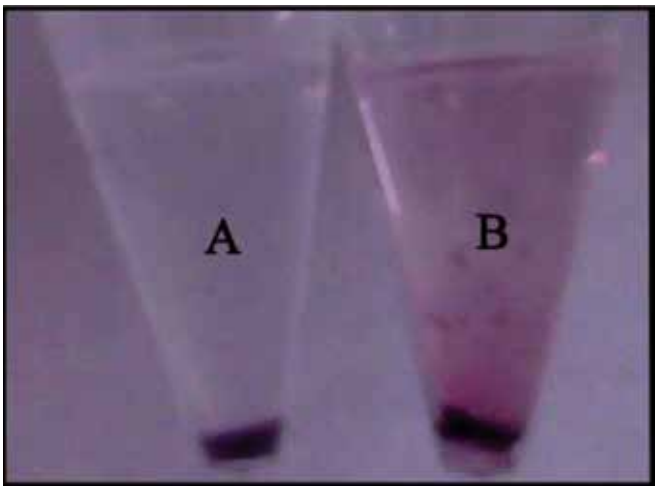
A variety of sensing applications were carved out of the newly synthesised q dots. Dots modified with calcium binding molecules were found to precisely locking onto calcium ions releasing sites.

A- polymer without Ca. B-polymer containing Ca. Fluorescence indicate that the probes lock onto Ca releasing polymer.

These kinds of probes may be used in locating bone crack and calcified tissues.

The laboratory designed interesting approaches to detect toxic ions like Hg and CN in water using Fluorescent dots. These novel methodologies can be employed for screening of water for toxic elements.

The laboratory also developed series of polymers and nanomaterials which are responsive to ions and pH. These components have potential applications in the design of novel "on demand" drug delivery vehicles. pH responsive capsules built over peptide (e. g. insulin) assembled gold nanoparticles were found to release the peptide only at physiological pH. This approach seems to have potential in developing carriers for pH sensitive molecules through oral route.



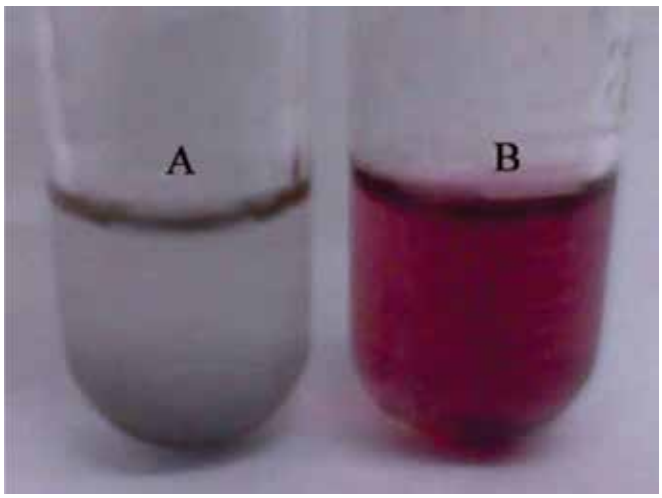
. The photographic images of the polymer coated Au-Ins@SiO2 @ Polymer at A) at pH 1.98 and B) at pH 7.5 after 1h.

The laboratory has also developed quite a few interesting analytical techniques. Increased circulating concentrations of homocysteine (HCY) and Asymmetric dimethylarginine (ADMA) are associated with vascular disease and vascular risk factors. A rapid, simple and sensitive method for the simultaneous determination of HCY and ADMA in human urine by liquid chromatography-tandem mass spectrometry (LC-MS/MS) coupled with electro spray ionization (ESI) in human urine was reported from the lab. The methodology designed here was used to estimate these molecules in urine

samples collected from patients reported to Cardiology Department of our hospital reflecting the potential of the method as an aid in disease diagnosis.

Gentamicin is a broad spectrum aminoglycosidic antibiotic used to treat many types of bacterial infections. Since gentamicin does not contain any chromophore or flurophore, chemical derivatization or fluorescent labeling is used prior to its analysis. These methods are cumbersome and often led into inaccurate results. One step and easy method for the estimation of gentamicin by generating gentamicin stabilized gold nanoparticles and recording their SPR absorption intensity which varies proportionally with the drug's concentration was developed in the laboratory.

Invisible becomes visible: Gentamicin induced AuNP formation enables



its detection

Microbiology

The research focus of the Division continues to be in the area of

1. Microbial biofilm infections: Both tissue- based and associated with the use of medical devices and Microbial disease diagnostics

2. Development of tissue engineered Hybrid artificial lung model for use as a test system for pollutants, drugs etc and understanding the trigonal interactions between biomaterial/ medical devices and pathogens understanding novel treatment modalities pathologies like alveolar fibrosis and effect of aerosols, nanoparticles etc

There is a project titled 'Epithelial -mesenchymal interactions in Tissue engineered hybrid artificial lung - role of angiogenic factors' funded by Department of Biotechnology, Govt. of India which is nearing completion.

Epithelial- mesenchymal conversions (EMC) in organs are critical in the repair process and also in disease pathologies. Three dimensional models developed using suitable scaffolds are being used to study EMC conversion in the lung to understand mechanism of fibrosis in the lung. This system was used to study changes induced agents like Tobacco extract, Retinoic acid etc in the lung both under monolayer and heterotypic culture conditions and also in tissue like constructs. The modulations of Surfactant synthesis a primary functional requirement of the lung was studied in detail. Both transcriptional and translational processes were studied by immunofluorescence and mRNA expression using qRT PCR.

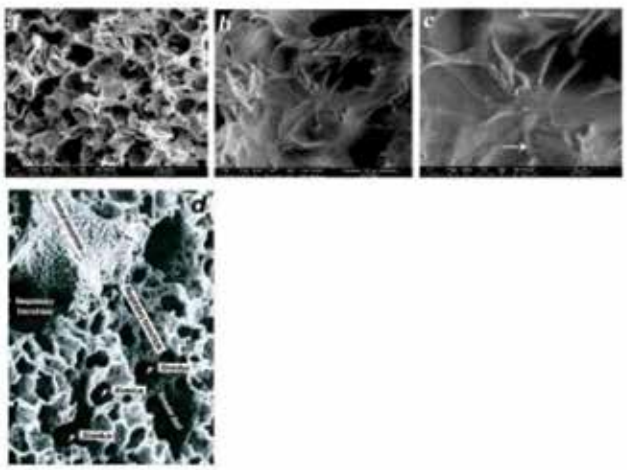


Fig: a,b,c : A549 and MRC 5 co-culture on purely synthetic Gelatin –vinyl acetate scaffold after three weeks of culture under dynamic conditions. The Scaffold porosity was adjusted to resemble the natural lung architecture (d) which is SEM image of human lung section (courtesy for (d) : Kessel RG & Kardon RH)

Polymer Lab

Studies on novel biodegradable polymeric materials and tissue engineering as cardiac implants', biosyntheteic chemically crosslinked amphiphilic smart hydrogels were prepared for cardiac tissue engineering using a poly (propylene fumarate)-co-alginate copolymer,

calcium chloride and vinyl monomer viz, 2-hydroxy ethyl methacrylate (HEMA), methyl methacrylate (MMA), butyl methacrylate (BMA), N,N'-methylene bisacrylamide (NMBA), polyethylene glycol diacrylate (PEGDA). DSC studies of these hydrogels reveal structured water (nonfreezing-bound water) along with free water more predominantly in all these hydrogels. Tensile strength of the water swollen hydrogels was also determined. ESEM analyses reveal nano porous structure which is favourable for transport of metabolites and cells. The fatigue life of the water swollen hydrogels was evaluated using a biomechanical tester under simulated physiological conditions. These hydrogels withstand appreciable cyclic stretching. The cyclic unidirectional stretching introduces complex macro and microarchitectural feature with interconnected pores with more structured bound water which provides long term viability of around 250% after the 24th day of culture. These hydrogels absorb plasma proteins depending on the content of structured water in hydrogel. These hydrogels are hemocompatible. These hydrogels prevent RBC aggregation, platelet adsorption and hemolysis when contacted with blood. Cell viability assay with L929 fibroblast cell reveals cytocompatibility. These hydrogels promote enhanced three dimensional cell growth of L929 fibroblast for longer duration (MTT assay) and H9C2 cardiomyoblasts (confocal microscopy). The prevention of deleterious effect of reactive oxygen species (ROS) on the cell growth by these hydrogels was also studied using H2O2 as model ROS molecule. These hydrogels were able to resist the penetration of reactive oxygen species (ROS) in the cell to a greater extent which was evident from the live/dead assay, increased intra cellular GSH levels when compared with the H2O2 treated control. The hydrogels were able to maintain the genomic integrity which was confirmed by comet assay. These hydrogels are promising as injectable hydrogels for the management of myocardial infarction and ischemia.

Under the CHVF programme, poly(polyol sebacate)-co-poly(trimethylol propyl fumarate) copolymer and poly(propylene fumarate) homopolymer were prepared by in situ polymerisation in molecularly dispersed calcium deficient hydroxyapatite suspension. These polymers were characterized by TG, DSC and GPC. Setting characteristics of these polymer blends were carried out using various adjuvants viz calcium carbonate, benzoyl peroxide, DMA and vinyl monomer. The quantities of the adjuvants have been optimized to obtain the required setting parameters. Solution casting of these polymer blends is being carried out to obtain smooth films with adequate strength using different vinyl monomers, methylmethacrylate, butylmethacrylate and n-vinyl pyrrolidone by casting method. The composites were characterised using DSC and Raman spectroscopy. The composite based on methylmethacrylate has better mechanical properties. Studies on mineralisation of these composites were initiated using 1.5 SBF Kokubu solution.

Under the INSPIRE programme, hydrogels which can be used as theranostic devices for the treatment of osteoarthritis were prepared. Aromatic polyanhydride precursors, l,6-bis(p-carboxyphenoxy) hexane (CPH) and l,3-bis(p-carboxyphenoxy) propane (CPP) were prepared. Aliphatic-aromatic polyanhydride was prepared using aromatic polyanhydride precursor and sebacic acid prepolymer. Thiolated copolymers were synthesized using polyanhydride prepolymer and four arm PEG. These thiolated copolymers were crosslinked with different vinyl monomers, viz acrylic acid and methyl methacrylate. The gelling characteristics and biostsbility were investigated.

Polymer Processing

Program 1: Development of a Dura Substitute by Electrospinning of ε-Caprolactone-Co- Lactide Polymers

The main objective is to develop innovative porous polymer scaffold materials with tailored properties and to explore the interaction mechanisms at nanoscale between the cells and porous membranes/scaffolds. It is also envisaged to design nano-fibrous structures that could slowly degrade over a period of time. Thus the current project could lead to the development of an ideal dura substitute for neurosurgery applications. The degradation behaviour of the electrospun mats of polycaprolactone blended with caprolactone-co-lactide polymers was evaluated at different time periods.

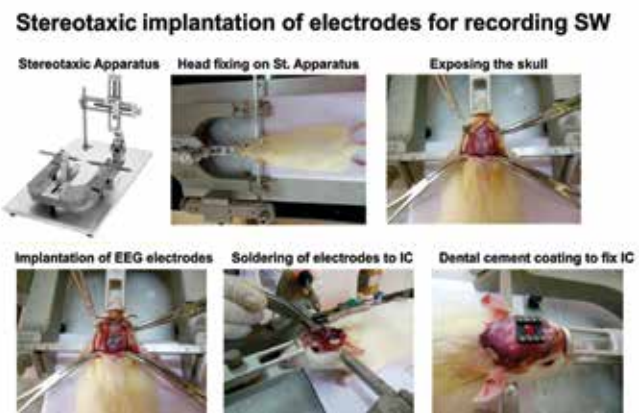
Program 2: Development of non-toxic radiopaque polyurethanes for biomedical applications

In this program, dihydroxy functional organic molecules were iodinated to impart radiopacity into the molecule. These molecules were incorporated into polymer chains during the polymerization process. A number of diiodo and tetraiodo compounds were synthesized and reacted with diisocyanates and diols to manufacture radiopaque polyurethanes. Radiopaque polyurethanes were characterized for cytotoxicity, mechanical properties, etc. and are being evaluated for making X-ray shielding devices.

Sleep Research Lab

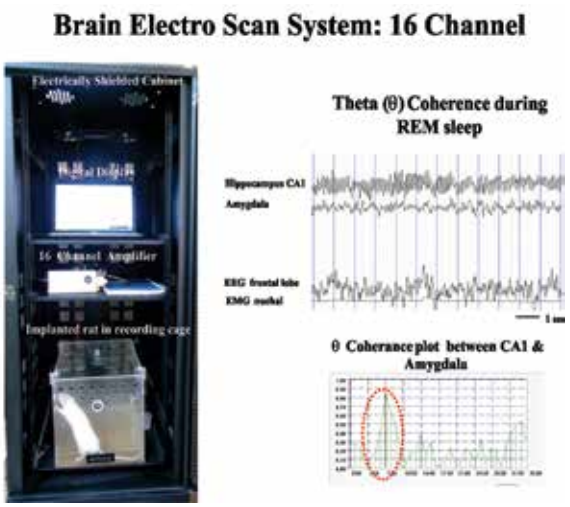
Sleep Research lab investigates the unresolved questions related to sleep and its functions. This facility aims to explore the basic mechanisms and to conduct translational research in emerging aspects of sleep regulation for improving human health. The unique feature of this laboratory is that the knowledge gained from animal experiments would be applied to cure various sleep disorders in human. The research laboratory works in close collaboration with the Sleep Clinic in identifying the unresolved puzzles of sleep disorders and seeks to find a solution to those human maladies. This most modern research laboratory is equipped with the latest instruments and technology to conduct basic sleep research in animal models and human subjects.

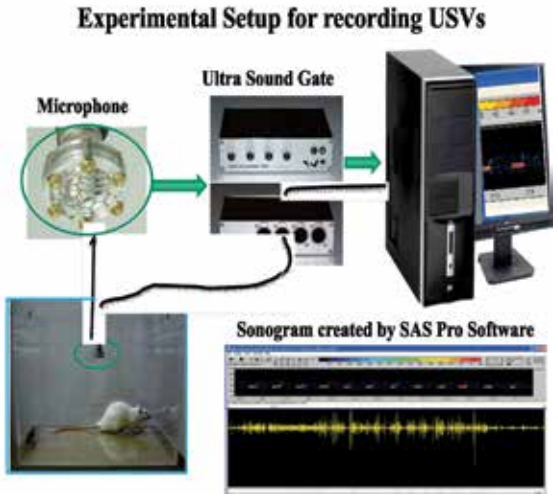
To study the effects of maternal sleep deprivation on cognition in the offspring, the sleep during pregnancy is carefully monitored in rat model. To record their sleep, EEG and EMG electrodes are chronically implanted under anaesthesia using stereotaxic apparatus as shown in Figure 1 below. The changes in neural dynamics in brain after sleep deprivation are studied using 16 Channel Brain Electro Scan System (BESS) in adult rats (Fig 2).



Recent results indicated the role of sleep during development in modulating cognitive behaviour in neonates. Maternal rapid eye movement (REM) sleep during late pregnancy was found linked to the ultrasonic vocalizations (USVs) in rat pups during early development.

Fig 2 & Fig 3





The effects of REM sleep restriction (SR) in rats during late pregnancy were studied on the USVs by the pups, which are distress calls not audible to human ears. The USVs of male pups were recorded after a brief isolation from their mother for two minutes on alternate post-natal days, from day one till weaning. The USVs, recorded using microphones, were analysed qualitatively and quantitatively using SASPro software (Recording set-up shown in Fig 3). The pups born to REMSR mothers showed not only a reduction in vocalization but also a delay in peak call making days in comparison to control pups. It is suggested that the reduced ultrasonic vocalizations can be utilized as a reliable early marker for affective state in rat pups. Such impaired vocalization responses could provide an important lead in understanding mother-child bonding for an optimal cognitive development during post-partum life. This is the novel report showing a potential link between maternal REM sleep deprivation and the vocalization in neonates and infants

The work is supported by the DST-CSI (Cognitive Science Initiative) program

Thrombosis Research Unit

The laboratory continues to develop fibrin based bio mimetic matrix system for 3 major applications: 1) compose niche for differentiation of adult stem cells and for cell transplantation; 2) compose hybrid scaffolds for tissue engineering; and 3) as drug delivery vehicle.

During the past year, fibrin based niche was standardized for differentiation of adipose derived mesenchymal stem cells (ADMSC) to keratinocytes. The culture conditions used for this yielded ~ 40% keratinocytes embedded in a bed of MSCs. Differentiated cells were characterised using different cellular and molecular tools. The cytokeratin staining was one of the proofs for differentiation of ADMSC to keratinocyte which is shown in Fig.2.

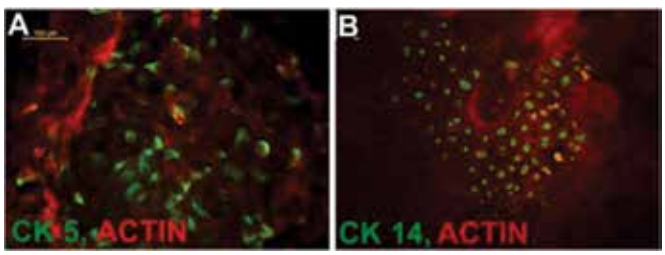


Fig.2. ADMSC differentiated into cytokeratin positive keratinocytes under the influence of specifically designed culture niche. Less than 40% cells differentiated into hexagonal shaped keratinocytes, and the remaining cells maintained fibroblastic morphology of MSC.

Matrix-directed differentiation of ADMSC to fibroblast was also demonstrated earlier from our laboratory. So, together with fibroblasts and keratinocytes derived from ADMSC, we can construct patient-specific skin substitutes using adipose tissue as a autologous cell source.

An electro spun biodegradable ter-polymeric (PLGC) scaffold was hybridized with fibrin composite for improving the properties of tissue engineered skin substitute. The hybrid scaffold supported increased fibroblast growth and extra cellular matrix deposition through which the mechanical strength of the scaffold was increased even after polymer degradation (Fig 3).

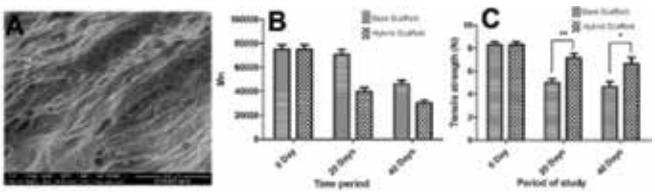


Fig.3. Tissue engineered dermal equivalent (TEDE). A, fibroblasts grown for 40 days on hybrid scaffold made of biodegradable polymer and fibrin matrix. B, comparison of MW of polymer in TEDE vs bare scaffold; C, comparison of mechanical strength: TEDE vs bare scaffold. Mechanical strength of TEDE is high even though degradation is higher in cell-grown scaffold

Peripheral blood mononuclear cells (PBMNC) contain multi potent adult progenitor cells (MAPC). We reported for the first time that the PBMNC fraction contains p63+ keratinocyte progenitor cells (KPC). These cells were selected using a bio mimetic matrix composition and were seeded on a transplantable form of fibrin disc on which they differentiated into involucrin+ and filaggrin+ keratinocytes (Fig 4).

Fig. 5. Neurons, differentiated from PBMNC derived MAPC expressed synaptophysin in 21 days of culture on a specifically designed niche. Surviavl of neurons in culture was ensured for 21 days in the presence of special medium

In an effort to develop delivery vehicle for curcumin (anticancer drug, but not therapeutically viable due to

poor aqueous solubility and bioavalability, two systems were produced and evaluated for their functional efficiency in in vitro culture. First one is fibrin based solid form for implant application for local sustained drug delivery and the second is albuminated curcumin which is highly soluble and can be used for systemic infusion. Both products were evaluated for their effect on cancer cells and normal cells. Dose at which they induce apoptosis of cancer cells with minimal effect on primary fibroblasts and endothelial cell was identified. The products are shown in figure 6.

Fig.6. A, Implantable curcumin loaded & lyophilized fibrin disc and B, Lyophilized powder of albuminated curcumin; C, solubilized infusible albuminated curcumin (1 M conentration) are ready for preclinical evaluation

Basic research project was carried out to understand platelet proteomics; profile difference between healthy subjects and diabetic subjects. On analysing the circulating platelet proteins from 2 groups, using 2-D electrophoresis, and many different proteins were detected in diabetic subject's plasma. Out of these, two proteins were identified to be secretogranin3 and cyclophilin using Western blot which are known to be inflammatory proteins. These proteins were found to induce apoptosis to cancer cell line with minimal effect on endothelial cells in culture. Work is ongoing to understand the effect these proteins on endothelial cell phenotype shift.

Toxicology

- 'Molecular and immunotoxicological effects of Dextran coated Ferrite and Hydroxylapitite nanomaterials', Nanomission, DST, New Delhi.

  The work includes the cytotoxicity, acute oral toxicity, sub-chronic toxicity, combined chronic toxicity and carcinogenicity, dermal toxicity, immuno-toxicity studies (B and T lymphocytes proliferation and inflammatory cytokines), DNA damaging effect, lipid peroxidation and antioxidant enzymes (Glutathione, glutathione reductase and glutathione peroxidase).

- 'In Vitro alternative test system development for Ocular Irritation' ICMR, New Delhi

  The objective of the present project is, to develop an in vitro test system for acute and sub acute ocular irritation and will be suitable for evaluating the biomaterials, medical devices, pharmaceuticals and chemicals

- Development of National GLP Guidelines & Identification and selection of National Regulatory Guidelines for Testing and Evaluation of Medical Devices'. This is supported by the National GLP Compliance Monitoring Authority, Dept. of Science and Technology, New Delhi. 12 documents prepared based on OECD GLP principles., Vertical standard prepared, Horizontal standard prepared, Final report submitted to DST

- Evaluation of molecular toxicity of newly developed materials intended for biomedical applications' is ongoing under the support of Indian Council of Medical Research (ICMR), New Delhi. The objective of the project is to evaluate the molecular level toxicity of the six newly developed materials and their chemical leachants on mtDNA, antioxidant enzymes, lipid peroxidation and cytogenetic effects. The expected out come of the project will be a cardinal change in approach to biocompatibility evaluations leading to a paradigm shift in bringing in newer regulations for development of safer medical devices, implants and tissue engineered organs for life time application. Final report submitted to ICMR

- Influence of Cryopreservation on IL-1 release from pooled lymphocytes in response to lipopolysaccharide and lipoteichoic acid.

  The present study was to analyze the influence of cryopreservation in IL-1β release, a marker for inflammatory response from human lymphocytes, in response to exogenous pyrogenic stimulants. Lymphocytes isolated from pooled blood of multiple healthy individuals were cryopreserved in DMSO and Glycerol for a period of 7, 14, 30 and 60 days and were challenged with Lipopolysaccharides and Lipoteichoic acid in vitro. The inflammatory cytokine, Interleukin 1 (IL-1) release was measured by Sandwich ELISA method. It was observed that the release of IL-

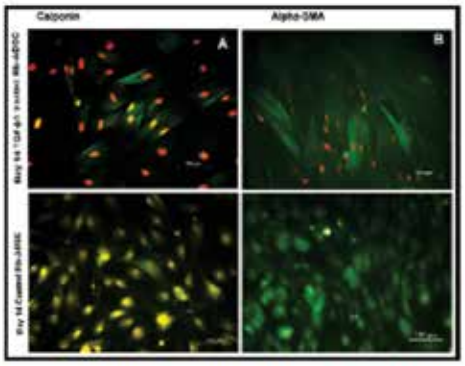
1β increases instantaneously after the initiation of incubation and reaches a maximum at 3-5 hours, then gradually decreases and get stabilized for both pyrogens. Moreover it was also observed that the effect of cryoprotectant (DMSO (10%) and Glycerol (10%) showed almost similar results for short term storage, but DMSO preserved lymphocytes yielded a better viability for long term storage

Tissue Engineering & Regeneration Technologies

Our research focus is the tissue engineering of organs such as pancreas, cartilage and blood vessels. Current major research programs of the division have been directed to develop (a) novel, biodegradable and bio mimetic "designer" scaffolds (b) understand the regeneration processes using adult cells and directed stem cell differentiation, and (c) delineate the molecular pathways that regulates the growth factors and other molecules or drugs to promote regeneration.. Other areas of our interest deal with usage of bioreactors, wherein the "in vivo" environment is recapitulated and monitored "in vitro," while exerting physiologically relevant mechanical and biochemical stimuli to guide neo tissue development. The division also contributes to other lab and institutional programs (e.g. lung, bone) with "designer" scaffolds. Development of biopolymer composites for medical applications is another important area of research. Scaffolds made by conventional techniques and electro spinning as well as regulator combinations generated by our division, find additional applications in drug delivery, wound healing and haemostats.

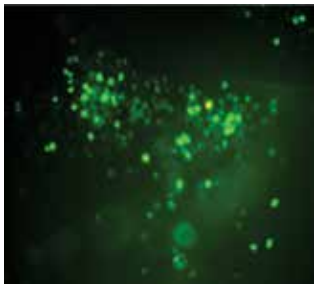
During the year, we have continued our work in the areas of pancreas and blood vessel and cartilage. The pancreas program is addressed through the activities of two PhD students. We have earlier shown that a macrocapsule could immunoisolate the islets from rejection when transplanted in vivo. The functional islets could also reverse the diabetes of experimental diabetes animal models. We have developed several 3 D porous scaffold structures that permit islet cells to adhere, grow and remain functional over extended periods of time in vitro. During the year we have also been able to demonstrate adipose stem cells - rabbit and human could be differentiated to islet like cells in vitro, grown in larger numbers and for extended periods of time - in vitro on novel scaffolds. We are also exploring the influence of differing physical and chemical attributes of scaffolds in enhancement of cell differentiation and secretory capabilities of the ILCs in vitro.We are currently engaged in exploring the in vivo applications of the adipose stem cell derived islets in rat and pig models.

In the area of blood vessel, we have explored the growth of smooth muscle cells on electrospun biopolymer hybrid and synthetic polymer scaffolds under static and dynamic conditions. The dynamic conditions and nanofibrillar electrospun structures gave the most impressive results with the correct SMC contractile phentoype and mechanical properties being developed. Further through the ongoing studies in our lab during the year, we were able to demonstrate that adipose derived stem cells could be differentiated to smooth muscle like cells using growth factors and even on dynamic stimulation without growth factors. Studies are ongoing to validate these results.

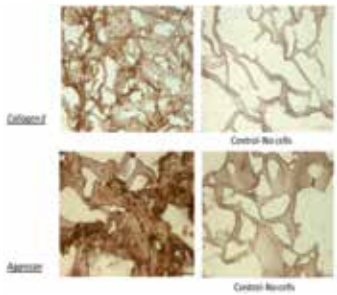


TGF-β1 treated Rb-ADSC stained for A) Calponin and B) Alpha-SMA

In the cartilage program we have continued with the earlier work. Additional aspects addressed during the year were exploring the use of a photopolymerised gel of biomimetic biomaterials to encapsulate goat chondrocytes and simulation of chondrogenesis in vitro by culturing for a 21 day period. Cells were found to be living in these gels and forming articular cartilage.

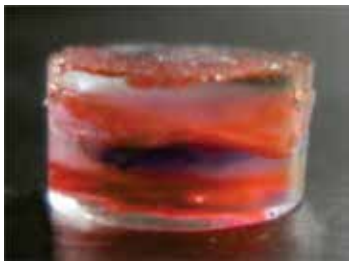


Live dead assay of chondrocytes in photpolymerised gel showing living cells at 14 days

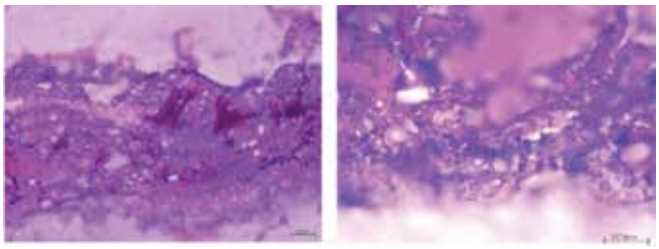


Immunohistoanalysis of articular cartilage formation in photopolymerised gels (21 day study)

A layer by layer membrane composite with the photopolymerised gel was also similarly explored. A three dimensional, multilayered construct using cell seeded PVA-PCL electrospun membrane and hyaluronic acid, stacked layer-by-layer, in a sandwich model, that mimic both the fibrous protein and proteoglycan ground substance of the native extracellular cartilage matrix was fabricated and investigated for chondrogenic potential.



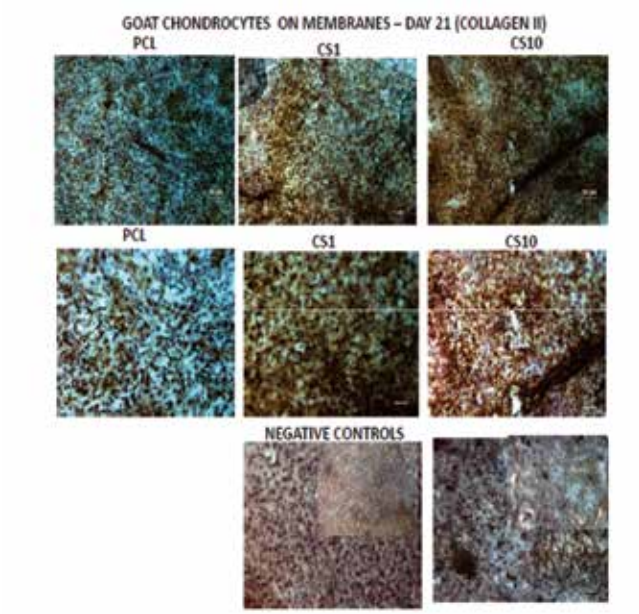
(a)



b)

(a) A layer by layer membrane composite with the photopolymerised gel (b) cryosection showing cartilage formation within gel

In another study, the potential of encapsulating raw materials in 3D electro spun fibers for recreating an ideal microenvironment for chondrocytes and adipose derived stem cell differentiation for osteochondral tissue engineering was investigated. Towards this approach, electrospun membranes made of polycaprolactone with different compositions of chondroitin sulfate and bioactive glass were fabricated. Chondrocytes were cultured on these membranes for a period of 3 weeks and characterized for the cellular response. Chondroitin sulfate served as substrate for faster synthesis of proteoglycans during chondrogenesis and upregulated the secretion of cartilage specific matrix. Bioactive glass served as inducing signal for faster mineralization. Adipose derived stem cell differentiation to osteochondral lineages became more prominent in presence of a combination of growth factor and the raw materials.



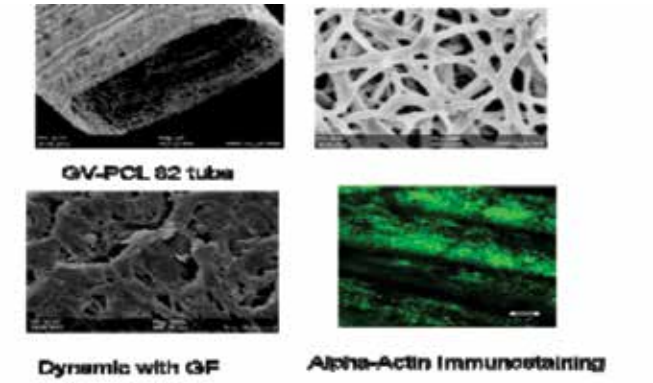
Program support for a Lead program on Centre of excellence in Tissue engineering (COE) program of the Department of Biotechnology (DBT), Govt of India – Prabha D Nair – Team Leader & P.I Sept 2007- Dec 2012 499 lakhs completed

Additional individual project under the COE program - Tissue engineering of cartilage using biomimetic scaffolds under dynamic conditions – Prabha D Nair (PI) Sept 2007-Dec 2012 – Rs. 76 lakhs Completed included in above cost

In this program on tissue engineering focused on core technologies such as (a) Development of Bioreactors (b) Novel Biomaterials and scaffolds for tissue engineering (c) Fabrication of biomaterial scaffolds through electrospinning and other methods (d) Characterisation of materials using AFM and other methods(d) Disease model development.

All the core programs have generated significant results which have emanated publications, 2 patents filed and 3 more patents in process. Three bioreactors were developed and validated. Several new biomaterial scaffolds and novel applications were generated and a disease model for arthritis standardized. Among the biomaterials developed were novel biomaterial scaffolds for blood vessel, pancreas, dura repair (collaboration with CMC Vellore), honey comb

membranes for retinal epithelial cells (collaboration at University of Liverpool, UK) etc



The individual programs on tissue engineered cartilage, biohybrid liver and cell based bone and osteochondral tissue engineering also made significant progress.

P.I - Dr Prabha D. Nair and team have shown that chondrogenesis could be obtained with chondrocytes and mesenchymal cells from a variety of sources in 3D scaffolds/ gels, which can be enhanced through usage of bioreactors and growth factor combinations. Some significant signaling pathways are elucidated for chondrogenesis and good integration of tissue engineered constructs with defect sites was obtained.

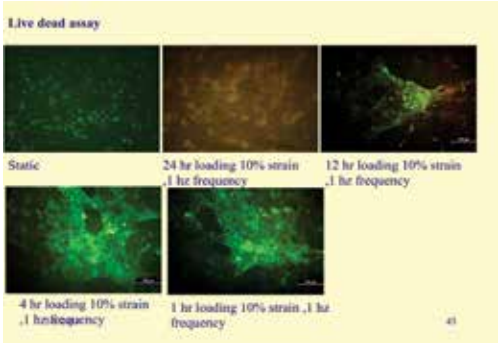
P.I- Dr T.V Kumary and team have fabricated a new three compartment bioreactor for bioartificial liver and evaluated for its functional performance. Two models of liver failure were standardized and in a pilot study they could show the presence of labeled cells within the liver, after transplantation.

P.I Dr Annie John and team- could demonstrate a cell – ceramic construct with adipose tissue derived stem cells and ceramic with radio-opaque properties with direct clinical implications for usage in segmental long bone defect reconstruction. They have also shown use of tissue – engineered constructs for the fault- free reconstruction of defects in articulating joints in small & large animal models.Two proof of concept studies of clinical translation trials were completed some more are planned. Technology transfer of the electrospinner station to Ms Holmarc Pvt Ltd and one scaffold HABG active to Ms M/s IFGL,Kolkota were effected. Technology transfer of bioreactor for liver and cartilage and some scaffolds are also expected in the future.

Signing of a Technical Tie up with M/S HOLMARC Opto-Mechatronics pvt ltd for Electrospinning station on 4th April 2012

Highlights of Tissue engineering of cartilage using biomimetic scaffolds under dynamic conditions during the last year

- Umbilical cord MSC with their advantages of painless collection, abundant supply, high expandability is a promising alternative cell source for tissue engineering and regenerative medicine
- The PVA-PCL scaffold owing to their characteristic physico chemical properties is suitable for cartilage tissue engineering application
- Chondrogenic potential of UCMSC enhanced in the presence of TGF beta3 and BMP2 growth factor combination
- Dynamic compression stimulates expression of chondrogenic genes in UCMSC even in the absence of chondrogenic cytokines proving the concept of functional tissue engineering
- Combination of mechanical stimuli and growth factor promotes chondrogenic differentiation of UCMSC
- Implantation results in rabbits have revealed that (a) PVA-PCL scaffold favours in vivo chondrogenesis and integration in rabbit cartilage defect site (b) injection of chondrocytes into the 3 D scaffold which is placed in the defect site has better integration and healing potential.



Indo-Danish Strategic programme on Musculoskeletal Stem cells in tissue regeneration funded by DBT India and Danish Ministry of Science & Technology June 2011 to 2015

Total cost Rs 637.89 lakhs ongoing

The research programme combines a range of disciplines of basic sciences, material sciences and biomedicine. The main objectives are: To study mesenchymal (stromal) stem cell biology in the undifferentiated and differentiated states in order to develop novel approaches to enhance the musculoskeletal system (bone, cartilage and muscle) generation.

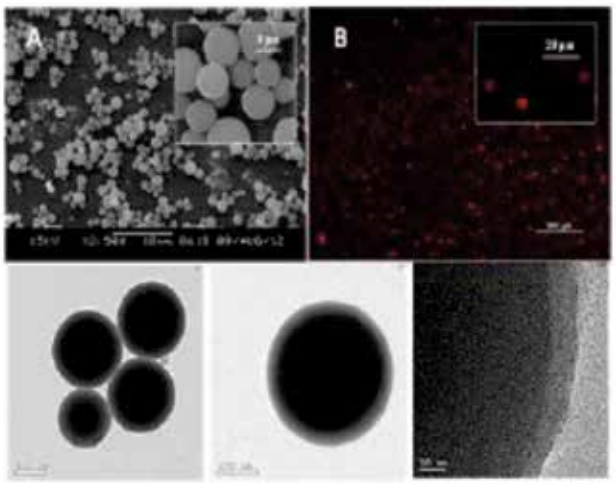
1. To test differentiated musculoskeletal cells in a number of preclinical large and small animal models of musculoskeletal diseases, and establish baseline data, safety and feasibility, for future Phase I clinical trials.
2. To establish a platform for collaborative scientific research in the area of stem cells and regenerative medicine between India and Denmark.
3. To establish an exchange programme between junior and senior researchers in India and Denmark.

In the SCTIMST component of the program (DTERT lab), we committed to the following Specific Aims, in collaboration with Profs. MoustaphaKassem, Prof. Henrik Schroeder and Prof Jorgen Kjems at Denmark and also the Indian investigators.

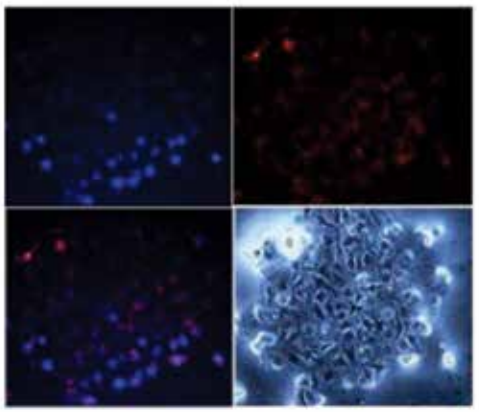
Our work has been focused on objectives as below

1. Well characterised 3D scaffolds for cartilage, bone and muscle tissue engineering
2. In vitro studies of generation of cartilage, bone and muscle tissue engineered constructs with the 3 D scaffold and stem cells
3. In vivo studies of repair of cartilage and bone defects with tissue engineered products

A new scaffold - Nano-hybrid scaffold with a fine distribution of osteoinductive filler was synthesized and characterized. The scaffold was determined to have potential applications in bone tissue engineering. Novel drug release systems that can serve as a pharmacologic intervention for experimentally induced osteoarthritis are being developed through the collaborations. We also developed water dispersible siloxane-F68- folate ternanry vesicles for the targeted delivery of doxorubicin



Vesicles produced from this system



Uptake of Silica-F68 vesicles with Human Osteo-Sarcoma Cells.

Product Development and Technology Transfer & Industrial Linkages

Artificial Organs

Modeling & Prototyping Lab

An MoU was signed for SCTIMST- SIDD Hub for the development and as a first step the following projects were identified for development:

a. Development of Paediatric membrane Oxygenator

b. Development of Neonatal membrane Oxygenator

c. Development of Paediatric and neonatal Arterial Filters.

Project was initiated and the recruitment process and preliminary design stage are ongoing.

Centrifugal Blood Pump Project

An improved design for the centrifugal bloodpump was completed which has better rotational stability and ease of manufacturing.

- Conducted evaluation of prototypes in simulated fluid environment as well as with blood to assess the performance of the device in-vitro.
- CFD simulations of the design was carried out to optimise the inlet geometry and bearing design. Bearing geometry was optimised to achieve lower stagnation and recirculation at the back of the bearing.

Electromagnetic Blood flow meter

- A project for development of electromagnetic blood flow meter is initiated.
- A proof of concept stage is ongoing by fabricating prototypes and evaluating the performance.
- Different hardware and software for the projects were developed and tested to come up with design which can detect bloodflow.

BIOMATERIAL AND BIOLOGICAL PRODUCTS

Bioceramics Laboratory

M/s IFGL, Calcutta, has introduced CPC product (BioGraft CPC) with our technology in the 37th National Annual Conference of Indian Society of Periodontology, held on October 12-14, 2012 at Shimla, Himachal Pradesh.
Production of the first batch of "Biograft CPC" (Calcium Phosphate Cement for bone graft applications) has started at IFGL factory at Rourkela, based on the Technology Document and practical guidance of Bioceramic Lab (BCL). The testing and evaluation of the initial batches will be done in the lab before routine production starts for commercial launching.

IFGL is in the process of bringing out blocks of hydroxyapatite (Biograft HA New) and bioactive glass composite (Biograft HABG) for bone grafting applications, with the know-how transferred from the lab.

Biosurface Technology

Oral Heparin

MOU was signed between Eris Life Sciences, Ahmedabad Gujarat and our Institute for R&D on Oral Low Molecular weight Heparin delivery system on February 27, 2013.

Evaluation of the efficacy of oral heparin formulation in a higher animal model, rabbit

Assessment of plasma heparin levels with respect to dose dependence; bioavailability and batch to batch variations in vivo were carried out in rabbit model. The in vivo study was performed on male New Zealand rabbits which were fasted overnight before administering the oral dose of heparin. Blood (250 μl) was withdrawn from the marginal ear vein at definite time intervals for over 7 hours. The drawn blood was added to 30μl sodium citrate and centrifuged at 5000xg for 10 minutes. The supernatant plasma was separated for analyzing the heparin. The bioavailability of heparin was determined by measuring the measuring the anti-Xa activity in rabbit plasma with a standard kit. Heparin nanoparticles were orally administered at a dose of 75, 150 and 300 IU/Kg and the subcutaneous dose was 150 IU/Kg. The bioavailability was calculated with respect to the subcutaneous doses. A bioavailability of 52.9 and 60% was obtained for doses 150 and 300 IU respectively. However no bioavailability was observed for lower dose of 75 IU/Kg.

Dosage IU/Kg	Bioavailability (%)
75 IU	--
150 IU	52.9
300 IU	60

From the dose dependency studies and the bioavailability evaluation it is seen that the bioavailability is higher in rabbit model than in rat model (previous studies). Batch to batch variation was evaluated at the dose of 150 IU/kg in the rabbits.

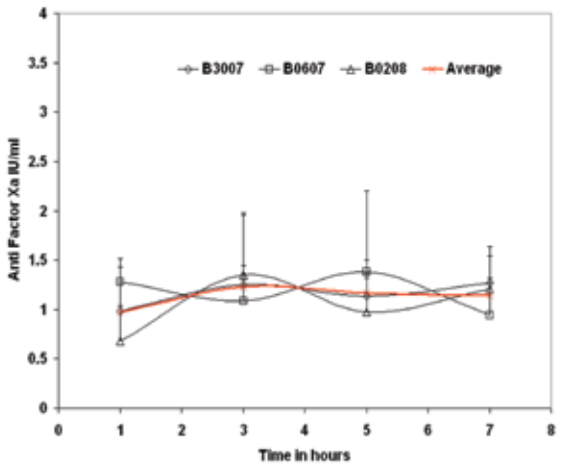


Figure 1.Batch to batch variation of orally administered heparin nanoparticles at a dose of 150 IU/kg in rabbits

Heparin loaded Particles	AUC $_{0-7}$ / kg ($IU.h^{-1}.mL^{-1}.kg^{-1}$)	Bioavailability (%)
B300712	7.71	53.15
B060712	7.78	53.6
B020812	6.83	47.1

Three batches were evaluated for batch to batch reproducibility and it could be established.

Gene Delivery

The major barriers associated with non-viral vectors include its toxicity, blood protein and cell interactions with the cationic domains of these vectors, stability in systemic circulation, endosomal escape within the cell and the unpacking of the nucleic acid from the vector. Cationic polymers form ionic complexes (nanoplexes) with negatively charged DNA which can be internalized by the cells by various pathways.

The journey of nanoplexes from the site of administration to the target tissue involves lots of hurdles, among them intracellular barriers including cellular uptake, endosomal release, nuclear localization, and gene transcription which may require vector/DNA unpacking. By elucidating the DNA unpacking and separation from cationic polymers the precise mechanism of non-viral vectors can be understood.

Once the nanoplex gets released into the cytoplasm following endosomolysis the next step is the localization of plasmid into nucleus. Nanoplex comes into contact with various cytoplasmic components. Depending on the nature of interactions the fate of the plasmid is defined. Recently it was reported that free histones are present in the cytoplasm.

It is well understood that the chromosal DNA exists as nucleohistones with in the nucleus. It is reported that Histone H1 and H3 are present in the cytoplasm. Hence it was hypothesized that the free histones in the cytoplasm may interact with the plasmid DNA and facilitates its entry into nucleus. With this background we investigated the possible role of histones in vector unpacking.

To study the effect of histone on vector/DNA polyplex unpacking, TRITC labeled polymer and YOYO tagged plasmid was complexed at a weight ratio of 1:4. To the nanoplex 1ng to 80 g of histone was added incubated for 20 minutes. From the microscopic observations done it was understood that histones replace the polymer and helps in transporting DNA into the cell.

Figure 1: Intracellular distribution of TRITC and YOYO-I tagged Dex-H /DNA complexes in the absence and presence of histones

In the absence of histone, strong fluorescence by TRITC labeled polymers PPEVI10 and Dex-H in the cytoplasmic region and DNA in the nucleus was detected. Here, DNA and TRITC labeled polymer remained tightly associated till it reached the cytoplasm and then the DNA was found to be unpacked and transported into the nucleus as detected by YOYO labeling. However, when the nanoplex was incubated with histones outside the cell, the unpacking of DNA from the polymer by histones took place outside the cell itself as evidenced by microscopic observations. With PPEVI10 almost 90% displacement of TRITC labeled polymer was observed. However, no labeled polymer was detected anywhere in the cell after the internalization of nanoplexes in the case of Dex-His.

Cellular uptake of DNA into the nucleus was higher in the presence of histones. This led us to conclude that the histones may be one of the factors responsible for unpacking DNA from the polymer in the cell. Further, histones of varying concentrations ranging from 1 ng to 80 μg were used to determine its vector unpacking capability. From our studies it was very clear that the histones of lower concentrations were equally efficient in unpacking of the DNA cargo.

- The transfection efficiency of the two vectors bearing imidazole groups was of the order Dex-His>PPEVI.
- The dissociation of DNA from the polymer was more efficient in the case of Dex-His.
- Hence from these results we conclude that by developing polymers with optimum affinity to DNA, with respect to histone will ensure the unpacking in the cytoplasm leading to enhanced transfection efficiency.

Dental Products Laboratory

Development of Drug Releasing Intruterine Device Project

Technology transfer documents were handed over to HLL Lifecare Ltd., and a Technology Transfer agreement was signed at a function held in BMT Wing 30th of April 2012 for hormone releasing IUD.

The technical product launch of the intrauterine EMILY device developed by the lab jointly with HLL Lifecare took place on 18th October at Hotel Atria, Bangalore. Dr. Kalliyana Krishnan was felicitated at the function in Bangalore by HLL Lifecare organized for the launch of IUD.

Limited Clinical trials of IUD were completed before March 2013. Production has started at 50 units per day. Marketing is expected to commence shortly.

Technology Transfer (Relicensing) of Dental Composites and bonding agent

Subsequent to the launch of Restofill and bonding agent to Anabond Stedman Ltd., Chennai in 2006, more enquiries have come this year for taking up these technologies. Negotiations are under way and terms have been fixed by the technology transfer committee which has been communicated to the industries.

Technology transfer of Caries Removal agent

Govt. Dental College, Trivandrum has agreed to carry out the clinical trials of the technology on caries removal agent `Chitrasolv' developed in the lab and transferred to Dr.Toms International, Calicut. This is expected to commence by April 2013.

Division of In vivo models & Testing

Decellularised bovine pericardium for cardiovascular application was developed. An Indian medical device company has expressed interest in this product as well the technology for decellularisation. Terms for technology transfer is finalised and the technology transfer is expected soon.

Experimental Pathology

Prototypes of skin grafts for clinical application are being developed

Polymer lab

Under the programme 'Dispensable and biodegradable polymeric bone cement', the biomechanical stability, fatigue life (endurance level) and blood compatibility of the polymeric bone cement was evaluated. Biomechanical stability is an important requirement as per FDA Guidance to decide the efficacy and endurance of the implanted material to withstand the compression and shear load of the vertebral disc until the biodegradation is initiated. The dynamic mechanical stability of bone cement was determined using dynamic mechanical analysis (DMA) technique. The effect of dynamic mechanical stress on storage modulus of the composites were analysed under the test parameters, dynamic mechanical load of 4.0N, frequency 1Hz and amplitude 240μm under three point bending as per ASTM D5023-99 method at 37oC. The bone cement material retains the storage modulus within the acceptable limit for the implant in air and PBS medium, though the storage modulus is comparatively lesser in PBS medium which is due to the absorption of the medium. SEM fractography bone cement material

after accelerated dynamic mechanical loading for 8h in air and PBS medium shows fatigue failure with well-defined striations and serrated structure. The serrated structure reflects the higher mechanical strength of the composite. The morphology shows good interfacial bonding between the polymer and the hydroxyapatite nanocrystals without cracks or voids at the interface of two phases. Biomechanical stability of bone cement-loaded bone was also evaluated by fatigue test as per FDA Guidance dt June 12, 2007 to assess the efficacy of the bone cement-loaded bone under in vivo conditions. The fatigue life of the bone cement-loaded trabecular bone resembling vertebral disc was assessed. The number of cycles at which the functional failure occurs was considered to assess the fatigue life and biomechanical stability. The bone cement-loaded trabecular bone has survived more than 2 million cycles. Functional performance of the bone cement-loaded trabecular bone was evaluated by failure analysis after the in vitro biomechanical tests. The structural integrity and load-bearing capability of the bone cement-loaded-bone was assessed by analyzing the formation of scaffold architecture, pore formation and interconnecting structure. Scanning electron microscopy was used for the failure analysis. SEM studies reveal surface erosion and formation of fibrile structure/pore more prominently on the surface and cross section. The degradation is only moderate in the bulk leading to a little change in the bulk morphology. The surface biodegradation is a slow process with the formation of fibril structure. The formation of fibril structure on the surface is essential for good anchoring of bone tissues without any fibrous tissue encapsulation. The slow degradation is essential for the load bearing orthopedic application. The prolonged degradation can lead to dimensional degradation and three dimensional scaffolds which can allow bone growth and remodeling through osteoinductive and osteoconductive pathways.

The blood compatibility of the newly prepared bone cement material was investigated by measuring the hematological parameters [leukocyte (WBC), erythrocyte (RBC) count and haemoglobin content and partial thromboplastin time (PTT)] after exposure to human blood as per ISO 10993-4. Leukocyte (WBC), erythrocyte (RBC) and haemoglobin count assay revealed no appreciable reduction of these blood components in the blood after exposure to the material. The bone cement material has elicited no hemolysis. The percentage of haemolysis is 0.04 which lies within the permissible limit of 5%. Partial thromboplastin time (PTT) assay, a performance indicator measuring the efficacy of both the intrinsic (contact activation pathway) and the common coagulation pathways reveal prolonged coagulation with the test material suggesting blood compatibility. Light microscopic investigation of adhesion of cells after exposure to human blood reveal absence of permanent attachment of cells. The studies reveal blood compatibility of the bone cement material. For the clinical trials of the bone cement, surgeons were identified for limited clinical trials.

Under the programme 'Biodegradable polymeric composite materials for orthopedic fixation devices' nanocomposites were prepared for experimental devices using sheet molding compound. Inorganically modified HT-PPF resin, methyl methacrylate and diethylene glycol dimethacrylate were used. The inorganically modified HT-PPF polymer has glass transition at temperature 40.740C and softening around 50-750C. The thermal DTA analysis of the sheet moulding compound reveals an exothermic peak at 94.90C which is due to the crosslinking reaction. Hot molding process was adopted to process the sheet moulding compound into a sheet. The surface studies of the compression moulded composite reveal hydrophilic character. The hardness was found to be 48 shore D. The SEM micro photograph of as-prepared compression moulded composite (fracture morphology) showed a serrated structure which reflects the high mechanical strength of the composite. The nanocomposites were tested for biodegradation under simulated physiological conditions. The nanocomposites enable stabilization of pH around the physiological range (7.32) at 37 °C. The stabilization of pH in PBS around 7 is due to the combined buffering effect of the inorganic ions of PBS and hydroxyl apatite. The buffering effect of the PBS and hydroxyl apatite slowed down the degradation. The blood compatibility, hemolysis and RBC aggregation was investigated as per the procedure ISO 10993-4. The composite is found to be nonhemolytic. The extent of hemolysis falls under the acceptable limit of <5%. The study on RBC aggregation

revelas absence of rouleaux formation. The cytotoxicity MTT Assay reveal cytocompatibility with L929 fibroblast cells.

Polymer Processing

Program 1: Development of fluoropolymer coated and hydrogel sealed large diameter vascular graft

Considerable progress was made in the program to develop fluoropolymer coated and hydrogel sealed vascular graft. Grafts were characterized for surface morphological features, water permeability as a function of ageing time in phosphate buffered saline, thermal stability, etc. Toxicological evaluation and hemocompatibility tests were also conducted on the graft. Grafts performed well and passed all these tests. Pre-clinical evaluation was performed in pig model. Eighteen test grafts and 9 control grafts were implanted in pig. Implantation periods were 2 weeks, 3 months and 6 months. Implants were retrieved to evaluate the graft performance. In all cases lumen of the retrieved grafts were found to be covered with neointima (see figures).

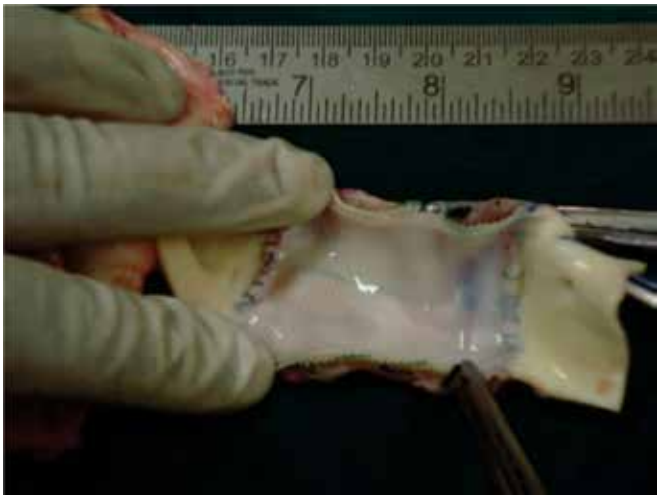


Fig.: Fluorocoated and gel sealed graft retrieved after 3 months implantation in pig showing neointima

Fig.: Fluorocoated and gel sealed graft retrieved after 6 months implantation in pig showing neointima.

Program 2: Development of Mandibular Advancement Device for the Treatment of Obstructive Sleep Apnea

This project is aimed to design, fabricate and evaluate prototype models of oral mandibular advancement device for the treatment of obstructive sleep apnea. Procedures were standardized to develop computer generated 3D models of complex irregular shaped objects. A number of silicone rubber based formulations of suitable hardness were developed and aging studies of the materials made of these formulations were conducted in artificial saliva. The material compositions did not show any deterioration in mechanical properties and considered to be suitable for the indented application.

Thrombosis Research nuit

The laboratory focused on scale up and technology proving activities for fibrin glue and anti venom antibodies. During the past year we initiated distribution of Fibrin Glue to the neurosurgery and cardiac surgery departments of our Institute through the blood bank.

Anti venom was developed against common snake venoms found in India by classifying neurotoxins (cobra & krait) and hemotoxins (Saw scaled viper & Russell's viper) as two separate products. The purification of the product from egg yolk of the immunized (against venom) hen was improved to obtain a refined product for future use in clinical medicine to treat snake bite victims. The chromatographic separation profile of pure IgY, proof of it's purity, and reactivity of neurotoxins in the venom of cobra and kraite is shown in Fig.1. The product is now

ready for testing by the commercial partner who has shown interest to take it up for clinical trial.

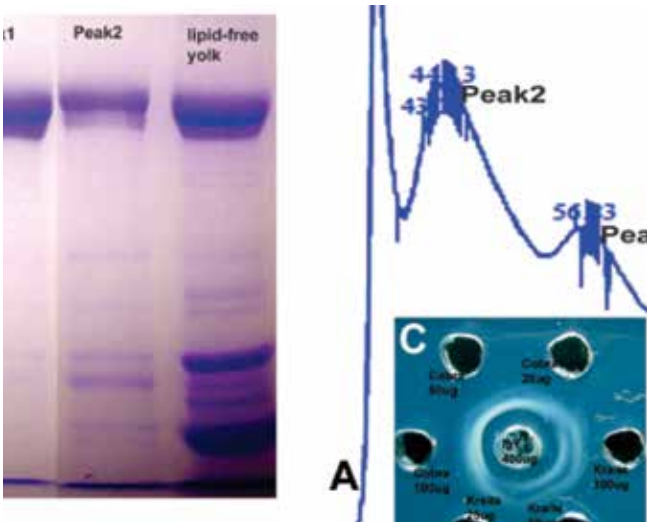


Fig.1. Antivenom purification and analysis. A, chromatogram showing separation of lipid free egg yolk proteins to 3 separate peaks; B, purity of the IgY eluted in the 1st peak and 2nd peak; C, reactivity of venom (cobra and kraite) added in peripheral wells with purified antibody in the middle well is demonstrated by precipitin lines in Ouchterlony's double diffusion, in between IgY and both venoms.

Diagnostics and Instrumentation Lab

Instrumentation Laboratory is involved in research and development in the field of medical instrumentation. The focus is on two main areas, namely development of bio-electrodes and use of electrical impedance techniques for early detection and diagnosis of diseases. The work in the laboratory is also aimed at development of indigenous technology for test and calibration equipment, which can be used in hospitals for routine safety testing and calibration of medical equipment.

The laboratory has been involved in development of indigenous technology for Disposable ECG Electrodes (in collaboration with Lakshmi Industries Pvt. Limited, Coimbatore) and Portable Medical Electrical Safety Analyser) in collaboration with CDAC, Trivandrum). The prototypes of both these devices have been evaluated and technologies are ready of transfer to industry.

The main focus in research of the laboratory has been on development of instrumentation for bioimpedance measurements. The current activities are aimed at development of a portable (body worn) movement artifact free breathing monitor for use in detection of sleep disordered breathing. Subsequently, there is also a plan to further refine this instrumentation to make it suitable for early detection of cancer or epithelial tissues and studying cell growth in tissue engineering constructs.

New initiatives during the year :

Project aimed at developing instrumentation for detection and diagnoses of sleep disorders were initiated. They would involve developing instrumentation for a home based device for screening of sleep disorders. This work would also include implementing wireless communication technology to reduce large number of wired connections currently used for carrying out polysomnography in a sleep laboratory.

Home based vital signs monitor for screening of sleep disorders

People suffering from sleep disorders are estimated to form 10% of the population and early detection and intervention of sleep disorders is of prime importance. Conventionally, sleep recording is carried out in a sleep laboratory, which requires expensive ploysomnography equipment, established infrastructure and trained technicians. About 22 different physiological parameters are recorded while the patients sleep in an unfamiliar environment of the sleep laboratory and mostly in an uncomfortable situation with many sensors and cables attached to the body, which in itself can adversely affect their sleep pattern. Therefore, it is appropriate and desirable to explore possibility of carrying out such recordings while patients sleep comfortably in their homes.

Heart Rate Variability (HRV) derived from ECG can provide adequate information about sleep stages whereas impedance pneumography (IPG) can record breathing to detect sleep apnoea. Thus, by combining HRV and IPG one can have a simple system for primary screening of sleep disorders. Efficiency of the detecting system could be further improved by monitoring oxygen saturation (SpO2). The proposed home based vital signs monitor will record IPG, ECG and SpO2. and will be worn by the patient while comfortably sleeping in home environment. The analysis of recorded data will indicate whether the patient needs further detailed polysomnographic examination. Thus,

such a home based monitor has a potential to be used as a population based screening device for sleep disorders.

Microbiology

Approximately 400 UTI rapid diagnostic kit with antibiotic sensitivity has been made and is undergoing shelf life evaluations.

Toxicology

The development of an In vitro pyrogen test kit for the evaluation of pyrogenicity using human whole blood is completed. This is an ELISA method for pyrogenicity assessment and will be suitable for evaluating wide spectrum of applications to measure the undetected non endotoxin pyrogens, such as pyrogens of any chemical or biological nature. Under validation process, different parameters expected to affect the process were evaluated. The validation process under different environmental conditions is yet to study.

Technology Transfer & Project Coordination

Technology Business Division

Technology Business Division interfaces between Institute and Industries for technology transfers and collaborative research activities. Customer Service Cell which is the contact point for all testing services for external and internal customers is a part of Technology Business Division.

Setting up of India's first MedTech RESEARCH PARK

In order to strengthen Industry Institute interactions and to create an innovation ecosystem for fostering medical device innovations in the country, the division took the first steps towards setting up of India's first medtech Research Park at Trivandrum.

The Institute submitted a concept proposal to the KSIDC which was accepted and land was allotted to set up the Institute's research park at the proposed KSIDC Lifesciences Park at Trivandrum.

The Institute is embarking upon the venture of setting up of MedTech Research Park of global standards with the larger goal of developing affordable medical devices for the country.

Industry Institute Interactions

An agreement for technical collaboration was signed with M/s Holmarc Optomechatronics pvt Ltd, Cochin on 4th April 2012 for design and development of electrospinning stations for tissue engineering applications

A tripartite MOU was signed on 20th June 2012 for developing affordable medical device intermediaries with M/s SIDD Lifesciences, Chennai and M/s Manali Petrochemicals, Chennai

An MOU was signed with Network of Excellence for Functional Biomaterials (NFB) at the National University of Ireland, Galway, Ireland for Collaborative research on mammalian derived scaffolds on 24th July 2012

An MOU was signed with M/s Infosys, Bangalore to explore collaboration in various areas of medical devices technology on 22nd Nov 2012

An MOU with M/s Biomodelling Solutions LLC, USA was facilitated on 27 Nov 2012 for collaborative research in sleep disorders

A project agreement was signed on 30th January 2013 with M/s SIDD Lifesciences Pvt ltd, Chennai for developing cardiopulmonary devices as part of SCTIMST-SIDD HUB

An MoU was signed with M/s Eris Lifesciences Pvt Ltd, Ahmedabad on 27th Feb 2013 for further development and transfer of know how of Oral Low Molecular Weight Heparin delivery system

The division also facilitated confidentiality agreements and Material transfer agreements as required by the various laboratories for facilitating inter-institutional research collaborations.

Training Programme for Industry

A customised training programme for Medical Device Engineers from L&T IES, Bangalore was organised on "Medical devices & Biomaterials" during 4-6 October 2012

Project Co-ordination

The division co-ordinated the application review and approval process of the TDF internal funded projects. The 13th internal Research conclave (RESCON) commenced with the first session held on 20th March 2013 under

chairmanship of Director was also co-ordinated by the division.

As part of the monitoring of technology development and technology transfer the following statutory committee meetings were co-ordinated during the year:

- The Technology Development Committee meeting was held on 16th May 2012.
- Internal Tech Transfer Committee meeting was held twice on 15th Nov 2012 and also on 18th March 2013.

Signing of an MoU with Infosys Ltd, Bangalore for collaboration in the area of Healthcare and Medical devices development. The MoU was signed by Dr. Radhakrishnan, Director, SCTIMST and Shri Deeshjith. V.G, Senior Vice President and Global Head, Lifesciences on 22nd Nov 2012 at Infosys headquaters, Bangalore. The MoU will facilitate long term partnership between SCTIMST and Infosys in various research & technology development activities, testing, training and other related areas in medical devices domain.

Signing of MoU on 27th Feb 2013 between Eris Life sciences Pvt Ltd, Ahmedabad and SCTIMST for R&D of oral delivery of Low Molecular Weight Heparin using nanoparticles

TESTING, QUALITY SYSTEM AND TECHNICAL SERVICES RELATED ACTIVITY

Calibration

During the period of 2012-13, CAC carried out 320 calibrations / validations of which 30 were for external calibrations for customers from healthcare industries, clinical laboratories, Research Institutions etc. Participated in two Inter laboratory Comparisons (ILC) with reference laboratories as part of routine quality assurance programs in Calibration Cell. Surface Profile measurements were carried out for 140 samples from external customers from healthcare industries and academic organizations. Completed NABL surveillance audit in mechanical and thermal calibration areas.

Calibration Cell also took up tow externally sponsored studies namely Validation of EO Sterilization System at TTK HCL Facility and Study of Temperature Measuring Instruments with sensors in Compaction System at TTK HCL Facility

Quality Cell

Activities of Quality Cell include the implementation, maintenance and improvement of management systems to assure that the facilities, equipment, personnel, methods, practices, records and its control are in conformance to the requirements of the standards.

Following were the major activities of the quality cell during the period from April 2012 to March 2013

a. COFRAC re-assessment was carried out from March 12th to March 14th 2013. (Annexure-1, List of Accredited Tests)

b. NABL Desktop Assessment

NABL Desktop assessment – data was sent to NABL for the assessment.

c. Training: Seven training programmes - "Introductory training for newcomers" were organised

d. Management review

- A Management Review Committee meeting was held on 27th June 2012. Management Review committee was reconstituted (Annexure-2).
- Two Technical Management Committee (Annexure-3) meetings were held on 11th June 2012 & 11th December 2012.

e. Internal Audits carried out:

- 14th – 23rd May 2012. Total of 31 Non-conformities reported.
- 19th – 29th November 2012. Total of 22 Non-conformities reported.

f. Document initiated/revised

The following were revised / issued during the period

(i) 2 system procedures of various laboratories.

(ii) Work Procedures: 72 Nos

(iii) Lab notebooks – 61 Nos

(iv) Registers & Logbooks – 109 Nos

(v) Corrective/ preventive actions/ Accident reports.

- A total of 41 CAR's were generated in this period by different laboratories
- Two preventive actions were raised this year.
- No accidents were reported during the period.

Testing services

Customer Service Cell - Testing & Evaluation Activity

The year 2012-13 witnessed more enquiries for testing of medical devices & biomaterials. The increase was higher for COFRAC accredited reports on biological tests as well as NABL accredited calibration reports.

The income from external testing increased marginally. External studies amounting to Rs 29.38 lakhs was carried out on the following studies:

- Pharmacokinetic evaluation of Sirolimus eluting stent
- Preliminary evaluation of non invasive cardiac monitor
- Biological, structural and stability studies on fabric material used for rotary cuff repair device
- Biofunctional and pharmacokinetic evaluation of DES
- 90 day sub-chronic toxicity by intraperitoneal implantation of Coated Copper T device in wistar rats
- In vivo genotoxicity test – chromosomal aberration & micronucleus
- Study on temperature measuring instruments with sensors in compaction system
- Validation of ETO sterilization system

Description	External			Internal		
	2010-11	2011-12	2012-13	2010-11	2011-12	2012-13
Work orders	718	672	585	304	335	438
No. of test materials handled	3278	2097	1879	1144	997	1968
Income (Rs)	**44,32,572**	**34,40,861**	**39,68,395**	**21,36,875**	**22,80,480**	**12,18,131**

Open house & Customer meet on Testing Services- An Open House and Customer Meet for Testing Services was organised on 16th Feb 2013 by the customer service cell along with all testing laboratories. The "Guide to Testing Services" was released at the meet. This event which was attended by various customers from all over India, consisted of lectures and laboratory visits, facilitated good

interaction between the customers and testing labs. There was strong feedback that the event should be expanded and held more frequently.

Summary of testing services offered by various laboratories

Dental Products

As part of the routine activities, the lab extended the testing facilities to both internal and external customers. We could record 21 Raman spectra, 125 FT-IR spectra and 81 micro CT samples during the year over and above our own samples. Over above this, mechanical property evaluation using UTM, sorption studies, Vickers hardness measurements, thermocycling studies etc were carried out on a routine basis for customers.

Division of In vivo Models & Tesing

The division provided a platform for preclinical animal evaluation of medical devices for in-house developed medical devices as well as the ones submitted by the industry. The following are the preclinical studies done in this division.

1. Preclinical evaluation of fluoro-passivated and hydrogel sealed vascular graft in pig model.
2. Preclinical evaluation of decellularised bovine pericardium as dura substitute in rabbit model.
3. Preclinical evaluation of a newly developed dental material by pulp and dentine usage test in dog model.
4. Pharmacokinetic evaluation of MIV Therapeutics drug eluting coronary stent in porcine coronary artery model.
5. Preliminary evaluation of non-invasive cardiac monitor

Experimental Pathology

Continued to offer histotechnology and histopathology services to researchers within and outside the campus as usual

Implant Biology

1.a. Histopathology Laboratory

The laboratory is unique in the country as a histopathology laboratory having facilities to undertake routine as well as a wide range of specialized techniques for evaluation of biocompatibility of various materials as per International standards and pre-clinical evaluation of medical devices as per approved protocols. The laboratory is well equipped for evaluation in soft and hard undecalcified tissues, with and without materials. Technical staffs are skilled in carrying out specialized techniques in histopathology. The laboratory has been accredited by Le Comite Francais d'accretation (COFRAC) of France for its Quality System based on ISO/IEC 10725 and follows the Institute Quality System. The laboratory received a record number of samples for evaluation of biocompatibility as per ISO 10993-6 and large study based requests for evaluation in pre-clinical studies from both Indian Industry and research groups and International research groups. These included studies on bare and drug coated stents, mechanical heart valves, small and large diameter vascular graft and surface modified bone implants. Student based studies from National Institutes and histopathological studies on cartilage constructs, decellularised tissue as aortic patches, dura substitutes and corneal substitutes were also carried out.

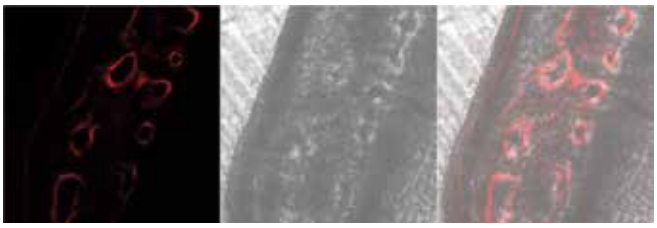


Figure 1 Fluorescence image of new bone formation with Haversian system. Alizarin red vital stain

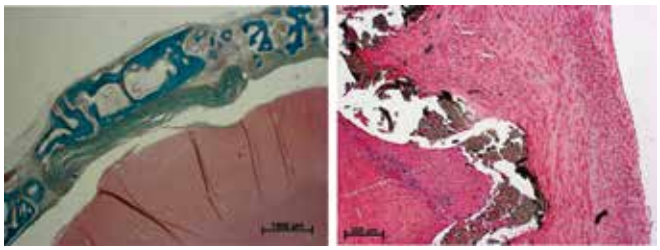


Figure 2 Dura substitute in a rabbit skull. Masson's Trichrome stain.
Figure 3 Large diameter vascular graft with neointima. H&E stain.

1.b. Tissue Culture Laboratory

Tissue culture laboratory continued maintenance of Quality system based on ISO17025 and COFRAC continued accreditation status of In vitro cytotoxicity tests after auditing the lab. Different cytotoxicity tests and other cell culture studies were imparted to internal as well as external customers based on requests.

New test methods such as Unscheduled DNA repair assay and nanoparticle uptake study were introduced.

1.c. Transmission Electron Microscopy Laboratory

The laboratory has Transmission Electron Microscopy facility (Hitachi H-7650) for ultra-structural analysis of samples varying from animal and plant tissues to cells to nanoparticles (morphology, size and distribution). The facility is extended to researchers (Internal and External) on a charge basis.

1.c.i.Biological Samples – Preparation of samples such as cells, tissues, bacteria etc. (fixation, embedding, ultra thin sectioning (50-70nm), heavy metal staining and photography (Figure 4 1.a and 1.b) for evaluation under Transmission Electron Microscope (TEM).

1.c.ii.Inorganic samples – Drop casting of samples like ceramic powders, lipid droplets, nanoparticles etc. for analysis under TEM.

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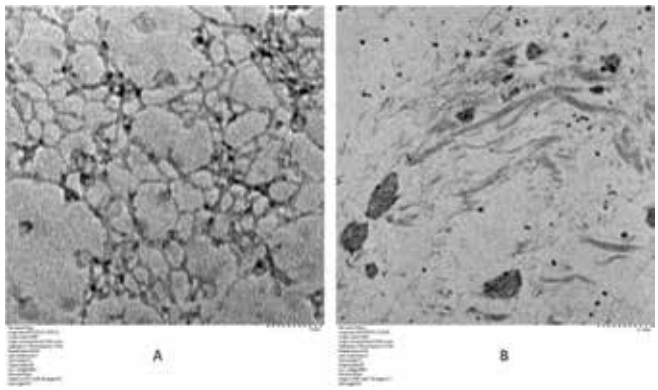


Figure 4 Transmission Electron Micrograph of (A) Nanocellulose fibers (B) Porcine Nucleus Pulposus (NP) cells with rounded morphology embedded in the extra cellular matrix depicting distinct banding pattern of collagen fibers.

Laboratory for polymer Analysis

The laboratory extended its analytical services to analyze materials submitted by external and internal customers. The analytical equipments include of FTIR, HPLC, GPC, TGA, DTA, DSC, LC/MS/MS, GC and UV-Vis spectrophotometer. Annually, the lab analyzes several hundreds of samples using these equipments. Its analytical services is strictly adhered to the quality policy of the Institute. The laboratory generated a reasonable amount as revenue by extending its analytical services to external customers.

Microbiology

The Division of Microbiology at BMT Wing has three areas of activity testing, research and Teaching.

Testing is done as per International standards. We are accredited by Cofrac of France as per ISO 17025 for testing and calibration laboratories. Both accredited and non- accredited tests are done. Sentinel pathogen (bacterial, fungal & viral) surveillance in small experimental animal colonies is done for a wide range of bacterial, fungal and viral pathogens in small experimental animals by microbiological culture method and by PCR. The List of tests offered by the Division and the number of tests performed in 2012 are listed below.

List of tests performed in 2012.

Sl No	NAME OF TEST	Number of requests [number of samples]
Accredited test		
	Sterility Test	37 (47)
	Invitro genotoxicity assay- the bacterial reverse mutation (AMES) Assay	5(5)
Test in support of accredited facilities		
	Microbiological monitoring of air	53 (136)
	Water Analysis	33(89)
	Sentinel screening for pathogens in small experimental animals.	22(22)
Non - accredited tests		
	Spore Viability Test	7 (7)
	Bioburden Analysis	3(4)
	Anti- microbial activity testing	7 (18)
	Culture/ Staining	61 (115)
	Growth Promotion Study in Media Validation	6(15)

Polymer Processing

About 41 work orders and 151 samples were received from external customers for mechanical and/or dynamic mechanical testing. All samples were tested within the stipulated time and test reports were issued.

Thrombosis Research Unit

Testing of biomaterials and devices for hemocompatibility, remained as a major activity of the division. Devices tested included coronary stent and blood/component storage bags. Report on stent evaluation is used by the manufacturer for regulatory approval and report on component bags is used either for regulatory clearance or as QC for marketing. In-line filters were also evaluated for leuko reduction for which a novel test was standardized using a special reagent from BD Science (USA) and accurate estimation of leukocytes was estimated using flow cytometry. Nearly 100 samples were analyzed for leukocount, before and after filtration for an Industry which develop and manufacture leukofilter. A new biochemical test was validated for evaluation of RBC for oxygen association/dissociation capability in stored blood and data was audited by COFRAC for accreditation of test. It is observed that demand for hemocompatibility testing of biomaterials and devices is increasing each year. All effort is made at TRU to meet customer satisfaction, and support the device manufacturing industries.

Toxicology

Toxicology division is a premier laboratory in the country in the field of biomaterial toxicology, and has a full-fledged facility for the pre-clinical safety and toxicity evaluation of various materials and medical devices as per International Standards such as ISO, USP and ASTM. The main aim of the division is the toxicity evaluation of materials, medical devices, tissue engineered products intended for the fabrication of medical devices and nanomaterial to investigate the potential biological hazards by careful observation for unexpected adverse reactions or events in humans during clinical use of the medical device

Following are the summary of routine toxicity/biocompatibility testing of materials done during last one year

Toxicity testing

No	Name of test	No of samples
Accredited tests		
1	Closed patch test for delayed hypersensitivity	6
2	Maximization test for delayed hypersensitivity	13
3	Intracutaneous Test	22
4	Acute systemic toxicity test	30
5	Test for local effects after Implantation in muscle	24

6	Pyrogen Test	03
7	Vaginal irritation Test	0
8	Penile irritation	0
9	In vivo Mammalian chromosomal Aberration test	1
10	In vivo Mammalian erythrocyte micronucleus test	1
12	Test for local effects after implantation in subcutaneous tissue	--
13	Bone Implantation	4
14	Animal skin irritation Test	3
15	Haemolysis	2
16	Sub chronic toxicity	1
17	Acute oral toxicity	1

Completed & Ongoing GLP Studies		
No	Title	Sponsor
1	90 day sub-chronic toxicity by intraperitoneal implantation of degradable Polycaprolactone (PCL) based scaffold in wistar rats	Dr. V. Kalliyana Krishnan, DPL, BMT Wing, SCTIMST
2	Evaluation of Chronic toxicity (12 months) by intraperitoneal implantation of degradable Polycaprolactone (PCL) based scaffold in wistar rats	completed
3	Evaluation of long term biocompatibity of degradable Polycaprolactone (PCL) based	
4	scaffold in albino rabbits (ongoing) Chromosomal aberration study of physiological Saline extract of ECSIL	Aortech Biomaterials Pvt Ltd, Australia
5	Chromosomal aberration study of ethanol-saline extract of ECSIL	Completed
6	Micronucleus study of physiological Saline extract of ECSIL	
7	Micronucleus study of ethanol: Saline extract of ECSIL	
8	Mammalian erythrocyte Micronucleus test	Dr. Vinay Agarwal
9	of UHMWPE Mammalian Bone marrow chromosome aberration UHMWPE	Completed

COLLABORATIVE WORK	
Brain Implantation (ICMR)	13 rats
Dermal Toxicity (DST 8043)	50 Rats
WATER ANALYSIS	
Physico Chemical Analysis of Potable Water for various Divisions	34 Samples.

Quality system improvement activities

Year	Activities
2012	Actively participated in the quality system improvement activities • 40 Work procedures revised • 01 Corrective actions report generated and implemented. • 14 Corrective actions implemented.

Technical Services

Division of Laboratory Animal Science

DLAS registered under the CPCSEA guidelines supplies quality laboratory animals that are cared and managed in the Laboratory on the platform of ISO 17025 to aid Testing & Research activities. Periodic quality assurance and compliance to ISO 10993 Part II guidelines is assured for the year at this facility.

- Breeding, Welfare, Care and Management of Rats, mice, rabbits and Guinea Pigs remains the prime area of concern.
- Health monitoring of small laboratory rodents and rabbits is improved by the introduction of a sentinel animal plan.
- Prepared and established a procedure for microbiological and pathological assessment for health in laboratory animals and norms for sampling for the same.
- Animal health was ascertained with a third party evaluation (reliance Life Sciences, Navi Mumbai) with ELISA in a tailor made panel of etiological agents.
- Addition and updating of FELASA based parasitological screening panel.
- Increased the supply of animals for testing and research with Rabbits = 230, GP =306, Mice= 809, Rat= 732 when compared with previous year figures of Rabbits = 186, GP =255, Mice 424, Rat= 148 from the same floor space available.

Precision Fabrication facility

This Division facilitates Technical services in Designing and Fabricating Jigs & Fixtures, mould making, prototype component machining activities using conventional and CNC machines. From Precision Fabrication Facility, nearly 80 work orders were executed during the year 2012-13 related to fabrication, machining of test setups and prototypes for the various projects and for other department al R&D activities.

The important technical service activities carried out are:-

1. Completed the designing machining of tray arrangement for holding 1 to 4 bioreactor components to DTERT Lab.

2. Completed the machining of Two types of Teflon mould for preparing test samples to DPL lab.

3. Completed the designing machining of four sets of stainless Steel split mould for preparing bone cement to cylindrical shape of size 6mm dia x 12mm length.

4. Completed the designing and machining of 2nos. Teflon mould to DPL lab for sample preparation

5. Completed the designing and fabrication of Ceramic Holding fixture to TEM Lab for cell culture purpose.

6. Completed the machining of four sets of Chamber module for the DTERT lab Bio reactor Project.

7. Completed the machining of two sets of Blood pump Case top, case bottom and the side connectors for MPL.

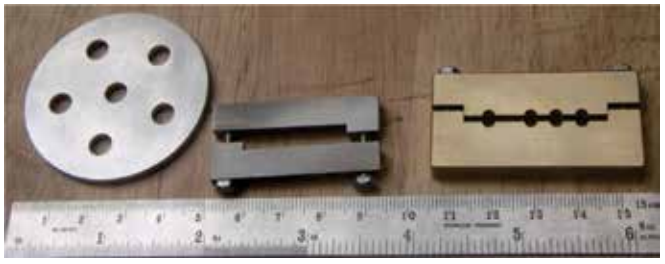
8. Completed the machining of angle measuring sine table for Mandibular Advancement Device project of POP.

9. Completed the machining of Stainless Steel mould to DTERT lab for a M.Tech student project work

10. Completed the machining of 8 nos. of bioreactor module components to DTL lab.

11. Completed the machining of 8 nos. of S.S. Pivots and Delrin Top Bearings for Blood Pump Project of MPL.

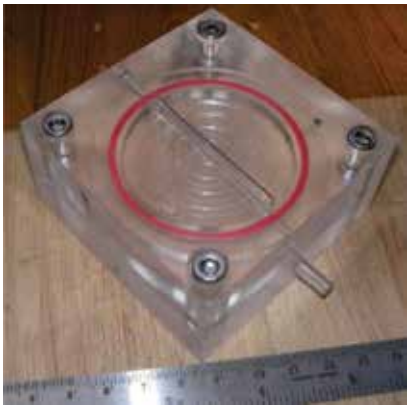
12. Completed the machining of three sets of mould for preparing flexural strength, diameteral strength and compressive strength test specimen of dental materials to DPL.



13. Completed the machining of 2 nos. of Blood Pump Case Bottom components for MPL.

14. Completed the machining of Mandibular Advancement Device Model in CNC milling machine for the MAD Project of POP lab.

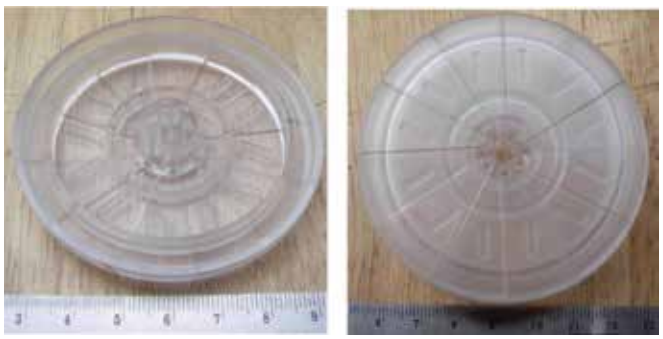
15. Completed the designing and machining of blood filter assembly for POP lab to study the leukocyte depletion.



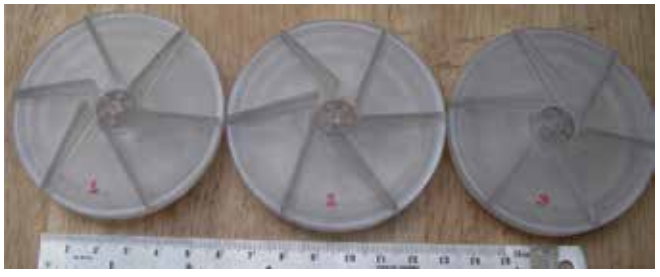
16. Completed the machining of S.S. single cavity "Subdural Electrodes" mould to INL lab.

17. Completed the machining of a Jig for coating standardization of coronary stent to DTL lab.

18. Completed the machining of 3 nos. of Polycarbonate impeller Bottom component for Blood Pump Project of MPL lab.



19. Completed the machining of 3 nos. of polycarbonate impeller Top component for Blood Pump Project of MPL lab.



20. Completed the machining of 6 nos. of Acrylic Case Bottom component for Blood pump project of MPL lab.

21. Completed the machining of two sets of Stainless steel mould to Polymer Division.

22. Completed the machining of 100nos. of Titanium blanks to CCF lab using wire cut EDM machine for conducting DLC & TiN coating trails.
23. Completed the machining of two sets of Bioreactor components to DTL lab.
24. Completed the machining of 'Extrusion Rheometry Attachment' to conduct extension studies on bone cements to BCL lab.
25. Completed the machining of one set of test fixture to TEM lab for conducting the bone compression test.
26. Completed the wire cut machining of 60 nos. of Titanium blanks to CCF Lab for laser coating of size 20 x 15 mm from the supplied Ti sheet
27. Completed the machining of test fixture for conducting the fracture resistance of teeth using Instron machine for MDS student's work.
28. Completed the machining of 20 nos. of sintered Polypropylene Porous Chamber to DTERT lab.
29. Completed the machining of 4 sets of compliance chamber for Bio reactor project to DTL lab.
30. Completed the machining 50nos. of Haynes blanks to size 25mm x 10mm x1mm using wire cut EDM.
31. Completed the machining of 40mm diameter SS Punch to POP lab.
32. Completed the machining of one set of bioreactor chamber(for Cartilage and bone TE) to DTL
33. Completed the machining of 100 nos. of 25 mm x2mm thick Stainless Steel blanks to CCF lab for conducting Coating trails.

INTELLECTUAL PROPERTY RIGHTS CELL

All Intellectual Property Rights related activity of the institute is coordinated by this cell. Activities of Intellectual Property Rights Cell include giving assistance for drafting the specifications, submitting the application for Indian Patent, liaison between the attorney and the inventors, maintenance of patents and design registrations, protection of intellectual property developed and updating the information on patent publications.

Patent granted during this financial year: 4

Granted Patents (Indian)

	Application number	Date of Filing	Patent number	Date of Grant	Title of invention	Inventors
1	130/MAS/2000	21/02/2000	253557	31/07/2012	A method of obtaining biomaterials coated in fibrin adhesive.	Lissy Kalliyana Krishnan
2	483/MAS/2000	26/06/2000	191730	21/08/2012	A method for producing a crosslinkable non-aromatic polyurethane potting compound	Muthu Jayabalan, Pampadikandathil Philip Lizy Mol
3	335/MAS/2000	04/05/2000	191945	21/08/2012	A process for the preparation of heparin immobilized pericardium	Chandra Prakash Sharma, Leister Rowsen Moses
4	1586/MAS/1996	11/09/1996	191410	21/08/2012	A process for the preparation of polyvinyl alcohol alginate composite matrix	Kunnatheri Sreenivasan, Kothanda Raman Rethinam, Rajagopalan Sivakumar

Number of fresh Patent applications submitted is 16 with details as follows

Sl. no	Application No	Date of Filing	Title of invention	Inventors
	1361/Che/2012	04/04/2012	Vascular graft sealed with biodegradable hydrogel	Roy Joseph, Chirathodi Vylappil Muraleedharan, Adathala Rajeev
	1362/Che/2012	04/04/2012	A vascular graft sealed with biodegradable hydrogel and passivated by fluropolymer coating	Roy Joseph, Chirathodi Vylappil Muraleedharan
	1514/Che/2012	16/4/2012	A process for the preparation of low Dimensional calcium sulphate crystals	Manoj Komath, Sureshbabu Sivadasan. Parimanathu Kovilakom Rama Varma Hari Krishna Varma
	1567/Che/2012	20/4/2012	Method of preparation of urease and gold Quantum cluster mediated nanobiosensor for the Detection of blood urea and the process involved	Ramapurath Sarojini Amma Jayasree Ayyappanpillai Ajayaghosh Lakshmi Vijayan Nair
	2002/Che/2012	21/05/2012	A composite for preparing radiation shielding materials	Roy Joseph, Kiran Skumaran

	2448/Che/2012	20/06/2012	A bioactive important for the closing and repair of bone defects.	Hariharan Venkat Easwer Girish Menon Ramachandran Jayanand Sudhir Bhanu Narayanan Nair Suresh Nair Krishna Kumar Kesavapisharady Gayathri Viswanathan Mathew Abraham Chittoor Viswanathan Gopalakrishnan George Chandy Vilanilam Venkatesan Ramesh Babu Sekharapillai Vijayan Parimanathu Kovilakom Rama Varma Hari Krishna Varma
	3172/Che/2012	02/08/2012	A process for making titanium bone implants with biocompatible and nanoporous surface structure	Rajesh Palangadan, Manoj Komath, Parimanathu Kovilakom Rama Varma Hari Krishna Varma
	4292/Che/2012	15/10/2012	A process for making diamond like carbon coating to prevent metal ion elution from the surfaces of medical devices	Manoj Komath Chirathodi Vylappil Muraleedharan Gobichettipalayam Subbratnam Bhuvaneshwar
	4529/Che/2012	30/10/2012	Single step method for covalently linking heparin to decellularised tissue	Payanam Ramachandra Umashankar Prem Mohan Mohana Chandran
	4822/Che/2012	19/11/2012	A process for making flexible and adherent diamond like carbon coating on vascular stents and stent like devices to prevent metal ion elution	Manoj Komath Chirathodi Vylappil Muraleedharan Gobichettipalayam Subbratnam Bhuvaneshwar
	106/Che/2013	07/01/2013	Drug oligomer based nanoparticles with Fast degrading properties	Kaladhar Kamalasanan, Radhika Raveendran, Pradeepkumar Soman Pillai Sarojini Amma, Akhandanandan Maya Nandkumar, Chandra Prakash Sharma
	608/Che/2013	13/3/2013	Ceramic particles with fast and tunable degradation properties for antibacterial Applications	Kaladhar Kamalasanan, Jayalakshmi Appukuttan Nair Chandra Kumari Amma Pradeepkumar Soman Pillai Sarojini Amma, Sekharapillai Vijayan, Parimanathu Kovilakom Rama Varma Hari Krishna Varma, Akhandanandan Maya Nandkumar Chandra Prakash Sharma
			Fibrin wafer/disc as a biological carrier for sustained delivery of curcumin	Lissy Kalliyana Krishnan Lakshmi Sreedharan Pillai

			Development of soluble albuminated curcumin for application in cancer therapy	Lissy Kalliyana Krishnan Christina Thomas
			Polymer-siloxane hybrid scaffold for tissue engineering applications and process there of	Prabha Damodaran Nair Bindu Presannakumaran Nair Neethu Mohan
			Catheter assisted therapeutic delivery device	Kaladhar Kamalasanan, Ramshekhar Narayanan Menon Sachin Jayachandra Shenoy Renuka Rajamma Nair Chandra Prakash Sharma

Total No: of granted patent of the Institute as on 21/03/2013 is 92

CONFERENCES, SEMINARS & WORKSHOPS ORGANIZED

Title of event and Theme	Date and Venue	Organisers/ co organisers
Bi Annual Training Programme in Handling of Small Laboratory Animals	Division of Laboratory Animal Science December 10th to 16th 2012	Faculty from The Division- Dr.Annie John, Dr.V.S.Harikrishnan, Sarath kumar R.S, Pradeep Kumar.B, Manoj.M, Sunil Kumar.M
Applications of Flow Cytometry in Basic Research and Clinical Diagnosis	May 7-10, 2012 BMT Wing, SCTIMT and RCC Trivandrum	SCTIMST (TIC, TRU), RCC and The Cytometry Society
Workshop on "Applications of Flow Cytometry in Basic Research"	July 5-8, 2012 BMT Wing, SCTIMST and RCC Trivandrum	SCTIMST (TIC, TRU)
Basics in Flow Cytometry	May 7-10, 2012	Joint training program was organized by TCS, India, RCC, Trivandrum and SCTIMST. Trivandrum
Basics in Flow Cytometry & Confocal Microscopy	July 4-7, 2013	Flow Cytometry by TCS, India, and SCTIMST Trivandrum
INDO-DANISH Seminar PROGRAMME	November 5-7, 2012 at InStem Bangalore	Dr Prabha D. Nair, Prof Jyotsna Dhawan, InStem, Prof Moustapha Kassem of Odense Unversity Denmark
Medical Equipment Safety Workshop Series – 2013	10 Institutions across India	Dr Niranjan, Professor Alan Murray, University of Newcastle, UK

STAFF DETAILS
Administration

Dr. Chandra P. Sharma, FBSE
Acting Head, BMT Wing

Mr. Muraleedharan C.V.
Associate Head

Mr. Mahadevan.R
Chief Accounts Officer

Ms. Vasantha Kumari.D.
Asst. Accounts Officer-C

Ms. Santhakumari.T
Asst. Purchase & Store Officer-A

Ms. Seethamoni .K.P.
Asst. Purchase & Store Officer-A

Mr. Anilkumar B.S.
Security & Safety Officer-B

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Mr. C.V. Muraleedharan, M.Tech.
Engineer G & Scientist In Charge, Device Testing lab

Mr. D. S. Nagesh, M.Tech.
Engineer G & Scientist In Charge, M
odelling & Prototyping lab
Mr. V. Vinod Kumar, M.Tech.
Engineer D

Mr. Sujesh Sreedharan, ME
Engineer D

Mr. V. Arun Anirudhan, M.Tech.
Engineer C

Mr. M. K. Sajithlal, M.S
Engineer C

Mr. G. Ranjith, B.Tech.
Engineer C

Mr A Rajeev, M.Tech
Technical Assistant-B

Ms Sreedevi V, Dip. Engg
Technical Assistant-A (Instruments)

BIOCERAMICS AND SEM LABORATORY

Dr. P. R. Harikrishna Varma, PhD
Scientist F & Scientist In Charge

Dr. Manoj Komath, PhD
Scientist E

Mr. R. Sreekumar, BSc
Junior Scientific Officer

Mr. S. Vijayan, MSc
Scientific Officer

Mr.S.Suresh Babu, M.Sc
Jr. Scientific Officer (Instruments)

Mr K.V. Nishad, M.Sc
Technical Assistant (Instruments)-A

Biophotonics and Imaging Laboratory

Dr R.S. Jayasree, PhD
Scientist D & Scientist In Charge

Biosurface Technology Division

Dr. Chandra P. Sharma, MTech, MS, DSc,MEBE,FBSE
Senior Scientist G & Scientist In Charge

Dr. M. R. Rekha, PhD
Scientist D

Mr. Willi Paul, MSc
Scientific Officer (Instruments)

CALIBRATION CELL

Mr. C. V. Muraleedharan, M.Tech
Engineer G & Scientist In Charge

Mrs. Leena Joseph, B.Tech
Engineer D

Mr Armugham V, Dip. Elec. Engg.
Scientific Assistant (Instruments)

Mr Rajesh R.P, B.Tech
Scientific Assistant (Instruments)

DENTAL PRODUCTS LABORATORY

Dr. V. Kalliyana Krishnan, PhD
Senior Scientist G & Scientist In Charge

Dr. P. P. Lizymol, PhD
Scientist D

Mr. R.Satheesh, MSc,MPhil
Technical Assistant (Instruments)-A

DIVISION OF IN-VIVO MODELS AND TESTING
Dr. P. R. Umashankar, MVSc, PhD
Scientist E & Scientist In Charge

Dr. Sachin J. Shenoy, MVSc
Scientist D

Ms. P.Smitha, Dip(Elect Eng), Dip (OTT)
Technical Assistant (Anaesthesia)-A

Mr. Prem Mohan M, B.Sc, MLT
Technical Assistant (Lab)-A

Division of Laboratory Animal Science
Dr. Annie John, PhD
Scientist F & Scientist In Charge

Dr. Harikrishnan V. S, BVSc & AH
Scientist C

Ms. Sreeja.K.R, BSc MLT
Technical Assistant -A

ENGINEERING SERVICES
Mr. O. S. Neelakantan Nair, BSc (Engg.)
Sr. Engineer G & Scientist In Charge

Mr. K Rajan, Dip. Elect. Engg.
Jr. Engineer(Instrumentation)-B

Mr. K. R. Asokakumar, Dip. Civil Engg.
Jr. Engineer (Water & Sewerage)-A

Mr. Binu.C.P, Dip.Mech. Engg.
Jr. Engineer (Incinerator & AC)

IMPLANT BIOLOGY
Dr. Mira Mohanty, MD (Pathology)
Senior Scientist G, Head, Division of Implant Biology & SIC

Histopathology Laboratory
Dr. T. V. Kumary, PhD
Scientist G & SIC Tissue Culture Laboratory
Dr. Annie John, PhD
Scientist F & SIC Transmission Electron Microscopy Lab

Dr. A. Sabareeswaran, MVSc
Scientist D

Dr. P. R. Anil Kumar, PhD
Scientist C

Mrs. Sulekha Baby, BSc, MLT
Scientific Officer (Lab)

Mrs. Usha Vasudev, BSc, MLT
Scientific Officer (Lab)

Mr. Joseph Sebastian, BSc MLT
Technical Assistant - A

Ms. Deepa K Raj, M.Sc. D.MLT
Technical Assistant – A

Mr. Vinod D, B.Sc. MLT
Technical Assistant – A

INSTRUMENTATION LABORATORY
Dr. Niranjan D. Khambete, MTech, PhD
Engineer F & Scientist In Charge

Intellectual Property Rights Cell
Mr. D. S. Nagesh, M.Tech
Engineer G & Scientist In Charge

Mr.Rajkrishna Rajan,B.E,MBA
Engineer C

Division of Microbiology
Dr. A. Maya Nandkumar, PhD
Scientist F & Scientist In Charge

Mr. Pradeep Kumar SS, BSc, BSc MLT
Sr. Technical Assistant (Lab)

Laboratory for Confocal Microscopy and Experimental Pathology

Dr. T. V. Anil Kumar, MVSc, MSc, PhD
Scientist E & Scientist in charge

Mr. Thulaseedharan N K, BSc (MLT)
Jr. Technical Officer (Lab)

MOLECULAR MEDICINE LABORATORY
Dr. Anoopkumar Thekkuveettil, PhD
Scientist F & Scientist In Charge
Mr. Jose Jacob, BSc
Jr. Technical Officer (Instruments)

POLYMER ANALYSIS
Dr. K. Sreenivasan, PhD
Scientist G & Scientist In Charge

Mr. P. R. Hari, BSc, AIE
Scientific Officer (Lab)

Dr. C. Radhakumari, PhD
Jr. Scientific Officer (Instruments)

POLYMER DIVISION
Dr. M. Jayabalan, PhD, D.Sc
Scientist G & Scientist In Charge

Polymer Processing Laboratory
Dr. Roy Joseph, M.Tech., Ph.D.
Scientist F & joint in-charge

Dr. P. Ramesh, M.Tech., Ph.D.
Scientist F & joint in-charge

Dr. M. C. Sunny, PhD
Scientific Officer

PRECISION FABRICATION FACILITY
Mr. V. Ramesh Babu, M.Tech
Engineer F & Scientist In Charge

Mr. S.Rajalingam, Dip. Mech.Engg
Jr. Technical Officer-A

QUALITY CELL
Mr. D. S. Nagesh, M.Tech
Scientist G, Quality Manager

Dr. P. Ramesh, PhD
Scientist F

Mr S L Sreekanth, B.Tech
Technical Assistant-B

TECHNOLOGY BUSINESS DIVISION
Mr. S. Balram, M.Tech
Scientist F & Scientist In Charge

Ms. Sandhya.C.G, B.Tech,MBA
Engineer C

Ms. Asha Rani V, MSc
Technical Assistant (Instruments)-A

Technical Co-ordination Cell
Mr. D. Ranjit, BE
Scientist F & Scientist In Charge

TECHNOLOGY PROVING FACILITY
Mr. D. S. Nagesh, M. Tech
Engineer G

TISSUE ENGINEERING AND REGENERATIVE TECHNOLOGIES
Dr. Prabha D. Nair, PhD
Scientist G & Scientist In Charge

THROMBOSIS RESEARCH UNIT

Dr. Lissy K. Krishnan, MSc, PhD
Scientist G & Scientist In Charge

Dr. Anugya Bhatt, MSc, PhD
Scientist C

Ms. Mary Vasantha Bai, BSc,DMLT
Scientific Officer (Lab)

Ms. Priyanka A, B.Sc.MLT
Technical Assistant A

Mr.Ranjith S, B.Sc MLT
Technical Assistant A

TOXICOLOGY
Dr. P. V. Mohanan, MSc, PhD
Scientist F & Scientist In Charge

Ms. Geetha. C. S, MSc, M.Phil
Jr. Scientific Officer

Ms. Remya. NS, MSc MLT
Technical Assistant A

ACHUTHA MENON CENTRE FOR HEALTH SCIENCE STUDIES

Mission

- To train highly competent and socially committed public health professionals.
- To advocate for policies that promote equity in health
- To undertake quality research on priority health issues of the country
- To offer consultancy service to national and international agencies

Vision

- Be a Global Leader in Health Science Studies by 2020

From the Head of AMCHSS

The year 2012-13 was a very productive year for the Achutha Menon Centre for Health Science Studies (AMCHSS). The 10 core faculty members of the AMCHSS published 32 peer reviewed journal articles with a mean impact factor of 3.18. In addition, one book on Survey Research in Public Health (PHI Learning Pvt Ltd New Delhi), one book chapter on Chronic Diseases in India (Oxford University Press) and three monographs on relevant public health topics were also published. The Achutha Menon Centre Positive Mental Health Scale and the Achutha Menon Centre Diabetes Risk Score were published in Asia Pacific Public Health Journal. All the 14 MPH dissertations of the 2010-11 batch were internally peer reviewed and uploaded as working papers in our Institute website.

Two of our faculty members completed their advanced one year training in Infectious Diseases and Environmental health at the London School of Hygiene and Tropical Medicine under one of the externally funded projects.

A Systematic Review of Best Practices in Family Planning in Developing Countries was undertaken as a consultancy from the Population Foundation of India. Another consultancy on the "Rapid assessment of the scheme for promotion of menstrual hygiene in Kerala" was undertaken for the National Health Systems Resource Centre, New Delhi.

A major research project titled "Improving the Control of Hypertension in Rural India (CHIRI): Overcoming barriers to diagnosis and effective treatment" has been approved for funding by the Global Alliance for chronic disease.

Sri C Achutha Menon Centenary Seminar was organized on the theme of "Universal Health Care: from aspiration to reality". Dr. D. Babu Paul, former Chief Secretary, Government of Kerala, presided and Dr. K. Mohandas, Vice Chancellor, Kerala University of Health Sciences, inaugurated the seminar. Prof. A Vaidyanathan, Prof. Imrana Qadeer, Dr T. Sundararaman, Dr. K P Aravindan and Prof B Ekbal spoke on various aspects of the seminar theme. Sri Rajeev Sadanandan Principal Secretary, Department of Health and Family Welfare, Government of Kerala, moderated the seminar.

World Health Day was observed on the theme "Aging and Health" jointly by the Public Health Students forum of AMCHSS, Kerala Institute of Local Administration and the Kerala Social Service

Society on April 07, 2012. World No Tobacco Day was jointly organized by the AMCHSS, Government of Kerala, and various NGOs working in the field of tobacco control on May 31, 2012.

Dr. P. Manickam, the first PhD student from the National Institute of Epidemiology (NIE) affiliated to SCTIMST graduated in the reporting year. Twelve MPH students and four DPH students completed their respective programs from our institute. Fourteen MPH and six MAE (Master of Applied Epidemiology) students completed their respective programs from the NIE. Five MPH students graduated from CMC Vellore affiliated to SCTIMST.

K.R. Thankappan

Achutha Menon Centre for Health Science Studies

The year 2012-13 was a very productive year for the Achutha Menon Centre for Health Science Studies (AMCHSS) particularly with regard to publications. The 10 core faculty members of the AMCHSS published 32 peer reviewed journal articles with an average of 3.2 articles per faculty with a mean impact factor of 3.18. In addition, one book on Survey Research in Public Health (PHI Learning Pvt Ltd New Delhi) along with a few other authors, one book chapter on Chronic Diseases in India (Oxford University Press) with a few other authors, three monographs; "Access to safe abortion services in Tamil Nadu, Universal Access to Safe Abortion services in India and Malaria and Pregnancy in India" were also published. The major publication was on the country actions to meet UN commitments on Non Communicable Diseases (NCDs) by the Lancet NCD Action Group published in the Lancet by a group of authors including one faculty from AMCHSS. The article suggests major strategies for the UN member countries to achieve the goal of a 25% reduction in relative mortality from NCDs by 2025 (the 25 by 25 goal). The Achutha Menon Centre Positive Mental Health Scale and Achutha Menon Centre Diabetes Risk Score were developed and published in the Asia Pacific Journal of Public Health. All the 14 MPH dissertations of the 2010-11 batch were internally peer reviewed and uploaded as working papers in the Institute website. In addition one of the PhD students published a single author paper in BMC Public Health.

One of the completed projects was the "Partnership for Better Health" supported by the European Commission through the Bangladesh Rural Advancement Committee (BRAC) School of Public Health. The major objective of this project was to build capacity in two Asian Schools of Public health with the support from three European Schools of Public Health. Two of our faculty members (Dr. Biju Soman and Dr. Manju R Nair) completed their advanced one year training in Infectious Diseases and Environmental Health respectively at the London School of Hygiene and Tropical Medicine under this project. They are now gradually taking over the teaching of the respective courses from the visiting faculty members. The MPH student Manual was developed using the resources of this project.

Another research project completed during this year was "Prevalence of type II diabetes in a rural community: identification of the contributing economic and socio-cultural factors". The major outcome of this qualitative study was that changes in household consumption and changes in the living and working environment interact to enhance the risk of type 2 diabetes and other non-communicable diseases within any community.

A Systematic Review of Best Practices in Family Planning in Developing Countries was undertaken as a consultancy from the Population Foundation of India. The major recommendation of this review based on available literature was in the direction of the following promising strategies/combination of strategies that included delaying age at marriage, delaying early pregnancy, promoting spacing between births and improving quality of family planning services. A consultancy on the "Rapid assessment of the scheme for promotion of menstrual hygiene in Kerala" was offered by the National Health Systems Resource Centre, New Delhi. The major finding of this consultation was that there were no major issues with regard to the implementation of this program in the state. This was attributed to the high level of awareness, social acceptance and use of sanitary pads that already exists in the state.

A new research project was funded by the Kerala Government Health Department for the surveillance of jaundice in the state. Another research project titled "Improving the Control of Hypertension in Rural India (CHIRI): Overcoming barriers to diagnosis and effective treatment" has been approved for funding by the Global Alliance for chronic disease (GACD) through the Monash University, Australia. This project will be implemented in collaboration with Monash University, Australia, Rishy Valley Rural Health Centre in Andhra Pradesh, Christian Medical College Vellore, and the George Institute for Global Health India. The major objective of this project is to quantify and identify the determinants of the prevalence, awareness, treatment and control of hypertension in three rural populations of different levels of epidemiological transition.

Sri C Achutha Menon Centenary Seminar was organized on January 13, 2013. The theme of the seminar was "Universal Health Care: from aspiration to reality". Dr. D. Babu Paul, former Chief Secretary Government of Kerala presided over the inaugural function and delivered the presidential address. Dr. K. Mohandas, Vice Chancellor, Kerala University of Health Sciences, inaugurated the seminar. Prof. A Vaidyanathan, Prof. Imrana Qadeer, Dr T. Sundararaman, Dr. K P Aravindan and Prof B Ekbal spoke on various aspects of the seminar theme. Sri Rajeev Sadanandan Principal Secretary Department of Health and Family Welfare, Government of Kerala, moderated the seminar.

World Health Day was observed on the theme "Aging and Health" jointly by the Public Health Students forum of AMCHSS, Kerala Institute of Local Administration and the Kerala Social Service Society on April 07, 2012. Close to 400 elected representatives from various local self government bodies from all over Kerala participated in the meeting. The meeting discussed the various activities that could be implemented for the elderly at Panchayat level. World No Tobacco Day was jointly organized by the AMCHSS, Government of Kerala Health Department and various NGOs working in the field of tobacco control on May 31, 2012. The theme of the day was "Tobacco industry interference"

Dr. P. Manickam, the first PhD student from the National Institute of Epidemiology (NIE) affiliated to SCTIMST graduated in the reporting year. Twelve MPH students and four DPH students completed their respective programs from our institute. Fourteen MPH and six MAE (Master of Applied Epidemiology) students completed their respective programs from the NIE. Five MPH students graduated from CMC Vellore. All the ASCEND (Asian Collaboration for Excellence in Non-Communicable Diseases) trainees from India received their certificate on completion of the ASCEND training program on March 15, 2013.

CONFERENCES ORGANISED

- World Health Day celebrations were jointly organized by the Public Health Students forum, Kerala Institute of Local Administration and the Kerala Social Service Society on April 07. Close to 400 elected representatives from various local self government bodies from all over Kerala participated in the meeting. The meeting discussed the various activities that could be implemented for the elderly at Panchayat level.
- Achutha Menon Centenary Seminar was organized on January 13, 2013. The welcome address for the seminar was given by the director of SCTIMST Prof K. Radhakrishnan, who started with a tribute to the memory of Sri C. Achutha Menon, the visionary behind the formation of SCTIMST.

Dr D Babu Paul IAS, Former Chief Secretary, Government of Kerala presided over the inaugural function and delivered the presidential address. Dr Babu Paul hailed Sri C Achutha Menon as one of Kerala's three harbingers of progress and prosperity after Maharaja Sri Swathi Tirunal, Sir CP Ramaswamy Iyer. Sri C. Achutha Menon's chief minister ship marked a turning point in Kerala's history, because it was during this short period of seven years (1979-77) that numerous institutions of knowledge and excellence were constituted. The seminar which concerned itself with making health care universal was a befitting tribute to the memory of Sri C. Achutha Menon whose public life was dedicated to the wellbeing of the people.

Professor K Mohandas, Vice Chancellor, Kerala University of Health Sciences and former director of SCTIMST inaugurated the seminar and delivered the inaugural address. Professor Mohandas dwelt on Sri C. Achutha Menon's role in the setting up of SCTIMST, and later, of the Centre for Public Health that came to be known by his name.

The inaugural session came to an end with the unveiling by Dr D. Babu Paul of a portrait of Sri C. Achutha Menon in the central foyer of the building of Achutha Menon Centre for Health Science Studies.

- Seminar- Universal Health Care: From Aspiration to Reality

The seminar consisted of a panel of five eminent speakers:

Professor A. Vaidyanathan, formerly Professor Emeritus, Madras Institute of Development Studies. He was a professor at Centre for Development Studies during C. Achutha Menon's term in office. His work in development economics ranges from agriculture and irrigation and health and nutrition. Prof Vaidyanathan spoke on "Equipping the public sector in health for Universal Health Care. Professor Imrana Qadeer, retired professor and Head, Centre for Social Medicine and Community Health, Jawaharlal Nehru University, Delhi. Her research areas have included health policy, primary health care and epidemiological studies. She addressed the politics of Universal Health Care. Dr T. Sundararaman, Executive Director of the National Health Systems Resource Centre, New Delhi, a position he's held since May 2007, and is also a Member Secretary of the Sector Innovation Council for the Health Sector. Dr Sundararaman presented his vision of the HLEG report. Dr K P Aravindan, Professor, Calicut Medical College, Kerala and recipient of Kerala Government special award for implementing comprehensive care program for patients with Sickle cell anemia in 2011. He presented the importance of making health system work for the marginalized populations. Professor B. Ekbal, former vice-chancellor of Kerala University, neurosurgeon and academic, well-known public health activist and convener of the Jan Swasthya Abhiyan (People's Health Movement) in India. Dr Ekbal presented the perspectives from People's Health movement on the Universal Health Care

- The World No Tobacco Day was organized by the Government of Kerala on May 31, 2012 at Trivandrum in collaboration with SCTIMST, Regional Cancer Centre and various non-Government organizations. Honorable Health Minister, Government of Kerala inaugurated. Shri K Muraleedharan MLA, Honorable Mayor of Trivandrum City, district Panchayat President were the other guests for the program. Dr K R Thankappan presented the theme paper in the seminar that followed the inaugural session.
- We observed International Women's Day 2013 with women volunteers of the Household Technology for Women (Proj. 5219) project on 8th March at AMCHSS, with the theme "Unaroo... Surakshakkayi" (in Malayalam).

AMC SEMINAR SERIES

- FULBRIGHT SEMINAR: Research and Teaching in the U.S. and India: Challenges, and Opportunities, "Achieving Health Care Performance Excellence through Baldrige Quality Assessment." By Dr. Josephine Kershaw (University of Findlay) - Visiting Lecturer to India on 2nd and 5th May 2012.
- Prof Brian Oldenburg of Monash University Australia offered an AMC seminar on "Soft touch and high tech" approaches to the prevention and control of Diabetes on November 07, 2012.
- Prof Michael Pratt from CDC (Centres for Disease Control) Atlanta, USA offered an AMC seminar on Global Public Health Challenge for Physical Activity on November 07, 2012.
- An AMC seminar was organized on March 15, 2013. Professor Brian Oldenburg, Monash University, Australia spoke on Improving the prevention and control of Diabetes, Dr Xuefeng Anhui, CDC China spoke on Reciprocal Cooperation between Peer supporters and Community Health Centers in China and Professor K R Thankappan, AMCHSS spoke on Community interventions to prevent Diabetes and other non-communicable diseases in Kerala, India.

- An AMC seminar was organized on March 26, 2013. The presentation on the architecture of Global Health was made by Dr Richard A Cash of the Harvard School of Public Health USA.

WORKSHOPS & SHORT COURSES

- A 3-day national workshop on 'analyzing medical and health data using R' was conducted by Prof V Raman Kutty. Twenty two participants including faculty, staff and students from the institute, as well as from various other research centers like the National Institute of Epidemiology, Chennai, Centre for Development Studies, Medical College, Trivandrum, and Rajiv Gandhi Centre for Biotechnology, Trivandrum attended the course.
- A writing workshop was organized for using NSSO 60th round data during November 24-26 at AMCHSS. Two papers were planned. 1. Prevalence of self reported diabetes mellitus and associated co-morbidities among persons aged 60 years and above, India – 2004. 2. The Gender gap in utilization of in-patient care for diabetes mellitus. Evidence from India. Prof V Raman Kutty, Dr Mala Ramanathan, Dr TR Dilip (Consultant PHFI) Ms Archana, Junior Research Fellow.
- Dr K Srinivasan organised a "One Day Workshop on English Language skill for Effective Scientific communication" for Research and Publication Cell, SCTIMST.

Basic Biostatistics Course

Instructors – Dr.V. Ramankutty and P. Sankara Sarma

This course was designed for senior residents and PhD students of SCTIMST and were mandatory for residents from the departments of Anesthesiology, Cardiology, Cardiovascular and Thoracic surgery, Neurosurgery, Neurology, IS & IR. All doctors doing PDCC and PDF programs were encouraged to attend this course but not mandatory. Interested faculty members could also attend this course.

The objective of this course was to familiarize common statistical terminologies and design issues in biomedical and clinical research. It was expected that by the end of the course participants should be able to critically review, interpret and understand journal articles that are based on quantitative data analysis using statistics. Broad topics discussed in this course were descriptive statistics, design of studies, statistical inference, biases, multivariate analysis, reliability and validity, data analysis.

The course was scheduled as eight lectures of two-hour duration each, adding to a total of 16 hours.During the year 2012, this course was conducted twice; one during May 22 – 31, 2012 and another during October 30 to November 8, 2012.

Ethics in Health Research

Coordinated a short course on 'Basic Training on Ethics in Health Research' conducted jointly by the AMCHSS, SCTIMST and IEC-SCTIMST from August 6-10, 2012. The aim of the module was to enable participants to recognize concepts of ethical issues in health research, gain knowledge of existing guidelines in biomedical research and skills for the use of these principles for decision-making. The training was participatory and used lectures, case study discussions using written case studies and audiovisual based cases and mock ethics review to achieve the goals.

In all, 21 participants completed the course, 11 from the MPH program of AMCHSS, SCTIMST, 7 from other wings of SCTIMST – hospital and BMT and 3 from outside the institution. Certificates of participation were distributed by Justice M R Hariharan Nair, Chairperson of the IEC-SCTIMST on August 10, 2012.

Qualitative Methods for Research

Dr. Mala Ramanathan taught a module titled 'Qualitative Methods for Research' at the Indian Institute of Technology, Madras during December 11 to December 18, 2012.

The Faculty and students presented papers at national and international conferences.

The Faculty served as experts in committees at the national bodies, examiners in other Institutions. Community based training programmes were also conducted.

STAFF DETAILS

Dr. K R. Thankappan, MD, MPH	- Professor and Head
Dr. V Raman Kutty, MD, MPH	- Professor
Dr. T K Sundari Ravindran, PhD	- Professor
Dr. P Sankara Sarma, PhD	- Professor
Dr. Mala Ramanathan, PhD, MA	- Additional Professor
Dr. K Srinivasan	- Associate Professor
Dr. Biju Soman, MD, DPH	- Associate Professor

Dr Ravi Prasad Varma MD	- Assistant Professor
Dr. Manju R Nair MBBS, MPH	- Scientist C
Mrs.VT Jissa. MSc.	- Scientist B
Ms. Jayasree Neelakantan	- Upper Division Clerk (since November 6, 2012)

PhD awarded in 2012-13

Manickam P (Guide-Prof MD Gupte, former Director, National Institute of Epidemiology)

The unveiling of a portrait of Sri C. Achutha Menon by Dr D Babu Paul in the central foyer of the building of Achutha Menon Centre for Health Science Studies. Prof K Radhakrishnan, Prof K Mohandas, Prof B Ekbal, Prof Suresh Nair, Prof V Raman Kutty, Prof K P Aravindan and Prof K R Thankappan are also seen.

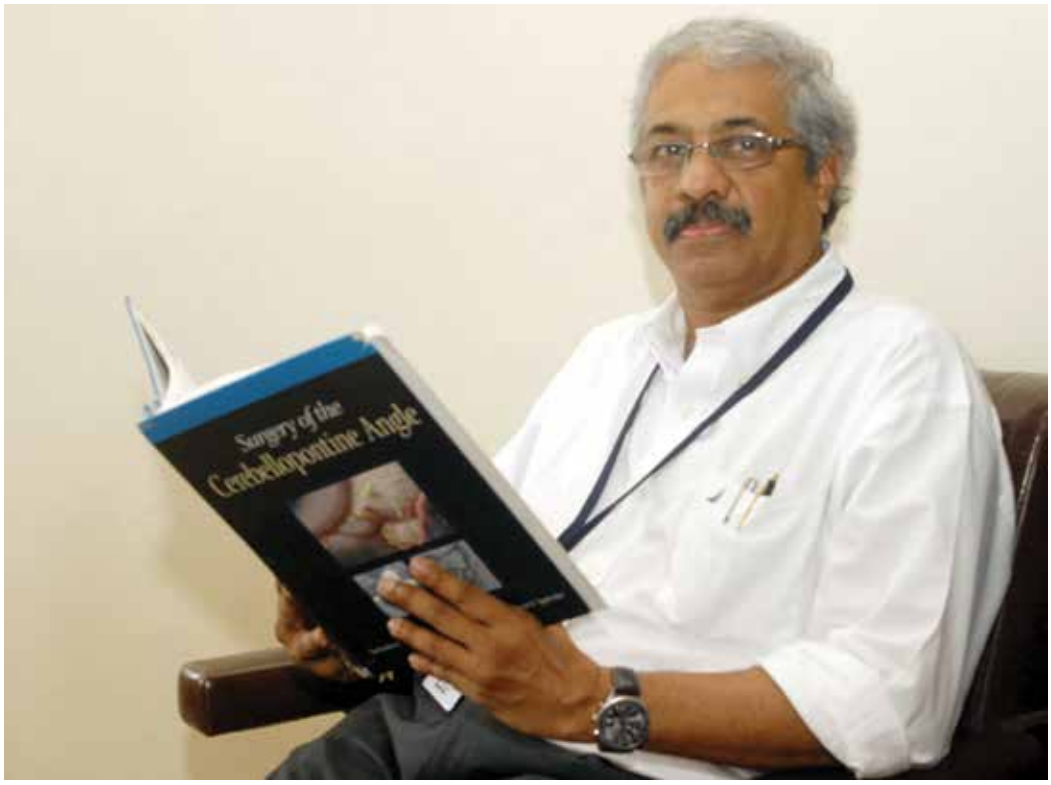
An MOU was signed between the Monash University Australia and SCTIMST on November 07, 2012.

Dr D Babu Paul inaugurated the Sri C Achutha Menon Centenary seminar on January 13, 2013. Prof K Mohandas, Prof K Radhakrishnan and Dr Vishal Raina are also seen.

Prof Brian Oldenburg offering the AMC seminar on "Improving the Prevention and Control of Diabetes" on March 15, 2013

Inauguration of Academic floor by Dr. R. Chidambaram,
Institute President & Principle Scientific Advisor to the Govt. of India

Academic Division



From the Dean's Desk

Sree Chitra Tirunal institute is a premier medical and biomedical research institute and a public health institute of amazing size and breadth. As Dean of this institute, I have inherited an enviable legacy and am the proud leader of a dedicated group of faculty and students who are outstanding by any criteria. Keeping our academic fraternity well positioned to respond to scientific opportunities is a wonderful responsibility of the dean. Less than an year as Dean, I am excited about the possibilities and am extremely optimistic about the future.

Our institute is one of the most sought after postgraduate scientific training sites in the country. The kind of training and education we impart is part of our core identity and we try to keep it vibrant and well funded which is a major challenge in the current scenari . We have made remarkable achievements over the year . The highlight in the preceding year was streamlining of the academic curriculum and program by the board of studies. The collaborative work with other reputed institutes like IIT, Chennai, CMC Vellore, NIE, Chennai etc has started yielding dividends. The medical fraternity is engaged in innumerable research projects with leading scientific bodies within the country and abroad, as is our school of public health .The broad and emerging field of bioengineering also presents us with tremendous opportunities. Tissue engineering, nanotechnology and innovative indigenous biomedical technology development are the new thrust areas which require our commitment and whole hearted dedication.

The annual convocation for the 28th batch of graduates was held on 12th May 2012. Dr.Viswa Mohan Katoch, Secretary to Government of India, Department of Health Research & Director

General, Indian Council of Medical Research delivered the convocation address. Dr.MS Ananth, Visiting Professor, Department of Chemical Engineering, Indian Institute of Science, Bangalore, was the Guest of Honor.

Yet, we are not where we need to be. We need to seize more opportunities and keep pace with the recent advance of medical science and biotechnology. We need to augment the mentoring we provide to our faculty and the leadership opportunities we afford them. These are some of my long term goals and I am totally committed to them..

It has been my great pleasure to collaborate closely with many wonderful individuals in the past year. I am deeply grateful to all those who contributed their ideas, time, energy, good will, and support to our many initiatives.

SCTIMST is an institution with enormous potential. Our challenge is to transform our outlook, explore newer options, rededicate ourselves and passionately immerse ourselves in our profession. The way forward is by engaging with others—within the campus, across the country and abroad. We have made rapid strides but we have miles to go before we sleep…

Dr. N. Suresh Nair

Division of Academic Affairs

The Division of Academic Affairs is headed by the Dean, Academic Affairs. Admission of students and evaluation of students registered for various programmes are the primary responsibilities entrusted to the division. The division co-ordinates the work of standing Academic Committee of the Institute which has been constituted to make recommendations to the Governing Body on general supervision over the academic policies of the Institute and method of instruction, teaching, training, evaluation of research and improvement in academic standards. The Division of Academic Affairs strives to create a positive environment suitable for students' holistic growth and development with the support of five Associate Deans.

The Division of Academic Affairs has been co-ordinating with the students group for students representation in the various committees.

Programmes offerred – 2012

Post-doctoral

1. DM Cardiology
2. DM Neurology
3. DM Neuroimaging and Interventional Neuroradiology
4. DM Cardio Thoracic & Vascular Anaesthesia
5. DM NeuroAnaesthesia
6. MCh Cardiovascular & Thoracic Surgery
7. MCh Vascular surgery
8. MCh Neuro Surgery (after M.S)
9. MCh Neuro Surgery (after MBBS and 1 year Residency in General Surgery)
10. Certificate course in Cardiovascular & Neuro Surgical Anaesthesia
11. Certificate course in Cardiovascular & Neuro Radiology
12. Certificate course in Vascular Surgery
13. Post DM/MCh Fellowship

PhD./Master's

14. PhD
15. Master of Public Health (MPH)
16. M.Phil

Diploma

17. Cardio Vascular & Thoracic Nursing
18. Neuro Nursing
19. Blood Banking Technology
20. Cardiac Laboratory Technology
21. Neuro Technology
22. Operation Theatre Technology
23. Advanced Medical Imaging Technology
24. Clinical Perfusion
25. Medical Records Science

Students Enrolment

The student strength for DM/MCh degree, Post-doctoral certificate courses and Post DM/ MCh Fellowships during the year was 87. The Master of Public Health degree programme has 24 scholars. The Institute has, as of now, 82 students for the PhD programme, 66 scholars for the various Nursing and Technology related Diploma Programmes. The affiliated programmes of SCTIMST at the National Institute of Epidemiology have an enrolment of 39 students for the Master of Applied Epidemiology programme and 32 students for the Master of Public Health.

A. List of Post-doctoral students

DM (Cardiology)

Arun S R (Sponsored)
Reghuram A Krishnan
Suchit Majumdar
Shunmuga Sundaram P
Kiron S
Harikrishnan G
Deepa S Kumar
Mukund A Prabhu
Sanjeev H Naganur
Vekariya Ketan Manubhai
Patel Nilesh Parshottambhai
Paneer Selvam
Harihara Subramonia Sharma

DM (Neurology)

Sujit Abaji Rao Jagtap
Pournamy Sarathchandran
Himanshu G Soni
Jayakrishnan Chellenton
Sruthi S Nair
Manish Gupta
Alok Mandliya
Soumya Sundaram
Prasanth Varghese C
Jeevan S Nair
Sandeep N
Radhamani M
Hardeep Kumar
Deepak Menon
Divya K.P

DM (Cardiothoracic Anaesthesiology)

Dinesh Kumar U S
Soumendu Pal
Omprakash S
Poornima Kasthuri
Sujatha M
Reshmi Liza Jose

DM (Neuro Anesthesiology)

Georgene Singh
Arimanickam G
Arulvelan A
Vidhu Bhatnagar
Vinoth Kumar N V
Josemine Davis

DM (Neuroimaging and Interventional Neuroradiology)

Harsha KJ
Divyata Rajendra Hingwala
Atul Mishra
Ankit Mathur
Praveen A
Narendra Kumar Jain

M Ch (Cardio Vascular & Thoracic Surgery)

Gopinath P
Bineesh KR
Manish Mathew
Sreevathsa KS Prasad
Praveen Reddy B
Mohamed Shafiu (Sponsored)
Dhairyasheel B. Kanase
Sivaprasad V
George J Valooran
Simran Kundan
Sudip Dutta Baruah
Ashok Kumar C.J.
Mohammed Idhrees A.
Mrithyunjaya V Kalmath
Ananthanarayanan C

M Ch (Vascular Surgery)

Nedounsejiane M
Shashidhar K P
Vivek Agrawal
Sidharth Viswanathan

MCh (Neurosurgery)

Adesh Shrivastava
Akshay Shrirang Patil
Anasari Khursheed Ahmad E
Vipin Kumar
Dipendra Kumar Pradhan
Arun P S
Saravanan S
Shivashankar Marajakke
Sanjeev Kumar
Debabrata Sahana
Bhaumik Prabhatsinh Thakor
Amit Kumar Upadhyay

PDCC (Anaesthesiology)

Unnikrishnan P
Shanil Jose
Bhandari Dhiraj Baijulal

PDCC (Radiology)

Ankit Jitendra Dumaswala
Rakesh Kumar Singh

Post DM / MCh Fellowships

Sathia Prabhu
Manish Ganesh Pai
Ashiq Nihmathullah
Ajeet Arulkumar S J
Ali Shafeeq
Dinesh Choudhary
Mahesh Kumar S
Anis Jukkarwala
Haseeb Hassan
Vikash Agarwal
Pramod K

B. List of PhD / Master's Programme students

PhD Students

Ajay Godwin Potnuri
Ansar E B
Ansu Abu Alex
Anu S Nair
Anupama V
Anwar Azad P
Ariya Saraswathy
Arjun G Namboodiri
Arun B
Asha Caroline Thomas
Aswathy P M
Beena G Mohan
Bejoy Vijayan
Deepa R
Deepa Surendran
Deepthi R S
Dhanesh V
Durgadas C V
Elizebeth Mathews
Mir Mahmoud Mortazavi Roudmiane
Nandini R J
Neena Aloysious
Neena Elizabeth Philip
Nima S Ganga
Nimmy Mohan
Padmakrishnan C J
Pramod S
Priya A Nair
Radhika Raveendran
Raji S R
Rakhi A
Reema George
Salar Abbas
Sandhya S
Sangeetha Hareendran
Sarvepalli Jahnavi
Shabeesh Balan

Fayaz R K
Finosh G T
Francis Boniface Fernandez
Genu George
Jairani P S
Jaseer Muhamed C J
Jija S James
Joe Varghese
Kalaivani V
Karthik N Ramesh
Kiran S
Lakshmi R Nair
Lakshmi V Nair
Linda Philip
Mayuri P V
Meena Daivadanam
Merlin Rajesh Lal L P
Rekha M Ravindran
Remya K R
Renjith P Nair
Rethikala P K
Sabareeshwaran A
Sabarinath P S
Sachin David
Saifudeen Ismael
Shanti Krishna A
Sheeja Liza Easo
Sheela Kumari R
Shelma R
Sherin S
Sini S
Smitha K A
Soma Dey
Soumya Columbus K C
Soumyarani V S
Subha S
Sujesh Sreedharan
Sumitha P B
Sunitha Chandran
Susan M Alex
Swapna Nandakumar
Syama S
Tara S
Thankachi Yamini Ramachandran
Thasneem Y M
Tulsi Ram Bhandari
Uma V Santhosh
Unnikrishnan S

Master of Public Health Students

Anand S
Anju Lijin
Ann Mary James
Apurvadan N Ratnu
Dinta Suresh
Elsa Mary
Harikumar S
Jyolsna Anand U
Kamaruddeen M
Komal Raycha
Merryson Roy Mathew
Parvathy Mini Pradeep
Sanjeev Kumar Singh
Saumya Ranjan Mishra
Shamim Begam N
Shibulal A
Sithara S Pillai
Sreejini J
Suganthi J
Sunita Chowdhury
Tintu T James
Vishal Raina
Joanna Sara Valson
Rohan Thakur
Praveen G Pai
Remya S

M.Phil

Sheethal Sivaraman Nair
Indu A G
Anupama Nair
Joice Tom J
Sreethu Sankar
Berwin Singh S V
Serene Hilary
Reshmitha T R
Resmi V Nair
Dexy Joseph

Two affiliated prgrammes of two-year duration are offered at the National Institute of Applied Epidemiology, Chennai (NIE) which is under the Indian Council of Medical Research (ICMR)

1. Master of Applied Epidemiology
2. Master of Public Health (Health Services, Development and Research)

Joint Programme by IIT Madras / CMC Vellore / SCTIMST - Trivandrum

The three institutions – IIT Madras, CMC Vellore and SCTIMST Trivandrum, each having a set of unique strengths and facilities, had joined together in starting two Programmes – 'M.Tech in Clinical Engineering' and 'Ph.D in Bio-medical devices and technology' to address the issue of capacity building for reducing India's dependence on imports of medical devices. A unique feature of these courses is the clinical attachment with a maximum exposure to the clinical environment. This ensures that, at the end of the course the students will be able to interact effectively with the clinicians and other medical and paramedical staff in the hospital resulting in the identification of unmet 'clinical needs'. This is also expected to trigger further research leading to development of innovative indigenous healthcare technology.

MS / Ph.D Bio-engineering courses at CMC Vellore

This affiliated campus programme of the Institute, post-

Akhil Balachandran	Harisreela S Nair
Archana Gopan	Lekshmi I
Manu John	Revathy A
Sajeesh M Subrahmanian	Revathy L R
Sarath Mohan K C	Hridya S Kumar

Vishnu V	Krishnakumar B
Anu J	Aswathy S Nair
Deepa C R	Gilna P
Mary Angel P G	Neenu Mohan
Swapna B	Renju R S
Dhanusree R S	Surya V S
Gracious George	Vithu V T
Manoj M	Anila P V
Parvathy J Nair	Jeena J V
Rejitha O V	Rejina P K
Shabeeb A	

graduate Bioengineering programme, emphasizes the R&D needs of health care in India to be developed. There are two students admitted for the programme.

Technology related Programme

Name of the Programe	No: of students -First Year	No: of students -Second year	No: of students – graduated in Dec 2012
Diploma in Cardiovascular and Thoracic Nursing	10	6	9
Diploma in Neuronursing	10	5	4
Total	20	11	13

Staff

Dr.A.V.George MA, B.Ed., M.Phil, PhD

Dr.Sundar Jayasingh MA, MBA, DLL, PhD.

Ms.Radha M, DCP, BCom, MBA.

Ms.Remya A, M.Com., MPhil, NET

Mr.Shaju M Hussain, BIT, MBA.

Ms.Jubairiban M, PDC

NURSING EDUCATION

The speciality nursing programes continue to attract registered nurses as evidenced by the increase in the number of applicants for the two programes –More than 300 nurses trained through these programmes are placed in reputed centrs of the world. Currently thirty-one students (Sixteen CVT Nursing and fifteen Neuro nursing students) are enrolled for the programme as shown in the table 1.

Table.1.Present status of Specialty Nursing

Facilitated clinical rotation of MSc. Nursing students (101 students, 18 institutions) from various other institutions.

Organised SCTIMST Nursing Manual releasing function on 6th May 2012 in collaboration with the nursing service.

Staff details:

Dr. Saramma.P.P, M.N; PhD.

Senior Lecturer in Nursing

List of Diploma students

Cardiac Nursing

Ancy G S

Anila A S

Anjana S R

Ann Mary Sebastian

Arathy S R

Archana C K

Ashitha Rani M S

Aswathy Vijayan

Dhanya I S

Durga Lekshmy U K

Remya Michael

Resmi B Nair

Shanu S J

Sreelekshmi V

Suraja S R

Vidya S Nair

Neuro Nursing

Amrutha T

Aparna P S

Apsara R

Lekshmy M

Nishamol Y N

Rajalekshmi R

Rajeswari T

Rathika S

Reena Annie Cheriyan

Soumya C Das

Sreekesh S

Vineetha J R

Short-term training/observership upto a period of three months

Candidates sponsored by the Government /Autonomous institutions/ Health sector organizations, approved Medical/ Dental/Nursing colleges, paramedical Institutions and Government / Defence services are provided short term training.

This training / observership is coordinated by the Academic Division in consultation with the head of the department/ division

Around 215 observers from 60 institutions all over the country spent varying periods from two weeks to three months in different department of the Institute.

PROGRESSIVE USE OF HINDI

The Institute complied with the provisions relating to the Official Languages Act, Rules and instructions and directives of Government of India. All round progress in implementation of Official Language Acts and Rules had been achieved in the Institute. Hindi workshops were conducted for the benefit of staff members to increase the knowledge of functional Hindi. Letters received in Hindi were also reported in Hindi.

The Institute participated in the various Town Official Language Implementation committee meetings.

LIBRARY

The Hospital Wing library has a collection of 14704 books and 15643 back volumes of journals. During the current year, 166 books and 992 back volumes were added and 115 journals were subscribed. Electronic access to most of the journals subscribed has been activated and is available at both the campuses. Digitization of Theses and Dissertations of the Institute has been started to create an institutional repository.

Being part of National Knowledge Resource Consortium, the library has access to full text articles of number of journals in addition to those we subscribe.

The information management system and library automation are based on Microsoft SQL Server 2005. The library information is made available in the Internet.

The BMT Wing library has a collection of 10725 books and 6019 back volumes of journals. During the current year, 55 books and 521 back volumes were added and 51 journals and 1 database, Materials for Medical Devices Database were subscribed.

Results of analysis of the publications from the Institute showed the following:

Citation report for articles published in 2012-13

Number of Articles published: 168

Total Citations: 110 h-Index: 5

Citation report for articles published so far

Number of Articles: 2515

Total Citations: 16905 h-Index: 47

Staff Members

S.Jayachandradas M.A., M.L.I.Sc.- Librarian-cum-Information Officer - I

Sudha T. M.A., M.L.I.Sc- Librarian-cum Documentation Officer – B

N.Suresh- B.Com, M.L.I.Sc.Senior Librarian-cum-Documentation Assistant – B

Joy Vithayathil M.A., M.L.I.Sc.. Senior Librarian-cum-Documentation Assistant - B

Mr. Anilkumar CM.Com., M.L.I.Sc. Librarian-cum-Documentation Officer – B

Mr. Jayamohan CS B.Sc., M.L.I.Sc. Librarian-cum-Documentation Assistant - A

Dimple Gopi M.A., M.L.I.Sc.- Librarian-cum-Documentation Assistant – A

Seema S - M.Sc., M.L.I.Sc. Librarian-cum-Documentation Assistant – A

MEDICAL ILLUSTRATION

The Medical Illustration Division offers support to the Academic activities of the Institute by assisting the faculty and students in the preparation of slides and movies, photography and artwork and also organizing audio and video projection at meetings. In keeping with the technological advancements the Division has graduated from slides composed with Indiaink on paper to computer generated compositions of good quality prepared with diligence. The Photographs seen in the Annual Report are contributed by the Division.

Staff

Mr. Lijikumar.G., Jr. Scientific Officer (MED. ILLSTRN.)

Vasanthi.S., Sr. Artist - B (Medical Illustration)

Convocation 28th Batch - 12-05-2012

Externally Funded Research Projects

Sl.	Principal Investigator (PI) and Co-Investigators	Project Title	Funded By	Total cost	Duration	Status
1	Dr. S.K. Jawahar	Tele Health & Medical Education	Planning Board, Govt. of Kerala	Rs 3,00,000	1 year	Ongoing
2	Srinivas G,	Isolation, Characterization of Gliomasphere forming cells from GlioblastomaMultiforme: Correlation with Prognostic Factors and Treatment Outcome	Department of Biotechnology	Total Cost and Duration: 32.50 Lakhs	Two years	Ongoing
3	Dr.Harikrishnan.S	Coronary artery disease in the young	Kerala State Council for Science, Technology and Environment	RS.1,300,000	3 Year	Ongoing
4	Dr.Harikrishnan.S	Does non-regression of pulmonary hypertension following balloon mitral valvotomy correlate with BMPR2 mutations?	PVRI – Pulmonary vascular research Institute, Canterbury ,UK	RS.265,650/-	1 Year	Ongoing
5	Dr.Harikrishnan S	Comprehensive heart failure intervention program	ICMR	Rs.5,415,30/-	2 Year	Ongoing
6	Dr. K Shivakumar	Molecular basis of cardiac fibroblast resistance to oxidative stress"	DBT	45 Lakhs	3Years	Ongoing
7	Dr. K Shivakumar	Regulation of the cardiac fibroblast cell cycle by p44/42 MAPK	ICMR	20 lakhs	3years	Ongoing
8	Dr. Renuka Nair	Modulation of energy metabolism in prevention of cardiac remodeling: Stimulation of peroxisome proliferator-activated alpha-receptor.	DRDO	19.76 Lakhs	3Years	Completed
9	Dr. R. Renuka Nair	Autocrine and paracrine mechanisms in human resident cardiac stem cell signaling following hypoxic injury	KSCSTE	Rs.16,00,000/-	3 years	Ongoing
10	Dr. Sreeja Purushothaman	Mitochondria targeted antioxidants for reversal of metabolic remodeling and prevention of cardiac hypertrophy	KSCSTE	14 lakhs	3 years	Ongoing
11	Dr. C. Kesavadas	Self-Regulation of Broca's Area (right inferior frontal gyrus) using Real time fMRI in Post Stroke Aphasia patients	DBT	Rs. 9,00,000/-	2 years	Ongoing
12	Dr. C. Kesavadas	Neurobiological Marker for Population Differences: A Neuroeconomic Investigation with Anxiety & Depression Patients contrasted with Normal Population	DBT	Rs.7,00,000/-	2 years	Ongoing
13	Dr. R. Ashalatha	Improving localization in lesion negative focal epilepsy: Can EEG-FMRI predict the epileptogenic zone and the likelihood of post-operative seizure freedom?	KSCSTE	Rs.14,85,000/-	3 years	Ongoing.
14	Dr. Asha Kishore	Cerebellum and Cortical Plasticity – The Case of Dystonia" (Indo-French Collaborative Project.	ICMR and INSERM (Paris, France)	Rs.7,00,000/-	2 years	Ongoing

15	Dr. Asha Kishore	Developing experimental therapeutics using Transcranial magnetic stimulation for Movement disorders (Indo-French collaborative project): Cerebellum and Cortical Plasticity	Association Center for Neurological Research of the Sal Peteriere	Rs 7,00,000/-	2 years	Ongoing
16	Dr. Asha Kishore	Protocol SP921: A multicenter, randomized, double-blind, placebo controlled, 5-arm, parallel-group trial to assess the study drug transdermal system dose response in subjects with advanced-stage Parkinson's disease.	UCB Bioscience GmbH Funding agency	Rs.10,00,000	1 year	Completed
17	Dr. Asha Kishore	Protocol 28850: Open label trial to determine the long term safety of the study drug in Parkinson's disease patients.	Merck Serono	Rs.10,00,000	1 year	ongoing
18	Dr. Asha Kishore	Protocol P04938: A phase 3, 12- week, double blind, double-dummy, placebo and active controlled efficacy and safety study of the study drug in subjects with moderate to severe Parkinson's disease	Schering-Plough	Rs.10,00,000	1 year	Ongoing
19	Dr. Asha Kishore	Protocol P05664: A Phase III, double blind, placebo and active controlled, dose – range – finding efficacy and safety study of the study drug in subjects with early Parkinson's disease	Schering-Plough	Rs. 5,00,000/-	1 year	Ongoing
20	Dr. P.N Sylaja	Diabetes, prediabetes and insulin resistance in patients with recent transient ischemic attack and ischemic stroke	NIH	$ 15,000/-	10 months	Ongoing
21	Dr PN Sylaja	Indo-US Collaborative Stroke Registry and Infrastructure Development	DBT-NIH	$ 60,000/-	2years	Ongoing
22	Dr. P. S. Mathuranath	Multi-centric Indo-US collaborative project, the Kerala-Einstein study	National Institute of Health (NIH) USA	$ 82,759/-	5 years	Ongoing
23	Dr. AshaGopinathan	Creating a dendritic simulator	DST	Rs 15,96000	3 years	Completed
24	Prof. .Mendlow, Neurosurgery, Regional Neurosciences Centre, New Castle Upon Tyne, UK_ Dr. Suresh Nair	Multicentric multinational randomised controlled surgical 0trial in intracerebral haemorrhage (STICH II),	Sponsored by stroke association and medical research council, University of New Castle, UK.	Rs. 82,293/-	2.5years	Ongoing
25	Dr. Suresh Nair	International , randomized doble-blind, controlled study of Rindopepimut/ GM-CSF with adjuvant Temozolamide in patients with newly diagnosedsurgically resected EGFR vIII positive glioblastoma	Celldex Therapeutics, Inc., USA			Pre-screening

26	Dr. Suresh Nair	Image processing for improving diagnostic accuracy in gliomas by magnetic resonance Imaging (MRI) and histopathology	KSCSTE	Rs. 9,00,000	2 years	Ongoing
27	Dr. G. Menon	Hemodynamic Imaging of intracranial aneurysms	KSCSTE	Rs. 10,00,000	2 years	Ongoing
28	Dr.Radhakrishnan VV	The role of cord factor of M tuberculosis and its role in the immunodiagnostic and prognosis in pulmonary tuberculosis	KSCSTE	Rs.5,63,200/-	2 years	Ongoing
29	Dr.Radhakrishnan VV	Cord factor of M tuberculosis and its role in the immunopathogenesis of murine tuberculosis	DST	Rs.12,49,600	2 years	Ongoing
30	Dr. Santhosh Kumar B.	Fluorescence Optical biopsy: A novel diagnostic tool for rapid characterization of cancer biomarkers	DST	25 Lakhs	3 Years	Ongoing

Biomedical Technology Wing

TITLE OF THE PROJECT	PRINCIPAL INVESTIGATOR	FUNDING AGENCY	COST (Rs)	DURATION	STATUS
Detection of Zinc in epileptic condition using ratiometric fluorescent molecular probes	Dr. R S Jayasree	DBT	85.02 lakh	3 year	Newly initiated
Gold nanorods for targeted photodynamic therapy and fluorescence imaging	Dr. R S Jayasree	ICMR	40.60 lakh	3 year	Newly initiated
Production of novel nano-composites of lactoferrin conjugated gallium and silver quantum dots and its biomedical applications	Dr. Chandra P.Sharma	DST (UKIERI)	12.16 lakh	2 year	Newly initiated
Non-enzymatic Blood glucose measurement system	Dr. K. Sreenivasan	ICMR	24.00 lakh	2 year	Newly initiated
Development of Skin Graft Substitutes for Wound Healing Applications from Mammalian Derived Extracellular Matrix	Dr. T V Anilkumar	DBT	42.00 lakh	3 year	Newly initiated
Cell sheet engineering on electrospun scaffolds for efficient cell supply in skin tissue engineering	Dr. Anil Kumar PR	DST	19.44 lakh	3 year	Newly initiated
Regeneration of Intervertebral discs – A tissue engineering approach.	Dr. Annie John	KSCSTE			Newly initiated
Development of Paediatric and Neonatal Membrane Oxygenators and arterial filters	D.S. Nagesh	SIDD Lifesciences Ltd.	35.00 lakh	2 year	Newly initiated
Home based vital signs monitor for screening of sleep disorders	Dr. Niranjan Khambete	DST	29.24 lakh	2 year	Newly initiated
Development of iron oxide nanoparticle probes for organ specific molecular MR imaging	Dr.R S Jayasree & Dr.H K Varma	BRNS	35.00 lakh	4.5 year	Ongoing

Quantum dot conjugated single walled carbon nanotubes for imaging and therapy	Dr.R S Jayasree	DST (Indo-Japan Program)	5.00 lakh	2 year	Ongoing
Nonviral gene delivery vectors for therapeutic gene and siRNA delivery for glioma targeting: In vitro evaluation of cationized pullulan based materials	Dr. Rekha M R	DBT (Bio-CARe)	36.11 lakh	3 year	Ongoing
Prototyping of skin-graft substitutes for wound healing applications using cholecyst-derived extracellular matrix	Dr. TV Anilkumar	TDF	9.00 lakh	2 year	Ongoing
Visible light induced insitu gelling Multifunctional Hydrogels as Potential Wound Dressings	Dr. C. Radhakumary	DBT	39.79 lakh	3 year	Ongoing
Dispensable and biodegradable polymeric bone cement for minimally invasive treatment of bone diseases – product validation	Dr. M. Jayabalan	DST	32.07 lakh	3 year	Ongoing
Differentiation of foetal progenitor cells and fabrication of a prototype of bioreactor for bioartificial liver	Dr. TV Kumary	DBT	59.56 lakh	1 year	Ongoing
Development and Feasibility study of Polymeric Scaffolds for Tissue Culture Under Simulated Microgravity	Dr. Anil Kumar PR	IIST	25.00 lakh	3 year	Ongoing
Epithelial -mesenchymal interactions in Tissue engineered hybrid artificial lung - role of angiogenic factors	Dr. A Maya Nandkumar	DBT	46.10 lakh	3 year	Ongoing
Development of UTI Rapid diagnostic kit	Dr. A. Maya Nandkumar	TDF	1.95 lakh	1.5 year	Ongoing
In vitro and Preclinical evaluation of curcumin released from biodegradable drug carriers	Dr Lissy Krishnan	ICMR	15.00 lakh	2 year	Ongoing
Bioengineered hybrid skin substitute for burn wounds	Dr Lissy Krishnan	KSCSTE & HLL Lifecare	27.00 lakh	3 year	Ongoing
Role of platelet protein on endothelial cell and smooth muscle proliferation	Dr. Anugya Bhatt	SCTIMST	1.50 lakh	1 year	Ongoing
Development and purification of antivenom: two separate products specific to (1) hemotoxins and (2) neurotoxins	Dr. Lissy Krishnan	SCTIMST	1.73 lakh	10 months	Ongoing
Development of Mandibular Advancement Device for the Treatment of Obstructive Sleep Apnea	Dr. Roy Joseph	TDF	9.98 lakh	2 year	Ongoing
Pre-clinical evaluation of fluoropassivated and hydrogel sealed vascular graft	Dr. Roy Joseph	TTK Healthcare Ltd	37.79 lakh	3 year & 3 months	Ongoing
Molecular and immuno - toxicological effects of Dextran coated Ferrite and Hydroxylapitite nanomaterials	Dr. PV. Mohanan	DST (Nanomission)	49.39 lakh	3 year	Ongoing
In Vitro alternative test system development for Ocular Irritation	Dr. PV. Mohanan	ICMR	40.11 lakh	3 year	
Preclinical animal evaluation of decellularised bovine pericardium as Dura substitute	Dr. Girish Menon	TDF	6.87 lakh	1.5 year	Ongoing
Efficacy of differentiated Mesenchymal stem Cells for treating acute liver failure in Rat Model	Dr.T.V.Kumary	DBT		5 year	Ongoing

Differentiation of Circulating Adult Stem cells to Neurons for regenerative therapy of parkinsons disease and spinal cord injury models	Dr.Lissy K Krishnan	DST	26.50 lakh		Ongoing
A Biomimetic approach to construct a tissue engineered autologous skin substitute from the circulating progenitor cells to treat diabetic wounds	Dr. Lissy K Krishnan	CSIR	10.33 lakh		Ongoing
Tissue-engineered strontium incorporated hydroxyapatite (HA-Sr) bone substitute for osteoporotic femur defect model - A preclinical perspective.	Dr. Annie John	-			Ongoing
Development of smart dental composites consisting of calcium containing resins and fillers	Dr.P.P.Lizymol	KSCSTE	14.65 lakh	3 year	Ongoing
Medical device retrieval programme	Dr. Mira Mohanty	DBT	48.65 lakh	3 year	Ongoing
Quantum dots for cardio-vascular Applications	Dr.Diksha Painuly-PI Dr. Kalliyana Krishnan-Mentor	DST	22.00 lakh	3 year	Completed
Toxicological evaluation of a new dental restorative composite containing `Diphenyl [2,4,6-trimethyl benzoyl] phosphine oxide [TPO] as photoinitiator	Dr. V. Kalliyana Krishnan	TDF	9.11 lakh	2 year	Completed
Development of bioactive bone cement based on organically modified ceramic resin	Dr. P.P.Lizymol	TDF	6.33 lakh	1 year	Completed
In vivo evaluation of the efficacy of oral heparin nanoparticles in rabbit models	Dr. Chandra P Sharma	TDF	1.98 lakh	10 months	Completed
Development of Technologies for isolation and characterization of tissue-engineering-scaffolds from mammalian organs and tissues	Dr TV Anilkumar	DBT	30.00 lakh	3 year	Completed
Development of hemostatic scaffold using biodegradable polymer and bio mimetic extra cellular matrix for healing of chronic dermal wounds	Dr. Lissy Krishnan	CSIR	22.00 lakh	3 year	Completed
Development of a Dura Substitute by Electrospinning of □-Caprolactone-Co- Lactide Polymers	Dr. P.Ramesh	KSCSTE	9.58 lakh	4 year	Completed
Development of Calcium Sulfate Based Injectable Bone Substitute	Dr Manoj Komath	DST(SERC)	12.03 lakh	2 year	Completed
Production Scale up of Calcium Phosphate Cement	Dr Manoj Komath	TDF	4.30 lakh	1 year	Completed
Development of National GLP Guidelines & Identification and selection of National **Regulatory Guidelines for Testing and Evaluation of Medical Devices**	Dr. PV. Mohanan	DST (GLP)	10.77 lakh	1.5 year	Completed
Evaluation of molecular toxicity of newly developed materials intended for biomedical applications	Dr. PV. Mohanan	ICMR	18.44 lakh	3 year	Completed
Development of neurons from adult stem cells for the application of regenerative medicine	Dr. Lissy Krishnan	DST	29.00 lakh	3 year	Completed
Cell-based Tissue-Engineered Fabrication of Osteochondral Constructs	Dr. Annie John	DBT	54.57 lakh	5 year	Completed

Bone Tissue Engineering Using Adipose Stromal cells on 3D porous bioactive ceramic scaffolds	Dr. Annie John	DBT	35.00 lakh	1 year	Completed
Colour atlas of tissue response to biomaterials	Dr. Mira Mohanty	DST	5.78 lakh	1 year	Completed
Synthesis, characterization and in vivo evaluation of novel iron oxide nano particles for organ specific molecular MR Imaging	Dr. R. Jayasree	DAE Board of Research In Nuclear Sciences	Rs. 60,00,000/-	3 years	Ongoing

Achutha Menon Centre for Health Science Studies

Sl. No	Principal Investigator	Project Title	Funded By	Total cost	Duration	Status
1	K R Thankappan,	Building Capacity for Tobacco Cessation in India and Indonesia	Fogarty International Centre of the National Institutes of Health	US $ 472,500	Five years	Ongoing
2	K R Thankappan	Community Interventions for Health	Oxford Health Alliance	US $ 690,000	Five Years	Ongoing
3	Prof Brian Oldenburg, (Australia) Prof Khalid Kadir, (Malaysia) Prof Edwin Fisher, (USA) Prof K R. Thankappan, (India) Dr Prasad Katalunda (Sri Lanka)	Asian Collaboration for Excellence in Non-Communicable Diseases (ASCEND)	Fogarty International Centre of the National Institutes of Health, USA	US $ 1.0343 Million	Five years up to June 30, 2015	Ongoing
4	K R Thankappan	Kerala Diabetes Prevention Program	National Medical and Health Research Council, Australia	AUD 1.03 Million	Five years up to June 30, 2015.	Ongoing
5	Mala Ramanathan	Prevalence of Type II diabetes in a rural Community: Identification of the Contributing Economic and Socio-cultural factors		Rs. 1.15 lakhs	Two years until October 2012	Completed
6	K R Thankappan	Partnership for Better Health	European Commission through the BRAC school of Public Health Bangladesh	Euro 180,455	Four years	Completed

7	V Raman Kutty	Impact of type 2 Diabetes on women's lives and well being	Women Component plan of DST	19.85 lakhs	Four years	Ongoing
8	Biju Soman	Capacity Building for Women Health workers	Women Component Plan of DST	Rs 10 lakhs	Three years	Ongoing
9	Biju Soman	Health Impact of Use of Technology by women	Women Component Plan	Rs 20 lakhs	Three years	Ongoing
10	Biju Soman	Surveillance of Jaundice	Kerala Government Health Department	Rs 3 lakhs	Six months	Ongoing
11	TK Sundari Ravindran	Systematic Review of Best Practices in Family Planning in Developing Countries	Population Foundation of India	Rs. lakhs	14 days December 2012 to February 2013	Completed
12	K.Srinivasan	Rapid Assessment of the scheme for promotion of menstrual hygiene in Kerala	National Health Systems Resource Centre, New Delhi	Rs.1.25 lakhs	15 days completed on Feb 23 2013	Completed

Scientific Fete 2012

5th May 2012

SCIENTIFIC PUBLICATIONS

Journal Articles

- Anjana Vaman VS, Tinu SK, Geetha CS, Mohanan PV. Effect of Hydroxyapatite Coated Bioactive Glass andEthyl Vinyl Acetate on Antioxidant Defense Mechanism, Oxidative DNA Damage and Chromosomal Anomalies. Trends Biomater. Artif. Organs, 2012; 26(2), 64-73
- Anjana Vaman VS, Tinu SK, Geetha CS & Mohanan PV. Assessment of micronuclei and chromosomal anomalies of five biocompatible materials in mice. Toxicological & Environmental Chemistry, 2012;DOI:10.1080/02772248.2012.694999
- Ansar EB, Ajeesh M.,Yoshiyuki Yokogawa, Wilfried Wunderlich and Harikrishna Varma . Synthesis and Characterization of Iron Oxide Embedded Hydroxyapatite Bioceramics. J. Am. Ceram. Soc. 2012; 95 (9) :2695–2699
- Antony M, James J Misra CS, Sagadevan LDM, Arun Kumar T Veettil, Thankamani V.
- Anti Mycobacterial activity of the plant extracts of Alstonia scholaris. Int. J Current Pharmaceut Res, 2012; Vol 4, Issue 1: 40-42
- Antony M, Neethu S, Kavitha B, Misra C B, Thankamani V. Antifungal activity of methanolic fractions of Alstonia scholaris against clinical isolates of Candida and other yeast species. Int J Res. Pharmaceut Sc. 2012; 3(2), 275-281.
- Anuradha S, Geetha M, Sabarinath PS, Appukuttan PS. ApoB-independent enzyme immunoassay for lipoprotein(a) by capture on immobilized lectin (jacalin). J Immunoassay Immunochem. 2013;34(2):166-79. Epub 2013/03/30.
- Anwar A Palakkan, David C Hay, Anil Kumar PR, Kumary TV, James A. Ross. Liver tissue engineering and cell sources: Issues and challenges.Liver International 2013
- Arjun GN and Ramesh P. Structural characterization, mechanical properties and in vitro cytocompatibility evaluation of fibrous polycarbonate urethane membranes for biomedical applications. J Biomed Mater Res Part A 2012; 100A: 3042–3050
- Arun M, Silja PK, Sheeja LE, Geetha CS, Mohanan PV (2012). Molecular level toxicological evaluation of a dental composite implanted in albino rats. Toxicol. Environ Chem. DOI:10.1080/02772248.2012.673716
- Babykutty S, Priya S, Srinivas P, Nair AS, Chandramohan K, Gopala. Insidious role of nitric oxide in migration/invasion of colon cancer cells by upregulating MMP-2/9 via activation of cGMP-PKG-ERK signaling pathways. Clinical Expertl Metastasis 29: 471-492, 2012
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Honours, Awards & Events

Honours and Awards

Smt Sudarsa K, Chief Ward sister, received the prestigious "National Florence Nightingale Award" from the President of India

Mrs. Gracyamma Bridget, has received Best Nurse Award instituted by the Trained Nurses Association of India

- Mrs. Sudha P.M,Staff Nurse got first prize for paper presentation on Anti epileptic drug compliance among people with epilepsy in Society of Indian Neuro Science Nurses Conference at Delhi.
- Mrs Saji Gopinath got third prize for model presentationon on Deep Brain Stimulation in Society of Indian Neuro Science Nurses Conference at Delhi.
- Dr Vidhu Bhatnagar won the First prize for free paper presentation in Indian Society of Neuroanaesthesia and Critical care (ISNACC 2012) Conference held at Varanasi and KOPS award for the best scientific paper presented in cardiac anaesthesia at the Annual National Conference of the Indian Society of Anaesthesiologists (ISACON) at Indore on 29th December 2012.
- Dr. Divya, K. P, Senior resident , DM Neurology , "was awarded Best Paper in Oral Presentation Category during ISACON 2013 "the 8th National Conference of the Indian Stroke Association held at Ludhiana from March 1 to 3,2013 for paper entitled "Implicating the long styloid process in Cervical Carotid Artery Dissection"
- Best poster award in National CSI, New Delhi in December,2012 "Catch them young: Can younger age pediatric cardiac interventions alter the psychological impact of congenital heart diseases on growing children?" was awarded to Deepa S, from the Department of Cardiology,
- Dr. Mukund A Prabhu, senior resident, won the second prize at national level in Electrophysiology Quiz competition conducted during annual meeting of Indian Heart Rhythm Society held in Mumbai in September 2012.

Dr. A.V. George, Registrar, SCTIMST is receiving performance certificate for the progressive use of Hindi 2011-12 from Smt. Shobha Koshy, Chairman TOLIC

- Dr. Shunmugasundaram, senior resident won the best paper award for his abstract presentation on "Arrhythmias during follow up in patients who underwent flutter ablation" at Annual Meeting of Cardiological Society of Kerala held in Kannur on 4th, Novemebr 2012
- Young innovator award for Dr. Thomas Mathew , Assistant Professor at Annual Conference of Pediatric Cardiac Society of India held at Chennai on September 2012 for " Adjustable retractor for Ministernotomy".
- Dr.C.Kesavadas was awarded the Dr. Anibhav Goel Gold Medal , USCON 2012, Auranagabad : Awarded for work on ultrasound enhanced contrast media for detecting carotid plaque vulnerability
- M/s Jija James, PhD student was awarded the Certificate of Merit at the Annual Scientific meeting of Radiological Society of North America Chicago, 2012 : Awarded for the work on Brain morphometry techniques.
- Dr. Amita bagged the 3rd Prize (with cash award) in the on-line Quiz conducted as part of GENOPATH 2013 (8th National CME in Pathology organized by Indian Association of Pathology and Microbiology, Kerala Chapter).
- Kop's award 2012 during 60th Annual National Conference of Indian Society of Anaesthesiogists conducted from December 24 to December 29, 2012 at Indore, India for the paper, 'Accuracy of chest x-ray based method for predicting depth of insertion of endotracheal tubes in children undergoing cardiac surgery'. Dr.Satyajeet Misra, Dr. Thomas Koshy
- Prof. M. Unnikrishnan was conferred "Surgical Fellow of Vascular Society of India (FVSI) Certificate" at the 19th Annual Conference of Vascular Society of India (VSICON 2012) held at Jaipur from 26th to 29th September 2012 in appreciation of his services to the field of Vascular Surgery in India.
- Dr. Vivek Agrawal, Senior Resident (Final Year M.Ch. Vascular Surgery), won the Second Prize in Best Paper Award in the 19th Annual Conference of Vascular Society of India (VSICON 2012) held at Jaipur from 26th to 29th September 2012.The topic of paper was "Development and pre-clinical evaluation of an indigenous hydrogel sealed large diameter Woven Polyethylene terephthalate (PET) vascular graft"
- Dr. Sidharth Viswanathan, 2nd year MCh Vascular Surgery resident, won the best poster award in the 2nd INDOVASC SYMPOSIUM for his paper "Emergent repair of ruptured Thoracic Aortic pathologies in the endovascular era", organised by Narayana Hrudyalaya held at The Sheraton Hotel, Bangalore on March 21st-24th 2013
- Dr Biju Soman was awarded a fellowship on Health Technology Assessment (HTA) during the International Fellowship on Health Technology Assessment (HTA) program conducted by Amrita Institute of Medical Sciences, Kochi in association with Joanna Briggs Institute of Evidence Based Medicine Australia, Healthcare Technology Innovation Centre, IIT Madras and NABH from 9th to 16th December 2012.
- Ms Neena Elezebeth Philip was awarded the DST scholarship for PhD at SCTIMST, ASCEND (Asian Collaboration for Excellence in Non Communicable Disease) Research Network fellowship & Young Investigator award for the "Best abstract" presented at the 44th APACPH Conference, Colombo, Sri Lanka 15-17 Oct 2012.
- Dr Nima S Ganga (formerly Sheena Mathew) won the SHARE fellowship initiated by South Asian Hub for Advocacy, Research and Education in mental health, which is an NIH (US) supported hub for mental health in South Asia. The fellowship is administered by the PHFI and Dr Nima is one of two persons in South Asia selected for the award in 2012. Dr Nima completed her Ph D in July 2013 at the Achutha Menon Centre.

Dr. Kuruvilla is a WHO International Consultant in Stroke Neurology for setting up Stroke program in Western Pacific region.

Participants receiving prizes for presentations at the Scientific Fete, held on 16th March, 2013.

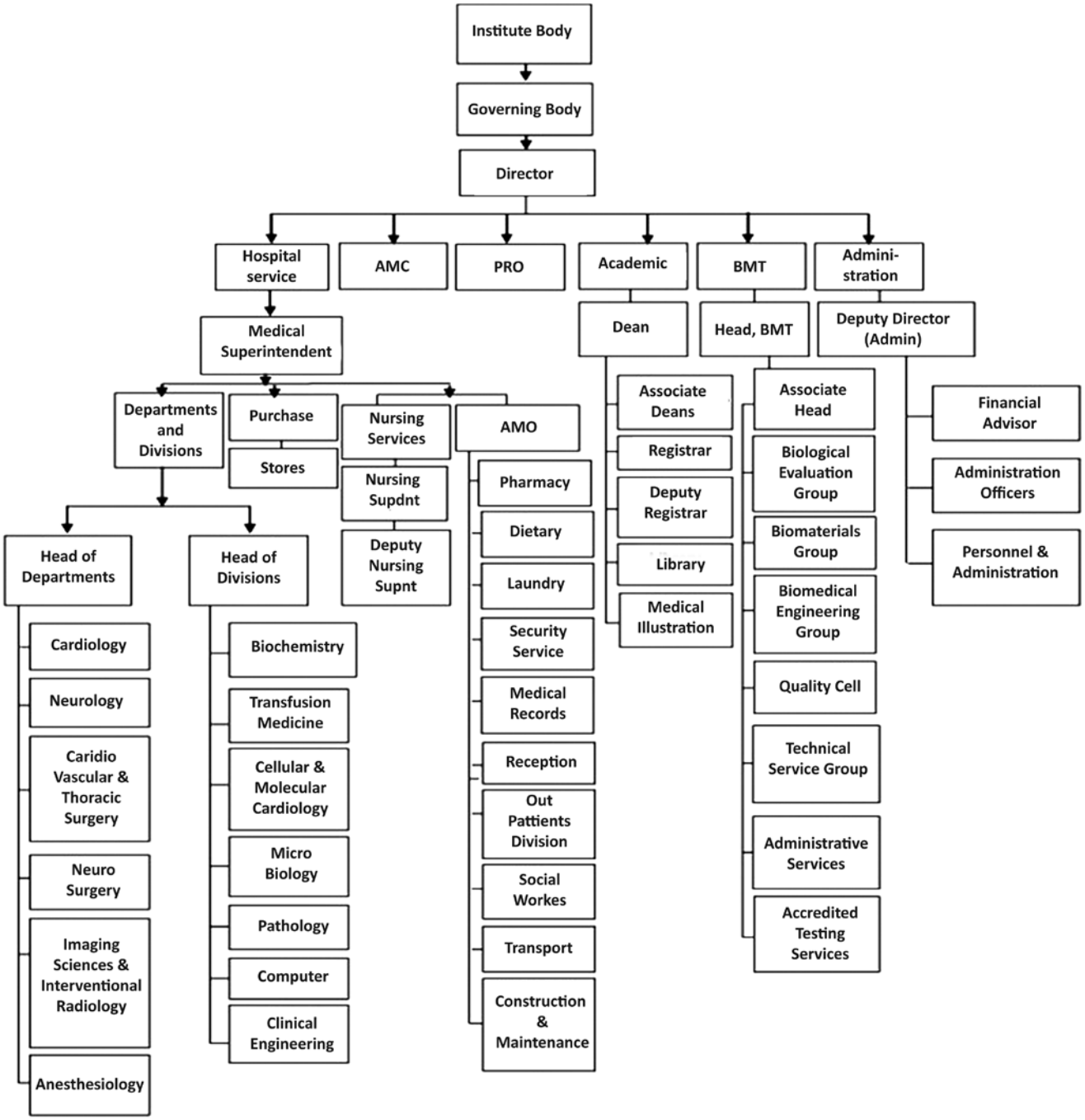
- Dr.Manoj Komath won the Science Literature Award (2012) for the best Science book in Malayalam, constituted by the Kerala State Council for Science Technology and Environment.
- Dr R S Jayasree received PSN National award for Excellence in Science and Technology from Dr.T.Ramasamy (Secretary, DST) on 23rd April 2012
- Dr VS Harikrishnan received the overseas scholarships and grants to participate and present a paper at the Scand-Las (Scandinavian Association of Laboratory Animal Science) Conference held in Tallinn, Estonia in April 2013 granted by The Scandinavian Society of Laboratory Animal Science and ravel Grant to attend the Masters course held at The University of Copenhagen from SGV- laboratory animal Science Association of Switzerland.

- Dr. Kalliyana Krishnan was honored by HLL Lifecare Ltd, Trivandrum on the occasion of the launch of the IUD EMILY at Bangalore on 18th October 2012
- Dr TV Anilkumar was awarded Cutting-Edge Research Enhancement and Scientific and Training Award (CREST award, 2011-2012) of the Department of Science and Technology
- Sreepriya.C.S., Executive Secretary to Director-cum-Ethics Committee Coordinator has been selected for IRB Training Program conducted by National Institutions of Health, Maryland, Bethesda, United States of America from 4th September to 31st December 2012. The training was attended by IRB Administrators from three different countries: India, China and Uganda. This training was intended to impart research ethics education and Institutional Review Board Management to the officials who were from different parts of the World.
- Ms. Deepa R was awarded the Biomaterials Best Poster Award (2012) at the 9th World Biomaterial Congress at Chengdu, China between 1st -5th June 2012 for the poster on Development of a Potential Bio-artificial Skin Graft Using Cholecyst-Derived Extracellular Matrix (Deepa R, Vineetha VP, Jaseer M and Anilkumar TV)
- Ms. Sidhy Viha secured Bajpai-Saha Best Paper award at the International conference of Biomaterials Implant Devices and Tissue Engineering (BIDTE 2012), Rajalakshmi Engineering College, Chennai during January 6-8, 2012 for the study entitled Functional evaluation of a polysaccharide-protein hydrogel as a packed bed scaffold for liver tissue engineering, (Sidhy Viha CV, Sarika PR, Sajin Raj RG, Nirmala Rachel James and Anil Kumar PR)
- Best Poster Presentation Award (First) for the poster titled "Lighting the Path: Cell Tracking in Complex 3-D Ceramic Scaffolds", (BF Fernandez, Dr. H. K. Varma, Dr. Annie John) during the XXIII Conference of the Society for Biomaterials and Artificial Organs (India) at the Indian Institute of Science, Bangalore, December 9 – 11, 2012.
- Best Poster Presentation Award (Third) for the poster titled "Strontium Alginate Scaffold for Nucleus Pulposus Tissue Engineering", (Mir Mahmoud Mortazavi, Suresh Babu S, Dr. H. K. Varma, Dr. Annie John) during the XXIII Conference of the Society for Biomaterials and Artificial Organs (India) at the Indian Institute of Science, Bangalore, December 9 – 11, 2012.

- Dr. Annie John won "First Award" for Best Poster in Researcher Category at the International Conference New Age Science and Technology for Sustainable Development & "3rd" Annual Conference of Indian JSPS Alumni Association on 6th and 7th August 2012 held at the CSIR-National Environmental Engineering Research Institute (NEERI), Nehru Marg, Nagpur, for her poster "Regenerative Medicine – concept to practical application" (Annie John , H.K.Varma, Susan Mani, Beena G. Mohan, Fernandes F.B, Sunitha Chandran, Mir Mahmoud Mortazavi & Thasneem Hadi E.K.)
- The poster "Development of an in vitro testing model for aerosols and drugs" (Ashna U, Lynda.V.Thomas, Prabha D Nair & A Maya Nandkumar) won Second award for Best poster in researcher category at the International Conference on new Age Science and Technology for sustainable development and 3rd Annual Conference of Indian JSPS Alumni association. 2012.
- Dr. Anugya Bhatt won 2nd best poster at TCS-Kolkatta
- Dr. P.V. Mohanan received the 'JSPS Bridge Fellowship 2012' from the Japan Society for Promotion of Science, Govt. of Japan.
- Dr. Vidya Raj was awarded the best Ph D thesis award of the Society of Polymer Science, Trivandrum Chapter for the year 2012

- Dr. Bindu P. Nair, DST-Inspire Faculty Fellow won the "Young Scientists Award" instituted by the Kerala State Council for Science, Technology and Environment (KSCSTE) for the year 2012.
- Dr Neethu Mohan (CHVF Fellow) became Editorial board member of journal "Tissue Engineering Part A, B & C"
- Fulbright Nehru Post Doctoral Fellowship 2012-2013 was awarded to Dr. Lynda V.Thomas, Research Associate to conduct Post Doctoral research at Duke Universtity USA for a period of one year.

Administration


Institute Body
Governing Body
Director
Hospital service
AMC
PRO
Academic
BMT
Admini-stration
Medical Superintendent
Dean
Head, BMT
Deputy Director (Admin)
Departments and Divisions
Purchase
Stores
Nursing Services
Nursing Supdnt
Deputy Nursing Supnt
AMO
Associate Deans
Registrar
Deputy Registrar
Library
Medical Illustration
Associate Head
Biological Evaluation Group
Biomaterials Group
Biomedical Engineering Group
Quality Cell
Technical Service Group
Administrative Services
Accredited Testing Services
Financial Advisor
Administration Officers
Personnel & Administration
Head of Departments
Head of Divisions
Cardiology
Neurology
Caridio Vascular & Thoracic Surgery
Neuro Surgery
Imaging Sciences & Interventional Radiology
Anesthesiology
Biochemistry
Transfusion Medicine
Cellular & Molecular Cardiology
Micro Biology
Pathology
Computer
Clinical Engineering
Pharmacy
Dietary
Laundry
Security Service
Medical Records
Reception
Out Pattients Division
Social Workes
Transport
Construction & Maintenance

Message from the Acting Dy Director

Personnel and Administrative Division supports the Line Functions of various departments and divisions of the Institute in general and Human Resource Management in particular. Looking from the objectives of the Institute, the requirement of highly skilled and motivated staff, their development for the sustained growth of the Institute in terms of quality and quantity are of prime importance. Well-defined staffing policies, updated Recruitment and Selection Rules and standard operating procedures are in place to ensure that sufficient, qualified; skilled and motivated staff is in position as and when required. Keeping pace with the healthy and sustained growth, Institute continued its initiatives to develop promotional avenues, tempering merit and seniority, to ensure talent retention and sustain their motivation. Senior and Junior Staff selection Committees are statutory bodies that make selection of permanent staff. E-recruitment and e-selection initiatives have already been taken to enhance transparency, efficiency and effectiveness.

As on 31.03.2013, we have 928 permanent staff ranging from the housekeeping personnel to technical/ supporting staff, Nurses, Scientists, Engineers, Super specialty medical and non-medical doctors. Apprentices belonging to different trades come to 78 in number whereas temporary and project staff put together comes to 250. Certain non-core functions such as house keeping, guarding, gardening etc. have been contracted out in tune with the present day Management System. We continued to enjoy cordial and harmonious relations with different Employees' Organizations. Thanks to the leadership not even a single man-hour was lost on account of staff disturbance.

Introduction of Administrative Committee headed by Dy. Director (A) to enhance participative decision making process, Revision of Store Purchase Procedure keeping in view GFR provisions, Preparation of Office Manual, establishment of Training Cell for planned HR intervention for the learning and development of Staff, constitution of high level Committee for Staff Grievance Redressal and Supportive Mechanism for personal issues are some of the notable initiatives/ achievements during the year.

The Finance and Accounts Division headed by Financial Advisor advises the higher authorities in formulating financial policies and programmes, continues to maintain the accounts and fulfills the statutory requirements appreciably well.

We maintain an effective internal control mechanism that provides assurance on administrative, financial operations of the institute through Internal Audit Division that is supervised by an

Audit Officer (on deputation through o/o C & AG). We also have a Vigilance Cell carrying out various vigilance activities by means of inspections, detailed examinations, study/scrutiny etc. as the situation demands.

The Institute complies with government directives in regard to Reservation Policies and also adheres to the prescriptions in regard to the Right to Information Act, 2005 to ensure transparency, accountability and good governance.

Overall, managerial and administrative functions bestowed upon different arms of the Institute could give necessary impetus to sustain momentum for development.

Sasikumar.S
Ag.Deputy Director(Admn)

Staff Details

Mr. Sasikumar.S
Ag.Deputy Director(Admn)

Ms. Shiny George Ambat
Financial Advisor

Ms. Sreepriya.C.S.
Exe.secretary To The Director Cum Ec.coordinator

Mr. Pramod.S
Secretary To The Director

Mr. Vipin .C.G.
Sr. Accounts Officer

Ms. Indira Antherjanam.I.N.
Administrative Officer-C

Mr. Velappan Nair.S
Administrative Officer-B

Mr. Venkita Subramania Iyer.N
Accounts Officer-A

Ms. Helen Joseph
Purchase & Store Officer-C

Mr. Unnikrishnan.A.R.
Purchase & Store Officer-A

Mr. Rajasekhar .K.
Asst.Purchase & Store Officer-D

Mr. Lekshmanan Pillai.C
Asst.Accounts Officer-A

Ms.Ponnamma.K
Asst.Accounts Officer-A

ADMINISTRATIVE BODIES

INSTITUTE BODY

Dr. R. Chidambaram
Principal Scientific Advisor to the Government of India
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Dr. Shashi Tharoor (Till October 2012)
Hon'ble Member of Parliament (Lok Sabha)
TC 26/1592
Government Press Road
Pulimood,
Thiruvananthapuram-1

Prof. P.J. Kurien (Till August 2012)
Hon'ble Member of Parliament (Rajya Sabha)
Pallathu Veedu, Paduthodu P.O.
Vennikkulam, THIRUVALLA.

Dr. Rajan Sushant
Hon'ble Member of Parliament (Lok Sabha)
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Dr. T. Ramasami
Secretary to Government of India
Department of Science & Technology
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Director General of Health Services
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Secretary to the Govt. of India
Ministry of Health and Family Welfare
Nirman Bhavan, Maulana Azad Road
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Secretary to the Govt. of India
Department of Higher Education
Ministry of Human Resource Development
Shastri Bhawan
New Delhi – 110001.

Ms.Anuradha Mitra.IDAS
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Secretary to the Govt. of Kerala
Department of Health & Social Welfare
Secretariat
Thiruvananthapuram - 695 001.

Dr. Rajasekharan Pillai
Executive Vice President
Kerala State Council for Science,
Technology & Environment
Sasthra Bhavan, Pattom
Thiruvananthapuram – 695 004.

Vice Chancellor
University of Kerala
Thiruvananthapuram – 695 034.

Prof. R. C. Deka
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All India Institute for Medical Sciences
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New Delhi – 110029.

Dr. Baldev Raj
Former Director
Indira Gandhi Centre for Atomic Research (IGCAR)
Kalpakkam - 603 102,
Tamil Nadu.

Dr. Jairup Singh
Vice Chancellor
Central University of Punjab
Bathinda
Punjab – 151 001.

Prof. P. Balaram
Director
Indian Institute of Science
Bangalore - 560 012.

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Director, Academics
Tata memorial Hospital
Dr.E Borges Road, Parel
Mumbai - 400012

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TIFR, Mumbai. 10 Rohini CHS, Sector 9A,
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Professor & Head
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Bagayam, Vellore – 632002.Tamil Nadu.

Prof. Ashok Misra
Chairman
Intellectual Ventures India
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Bangalore – 560 025.

Dr.K.Radhakrishnan
Director, Sree Chitra Tirunal Institute for
Medical Sciences and Technology
Thiruvananthapuram - 695 011

Dr.C.P.Sharma (Acting Head, BMT Wing)
Sree Chitra Tirunal Institute for
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GOVERNING BODY

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Director General of Health Services
Ministry of Health & Family Welfare,
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Former Director
Indira Gandhi Centre for Atomic Research (IGCAR)
Kalpakkam - 603 102, Tamil Nadu.

Dr. V.N. Rajasekharan Pillai
Executive Vice President
Kerala State Council for Science,Technology & Environment
Sasthra Bhavan, Pattom
Thiruvananthapuram - 695 004.

Dr. Kailash S. Sharma
Director, Academics
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Dr.K.Radhakrishnan
Director, Sree Chitra Tirunal Institute for
Medical Sciences and Technology
Thiruvananthapuram - 695 011

Dr.G.S.Bhuvaneshwar (Till
Head , Biomedical Technology Wing

Dr.C P Sharma (Acting Head)
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Dr.P.S.Appukuttan
Professor & Head, Dept.of Biochemistry
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Shri. Justice M. R. Hariharan Nair
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Acting Head, B.M.T. Wing, Satelmond Palace
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Thiruvananthapuram-12

Ms. Sreepriya.C S
Coordinator, IEC (Executive Secretary to the Director-cum-EC.Co.)
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Institutional Committee for Stem Cell Research and Therapy (ICSCRT)

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Director, SCTIMST,
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Chairman Cancer Institute &
Institute of Molecular Medicine,
Amrita Institute of Medical Sciences,
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KJK Hospital, Nalanchira
Trivandrum,

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Scientist-E1, Neurobiology Division,
Rajiv Gandhi Center for Biotechnology,
Thiruvananthapuram - 695014

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Scientist 'G', Thrombosis Research Unit
BMT Wing, SCTIMST, Trivandrum - 12

Dr. Prabha D. Nair — Convener
Scientist G, Division of Tissue Engineering and Regeneration Technology ,
BMT Wing, SCTIMST, Trivandrum - 12

Dr. Anoop Kumar T. — Member
Member Secretary, IEC, & Scientist 'F',
Molecular Medicine, BMT Wing,
SCTIMST Trivandrum-12

Ms. Sreepriya.C S — Coordinator
Exe. Secretary to the Director-cum-EC.Co
SCTIMST, Trivandrum-11

STANDING COMMITTEES

Academic Committee

Prof.K.Radhakrishnan (Chairman)
Director
SCTIMST, Thiruvananthapuram.

Vice Chancellor
University of Kerala, Thiruvananthapuram

Prof.Jayaprakash Muliyil
Professor of Community Medicine
Christian Medical College, Vellore

Dr.M.Radhakrishna Pillai
Director
Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram.

Dr.G.K.Suraishkumar
Professor of Biotechnology, I.I.T., Madras.

Head, BMT Wing, SCTIMST
Poojappura, Thiruvananthapuram

Dr.J.M.Tharakan
Dean (Academic Affairs) & HOD, Cardiology, SCTIMST

Dr.Suresh Nair N.
Professor of Neurosurgery, SCTIMST

Dr.K.R.Thankappan
Professor, AMCHSS, SCTIMST

Dr. C.P. Sharma
Scientist 'G', SCTIMST

Dr.Rupa Sreedhar
Professor of Anaesthesiology, SCTIMST

Dr.Prabha D. Nair
Scientist 'G', SCTIMST

Dr.A.V.George
Registrar, SCTIMST (Convener)

Building Committee

Dr.K.Radhakrishnan (Chairman)
Director
SCTIMST, Thiruvananthapuram

Secretary to the Government of Kerala
Health & Family Welfare
Thiruvananthapuram

Shri. K.N. S Nair
Head, Engineering Maintenance Division
VSSC (Retd)
"Deepti", Kazhakuttan, Thiruvananthapuram

Head, BMT Wing, SCTIMST
Poojappura, Thiruvananthapuram

Shri. K.M. Nair
Former Head CMD (Rtd), VSSC/ISRO
Financial Advisor
SCTIMST, Thiruvananthapuram

A member to be co-opted by the
Director as and when necessary

Finance Committee

Dr.K.Radhakrishnan (Chairman)
Director
SCTIMST, Thiruvananthapuram

Dr. T. Ramasami
Secretary to the Govt. of India
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Ms. Anuradha Mitra IDAS
Joint Secretary to Goverment of India &
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Head, BMT Wing, SCTIMST

Mrs. Shiny George Ambat
Financial Advisor (Ex-Officio Convenor)
SCTIMST, Thiruvananthapuram

Senior Staff Selection Committee

Dr.K.Radhakrishnan (Chairman)
Director
SCTIMST, Thiruvananthapuram

Head, BMT Wing, SCTIMST, Poojappura
Thiruvananthapuram

Prof. Jayaprakash Muliyil
Professor & Head of Community Medicine
Christian Medical College, Vellore

Nominee of the Secretary
Department of Science & Technology
Govt. of India, New Delhi - 110 016

A Senior Professor of SCTIMST

An External Expert nominated by the
President of the Institute

Junior Staff Selection Committee

Medical Superintendent
SCTIMST
Thiruvananthapuram

Head, BMT Wing, SCTIMST, Poojappura
Thiruvananthapuram

Shri. P. B. Sourabhan
Deputy Director (Admn)(upto 27-6-2012)
SCTIMST, Thiruvananthapuram

Nursing Superintendent
SCTIMST, Thiruvananthapuram

Dr. Kalliyana Krishnan V
Scientist 'G', BMT Wing

Representative of Academic Wing of the
Institute nominated by the Director
of the Institute

Institutional Ethics Committee

Chairman-IEC
Shri.Justice M .R. Hariharan Nair
'LIVRA-57', Link Valley
Kakkanad, Eranakulam ,Cochin-682030

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Director
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State Project Director
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Head, B.M.T. Wing
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Co-ordinator, IEC
Ms.Sreepriya C.S
Executive Secretary to the Director.cum.
Ethics Committee Co-ordinator
SCTIMST, Thiruvananthapuram-695011

Technology Development Committee

Dr K. Radhakrishnan – Chairman
Director, SCTIMST

Dr Baldev Raj
Former Directror
IGCAR, Kalpakkam

Dr K. Balasubramanian
Director,
NFTDC, Hyderabad

Dr R. Krishna Kumar
Professor
IIT Madras, Chennai

Dr S Radhakrishnan
Formerly Scientist-G
NCL, Pune

Dr M. Radhakrishna Pillai
Director
RGCB, Thiruvananthapuram

Dr K.G.Rajendran
Formerly Vice President
USV Ltd, Mumbai

Dr K. Jayakumar
HOD and Sr Prof CVTS
SCTIMST

Dr Sanjeev Thomas
Prof. of Neurology
SCTIMST

Dr V Kalliyanakrishnan
Scientist-G
BMT Wing, SCTIMST

Convenor
Head, BMT Wing

OTHER INTERNAL WORKING COMMITTEES

Biosafety Committee

Dr. Mira Mohanty, Associate Head, BMT Wing- Chairperson
Dr Renuka Nair- Scientist G (Senior Grade), Div. of Cellulat & Molecular Cardiology
Dr. Lissy Kalayana Krishnan- Scientist G, Thrombosis Research Unit
Dr. P. Ramesh – Scientist F, Polymer Processing
Dr. Kavita Raja – Professor, Division of Microbioology
Dr. Jawahar SK- Administrative Medical Officer and Biosafety Officer.
Dr. Satheesh Mundayoor - Rajiv Gandhi Center for Biotechnology, DBT nominee
Dr. Moinak Banerjee- Rajiv Gandhi Center for Biotechnology, External expert.
Dr. A. Maya Nandkumar, Scientist E- Secretary and Convener

Hospital Management Committee

Dr. R. Sankarkumar, Medical Superintendent, SCTIMST
HOD , Dept. of Cardiology
Dr. Muralidharan Nair, HOD, Dept. of Neurology
Dr. Suresh Nair,HOD , Dept. of Neurosurgery
Dr. Jayakumar K,HOD , Dept. of CVTS
Dr. Kapilamoorthy. T R.,HOD , Dept. of IS & IR
Dr Ramesh Chandra Rathod, HOD, Dept. of Anesthesiology
Dr. S. K. Jawahar, Administrative Medical Officer
Smt. Sudhamani Amma, Nursing Superintendent i/c
Mr. N. G. Thampi, SMRO

Hospital Infection Control Committee

Dr. R. Sankarkumar, Medical Superintendent
Dr. Jayakumar K,HOD , Dept. of CVTS
Dr. Suresh Nair,HOD , Dept. of Neurosurgery
Dr. Kavita Raja, HOD,Dept. of Microbiology
Dr. Jaisy Mathai, HOD, Dept. of Transfusion Medicine
Dr. Sanjeev V. Thomas, Professor, Dept. of Neurology
Dr. Thomas Koshy, Addl. Professor, Dept. of Anesthesiology
Dr. Harikrishnan S, Addl Professor, Dept. of Cardiology
Dr. Kesavadas C, Addl Professor, Dept. of IS &IR
Dr. S. K. Jawahar, Adminsitrative Medical Officer-Convener
Dr. Baiju S. Dharan, Assoc. Professor, Dept. of CVTS
Dr. Krishnakumar K, Assoc. Professor, Dept. of Neurosurgery
Mr. Mohanlal G, Scientist G, DCE

Hospital Transfusion Committee

Dr. Jaisy Mathai, Scientist G Dept of Transfusion Medicine	Chiarperson
Dr. Shrinivas V.G, Additional Prof, Anaesthesiology	Member
Dr. Vivek.V.Pillai, Assistant Prof, CVTS	Member
Dr. Krishnakumar,Assistant Prof., Neurosurgery	Member
Dr. Bijulal.S,Assistant Prof, Cardiology	Member
Dr. Anugya Bhatt,Scientist C, Thrombosis Research unit	Member
Smt. Sudhamoni Amma, i/c. Nursing Superintendent	Member
Dr.Sathyabhama.S,Scientist F Dept. of Transfusion Medicine	Convener

Institutional Animal Ethics Committee (IAEC)

Head, BMT Wing, (Chairman)
Dr. Renuka Nair, Head, Cellular & molecular Cardiology, Biological Scientist
Dr. T.V. Kumary, Scientist G.
Dr. P.R.Umashankar, Scientist E, Veterinarian
Dr. Annie John, Scientist E, Biological Scientist
(Member Secretary, IAEC)
Dr. Robin D Culas – Main CPCSEA Nominee
Dr. Arun George - Link CPCSEA Nominee
Mr. A.G.Babu - Non Scientific Socially Aware Member
Dr. K.R.Chandra Mohan Nair – Scientist from Outside the Institute

Library Committee

Dean and HOD, Cardiology(Chairman)
Dr. Sanjeev Thomas, Professor, Neurology
Dr. Kavita Raja, Professor, Microbiology
Dr. Lissy K. Krishnan, Scientist 'G', BMT Wing
Dr. S. Harikrishnan, Additional Professor, Cardiology
Shri. Nagesh D.S., Scientist 'F', BMT Wing
Dr. K. Srinivasan, Associate Professor, AMCHSS
Dr. Venkateshwaran S., Sr. Resident, DM Cardiology
Dr. Sohini Banerjee, MPH Student
Ms. Saumya Gopalan, DNN I Year Student
Mr. Suhesh M.S., DBBT Student
Shri. Jayachandra Das, Librarian-cum-Infmn. Officer(Convener)

Official Language Implementation Committee

Director (Chairman)
Dy. Director, Admn
Dr. C.P. Sharma, Scientist G(Sr.Grade)
Mrs. Shiny George Ambat, FA
Dr. Kamalesh K. Gulia, Scientist D
Dr. Anugya Bhatt, Scientist C
Dr. P.P. Saramma, Senior Lecturer
Dr. Usha Kandaswamy, Sr.MSW
Dr. A. V. George, Registrar (Convener)

Research and Publication Cell

Dr. R. Renuka Nair, Scientist G, (Sr.Grade)	Associate Dean(R&P Cell)

Dr. Sundari Ravindran T.K, Professor	Member
Dr. Sreenivasan K, Scientist G	Member
Dr. Harikrishnan S, Additional Professor	Member
Dr. Rathore Chaturbhuj Gopal Singh, Assistant Professor	Member
Dr. Srinivas G, Scientist D	Member
Dr. Kamalesh K. Gulia, Scientist D	Member
Dr. K. Srinivasan, Associate Professor	Convener

Supporting Staff

Shri Balram S, Scientist F
Shri Suresh Kumar B, Engineer C
Shri Lijikumar G, Chief Technician MI
Smt. Vasanti S, Artist MI
Smt. Thankamoni S, (Till Feb 2012)
Shri Phil Roy, Manager, Project Cell

Technical Management Committee

Head, BMT Wing(Chairman)
Dr. C.P.Sharma, Scientist 'G', Sr.Grade
Mr. D.S.Nagesh, Scientist 'G'
Dr. Ramesh.P, Scientist 'F'
Dr. Annie John, Scientist 'E'
Dr. H.K.Varma, Engineer 'F'
Mr. C.V.Muraleedharan, Scientist 'G'
Mr. Balram.S, Scientist 'F'
Mr. O.S.Neelakantan Nair, Scientist 'G'
Dr. Sreenivasan.K, Scientist 'G'
Dr. Maya Nandkumar, Scientist 'E'
Dr. Mira Mohanty, Scientist 'G', Sr.Grade
Dr. Kumary.T.V, Scientist 'G'
Dr. Mohanan.P.V, Scientist 'E'
Dr. Lissy.K.Krishnan, Scientist 'G'
Dr. P.R.Umashankar, Scientist 'E'
Mrs. Helen Joseph, Stores & Purchase Officer Gr.II
Mr. Prasanna Kumar.K, Security Officer
Mr. Selvaraj Kumar.A, Administrative Officer Gr.II
Mr. Jayachandra Das.S, Librarian cum-Information Officer

Technical Advisory Committee (TAC)

Technical Advisory Committee for Studies on Medical Devices:

Head, BMT Wing (Chairman)
Shri. C.V. Muraleedharan, Scientist 'G', BMT Wing
Dr. Girish Menon, Additional Professor, Neurosurgery
Dr. Anoop Kumar T., Scientist 'F', BMT Wing (Member Secretary)

Technical Advisory Committee for Clinical Studies (not including medical devices):

Dr. V.Mohankumar, Emeritus Professor, Sleep Disorder Center (Chairman)

Dr. R.Sankar Kumar, Medical Supdt. & Sr.Professor of CVTS
Dr. T.V.Kumari, Scientist G, BMT Wing
Dr. Thomas Koshy, Professor, Anaesthesiology
Dr. C.Kesavadas, Additional Professor, IS & IR
Dr. K.Srinivasan, Associate Professor, AMCHSS
Dr. Narayan Namboodiri, Associate Professor, Cardiology
Dr. Chaturbhuj Gopal Singh Rathore, Assistant Professor, Neurology
Dr. K.Shivakumar, Scientist G, Cellular & Molecular Cardiology (Member Secretary)

Technical Advisory Committee for Studies on Public Health:

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Dr. S. Sivasankaran, Additional Professor, Cardiology
Dr. Lissy K. Krishnan, Scientist 'F', BMT Wing
Dr. Mala Ramanathan, Additional Professor, AMCHSS (Member Secretary)

Complaints Committee for redressal of complaints on Sexual harassment of working women

Dr. Rupa Sreedhar, Professor (Chairperson)
Dr. Renuka Nair, Scientist 'G' (Senior Grade)
Dr. Mala Ramanathan, Addl. Professor
Dr. Lissy K. Krishnan, Scientist 'G'
Ms. Sudhamani Amma S., Nursing Supdt. i/c.
Smt. Nalini Nayak, Secretary, SEWA, Thiruvuananthapuram

Right to Information

(Published as required under section 41(b), Chapter II of Right to Information Act, 2005.)
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Vigilance officer

Head AMCHSS

Statement of Accounts

Balance Sheet

Income & Expenditure Account

Schedules Forming Part of Accounts

Receipt & Payments Accounts of the year 2012-2013

Provident Fund Account for the year ended 31.03.2013

Accounts of NCMMR, Trivandrum

Separate Audit Report

BALANCE SHEET AS AT 31st MARCH 2013

		2012-13	2011-12
CORPUS/CAPITAL FUND AND LIABILITIES	Schedules	[Rs.]	[Rs.]
CAPITAL FUND	1	2584413442	2768668378.88
RESERVES & SURPLUS	2	460849639	408563899.45
EARMARKED ENDOWMENT FUNDS	3	261440621	236774177.31
SECURED LOANS & BORROWINGS	4	0.00	0.00
CURRENT LIABILITIES & PROVISIONS	7	155141371	132100430.22
TOTAL		3461845074	3546106885.86
ASSETS			
FIXED ASSETS	8	1476923022	1469191220.49
INVESTMENTS FROM EARMARKED ENDOWMENT FUNDS	9	578801098	517764355.45
CURRENT ASSETS , LOANS, ADVANCES ETC	11	1406120953	1559151309.92
MISCELLANEOUS EXPENDITURE (TO THE EXTENT NOT WRITTEN OFF)		0.00	0.00
TOTAL		3461845074	3546106885.86
SIGNIFICANT ACCOUNTING POLICIES	24		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25		

S/d-
FINANCIAL ADVISOR

S/d-
DIRECTOR

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st MARCH 2013

INCOME	Schedules	2012-13	2011-12
		[Rs.]	Rs.
Income from Sales / Services	12	488840451	394775138.50
Grants Received from Govt of India(Non Plan)	13	195919478	239495165.00
Fees/Subscription	14	6910864	5053867.00
Income from Investments (Income on Investment from earmarked/endow.Funds transferred to Funds)	15	23967405	27294531.45
Income from Royalty, Publication etc	16	272560	2302598.00
Interest Earned	17	93326443	78409570.91
Other Income	18	18401941	4296687.70
Total		827639142	751627558.56
EXPENDITURE			
Establishment Expenses	20	885686843	873490403.25
Other Administrative Expenses	21	607850584	458779828.98
Bank Charges	23	189686	118974.00
Depreciation (Net Total at the year-end-corresponding to Schedule 8)		143407167	143965460.78
Total		1637134280	1476354667.01
Balance being Excess Expenditure over Income		809495138	724727108.45
Add: Transfer to Special Reserve Account		60495283	59744954.45
BALANCE BEING DEFICIT CARRIED TO CAPITAL FUND		869990421	784472062.90
SIGNIFICANT ACCOUNTING POLICIES	24		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25		

S/d-
FINANCIAL ADVISOR

S/d-
DIRECTOR

SCHEDULES		
	2012-13	2011-12
PARTICULARS	[Rs.]	[Rs.]
SCHEDULE 1 - CORPUS/CAPITAL FUND		
Balance as at the beginning of the year	4085196272.32	4056247692.39
Less Depreciation up to the end of the previous year	1316527893.36	1172562432.61
Net balance at the beginning of the year	2768668378.96	2883685259.78
Add: Plan Grants received from Government of India	714190522.00	670504835.00
Add: Grants received from Others for Capital Assets(WCP)	0.00	0.00
Add:Contribution towards Corpus/Capital Fund	0.00	0.00
Deduct: Balance of net expenditure transferred from the Income and Expenditure Account	869990421.20	784472062.90
Less:Value of Assets Written off during the year	28455037.53	1049653.00
DeductTransfer to BMT/Add Transfer from CHO	0.00	0.00
BALANCE AS AT THE YEAR-END	2584413442.23	2768668378.88
SCHEDULE 2-RESERVES AND SURPLUS:		
1. Capital Reserve:		
As per last Account	--	--
Addition during the year	--	--
Less:Deduction during the year	--	--
2. Revaluation Reserve:		
As per last Account	--	--
Addition during the year	--	--
Less: Deductions during the year	--	--
3. Special Reserves:		
As per last Account	408563899.5	355187993.70
Addition during the year (Current year transfer-Decrease in provision)	52285739.53	53375905.75
Less: Deductions during the year	--	--
4. General Reserve:		
As per last Account	--	--
Addition during the year	--	--
Less: Deductions during the year	--	--
TOTAL	460849638.98	408563899.45

	2012-13	2011-12
PARTICULARS	[Rs.]	[Rs.]
SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS		
a) Opening balance of the funds	--	--
b) Additions to the funds:	--	--
i. Donations/grants	--	--
ii. Income from Investments made on account of funds	--	--
iii. Other additions (Specify nature)	--	--
TOTAL (a+b)	--	--
c) Utilisation / Expenditure towards objective of funds	--	--
i. Capital Expenditure	--	--
- Fixed Assets	--	--
- Others	--	--
Total (Detailed Schedule Attached)	--	--
ii. Revenue Expenditure	--	--
- Salaries, Wages and allowances etc.	261440621.19	236774177.31
- Rent	--	--
- Other Administrative expenses	--	--
Total	261440621.19	236774177.31
TOTAL (c)		
NET BALANCE AS AT THE YEAR-END (a+b+c)	261440621.19	236774177.31

	SCHEDULE 3-EARMARKED/ENDOWMWNT FUNDS	FUND-WISE BREAK UP 2012-2013				
PROJ Code	NAME OF GRANTEE/PRINCIPAL INVESTIGATOR	OPENING BALANCE	ADDITIONS TO FUND			
			GRANTS	OTHER RECEIPTS	TOTAL	
5000	PROJ-MISCELLANEOUS	1126141	7806796	645227	9578164	
5008	DR.C.KESAVADAS	10916	0.00	0.00	10916	
5033	MPH PROGRAMME	1480	0.00	0.00	1480	
5040	PROJ. DR.ASHA VIJAYARAGHAVAN	1146122	0.00	16545	1162667	
5055	GRANT/ROCKFELLER FOUNDATION,USA	686120	0.00	0.00	686120	
5065	M.D.PHARMA(DR,ASHA)	398587	0.00	0.00	398587	
5078	PROJECT GRANT/DR MALA RAMANATHAN	5810	0.00	0.00	5810	
5082	T V HEMALATHA/HEALTHAWARENESS PROGRAM	127537	0.00	0.00	127537	
5088	DOUBLE BLIND PLACEBO CONT. PARALLEL	63023	0.00	0.00	63023	
5091	EURO REG. OF EPILEPSY & PREGNANCY	71796	0.00	0.00	71796	
5094	KERALA STATE AIDS CONTROL SOCIETY	41560	0.00	0.00	41560	
5100	AMC/MAC ARTHUR FOUNDATION/02-70546	46315	0.00	0.00	46315	
5103	CLINICAL TRIAL/QUINTAILSPEC/DR.RADHAKRISHNAN	314637	0.00	0.00	314637	
5108	EVAL.SUB-TYPES DEMENTIA/DR.MATHURA	15801	0.00	0.00	15801	
5110	TOBACCO CESSATION & RESEARCH / DR.THANKAP	4884717	5084491	126509	10095717	
5119	STAKE HOLDER-PERCEPT/INST.REV BO	151590	0.00	0.00	151590	
5128	INDENT. OF MACOBACTERIAL/DST/ V.V.RADHAKRISHN	136107	0.00	0.00	136107	
5130	TELE-HEALTH & MEDICAL EDUCATION/JAWAHAR	1032168	0.00	0.00	1032168	
5133	COMMUNITY BASED INTERVENTION/WHO	215059	0.00	0.00	215059	
5135	A 16-WEEK,DOUBLE BLIND/ASHA KISHORE	1670202	0.00	0.00	1670202	
5137	MECHANISM OF ANTICANCER/DAE, BRS	2761	0.00	0.00	2761	
5139	A 24 WEEK, MULTICENTER/DR. MATHURANATH	3127766	0.00	722	3128488	
5140	HARVARD SCHOOL OF PUBLIC HEALTH	91794	0.00	0.00	91794	
5142	BANKING FOR BETTER HEALTH-MEDISAVE	153911	0.00	0.00	153911	
5146	DEVELOPMENT OF SPECT	11026	0.00	0.00	11026	
5147	DEVELOPMENT OF SPECT	39137	0.00	0.00	39137	
5150	PROTOCOL 6002-INT 001	359797	0.00	0.00	359797	
5153	DEV REF. MANUAL FOR	155802	0.00	0.00	155802	
5155	COMM BASED DETECTION	209315	0.00	0.00	209315	
5156	TSUNAMI PROJECT	408186	0.00	0.00	408186	
5159	NCD RISK FACTOR	71123	0.00	0.00	71123	
5160	BRAIN MAPING & BASIC NEUROGENETIC/DR.P.S MATHURANATH	161154	0.00	0.00	161154	
5161	DOSE RANGING STUDY:CGHR	1975871	0.00	0.00	1975871	
5167	PROJ/SURVIVAL MECHANISM	209319	0.00	0.00	209319	
5168	PROJ/VERMEER STUDY	1530914	0.00	0.00	1530914	
5170	DR.ASHA KISHORE	1997261	0.00	0.00	1997261	
5173	DR.DINESH NAYAK	640691	0.00	0.00	640691	
5174	CHANGES IN SLEEP WAKEFULNESS-Dr.Mohanku.	49317	0.00	0.00	49317	
5175	SURGICAL TRAIL IN LOBAR INTRACEREBRAL	39125	0.00	0.00	39125	

	UTILISATION OF FUNDS								
	CAPITAL EXPENDITURE			REVENUE EXPENDITURE				TOTAL	NET BALANCE
	FIXED ASSETS	OTHERS	SUB TOTAL	SALARIES WAGES	RENT/ CONSUMABLES	OTHER ADM EXP	SUB TOTAL		
	0.00	0.00	0.00	5772757	461158	776152	7010067	7010067	2568097
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10916
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1480
	0.00	0.00	0.00	0.00	0.00	60912	60912	60912	1101755
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	686120
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	398587
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5810
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	127537
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63023
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71796
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41560
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46315
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	314637
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15801
	0.00	0.00	0.00	3267050	220004	1708380	5195434	5195434	4900283
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	151590
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	136107
	0.00	0.00	0.00	190000	0.00	58314	248314	248314	783854
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	215059
	0.00	0.00	0.00	80000	0.00	4166	84166	84166	1586036
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2761
	0.00	0.00	0.00	450515	27533	48393	526441	526441	2602047
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91794
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	153911
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11026
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39137
	0.00	0.00	0.00	33000	0.00	0.00	33000	33000	326797
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	155802
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	209315
	0.00	0.00	0.00	135919	0.00	0.00	135919	135919	272267
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71123
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	161154
	0.00	0.00	0.00	174000	0.00	46948	220948	220948	1754923
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	209319
	0.00	0.00	0.00	149298	0.00	0.00	149298	149298	1381616
	0.00	0.00	0.00	195000	0.00	0.00	195000	195000	1802261
	0.00	0.00	0.00	40500	0.00	3630	44130	44130	596561
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49317
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39125

	SCHEDULE 3-EARMARKED/ENDOWMWNT FUNDS	FUND-WISE BREAK UP 2012-2013				
PROJ Code	NAME OF GRANTEE/PRINCIPAL INVESTIGATOR	OPENING BALANCE	ADDITIONS TO FUND			
			GRANTS	OTHER RECEIPTS	TOTAL	
5176	WOMENT COMPONANT PLAN	59065	0.00	0.00	59065	
5180	DR.KANNAN SRINIVASAN	18308	0.00	0.00	18308	
5181	DR.ASHA KISHORE	-14350	0.00	0.00	-14350	
5182	DR.SANJEEV.V.THOMAS	2740580	0.00	5150	2745730	
5183	DR.K.R.THANKAPPAN	6364846	2843122	26952	9234920	
5184	DR.JAWAHAR	1630172	0.00	0.00	1630172	
5187	DR.SANJEEV.V.THOMAS	180586	0.00	0.00	180586	
5188	DR.K.RADHAKRISHNAN	214223	0.00	0.00	214223	
5189	DR.HARIKRISHNAN	1012	0.00	0.00	1012	
5190	DR.MALARAMANATHAN	42210	0.00	0.00	42210	
5191	DR.ASHA KISHORE	234562	0.00	0.00	234562	
5192	DR.K.R.THANKAPPAN	319176	0.00	1500	320676	
5193	DR.MALARAMANATHAN	71796	0.00	0.00	71796	
5194	DR.K.R.THANKAPPAN	1211211	0.00	833	1212044	
5196	DR.SHIVKUMAR	315267	0.00	0.00	315267	
5198	DR.RENUKA NAIR	211805	0.00	18892	230697	
5199	DR.JAYAKUMAR	644492	836000	0.00	1480492	
5201	DR.ASHA KISHORE	3832929	969060	0.00	4801989	
5203	STUDY IN MRI - ISIR	69329	0.00	0.00	69329	
5205	DR.SURESH NAIR	218344	0.00	0.00	218344	
5207	DR.JAYSREE/A.K.GUPTA	6692	0.00	0.00	6692	
5208	DR.K.SRINIVASAN	437535	0.00	0.00	437535	
5209	DR.S.HARIKRISHNAN	14290	11250	0.00	25540	
5210	DR.K.R.THANKAPPAN	993906	0.00	0.00	993906	
5212	DR.S.HARIKRISHNAN	534861	0.00	0.00	534861	
5213	AMC FUND	1475000	423576	0.00	1898576	
5214	DR.ASHA GOPINATHAN	172499	325000	0.00	497499	
5215	DR.V.V.RADHAKRISHNAN	298531	0.00	0.00	298531	
5216	DR.ASHA KISHORE	1122375	7020	1200	1130595	
5217	DR.K.SRINIVASAN	1010362	0.00	0.00	1010362	
5219	DR.BIJU SOMAN	1470580	0.00	0.00	1470580	
5220	DR.BIJU SOMAN	835218	0.00	2041	837259	
5221	DR.V.RAMANKUTTY	949156	0.00	0.00	949156	
5224	DR.C.KESAVADAS	255020	0.00	0.00	255020	
5226	DR.G.SRINIVAS	229945	1029000	0.00	1258945	
5227	DR.MURALIDHARAN NAIR	190075	793460	0.00	983535	
5228	DR.S.HARIKRISHNAN	340866	556500	0.00	897366	
5229	DR.C.KESAVADAS	221758	162000	0.00	383758	
5231	DR.V.V.RADHAKRISHNAN	261571	0.00	28688.00	261571	
5232	DR.ASHA KISHORE	97606	356984	234000	688590	

	UTILISATION OF FUNDS								
	CAPITAL EXPENDITURE			REVENUE EXPENDITURE				TOTAL	NET BALANCE
	FIXED ASSETS	OTHERS	SUB TOTAL	SALARIES WAGES	RENT/ CONSUMABLES	OTHER ADM EXP	SUB TOTAL		
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59065
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18308
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-14350
	117157	0.00	117157	913421	26788	255957	1196166	1313323	1432407
	0.00	0.00	0.00	1595006	854894	2130943	4580843	4580843	4654077
	0.00	0.00	0.00	0.00	0.00	266934	266934	266934	1363238
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	180586
	0.00	0.00	0.00	15000	0.00	23500	38500	38500	175723
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1012
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42210
	0.00	0.00	0.00	0.00	28184	0.00	28184	28184	206378
	0.00	0.00	0.00	0.00	0.00	49514	49514	49514	271162
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71796
	0.00	0.00	0.00	265400	0.00	83575	348975	348975	863069
	0.00	0.00	0.00	0.00	0.00	315267	315267	315267	0.00
	0.00	0.00	0.00	90048	83738	42369	216155	216155	14542
	0.00	0.00	0.00	348372	0.00	158493	506865	506865	973627
	0.00	0.00	0.00	473355	0.00	488734	962089	962089	3839900
	0.00	0.00	0.00	0.00	0.00	24086	24086	24086	45243
	0.00	0.00	0.00	0.00	0.00	5254	5254	5254	213090
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6692
	0.00	0.00	0.00	0.00	0.00	437535	437535	437535	0.00
	0.00	0.00	0.00	12500	0.00	0.00	12500	12500	13040
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	993906
	0.00	0.00	0.00	111483	90297	140348	342128	342128	192733
	0.00	0.00	0.00	0.00	0.00	1857653	1857653	1857653	40923
	0.00	0.00	0.00	385000	0.00	64883	449883	449883	47616
	0.00	0.00	0.00	0.00	0.00	298531	298531	298531	0.00
	0.00	0.00	0.00	76903	0.00	0.00	76903	76903	1053692
	0.00	0.00	0.00	0.00	0.00	55784	55784	55784	954578
	0.00	0.00	0.00	161016	0.00	110053	271069	271069	1199511
	0.00	0.00	0.00	69935	0.00	7275	77210	77210	760049
	0.00	0.00	0.00	165000	88901	190238	444139	444139	505017
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	255020
	0.00	0.00	0.00	272309	263213	29653	565175	565175	693770
	0.00	0.00	0.00	140049	42979	62773	245801	245801	737734
	0.00	0.00	0.00	69032	0.00	270851	339883	339883	557483
	0.00	0.00	0.00	161032	0.00	2489	163521	163521	220237
	0.00	0.00	0.00	183200	30126	48245	261571	261571	0.00
	0.00	0.00	0.00	233350	0.00	67870	301220	301220	387370

	SCHEDULE 3-EARMARKED/ENDOWMWNT FUNDS	FUND-WISE BREAK UP 2012-2013				
PROJ Code	NAME OF GRANTEE/PRINCIPAL INVESTIGATOR	OPENING BALANCE	ADDITIONS TO FUND			
			GRANTS	OTHER RECEIPTS	TOTAL	
5233	DR. BEJOY THOMAS/DR.C.KESAVADAS	21873	57076	0.00	78949	
5234	DR.R.ASHA LATHA	905125	207796	0.00	1112921	
5235	REGULATION OF THE CARDIAC FIBROBLAST C..	131650	618864	0.00	750514	
5237	KERALA DIABETES PREVENTION PROGRAM(K-DPP	791849	7088275	17275	7897399	
5238	IMPROVING LOCALIZATION IN LESION NEGA...	273945	0.00	0.00	273945	
5240	AUTOCRINE AND PARACRINE MECHANISMS IN ..	106400	356231	0.00	462631	
5241	DEVELOPMENT OF LIPID ANTIGEN BASED	549418	0.00	0.00	549418	
5243	STEROIDS IN CARDIAC SURGERY	535380	1389285	0.00	1924665	
5244	MOLECULAR BASIS OF CARDIAC FIBROBLAST ..	2285353	787539	1653690	4726582	
5245	IMPROVING LOCALIZATION IN LESION N..	1133118	453400	0.00	1586518	
5246	COMPREHENSIVE HEART FAILURE	0.00	3357684	0.00	3357684	
5247	A PHASE 3, 12-WEEK, DOUBLE BLIND, PLA...	93279	2268497	0.00	2361821	
5248	A PHASE 3, DOUBLE BLIND, PLACEBO AND A..	121316	1318416	0.00	1439732	
5249	CNRS-INDO-FRENCH PROJECT	783050	0.00	0.00	783050	
5250	DIABETES, PREDIABETES AND INSU	15923	20000	0.00	35923	
5251	NEUROBIOLOGICAL MARKER OF POPULATION D..	323517	197000	0.00	520517	
5252	INDO-US COLLABERATIVE STROKE	0.00	1177200	18742	1195942	
5253	INDO-SWISS SYMPOSIUM ON COHORT	230173	0.00	0.00	230173	
5255	PRIVATIZATION OF HEALTHCARE	353883	0.00	0.00	353883	
5256	HEALTHY LIFE STYLE	672357	3043795	0.00	3716152	
5257	PULMONARY HYPERTENSION,BMPRII	287129	0.00	0.00	287129	
5258	DETERMINE THE BRAIN BEHAVIOUR	0.00	1650000	0.00	1650000	
5259	EFFICACY OF THE THETA BURST	0.00	600000	0.00	600000	
5260	INFLUENCE OF SLEEP ARCHITECTUR	0.00	500500	0.00	500500	
5261	IMAGING PROCESSING FOR IMPROVING	0.00	203500	0.00	203500	
5262	HAEMODYNAMIC IMAGING	0.00	852500	0.00	852500	
5263	MITOCHONDRIA SPECIFIC ANTI-OXI	0.00	530000	0.00	530000	
5264	FLUORESCENCE OPTICAL BIOPSY	0.00	600000	0.00	600000	
5266	RAPID ASSESSMENT OF THE SCHEME	0.00	88000	0.00	88000	
5267	EVALUATION STUDY OF THE ASHA	0.00	752000	0.00	752000	
5269	SURVEILLANCE OF JAUNDICE	0.00	299700	0.00	299700	
6054	PROJ/DR RADHAKRISHNAN NEUROLOGY	442775	0.00	5600	448375	
6055	MOVEMENT/DR. ASHA KISHORE	-83481	0.00	0.00	-83481	
6057	PUBLISHING JOURNAL ARTICLE/DR. THANKAPPAN	12702	0.00	0.00	12702	
6058	ATHIYANOOR SCT ACTION/DR.K.R.T	21006	0.00	0.00	21006	
6064	SPEECH THERAPY	-755993	0.00	0.00	-755993	
6065	COMPREHENSIVE CENTRE FOR SLEEP DIS ORD.	-1023188	0.00	255600	-767588	
6066	DR.SANJEEV V THOMAS	7100	0.00	0.00	7100	
6067	DR.JAGANMOHAN THARAKAN	103160	0.00	0.00	103160	
6068	DR.SAJITH.S	150000	0.00	0.00	150000	

	UTILISATION OF FUNDS								
	CAPITAL EXPENDITURE			REVENUE EXPENDITURE				TOTAL	NET BALANCE
	FIXED ASSETS	OTHERS	SUB TOTAL	SALARIES WAGES	RENT/ CONSUMABLES	OTHER ADM EXP	SUB TOTAL		
	0.00	0.00	0.00	0.00	0.00	78858	78858	78858	91
	0.00	0.00	0.00	0.00	0.00	318204	318204	318204	794717
	50198	0.00	50198	194801	280577	57049	532427	582625	167889
	527288	0.00	527288	1243601	314624	497631	2055856	2583144	5314255
	0.00	0.00	0.00	0.00	0.00	10029	10029	10029	263916
	0.00	0.00	0.00	72000	179393	35084	286477	286477	176154
	0.00	0.00	0.00	0.00	0.00	549418	549418	549418	0.00
	0.00	0.00	0.00	0.00	0.00	2106	2106	2106	1922559
	1669307	0.00	1669307	0.00	1951517	146695	2098212	3767519	959063
	0.00	0.00	0.00	195039	0.00	161567	356606	356606	1229912
	0.00	0.00	0.00	373305	0.00	9939	383244	383244	2974440
	0.00	0.00	0.00	119677	0.00	133680	253357	253357	2108464
	0.00	0.00	0.00	0.00	0.00	176409	176409	176409	1263323
	0.00	0.00	0.00	0.00	0.00	188399	188399	188399	594651
	0.00	0.00	0.00	0.00	0.00	34189	34189	34189	1734
	0.00	0.00	0.00	222348	0.00	36886	253234	253234	267283
	0.00	0.00	0.00	502420	67316	19833	589569	589569	606373
	0.00	0.00	0.00	0.00	0.00	14034	14034	14034	216139
	0.00	0.00	0.00	0.00	0.00	16972	16972	16972	336911
	0.00	0.00	0.00	0.00	0.00	388326	388326	388326	3327826
	0.00	0.00	0.00	0.00	0.00	152725	152725	152725	134404
	0.00	0.00	0.00	0.00	0.00	1617361	1617361	1617361	32639
	0.00	0.00	0.00	111772	0.00	7382	119154	119154	480846
	0.00	0.00	0.00	36452	0.00	36501	72953	72953	427547
	0.00	0.00	0.00	21290	0.00	35	21325	21325	182175
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	852500
	0.00	0.00	0.00	51290	0.00	5967	57257	57257	472743
	0.00	0.00	0.00	90323	0.00	0.00	90323	90323	509677
	0.00	0.00	0.00	0.00	0.00	51246	51246	51246	36754
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	752000
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	299700
	0.00	0.00	0.00	120320	0.00	5600	125920	125920	322455
	0.00	0.00	0.00	40000	0.00	201223	241223	241223	-324704
	0.00	0.00	0.00	0.00	0.00	12702	12702	12702	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21006
	0.00	0.00	0.00	127921	0.00	0.00	127921	127921	-883914
	0.00	0.00	0.00	1012247	73532	190756	1276535	1276535	-2044123
	0.00	0.00	0.00	0.00	0.00	7100	7100	7100	0.00
	0.00	0.00	0.00	0.00	0.00	103160	103160	103160	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	150000

	SCHEDULE 3-EARMARKED/ENDOWMWNT FUNDS	FUND-WISE BREAK UP 2012-2013				
PROJ Code	NAME OF GRANTEE/PRINCIPAL INVESTIGATOR	OPENING BALANCE	ADDITIONS TO FUND			
			GRANTS	OTHER RECEIPTS	TOTAL	
6069	DR.SYAM.K	2130	0.00	0.00	2130	
6070	DR.BEJOY THOMAS/DR.GAYATHRI.P	73861	0.00	0.00	73861	
6071	DR.S.K.JAWAHAR	37644	0.00	0.00	37644	
6072	COMPREHENSIVE STROKE CARE	-4875409	0.00	0.00	-4875409	
6073	DR.KIRON.S	25019	0.00	0.00	25019	
6074	DR.DIVYATA FANJENDR HINGWALA	24990	0.00	0.00	24990	
6075	DR.BIJULAL.S	134994	0.00	0.00	134994	
6076	SCANNING THE MEDICAL RECORDS AS PART ..	242025	1100000	62737	1404762	
6077	TAC	-130000	0.00	0.00	-130000	
6078	DESIGN & DEVELOPMENT OF MINIMALLY INV...	0.00	90000.00	0.00	90000.00	
6078	DESIGN & DEVELOPMENT OF MINIMALLY IN	90000	0.00	0.00	90000	
6079	ESTIMATION OF AUTO ANTIBODIES	0.00	150000	0.00	150000	
6080	COMPREHENSIVE PAIN CLINIC	0.00	500000	0.00	500000	
6081	VALIDATION OF A CLINICAL PROTO	0.00	149100	0.00	149100	
6082	NOSOCOMIAL INFECTION	0.00	150000	0.00	150000	
6083	COMPARISON MANITOL AND HES	0.00	50000	0.00	50000	
6084	NEURO INTERVENTION CENTER (NIC)	0.00	1000000	0.00	1000000	
6085	PREVALENCE –METABOLIC SYNDROM	0.00	50000	0.00	50000	
6086	SPP 1 GENOTYPE	0.00	50000	0.00	50000	
6087	AUTONOMIC DYSFUNCTION	0.00	130500	0.00	130500	
7101	ADVANCES TO PI	-4180	0.00	2126135	2121955	
7102	AMT.PAYABLE TO PROJECT STAFF	2153	0.00	93328	95481	
2721	ADVANCE FOR SUPPLIES PROJECT	-668973	0.00	21338808	20669835	
	TOTAL	56106436	52951117	26651531	135709084	
	EARMARKED FUNDS	--	--	--	--	
1014	NEW PENSION SCHEME	11015821	0.00	55687660	66703481	
1301	EMPLOYEES PENSION FUND	113070997	0.00	178974079	292045076	
1075	PATIENT WELFARE FUND	2190089	0.00	1132223	3322312	
1077	INSTITUTIONAL ETHICS COMMITTEE FUND	5804853	0.00	2129292	7934145	
1078	DR. RICHARD A CASH & DR K MOHANDS AWARD	44457	0.00	94209	138666	
1080	STAFF BENEVOLENT FUND	697723	0.00	5635163	6332886	
1079	VICE CHANCELLORS CONFERENCE FUND	168437	0.00	0.00	168437	
1081	CONTINUUM - SPECIAL CME PUBLICATION FUND	51707	0.00	0.00	51707	
		133044084	0.00	243652626	376696710	

	UTILISATION OF FUNDS								NET BALANCE
	CAPITAL EXPENDITURE			REVENUE EXPENDITURE				TOTAL	
	FIXED ASSETS	OTHERS	SUB TOTAL	SALARIES WAGES	RENT/ CONSUMABLES	OTHER ADM EXP	SUB TOTAL		
	0.00	0.00	0.00	0.00	0.00	2130	2130	2130	0.00
	0.00	0.00	0.00	0.00	0.00	31495	31495	31495	42366
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37644
	0.00	0.00	0.00	3660399	401391	15700	4077490	4077490	-8952899
	0.00	0.00	0.00	0.00	0.00	22900	22900	22900	2119
	0.00	0.00	0.00	0.00	0.00	24269	24269	24269	721
	0.00	0.00	0.00	0.00	0.00	20239	20239	20239	114755
	0.00	0.00	0.00	867462	0.00	515852	1383314	1383314	21448
	0.00	0.00	0.00	10000	0.00	0.00	10000	10000	-140000
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90000.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90000
	0.00	0.00	0.00	0.00	0.00	91553	91553	91553	58447
	0.00	0.00	0.00	20500	0.00	0.00	20500	20500	479500
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	149100
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	150000
	0.00	0.00	0.00	0.00	0.00	43800	43800	43800	6200
	0.00	0.00	0.00	1501567	389026	3915	1894508	1894508	-894508
	0.00	0.00	0.00	0.00	0.00	8100	8100	8100	41900
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50000
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	130500
	0.00	0.00	0.00	0.00	0.00	2179345.00	2179345.00	2179345.00	-57390.00
	0.00	0.00	0.00	0.00	0.00	93328	93328	93328	2153
	0.00	0.00	0.00	0.00	0.00	29092424	29092424	29092424	0.00
	2363950	0.00	2363950	26824184	5875191	47601818	80301193	82665143	61466532
	--	--		--	--				
	0.00	0.00	0.00	0.00	0.00	55422314	55422314	55422314	11281167
	0.00	0.00	0.00	0.00	0.00	163824882	163824882	163824882	128220194
	0.00	0.00	0.00	0.00	0.00	83421	83421	83421	3238891
	0.00	0.00	0.00	0.00	0.00	455077	455077	455077	7479068
	0.00	0.00	0.00	0.00	0.00	55600	55600	55600	83066
	0.00	0.00	0.00	0.00	0.00	4212690	4212690	4212690	2120196
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	168437
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51707
	0.00	0.00	0.00	0.00	0.00	224053984	224053984	224053984	152642726
							GRAND TOTAL		214109258

	SCHEDULE 3-EARMARKED/ENDOWMWNT FUNDS	FUND-WISE BREAK UP 2012-2013				
PROJ Code	NAME OF GRANTEE/PRINCIPAL INVESTIGATOR	OPENING BALANCE	ADDITIONS TO FUND			
			GRANTS	OTHER RECEIPTS	TOTAL	
5000	PROJECT SUSPENSE	2147194	0.00	767326	2914520	
5057	DYNAMIC ORTHOPAEDIC PVT LTD, HYDROXY	6788	0.00	0.00	6788	
5089	DETEC & TREAT OF CANCER BY LASER	3959	0.00	0.00	3959	
6045	ROLE OF PLATELET PROTEINS ON THE ENDOTHE	146700	0.00	0.00	146700	
7000	MISCELLENEOUS PROJECT	30944	0.00	0.00	30944	
7001	PRO;SAHAJANAND VASCU;DR.AURTHUR	4175879	0.00	0.00	4175879	
7002	Dr.TOMS LABORATORY, Dr. K.KRISHNAN	13876	0.00	0.00	13876	
7003	PROJ:D.S.T. DR.P.V. MOHANAN	2537	0.00	0.00	2537	
7004	PROJ:ATMRF:DR LISSY KRISHNAN	551	0.00	0.00	551	
7005	PROJECT:DYNAMIC ORTHOPAEDICS	13656	0.00	0.00	13656	
7006	PROJ: D.S.T. D.S.NAGESH	193282	0.00	0.00	193282	
7008	NMITLI, PROJECT C.S.I.R	295329	0.00	0.00	295329	
7009	CHITOSAN BASED WAINED DRESSING	4762	0.00	0.00	4762	
7011	DST-FAB: CLINICALLY/SIG:SHAPE OF HEVA	213826	0.00	0.00	213826	
7014	AUROLAB,ARAVIND EYE HOSPITAL	13674	0.00	0.00	13674	
7015	TTK.HEALTHCARE.DEVELOPMENT OF VALV	39888	0.00	0.00	39888	
7016	INDO-GERMAN COMMITTEE MEETING-DST	5407	0.00	0.00	5407	
7017	HINDUSTAN LATEX.EVALU:BLOOD BAG++	1159813	0.00	0.00	1159813	
7018	ALL INDIA COUNCIL FOR TECHNI:EDU:SH	274746	145618	0.00	420364	
7019	DST.NIRANJAN	69847	0.00	0.00	69847	
7020	IFCPAR-DR.JAYAKRISHNAN	188	0.00	0.00	188	
7022	DST-LBFDPSBC-DR.SHARMA	79385	0.00	0.00	79385	
7023	DEV: HYDRO-CEPHALUS-HINDUSTAN LATEX	45510	0.00	0.00	45510	
7026	DEV.HEART VALVE-DST.MURALEE	2522	0.00	0.00	2522	
7027	STED-DR T V KUMARY-INVITRO	5089	0.00	0.00	5089	
7029	DONERG/LIFE SCIENCE BOARD	6876	0.00	0.00	6876	
7031	DBT/DR P V MOHAN/DEV INVITROPYRO	79064	0.00	0.00	79064	
7032	DST. DR. ANNINE/BONE REGENERATION	29166	0.00	0.00	29166	
7033	BIOFUNCTIONAL EVALUATION DR. UMASANKER	72581	0.00	0.00	72581	
7034	DST. DR. NIRMALA RACHEL	14664	0.00	0.00	14664	
7035	DST-H.K.VARMA	95433	0.00	0.00	95433	
7036	INVITRO HEMO CAMPABILITY/ DR. LISSY	196398	0.00	0.00	196398	
7037	INVIVO EVALUATION/ STED/DR. LISSY	6205	0.00	0.00	6205	
7039	JNC/ASR/DR. MOHANAN/STUDY OF ACCUTE…..	44684	0.00	0.00	44684	
7040	BIOMED/ C.V. MURALEEDHARAN	44000	0.00	0.00	44000	
7041	CSIR-GRANT-ASHA S MATHEW,PHD STUDENT	55973	0.00	0.00	55973	
7042	CSIR-GRANT-BERNADETTE K. MADATHIL,PHD	25870	0.00	0.00	25870	
7043	CSIR-GRANT-SAILAJA.G.S.SRF	9067	0.00	0.00	9067	
7044	LISI NO TRIAL TRIAL MERIND	21673	0.00	0.00	21673	

	UTILISATION OF FUNDS								
	CAPITAL EXPENDITURE			REVENUE EXPENDITURE				TOTAL	NET BALANCE
	FIXED ASSETS	OTHERS	SUB TOTAL	SALARIES WAGES	RENT/ CONSUMABLES	OTHER ADM EXP	SUB TOTAL		
	0.00	0.00	0.00	596700	0.00	1449038	2045738	2045738	868782
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6788
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3959
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	146700
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30944
	0.00	0.00	0.00	0.00	0.00	363236	363236	363236	3812643
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13876
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2537
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	551
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13656
	0.00	0.00	0.00	0.00	0.00	9394	9394	9394	183888
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	295329
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4762
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	213826
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13674
	0.00	0.00	0.00	0.00	0.00	464	464	464	39424
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5407
	0.00	0.00	0.00	0.00	0.00	30632	30632	30632	1129181
	0.00	0.00	0.00	0.00	0.00	80445	80445	80445	339919
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69847
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	188
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	79385
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45510
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2522
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5089
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6876
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	79064
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29166
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	72581
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14664
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95433
	0.00	0.00	0.00	0.00	0.00	213303	213303	213303	16905
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6205
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44684
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44000
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55973
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25870
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9067
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21673

	SCHEDULE 3-EARMARKED/ENDOWMWNT FUNDS	FUND-WISE BREAK UP 2012-2013			
PROJ Code	NAME OF GRANTEE/PRINCIPAL INVESTIGATOR	OPENING BALANCE	ADDITIONS TO FUND		
			GRANTS	OTHER RECEIPTS	TOTAL
7045	NIRMALA RACHEL, CSIR	14063	0.00	0.00	14063
7047	U.G.C. GRANT- RESEARCH FELLOW	311189	285446	0.00	596635
7048	CSIR GRANT- JOSENA JOSEPH	47473	0.00	0.00	47473
7049	CSIR GRANT - MARY VARGHESE	35837	0.00	0.00	35837
7050		0.00	0.00	0.00	0.00
7051	CSIR GRANT - MANITHA B NAIR	12062	0.00	0.00	12062
7052	DBT/DR.PRABHA/DEV. OF TEMP - RES - CO-OPLY	-229010	0.00	0.00	-229010
7053	DR.SREENIVASAN/DEVEL.OF TEMP.RES.CO-OPLY	22619	0.00	0.00	22619
7054	DST-DR.ANOOP-DIFF:EXPR:RAT BRAIN……	44434	0.00	0.00	44434
7055	CSIR-NMITLI SCHEME-C.V.MURALEEDHARAN	4469608	0.00	0.00	4469608
7056	D.S.T.ROYJOSEPH, BONE GRAFT SUB:SPINAL	110047	0.00	0.00	110047
7057	DST - PROJECT.DR.JAYABALAN	-1928450	1942921	0.00	14471
7059	DBT-DR. PRABHA D NAIR, ISLET IMMUN…..	67774	0.00	0.00	67774
7060	ICMR PROJECT/ SUDHAKAR MUTHALEE	138047	192115	0.00	330162
7061	DR. UMASANKAR/PRELIMI:EVALU:BIODEGRADABLE	241	0.00	0.00	241
7062	DR. LIZY-SAHAJA:EVA "STENT"INVITRO…..	-333240	471204	0.00	137964
7063	DR.P.V.MOHAN, SHAJANAD	-10824	0.00	0.00	-10824
7065	DR.T.V.KUMARI, DBT.BIOGENE	38713	0.00	0.00	38713
7066	DR.B.S.GEETHA.PDF,STED	15321	0.00	0.00	15321
7067	DBT.DR.JAYABALAN,DEV:&STUDIES…..	-27459	0.00	0.00	-27459
7069	VSSC - PROJECT. D.S. NAGESH	160376	176184	0.00	336560
7070	CHO PROJECT - 5146 JAYASREE	-872	0.00	0.00	-872
7071	STEC-PROJECT: DR.MAYA NANDKUMAR	-2164	0.00	0.00	-2164
7072	SAHAJANAND MED.TECH. C.V.MURALIDHARAN	76292	0.00	0.00	76292
7073	STUDY PROJECT:DR.P.V.MOHANAN	-95386	0.00	0.00	-95386
7074	STUDY PROJECT: CLRI- DR.MOHAN	289303	0.00	0.00	289303
7075	STUDY PROJECT - BIOSYNC SCI	11935	0.00	0.00	11935
7076	ARROW INTERNATIONAL : DR.UMASHANKAR	399773	0.00	0.00	399773
7077	UMHOU SENEMBYU:DR.UMASHANKAR	603714	0.00	0.00	603714
7079		0.00	0.00	0.00	0.00
7080	DBT-DR.MAYA- TISSUE ENGINEERING HYBRID	-391887	0.00	0.00	-391887
7081	USV LTD. MUMBAI - DR.MOHAN	88349	0.00	0.00	88349
7082	INDO-US JOINT PROJECT	878	0.00	0.00	878
7083	ARROW HAEMO DIALYSIS	30882	0.00	0.00	30882
7085	DR.R.V.THAMPAN - CSIR	26381	0.00	0.00	26381
7086	HORMONE RELEASING INTRA DEVICES	-86027	0.00	0.00	-86027
7087	CSIR - KALADHAR - BST	39103	0.00	0.00	39103
7088	FEASIBILITY STUDY	0.00	0.00	0.00	0.00
7089	PROJ/7089/DEV.PORTABLE SAFETY	0.00	0.00	0.00	0.00

	UTILISATION OF FUNDS								
	CAPITAL EXPENDITURE			REVENUE EXPENDITURE				TOTAL	NET BALANCE
	FIXED ASSETS	OTHERS	SUB TOTAL	SALARIES WAGES	RENT/ CONSUMABLES	OTHER ADM EXP	SUB TOTAL		
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14063
	0.00	0.00	0.00	0.00	0.00	295700	295700	295700	300935
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47473
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35837
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12062
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-229010
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22619
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44434
	0.00	0.00	0.00	0.00	0.00	3618980	3713056	3713056	756552
	0.00	0.00	0.00	94076	0.00	0.00	0.00	0.00	110047
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14471
	0.00	0.00	0.00	0.00	0.00	200	200	200	67574
	0.00	0.00	0.00	0.00	0.00	210770	210770	210770	119392
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	241
	0.00	0.00	0.00	0.00	0.00	35603	35603	35603	102361
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-10824
	0.00	0.00	0.00	0.00	0.00	54	54	54	38659
	0.00	0.00	0.00	0.00	0.00	15321	15321	15321	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-27459
	0.00	0.00	112320	0.00	0.00	61613	173933	173933	162627
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-872
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-2164
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	76292
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-95386
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	289303
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11935
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	399773
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	603714
	0.00	0.00	0.00	0.00	0.00	186	186	186	-186
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-391887
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	88349
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	878
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30882
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26381
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-86027
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39103
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	SCHEDULE 3-EARMARKED/ENDOWMWNT FUNDS	FUND-WISE BREAK UP 2012-2013				
PROJ Code	NAME OF GRANTEE/PRINCIPAL INVESTIGATOR	OPENING BALANCE	ADDITIONS TO FUND			
			GRANTS	OTHER RECEIPTS	TOTAL	
7090	PROJ/7090/TISSUE ENGINEERS VASCULAR	411977	0.00	0.00	411977	
7091	PROJ/7091/NOVEL MICROPHORES	-302731	0.00	302731	0.00	
7092	PROJ/7092/SEA FOOD	131878	0.00	0.00	131878	
7093	PROJ/7093/CSIR GRANT-LPA	39627	589058	0.00	628685	
7095	PROJ/7095/CSIR GRANT-VIOLA.B.MORRIS	22072	0.00	0.00	22072	
7097	PROJ/7097/ACCELERATED AGEING	318243	1880452	0.00	2198695	
7098	PROJ/7098/EVALN OF NTU DRUG	1355655	0.00	0.00	1355655	
7099	PROJ/7099/BCL	7011	0.00	0.00	7011	
7100	PROJ/7100/ITR PROGRAMME	4079	0.00	0.00	4079	
7101	PROJ/7101/CSIR/SONIA.T.A	2650	0.00	0.00	2650	
7102	PROJ/7102/CSIR/LYNDA THOMAS	0.00	0.00	0.00	0.00	
7103	PROJ/7103/CSIR/VIDYARAJ	5682	0.00	0.00	5682	
7104	PROJ/7104/CSIR/RENJITH.P.NAIR	67998	55840	0.00	123838	
7105	PROJ/7105/CSIR/ARJUN NAMBOODIRI	6821	308000	0.00	314821	
7106	PROJ/7106/CSIR/NITHYA JOSEPH	0.00	0.00	0.00	0.00	
7107	PROJ/7107/CSIR/NEENA & 2 FELLOWS	34863	0.00	0.00	34863	
7108	PROJ/7108/CSIR/FRANCIS.B.FERNANDEZ	47507	0.00	0.00	47507	
7109	PROJ/7109/CSIR/TARA.S	28892	546000	0.00	574892	
7110	PROJ/7110/CSIR/DEEPA.R	27449	180370	0.00	207819	
7111	PROJ/7111/CSIR/SHEEJA LIZA EASO	-7774	288838	0.00	281064	
7112	PROJ/7112/ICMR/JASEER MOHAMMED	2209	285934	0.00	288143	
7113	PROJ/7113/KSCSTE/RATHIKALA	4527	240911	0.00	245438	
7200	JOINT PROGRAME/M.TECH	1203976	0.00	0.00	1203976	
7210	PROJ/7210/CSIR/SOMA DEY	24172	303000	0.00	327172	
7220	COST OF ANIMAL FEED	657094	2375000	0.00	3032094	
7230	PROJ/7230/CSIR/MANJU.S	42306	0.00	0.00	42306	
7240	PROJ/7240/CSIR/SUNITHA CHANDRAN	49732	0.00	0.00	49732	
7250	PROJ/7250/CSIR/KIRAN.S.NAIR	37841	93066	0.00	130907	
7260	PROJ/7260/ST0X083Y09/DR.P.V.MOHANAN	279584	0.00	0.00	279584	
7270	PROJ/7270/KSCSTE/MAYURI.P.V.	84300	0.00	0.00	84300	
7280	PROJ/7280/CSIR/SUSAN.M.ALEX	46383	0.00	0.00	46383	
7290	PROJ/7290/CSIR/RAKHI.A	73803	0.00	0.00	73803	
7300	PROJ/7300/CSIR/ARIYA SARASWATHY	34704	0.00	0.00	34704	
7310	PHARMACOKINETIC EVALUATION OF MIV-DR.UMA	0.00	549900	0.00	549900	
7320	90 DAY SUB-CHRONIC TOXICITY DR.P V MOHA	0.00	353934	0.00	353934	
7330	Y M THASNEEM –UGC GRANT	0.00	490800	0.00	490800	
7350	UGC GRANT-LAXMI R NAIR –BMT PROJECT	0.00	315800	0.00	315800	
7360	MAMMALIAN BONE CHROMOSOME –DR. P V MOHANA	0.00	266292	0.00	266292	
7370	VALIDATION OF ETO STERILSATION SYSTEM	0.00	223133	0.00	223133	

	UTILISATION OF FUNDS								
	CAPITAL EXPENDITURE			REVENUE EXPENDITURE				TOTAL	NET BALANCE
	FIXED ASSETS	OTHERS	SUB TOTAL	SALARIES WAGES	RENT/ CONSUMABLES	OTHER ADM EXP	SUB TOTAL		
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	411977
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	33491	33491	33491	98387
	0.00	0.00	0.00	0.00	0.00	555289	558289	558289	73396
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22072
	0.00	0.00	0.00	0.00	0.00	81452	156471	156471	2042224
	0.00	0.00	0.00	75019	0.00	153670	153670	153670	1201985
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7011
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4079
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2650
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5682
	0.00	0.00	0.00	0.00	0.00	101552	101552	101552	22286
	0.00	0.00	0.00	0.00	0.00	288000	288000	288000	26821
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34863
	0.00	0.00	0.00	0.00	0.00	4038	4038	4038	43469
	0.00	0.00	0.00	0.00	0.00	491200	491200	491200	83692
	0.00	0.00	0.00	0.00	0.00	177762	177762	177762	30057
	0.00	0.00	0.00	0.00	0.00	268800	268800	268800	12264
	0.00	0.00	0.00	0.00	0.00	269663	269663	269663	24480
	0.00	0.00	0.00	0.00	0.00	228552	228552	228552	16886
	0.00	0.00	0.00	0.00	0.00	362182	372015	372015	831961
	0.00	0.00	0.00	9833	0.00	239777	239777	239777	87395
	0.00	0.00	0.00	32604	0.00	1202929	1235533	1235533	1796561
	0.00	0.00	0.00	0.00	0.00	29885	29885	29885	12421
	0.00	0.00	0.00	0.00	0.00	37138	37138	37138	12594
	0.00	0.00	0.00	0.00	0.00	120375	120375	120375	10532
	0.00	0.00	0.00	100800	0.00	7432	108232	108232	171352
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	84300
	0.00	0.00	0.00	0.00	0.00	25800	25800	25800	20583
	0.00	0.00	0.00	0.00	0.00	51200	51200	51200	22603
	0.00	0.00	0.00	0.00	0.00	21600	21600	21600	13104
	0.00	0.00	0.00	0.00	0.00	101500	101500	101500	448400
	0.00	0.00	0.00	0.00	0.00	43260	43260	43260	310674
	0.00	0.00	0.00	0.00	0.00	471735	471735	471735	19065
	0.00	0.00	0.00	0.00	0.00	277600	277600	277600	38200
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	266292
	0.00	0.00	0.00	0.00	0.00	40036	40036	40036	183097

	SCHEDULE 3-EARMARKED/ENDOWMWNT FUNDS	FUND-WISE BREAK UP 2012-2013			
PROJ Code	NAME OF GRANTEE/PRINCIPAL INVESTIGATOR	OPENING BALANCE	ADDITIONS TO FUND		
			GRANTS	OTHER RECEIPTS	TOTAL
7380	NETWORKING SERVICES –NTC BLDING –ARUN ANI	0.00	0.00	43200	43200
8001	PROJ/8001/PROGRAM SUPPORT &TISSUE	-611212	2520000	0.00	1908788
8002	PROJ/8002/PROGRAM SUPPORT & TISSUE	441821	1321000	0.00	1762821
8003	PROJ/8003/PROGRAM SUPPORT & TISSUE	348962	850000	0.00	1198962
8004	PROJ/8004/PROGRAM SUPPORT & TISSUE	-77015	0.00	0.00	-77015
8005	PROJ/8005/PROGRAM SUPPORT & TISSUE	330388	595000	0.00	925388
8006	PROJ/8006/BIOCONJUGATION NANO MAT.	-226843	0.00	0.00	-226843
8007	PROJ/8007/PRODUCTS OF POLYMER	0.00	0.00	0.00	0.00
8008	PROJ/8008/CSIR GRANT-PADMAJA.P.NAMBI	12990	0.00	0.00	12990
8009	PROJ/8009/DBT/DR.T.V.ANILKUMAR/DE…TISSUE	-719313	0.00	0.00	-719313
8010	PROJ/8010/DBT/DR.NIRANJAN/IMPLATED….CONTROL	283692	0.00	0.00	283692
8011	PROJ/8011/NANOFRONT/DR.NIRANJAN/INTRAMAS	139900	0.00	0.00	139900
8012	PROJ/8012/VSSC/DR.NIRANJAN/DESIGN STUDIES	2159652	0.00	0.00	2159652
8013	PROJ/8013/DST/DR.C.P.SHARMA/ FADDS	0.00	0.00	0.00	0.00
8014	PROJ/8014/DBT/DR.ROY JOSEPH/DEV….V.GRAFT	-17063	0.00	0.00	-17063
8015	PROJ/8015/DR.ANOOPKUMAR/PROGRAMME…	4566	0.00	0.00	4566
8016	PROJ/8016/DBT/DR.UMASHANKAR/DEVE….APPLN.	-181065	0.00	0.00	-181065
8017	PROJ/8017/AYUTECH/DR.UMASANKAR	365050	250000	0.00	615050
8018	PROJ/8018/ICMR/DR.P.V.MOHANAN	-55191	0.00	0.00	-55191
8019	PROJ/8019/STEC/DR.P.RAMESH	135105	0.00	0.00	135105
8020	PROJ/8020/CSIR/DR.LISSY KRISHNAN	302080	0.00	0.00	302080
8021	PROJ/8021/ANGIOGENESIS EXP/DR.UMASHANKAR	79036	0.00	0.00	79036
8022	PROJ/8022/AIR POLLUTION/SUJESH SREEDHAR	96433	0.00	0.00	96433
8023	PROJ/8023/KSCSTE/DR.H.K.VARMA	4615	190985	0.00	195600
8024	PROJ/8024/IIT/DR.P.R.ANILKUMAR	53815	31029	0.00	84844
8025	PROJ/8025/	126746	613900	0.00	740646
8026	PROJ/8026/	3339	0.00	0.00	3339
8027	PROJ/8027/DR.P.V.MOHANAN	80632	0.00	0.00	80632
8028	PROJ/8028/DR.DIKSHA PAINULY	243286	700000	0.00	943286
8029	PROJ/8029/INDO-JAPAN	90063	0.00	0.00	90063
8030	PROJ/STUDY/DR.UMASHANKAR	421061	704384	0.00	1125445
8031	PROJ/8031	-412735	1449553	0.00	1036818
8032	PROJ/8032/O.S.N.NAIR	166000	0.00	0.00	166000
8033	PROJ/8033/DEV. OF IRON OXIDE-DR.R.S.JAYASREE	468209	0.00	0.00	468209
8034	PROJ/8034/FLURO PASSI…DR.ROY JOSEPH	908579	907868	0.00	1816447
8035	PROJ/EVALN OF SEWING RING-DR.UMASHANKAR	-78600	100801	0.00	22201
8036	PROJ/DEV OF CALCIUM SULPHATE-DR.MANOJ	176493	281000	0.00	457493
8037	PROJ/MEDICAL DEVICE RET - DR.MIRA MOHANTY	884833	1025000	0.00	1909833
8038	PROJ/DEV OF MISSION PROGRAM - DR.GSB	1198034	0.00	0.00	1198034
8039	PROJ/DISPENSABLE & BIODEGR- DR.JAYABALAN	1845339	600000	0.00	2445339

	UTILISATION OF FUNDS								
	CAPITAL EXPENDITURE			REVENUE EXPENDITURE				TOTAL	NET BALANCE
	FIXED ASSETS	OTHERS	SUB TOTAL	SALARIES WAGES	RENT/ CONSUMABLES	OTHER ADM EXP	SUB TOTAL		
	0.00	0.00	0.00	0.00	0.00	43200	43200	43200	0.00
	0.00	0.00	0.00	819529	0.00	710561	1530090	1530090	378698
	0.00	0.00	0.00	278400	0.00	1597858	1876258	1876258	-113437
	0.00	0.00	0.00	0.00	0.00	382809	382809	382809	816153
	0.00	0.00	0.00	0.00	0.00	201330	201330	201330	-278345
	0.00	0.00	0.00	126476	0.00	585562	712038	712038	213350
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-226843
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12990
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-719313
	0.00	0.00	0.00	0.00	0.00	62127	62127	62127	221565
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	139900
	0.00	0.00	0.00	0.00	0.00	11029	11029	11029	2148623
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-17063
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4566
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-181065
	0.00	0.00	0.00	0.00	0.00	54384	54384	54384	560666
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-55191
	0.00	0.00	0.00	0.00	0.00	13615	13615	13615	121490
	0.00	0.00	0.00	218926	0.00	484057	702983	702983	-400903
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	79036
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96433
	0.00	0.00	0.00	30323	0.00	0.00	30323	30323	165277
	0.00	0.00	0.00	0.00	0.00	40064	40064	40064	44780
	0.00	0.00	0.00	115200	0.00	216435	331635	331635	409011
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3339
	0.00	0.00	0.00	0.00	0.00	900	900	900	79732
	0.00	0.00	0.00	332989	0.00	460639	793628	793628	149658
	0.00	0.00	0.00	0.00	0.00	90063	90063	90063	0.00
	0.00	0.00	0.00	0.00	0.00	752211	752211	752211	373234
	0.00	0.00	0.00	364568	0.00	870745	1235313	1235313	-198495
	0.00	0.00	0.00	0.00	0.00	37529	37529	37529	128471
	0.00	0.00	0.00	348676	0.00	173485	522161	522161	-53952
	0.00	0.00	0.00	521607	0.00	393302	914909	914909	901538
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22201
	0.00	0.00	0.00	0.00	0.00	232434	232434	232434	225059
	0.00	0.00	0.00	405703	0.00	575654	981357	981357	928476
	0.00	0.00	0.00	0.00	0.00	15396	15396	15396	1182638
	0.00	0.00	0.00	240800	0.00	2418340	2659140	2659140	-213801

	SCHEDULE 3-EARMARKED/ENDOWMWNT FUNDS	FUND-WISE BREAK UP 2012-2013				
PROJ Code	NAME OF GRANTEE/PRINCIPAL INVESTIGATOR	OPENING BALANCE	ADDITIONS TO FUND			
			GRANTS	OTHER RECEIPTS	TOTAL	
8040	PROJ/SYNTHESIS OF OXIDE-DR.H.K.VARMA	-24640	450000	0.00	425360	
8041	PROJ/DEV OF NANO DEVICES DNA-DR.C.P.SHARMA	192112	538510	0.00	730622	
8042	PROJ/BIOENGINEERED HYBRID -DR.LISSY KRISH	250949	90000	0.00	340949	
8043	PROJ/MOLECULAR IMMUNOTOX-DR.P.V.MOHANAN	1586409	0.00	0.00	1586409	
8044	PROJ/TISSUE ENGINEERING-BERNADETTE	-44623	824000	0.00	779377	
8045	PROJ/COLOUR ATLAS OF TISSUE-DR.MIRA	-21567	21101	0.00	-466	
8046	PROJ/DIFF. OF ADULT PRO - DR.ASHA.S.MATHEW	739755	0.00	0.00	739755	
8047	PROJ/INVIVO GENOTOXICITY-DR.P.V.MOHANAN	474909	0.00	0.00	474909	
8048	PROJ/STUDIES DR.KAMALESH GULIA	166599	0.00	0.00	166599	
8049	PROJ/NEW VISION BIOMAT-DR.C.P.SHARMA	-44861	0.00	0.00	-44861	
8050	PROJ/GENOTOXICITY STUDY-DR.P.V.MOHANAN	302655	0.00	0.00	302655	
8051	PROJ/INVITRO ALTE.TEST-DR.P.V.MOHANAN	1378778	324449	0.00	1703227	
8052	PROJ/ROLL OF TRANFORMN GROWTH-DR.ANOOP	233715	0.00	0.00	233715	
8053	PROJ/DEVELOPMENT OF SMART../DR.LIZYMOL.PP	321619	456075	0.00	777694	
8054	PROJ/MUSCULASKELETAL STEM CELL/DR.PDNAIR	5749040	4888000	0.00	10637040	
8055	PROJ/MUSCULASKELETAL STEM /DR.H.K.VARMA	757904	453000	0.00	1210904	
8056	PROJ/DR.A.C.JAYALEKSHMI	52144	285452	0.00	337596	
8057	PROJ/INVITRO PRECLINICAL / DR.LISSY	336287	480009	0.00	816296	
8058	PROJ/AORC FELLOWSHIP/MAYURI.P.V.	91375	313000	0.00	404375	
8059	PROJ/CELL SHEET ENGG-DR.P.R.ANILKUMAR	793600	0.00	0.00	793600	
8060	PROJ/DEVELOPMENT OF SKIN GRAFT	2213400	0.00	0.00	2213400	
8061	PROJ/VISIBLE LIGHT INDUCED../DR.RADHAKUMARI	2189058	0.00	0.00	2189058	
8062	PROJ/ACCELERATED AREING../MR.C.V.MURALI	213728	0.00	0.00	213728	
8063	PROJ/EFFECTS OF MATERIAL SLEEP/DR.K.GULIA	2385000	0.00	0.00	2385000	
8064	Nonviral Gene Delivery Vectors-Dr.Rekha	0.00	834000	0.00	834000	
8065	Proj/8065/Rate Earth Based Materials	0.00	970000	0.00	970000	
8066	To Investigate the Effects of /Dr.Gulia	0.00	1374000	0.00	1374000	
8067	Quantum Dot Conjugated –Dr.R S Jayasree	0.00	234854	0.00	234854	
8068	Inspire Research Project –Dr.Bindu P Nai	0.00	1900000	0.00	1900000	
8069	Proj/8069/Studies Biodegradable	0.00	50000	0.00	50000	
8070	Proj/8070/Inspire Faculty Awards-Dr.Shiv	0.00	1900000	0.00	1900000	
8071	Proj/8071/Regen. of Intervertebral Disc	0.00	560333	0.00	560333	
8072	proj/8072/Nano Calcium Phosphate	0.00	920000	0.00	920000	
8073	Proj/8073/Develop.of Cardiopulmonary	0.00	700000	0.00	700000	
8074	Production of Novel nano Indo-Uk Dr.CP.S	0.00	601500	0.00	601500	
8077	Home Based Vital Signs-Dr.Niranjan S	0.00	1777600	0.00	1777600	
2622	OHF For Innovative Projects	0.00	1000000	0.00	1000000	
2621	IIPC Fund (Industry Institute Partnership-BMT	0.00	260767	0.00	260767	
	Total	47623657	46906986	1113257	95643900	

UTILISATION OF FUNDS								NET BALANCE
CAPITAL EXPENDITURE			REVENUE EXPENDITURE				TOTAL	
FIXED ASSETS	OTHERS	SUB TOTAL	SALARIES WAGES	RENT/ CONSUMABLES	OTHER ADM EXP	SUB TOTAL		
0.00	0.00	0.00	220800	0.00	219661	440461	440461	-15101
0.00	0.00	0.00	0.00	0.00	552480	552480	552480	178142
0.00	0.00	0.00	220000	0.00	537519	757519	757519	-416570
0.00	0.00	0.00	554952	0.00	773017	1327969	1327969	258440
0.00	0.00	0.00	463200	0.00	85097	548297	548297	231080
0.00	0.00	0.00	0.00	0.00	939	939	939	-1405
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	739755
0.00	0.00	0.00	0.00	0.00	7258	7258	7258	467651
0.00	0.00	0.00	0.00	0.00	138801	138801	138801	27798
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-44861
0.00	0.00	0.00	41032	0.00	28317	69349	69349	233306
0.00	0.00	0.00	290880	0.00	901286	1192166	1192166	511061
0.00	0.00	0.00	119286	0.00	129494	248780	248780	-15065
0.00	0.00	0.00	120000	0.00	222506	342506	342506	435188
0.00	0.00	0.00	750442	0.00	4046025	4796467	4796467	5840573
0.00	0.00	0.00	220800	0.00	645718	866518	866518	344386
0.00	0.00	0.00	0.00	0.00	281227	281227	281227	56369
0.00	0.00	0.00	432129	0.00	258530	690659	690659	125637
0.00	0.00	0.00	0.00	0.00	252400	252400	252400	151975
0.00	0.00	0.00	172800	0.00	449870	622670	622670	170930
0.00	0.00	0.00	316800	0.00	951401	1268201	1268201	945199
0.00	0.00	0.00	261200	0.00	1360830	1622030	1622030	567028
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	213728
0.00	0.00	0.00	158369	0.00	2119067	2277436	2277436	107564
0.00	0.00	0.00	145902	0.00	426098	572000	572000	262000
0.00	0.00	0.00	327833	0.00	104997	432830	432830	537170
0.00	0.00	0.00	70920	0.00	168766	239686	239686	1134314
0.00	0.00	0.00	0.00	0.00	188000	188000	188000	46854
0.00	0.00	0.00	811138	0.00	32418	843556	843556	1056444
0.00	0.00	0.00	0.00	0.00	7484	7484	7484	42516
0.00	0.00	0.00	165161	0.00	142870	308031	308031	1591969
0.00	0.00	0.00	16258	0.00	79991	96249	96249	464084
0.00	0.00	0.00	7433	0.00	0.00	7433	7433	912567
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	700000
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	601500
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1777600
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1000000
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	260767
0	0	0	10711884	0	37600653	48312537	48312537	47331363

	2012-13	2011-12
PARTICULARS	[Rs.]	[Rs.]
SCHEDULE 4-SECURED LOANS AND BORROWINGS:		
1. Central Government	--	--
2. State Government (Specify)	--	--
3. Financial Institutions	--	--
a) Term Loans	--	--
b) Interest accured and due	--	--
4. Banks:	--	--
a) Term Loans-Interest accured and due	--	--
b)Other Loans(specify)- Interest accured and due-Over draft	--	--
5. Other Institutions and Agencies	--	--
6. Debentures and Bonds	--	--
7. Others(Specify)	--	--
Against OD facility- cheques issued	--	--
TOTAL		
SCHEDULE 5-UNSECURED LOANS AND BORROWINGS		
1. Central Government	--	--
2. State Government (Specify)	--	--
3. Financial Institutions	--	--
4. Banks:	--	--
a) Term Loans	--	--
b)Other Loans(specify)	--	--
5. Other Institutions and Agencies	--	--
6. Debentures and Bonds	--	--
7. Fixed Deposits	--	--
8. Others(Specify)	--	--
TOTAL		
SCHEDULE 6-DEFERRED CREDIT LIABILITIES:		
a) Acceptances secured by hypothecation of capital equipment and other assets	--	--
b) Others		--
TOTAL	--	--
SCHEDULE 7-CURRENT LIABILITIES AND PROVISIONS		
A. CURRENT LIABILITIES		
1. Acceptances		
2. Sundry Creditors:		
a) For Goods	29198510.00	25773109.00
b) Others	2510647.00	1678641.00
3. Advances Received	61029275.93	33695568.93
4. Interest accured but not due on:	0.00	0.00

	2012-13	2011-12
PARTICULARS	[Rs.]	[Rs.]
a) Secured Loans / borrowings	0.00	0.00
b) Unsecured Loans / borrowings	0.00	0.00
5. Statutory Liabilities:	0.00	0.00
a) Overdue	460198.95	3670076.35
b) Others	25724490.29	38297774.94
6. Other current Liabilities	0.00	0.00
TOTAL(A)	118923122.17	103115170.22
B.PROVISIONS		
1. For Taxation	0.00	0.00
2. Gratuity	0.00	0.00
3. Accumulated Leave Encashment	0.00	0.00
4. Trade Warranties/Claims	0.00	0.00
5. Others(Specify) Audit fee	0.00	0.00
Sining fund contribution O.BAL Rs.28985260 Additional contribution Rs.7232989	36218249.00	28985260.00
TOTAL(B)	36218249.00	28985260.00
TOTAL(A+B)	155141371.17	132100430.22

SCHEDULE 8- FIXED ASSETS	GROSS BLOCK			
PARTICULARS	Cost/valuation as at the beginning of the year (01.04.2012)	Additions during the year 2012-13	Deductions during the year 2012-13	
A. FIXED ASSETS:				
1. LAND:				
a) Freehold	16894605.51	0.00	0.00	
b) Leasehold			0.00	
2.BUILDINGS:			0.00	
a) On Freehold Land *	43608096.88	0.00	0.00	
b) On Leasehold Land			0.00	
c) Ownership Flats/Premises			0.00	
d) Superstructures on Land not belonging to the entity	124216260.88	190859.00	0.00	
3. PLANT MACHINERY & EQUIPMENT	1727998507.04	124302874.01	27005449.00	
4. VEHICLES	7474233.74	0.00	0.00	
5. FURNITURE,FIXTURES	43526469.61	2984432.00	938841.53	
6. OFFICE EQUIPMENT	976203.54	0.00		
7. COMPUTER/PERIPHERALS		0.00		
8. ELECTRIC INSTALLATIONS	44977634.67	1944964.00	462649.00	
9. LIBRARY BOOKS	139002881.57	9145802.00		
10. TUBEWELLS & W.SUPPLY	174615.00	0.00		
11. OTHER FIXED ASSETS		0.00		
a)OXYGEN CYLINDERS	234319.42	0.00		
b)AIR CONDITIONERS	25967993.91	0.00	16250.00	
c)TELEPHONE INSTALLATIONS	2151441.94	0.00		
d) COLD ROOM INSTALLATION	341700.00	0.00		
e) WATER COOLERS	62866.50	0.00		
f) LIFT INSTALLATION	11250942.10	0.00		
g) KITCHEN EQUIPMENTS	1405978.22	0.00		
h)CANTEEN EQUIPMENTS	200858.59	91636		
I) PAINTINGS	450215.63	0.00		
k) LIVESTOCK	31848.00	0.00	31848.00	
l) GAS PLANT INSTALLATIONS	1171261.09	0.00		
m) SURGICAL EQUIPMENTS	6822158.05	11025.00		
Total for the year (Total -A)	2198941091.89	138671592.01	28455037.53	
Total for the previous year	2006279458.89	193711286.00	1049653.00	
Captial Work in Progress (B)	586778022.00	40922414.00		
Total for the year (A+B)	2785719113.89	179594006.01	28455037.53	
* Depreciation for item2(a) has been provided along with depreciation on 2(d)				

		Depreciation			NET BLOCK	
	Cost/valuation at the year end (31.03.2013)	Depreciation as at the beginning of the year (01.04.2012)	During the year 2012-13	Total up to the year end (31.03.2013)	As at the end of current year end (31.03.2013)	As at the previous year end (31.03.2012)
	16894605.51	0.00	0.00	0.00	16894605.51	16894605.51
	43608096.88	0.00	0.00	0.00	0.00	0.00
	124407119.88	95579858.12	7243535.86	1028233.98	65191822.78	72244499.64
	1825295932.05	1027587924.48	100313566.28	1127901490.77	697394441.28	700410582.56
	7474233.74	5113643.55	354088.53	5467732.08	2006501.66	2360590.19
	45572060.08	30580172.76	805185.36	31385358.12	14186701.96	12946296.85
	976203.54	905867.29	7033.63	912900.91	63302.63	70336.25
			0.00	0.00		0.00
	46459949.67	22703570.76	2032643.39	24736214.15	21723735.52	22274063.91
	148148683.57	97801987.15	30208017.85	128010005.00	20138678.57	41200894.42
	174615.00	161649.64	1296.54	162946.18	11668.82	12965.36
				0.00	0.00	
	234319.42	222135.10	7310.59	229445.69	4873.73	12184.33
	25951743.91	20274525.98	553882.49	20828408.47	5123335.44	5693467.93
	2151441.94	1936885.48	21455.65	1958341.12	193100.82	214556.46
	341700.00	339748.47	195.15	339943.62	1756.38	1951.53
	62866.50	62684.12	18.24	62702.35	164.15	182.38
	11250942.10	7042104.16	420883.79	7462987.95	3787954.15	4208837.94
	1405978.22	936829.47	46914.88	983744.34	422233.88	469148.75
	292494.59	134375.24	15811.94	150187.17	142307.42	66483.35
	450215.63	361605.12	8861.05	370466.17	79749.46	88610.51
	0.00	28884.32	-28884.32	0.00	0.00	2963.68
	1171261.09	696513.19	284848.74	981361.93	189899.16	474747.90
	6833183.05	4056928.99	1110501.63	5167430.61	1665752.44	2765229.06
	2309157646.37	1316527893.36	143407167.27	1459935060.63	849222585.74	882413198.53
	2198941091.89	1172562432.58	143965460.8	1316527893.36	882413198.53	833717026.31
	627700436.00	0.00	0.00	0.00	627700436.00	586778022.00
	2936858082.37	1316527893.36	143407167.27	1459935060.63	1476923021.74	1469191220.53

PARTICULARS	2012-13 [Rs.]	2011-12 [Rs.]
SCHEDULE 9 - INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS		
1. In Government Securities	55338266.00	50414956.00
2. Other approved Securities	5685391.00	5685391.00
3. Shares	0.00	0.00
4. Debentures and Bonds	0.00	0.00
5. Subsidiaries and Joint Ventures	0.00	0.00
6. Others (to be specified) Sinking Fund Investments	402380134.00	350059901.00
Technology Fund	63789849.45	60682967.45
Pension & staff funds	51607458.00	50921140.00
TOTAL	578801098.45	517764355.45
SCHEDULE 10-INVESTMENTS-OTHERS		
1. In Government Securities	--	--
2. Other approved Securities	--	--
3. Shares	--	--
4. Debentures and Bonds	--	--
5. Subsidiaries and Joint Ventures	--	--
6. Others (to be specified)	--	--
TOTAL	--	--
SCHEDULE 11-CURRENT ASSETS,LOANS,ADVANCES ETC		
A. CURRENT ASSETS		
1. Inventories:		
a) Stores and Spares	245840760.02	226753215.13
b) Loose Tools	7249504.00	6731530.00
c) Stock-in trade		
Finished Goods		
Work-in-progress		
Medicine	10134136.95	8782277.00
2. Sundry Debtors:		
a) Debts Outstanding for a period exceeding six months		
b) Others	84769513.00	77268199.00
3. Cash balances in hand(including cheques/drafts and imprest)	1516100.38	868645.18
4. Bank Balances:		
a) With Scheduled Banks:		

	2012-13	2011-12
PARTICULARS	[Rs.]	[Rs.]
-On Current Account	1.15	1.15
-On Deposit Accounts(L.C. margin & Commitment deposit)	606222520.00	788406645.00
-On Savings Accounts	200958017.89	201042234.83
b) With non-Scheduled Banks:		
-On Current Account	0.00	0.00
-On Deposit Accounts	0.00	0.00
-On Savings Accounts	0.00	0.00
5. Post-Office-Savings Accounts	0.00	0.00
TOTAL(A)	1156690553.39	1309852747.29
B.LOANS, ADVANCES AND OTHER ASSETS		
1. Loans:		
a) Staff	13412435.00	13378624.00
b) Other Entities engaged in activities/objectives similar to that of the Entity	0.00	0.00
c) Other(specify)		
2. Advances and other amounts recoverable in cash or in kind or for value to be received:		
a) On Capital Account	207587142.09	217851647.10
b) Prepayments	28430822.37	18068291.53
c) Others		
3. Income Accured:		
a) On Investments from Earmarked/endowment Funds	0.00	0.00
b) On Investments-Others	0.00	0.00
c) On Loans and Advances	0.00	0.00
d) Others	0.00	0.00
(includes income due unrealised Rs)		
4. Claims Receivable		
From Govt of India on Plan Funds	0.00	0.00
TOTAL(B)	249430399.46	249298562.63
TOTAL(A+B)	1406120952.85	1559151309.92
Savings bank account includes Rs.15/- (GL code No.2410-Synd Bank vikas certificate)		
SCHEDULE 12- INCOME FROM SALES/SERVICES		
1. Income from Sales		
a) Sale of Finished Goods	0.00	0.00
b) Sale of Raw Material	0.00	0.00

PARTICULARS	2012-13 [Rs.]	2011-12 [Rs.]
c) Sale of Scraps	0.00	0.00
2. Income from Services		
a) Labour and processing charges	0.00	0.00
b) Professional/Consultancy Services	0.00	0.00
c) Agency Commission and Brokerage	0.00	0.00
d) Maintenance Services	0.00	0.00
e) Others (Specify)	0.00	0.00
From Hospital Services-Gross Income Rs.642019990	0.00	0.00
Less concession to poor Patients Rs.159109478	482909990.20	386470130.00
From Projects	2069177.00	3972145.00
Testing & Facility charges received	3861284.00	4332863.50
TOTAL	488840451.20	394775138.50
SCHEDULE 13- GRANTS/SUBSIDIES		
(Irrevocable Grants & Subsidies Received)		
1. Central Government	195919478.00	239495165.00
2. State Government(s)	0.00	0.00
3. Government Agencies	0.00	0.00
4. Institution/Welfare Bodies	0.00	0.00
5. International Organisations	0.00	0.00
6. Others(Specify)	0.00	0.00
TOTAL	195919478.00	239495165.00
SCHEDULE 14-FEES/SUBSCRIPTIONS		
1. Entrance Fees	1182820.00	1210330.00
2. Annual Fees/ Subscriptions	4911560.00	2707370.00
3. Seminar/Program Fees	0.00	0.00
4. Consultancy Fees	0.00	0.00
5. Others(Specify) Examination Fees	816484.00	1136167.00
TOTAL	6910864.00	5053867.00
SCHEDULE 15- INCOME FROM INVESTMENTS		
(Income on Invest.from Earmarked/Endowment Funds transferred to Funds)		
1) Interest		
a) On Govt. Securities	0.00	0.00

PARTICULARS	2012-13 [Rs.]	2011-12 [Rs.]
b) Other Bonds/Debentures	0.00	0.00
2) Dividends:		
a) On Shares	0.00	0.00
b) On Mutual Fund Securities	0.00	0.00
3) Rents	0.00	0.00
4) Others(Specify) On Sinking Fund	23334973.00	22648562.00
On Technology Fund	632432.00	4645969.45
TOTAL	23967405.00	27294531.45
TRANSFERRED TO EARMARKED/ENDOWMENT FUNDS		
SCHEDULE 16- INCOME FROM ROYALITY,PUBLICATION ETC		
1) Income from Royalty	272560.00	2302598.00
2) Income from Publications	0.00	0.00
3)Others(Specify)		
TOTAL	272560.00	2302598.00
SCHEDULE 17- INTEREST EARNED		
1) On Term Deposit		
a) With Scheduled Banks	85126926.00	72531466.00
b) With non-scheduled banks	0.00	0.00
c) With Institutions	0.00	0.00
d) Others	0.00	0.00
2) On Savings Account	0.00	0.00
a) With Scheduled Banks	7126890.53	4564117.91
b) With non-scheduled banks	0.00	0.00
c) Post Office Savings Account	0.00	0.00
d) Others	0.00	0.00
3) On Loans		
a) Employees/Staff	1072626.00	1313987.00
b) Others	0.00	0.00
4) Interest on Debtors and other Receivables		
TOTAL	93326442.53	78409570.91

	2012-13	2011-12
PARTICULARS	[Rs.]	[Rs.]
SCHEDULE 18- OTHER INCOME		
1. Profit on Sale/disposal of Assets:		
a) Owned assets	0.00	0.00
b) Assets acquired out of grants, or received free of cost	0.00	0.00
c) WIP written back from Repairs and maintanance	12936323.00	0.00
2. Rent	1440694.00	1491644.50
3. Fees for Miscellaneous Services	0.00	0.00
4. Miscellaneous Income (income from Projects)	30000.00	170000.00
Other Income	3994924.30	2635043.20
TOTAL	18401941.30	4296687.70
SCHEDULE 20-ESTABLISHMENT EXPENSES		
a) Salaries and Wages	618001550.80	540690563.90
b) Allowances and Bonus	6445173.00	6264537.00
c) Contribution to Provident Fund	0.00	0.00
d) Contribution to other fund(specify)	0.00	0.00
e) Staff Welfare Expenses	17462765.00	11630183.35
f) Expenses on Employee's Retirement and Terminal Benefits	145236432.00	214525802.00
g) Others(Specify) PG Training & Accademic payments	98540922.00	100379317.00
TOTAL	885686842.80	873490403.25
SCHEDULES 21- ADMINISTRATIVE EXPENSES		
a) Purchases	480192369.16	359413265.00
b) Labour and processing expenses	0.00	0.00
c) Cartage and Carriage Inwards	191251.00	148927.00
d) Electricity and power	39941254.00	29029302.00
e) Water charges	4120348.00	3753342.00
f) Insurance	357677.00	379832.00
g) Repairs and maintenance	32502290.00	30040706.00
h) Excise duty	0.00	0.00
i) Rent,Rates and Taxes	397999.00	378726.00
j) Vehicles Running and Maintenance	820394.00	866496.00
k) Postage,Telephone and Communication Charges	2363220.00	3112683.00

	2012-13	2011-12
PARTICULARS	[Rs.]	[Rs.]
l) Printing and Stationary	3970103.00	2587599.00
m) Travelling and Conveyence Expenses	2574410.00	2456262.00
n) Expenses on Seminar/Workshop	2066560.00	2423045.00
o) Subscription Expenses	142944.00	71060.00
p) Expenses on Fees	0.00	0.00
q) Auditors Renumeration	11236.00	0.00
r) Hospitality Expenses	0.00	0.00
s) Professional Charges	0.00	0.00
t) Provision for Bad and Doubtful Debts/Advances	0.00	0.00
u) Irrecoverable Balances Written-off	0.00	0.00
v) Packing Charges	0.00	0.00
w) Freight and Forwarding Expenses	0.00	0.00
x) Distribution Expenses	0.00	0.00
y) Advertisement and Publicity	6860963.00	5659801.00
z) Others(specify)	31337566.00	18458782.98
TOTAL	607850584.16	458779828.98
SCHEDULE 23-INTEREST		
a) On Fixed Loans		
b) Bank Charges)	189686	118974
c) Others(specify)	0.00	0.00
TOTAL	189686.00	118974.00

S/d-
FINANCIAL ADVISOR

S/d-
DIRECTOR

RECEIPTS & PAYMENTS ACCOUNTS FOR THE

	RECEIPTS	2012-13	2011-12	
		Rs.	Rs.	
I	Opening Balances			
a)	Cash In Hand	868645.18	801568.18	
b)	Bank Balances			
	I) In Current Account	1.15	1.15	
	ii)In deposit Account			
	iii)Savings Account *	203542234.83	231896817.31	
II	Grant Received			
	From Government of India			
	Under Plan scheme	873300000.00	861400000.00	
	Unde Plan scheme -NCMMR/Nurses Training	111821.00	2500000.00	
	Non-Plan scheme	36810000.00	48600000.00	
III	Receipts against Earmarked Funds			
	a) Earmarked funds	156147319.05	65755355.00	
	b)Own funds			
IV	Interest Received			
	a) On Bank deposits	84785002.53	57176127.50	
	b) Loans Advances etc	191121.00	417789.00	
V	Receipts from services			
	Receipts from Patient services	586396123.20	445075179.00	
	Other receipts including Royalty	18222209.60	19057254.40	
VI	Other receipts			
	Grant received for Projects	104756412.87	86834139.66	
	Refund of Deposits(LC Margin)			
	Other receipts	323429688.46	268749286.75	
	Total	2388560578.87	2088263517.95	
	*Closing balance of Bank include grant amount received from DST for setting up of NCMMR, Thiruvananthapuram			

Sd/-
FINANCIAL ADVISOR

PERIOD FROM 01-04-2012 TO 31-03-2013

		Payments	2012-13	2011-12
			Rs.	Rs.
	I	Expenses		
		a) Establishment expenses	696666872.90	512148996.60
		b) Administrative Expenses		
		For Purchases	333858605.00	329055435.00
		Other expenses	63630558.00	49146667.00
	II	Payments made against funds for various		
		Projects		
		As Per schedule	82076154.00	77680338.00
	III	Investments & Deposits made		
		a) Out of Earmarked funds	211033369.00	246830140.00
		b) Out of own funds		
	IV	Expenditure on Fixed Assets & Capital work		
		-in- progress		
		a) Purchase of Fixed Assets	231366164.00	113533276.00
		b)Capital work-in-progress		
	V	Refund of Loans		
	VI	Finance Charges(Bank charges)	151164.00	98743.00
	VII	Other Payments		
		To Funds/Deposit- refunds	564726805.55	555359041.19
	VIII	Closing Balance		
		a) Cash in hand	1516100.38	868645.18
		b) Bank Balances		
		I) In current Account	1.15	1.15
		ii) In Deposit Account		
		iii) Savings Account *	203534784.89	203542234.83
		Total	2388560578.87	2088263517.95

S/d-
DIRECTOR

SCHEDULES FORMING PART OF ACCOUNTS AS AT 31-03-2013

SCHEDULE 24- SIGNIFICANT ACCOUNTING POLICIES

1. ACCOUNTING CONVENTION

Financial Statements are prepared on the basis of historical cost convention unless otherwise stated and on the accrual method of accounting.

2. INVENTORY VALUATION

Stores and spares including machinery spares are valued at cost.

3. INVESTMENTS

Investment including long term investments are carried at cost.

4. FIXED ASSETS

Fixed assets are stated at cost of acquisition inclusive of inward freight, duties and taxes incidental and direct expenses related to acquisition.Work-in Progress accounted during the previous years in Repairs and Maintnance accounts has been rectified and is duly accounted in the Fixed Asset Schedule as Work-in progress

5. DEPRECIATION

Depreciation is provided on reducing balance method at the rates specified by the Income Tax Act 1961 and as decided in Governing Body dated 14.03.2013.In respect of additions to fixed assets during the year depreciation is provided for full year. In case of condemnation of an asset,depreciation for the current year has not been provided and the accumulated depreciation for the previous years has been duly adjusted from the depreciation of the current year.

6. GOVERNMENT GRANTS /SUBSIDIES

Government Grant from Plan fund are treated as additions to Capital fund of Institute. Grants in respect of specific fixed assets acquired are shown as deduction from the cost of the related asset. Government Grants/subsidies are accounted on Grant release order basis.

7. FOREIGN CURRENCY TRANSACTIONS

Transactions denominated in foreign currency are accounted at exchange rate prevailing at the date of transactions.

8. RETIREMENT BENEFITS

Gratuity : From the year 2006, (with the implementation 6th Pay Commission report), the gratuity payments are treated as Institute expenses and accounted on actual payment basis.

Leave Salary : Leave encashment eligible at the time of retirement/reliving is treated as Institute expenses and accounted on actual payment basis.

Pension : From the year 2006, (with the implementation of 6th Pay Commission report) 12% of the salary is transferred to the Pension Fund.The amount of transfer for the current year works out to Rs.331,66,232.00.

New Pension Scheme : In the case of employees who joined on or after 01.01.2004 10% of the salary is deducted as employees subscription and equal contribution is being made by the Institute. The funds are remitted to NPS Trust Account maintained by GOI and subscription details forwarded to NSDL/CRA every month.

9. PROVIDENT FUND

Assets and Liabilities of General Provident Fund account were separated from Balance sheet of Institute and shown as separate statement. Interest is provided on the accumulations as per the rates prescribed by Central Government from time to time.

10. EMERGENCY RESERVE FUND

An amount equal to 7.50 percent of receipts from patient are transferred to a Fund for meeting unexpected requirements for Fixed assets.

11. TECHNOLOGY DEVELOPMENT FUND

Receipts against technology developed by the Institute are transferred to the above fund for meeting additional expenses on Improvement of technologies already developed.

12. OVERHEAD FUND SCHEME

Overhead Funds Scheme for Innovative Projects has been introduced from the year 2012-13.According an amount of Rs.10 lakhs will be transferred to this account every year and utilised for innovative projects.During the year an amount of Rs.10 lakhs has been transferred to this fund from the Overhead charges collected from External Projects.

Sd/-	Sd/-
Financial Advisor	Director

SCHEDULE 25- CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS

1. CONTINGENT LIABILITIES

	Rs. In lakhs 2012-13	2011-12
Claims against the Institute not acknowledged as debts	NIL	NIL
Bank Guarantee given by Institute	18.83	22.12
Letters of credit opened on behalf of Institute	373.06	46.00
Disputed demands on Income tax etc	NIL	NIL
In respect of claims from parties for non- execution of orders	NIL	NIL

2. UNEXPIRED CAPITAL COMMITMENTS

	Rs. In lakhs 2011-12	2010-11
Estimated value of orders remaining to be executed on Capital Account including	1811.70	2365.37
Construction under vision 2020		
Lease obligation for rentals for Plant & Machinery	NIL	NIL

3. CURRENT ASSETS, LOANS & ADVANCES

The aggregate amount shown in the Balance sheet for the Current assets, Loans and Advances, have the value which is realisable in the ordinary course of business.

4. PROVISIONS

Provision for Income tax not made since there is no taxable income for Institute under Income tax Act 1961, during the year.

5. FOREIGN CURRENCY TRANSACTIONS:

	Rs. In lakhs 2012-13	2011-12
5.1 Value of Imports		
Capital Goods	3273.24	133.40
Stores Spare & Consumables	101.86	57.71
5.2 Expenditure in foreign currency		
Travel Expenses	USD 50	2000
	Earnings:	
5.3. Earnings:		
Value of Exports	NIL	NIL

6. OTHER ITEMS :

6.1 Transfer to Emergency Reserve Fund & Technology Development Fund

During the year an amount of Rs.595.53 lakhs (previous year Rs. 516.34 lakhs) and Rs.1.94 lakhs (previous year Rs. 81.11 lakhs) was transferred to Emergency Reserve Fund & Technology Development Fund. During the year Rs.25.65 lakhs has been spent from Technology Development Fund.

6.3 Setting up of NCMMR, Thiruvananthapuram

An interest of Rs.96294 /- was earned during 2012-13 on the fund received for setting up of NCMM and an amount of Rs.19527

/- was spent on behalf of NCMM, thus the balance now in the Book of account is Rs.25,76,767.00.This has been accounted separately and annexed to the Balance Sheet.

7. Corresponding figures for previous years have been regrouped, where ever necessary.

Schedules 1 to 25 are annexed to and form integral part of the Balance Sheet as at 31-03-2013, and Income & Expenditure Account for the year ended on that date.

Sd/-	Sd/-
Financial Advisor	Director

PROVIDENT FUND ACCOUNT FOR THE YEAR ENDED 31-03-2013

Particulars	2012-13	2011-12
	[Rupees]	[Rupees]
LIABILITIES		
MEMBERS BALANCE	260422346.00	244354602.00
MEMBERS CREDITS [for march]	0.00	3854740.00
BALANCE DUE TO MEMBERS NOT IN SERVICE		
Under EPF scheme	7696523.00	8371886.00
,, GPF ,,	532055.00	532055.00
PENSION FUND DUES	51168169.00	51168169.00
RESERVES&SURPLUS-INTEREST	1714228.39	10079095.39
TOTAL	321533321.39	318360547.39
ASSETS		
INVESTMENT AT COST	291383991.00	287659515.00
DUES TO PF ACCOUNT		
FROM INSTITUTE	0.00	3854740.00
FROM PF COMMISSIONER	8403467.00	8403467.00
INTEREST ACCRUED NOT DUE	1000280.00	1000280.00
BALANCE WITH BANKS		
SBT -GPF A/C	20745583.39	17442545.39
TOTAL	321533321.39	318360547.39

Sd/-
Financial Advisor

Sd/-
Director

NATIONAL CENTRE FOR MOLECULAR MATERIALS
RESEARCH ACCOUNT FOR THE YEAR ENDED 31-03-2013

Particulars	2012-13	
	[Rupees]	
LIABILITIES		
GRANT RECEIVED	2500000.00	
(Grant received from DST for the setting up of the National Centre for Molecular Materials Research (NCMMR), Thiruvananthapuram, vide order No.AI/NCMM/003/2011/2 & 4 dt.19.01.2012)		
Interest on Bank Account	76767.00	
TOTAL	2576767.00	
ASSETS	2576767.00	
BANK BALANCE	2576767.00	
(Union Bank of India Account No.541502010002675)		
TOTAL	2576767.00	

Sd/-
Financial Advisor

Sd/-
Director

Separate Audit Report on the Accounts of Sree Chitra Tirunal Institute of Medical Sciences and Technology (SCTIMST), Thiruvananthapuram for the year ended 31 March 2013

1. We have audited the Balance Sheet of Sree Chitra Tirunal Institute of Medical Sciences and Technology (SCTIMST), Thiruvananthapuram as at 31 March 2013, the Income & Expenditure Account and the Receipts & Payment Account for the year ended on that date under Section 19(2) of the Comptroller & Auditor General's (Duties, Powers & Conditions of Service) Act, 1971 read with section 18(2) of the SCTIMST Act, 1980. These financial statements include the accounts of Bio-Medical Technology (BMT) wing of the SCTIMST. These financial statements are the responsibility of the SCTIMST's management. Our responsibility is to express an opinion on these financial statements based on our audit.

2. This Separate Audit Report contains the comments of the Comptroller & Auditor General of India (CAG) on the accounting treatment only with regard to classification, conformity with the best accounting practices, accounting standards and disclosure norms, etc. Audit observations on financial transactions with regard to compliance with the Law, Rules & Regulations (Propriety and Regularity) and efficiency-cum-performance aspects etc., if any, are reported through Inspection Reports/ CAG's Audit Reports separately.

3. We have conducted our audit in accordance with auditing standards generally accepted in India. These standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements. An audit includes examining, on a test basis, evidences supporting the amounts and disclosure in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of financial statements. We believe that our audit provides a reasonable basis for our opinion.

4. Based on our audit, we report that:

   i We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our audit;

   ii The Balance Sheet, Income & Expenditure Account and Receipt & Payment Account dealt with by this report have been drawn up in the format approved by the Government of India, Ministry of Finance.

   iii In our opinion, proper books of accounts and other relevant records have been maintained by the SCTIMST as required under Section 18 (1) of SCTIMST Act, 1980 in so far as it appears from our examination of such books subject to observations made hereunder.

   iv Based on our audit, we further report that:

(A) Revision of Accounts

SCTIMST revised the receipt and payment account based on the comments of Audit. Receipt side of the Receipt and Payment side of the receipt and payment account was decreased by ` 383.53 crore.

(B) Balance Sheet

B.1 Corpus Capital Fund (Schedule 1)

Plan Grants received from Government of India `71.42 crore

Government of India gave total grant of `91.01 crore (`61 crore for salary, `18.91 crore for general purpose and `11.10 crore for creation of capital assets) during the year. Thus `11.10 crore should have been included in the corpus whereas the Institute has shown the same as `71.42 crore. This has resulted in overstatement of Corpus and understatement of Income Grant (Schedule 13) to the extent of `60.32 crore.

(C) Income & Expenditure Account

C.1 Expenditure-Audit Fee

CAG had raised claim for the audit fee amounting to ` 10.29 lakh for the period up to March 2012 which was neither remitted nor shown under liabilities.

C.2 Depreciation-Rs.1434.07 lakh

The expenditure incurred on purchase of computers/ peripherals are being booked under plant & machinery. The rate of depreciation chargeable for the Computers and accessories is at the rate of 60 per cent while the depreciation applicable to Plant and Machinery and the applicable depreciation is 15 per cent. Thus inclusion of computer and accessories under Plant Machinery had resulted in understatement of depreciation account by ` 17.75 lakh and overstatement of fixed asset account by the same amount.

(D) General

D.1 Accounting Policy No.1 (Schedule 24)

As per policy No.1 of the significant policies (Schedule 24) of SCTIMST, financial statements are prepared on the accrual method of accounting. However, it was observed that the institute had recognized its income such as income from projects, testing charges, facility utilization charges, fees, subscriptions, royalty, interest on fixed deposits etc. on cash basis.

D.4 Grants in aid

The Grant of `91.01 crore was received and utilised during the current year viz., 2012-13.

(E) Management letter

Deficiencies which have not been included in the Audit Report have been brought to the notice of the SCTIMST through a Management letter issued separately for remedial/ corrective action.

i) Subject to our observations in the preceding paragraphs, we report that the Balance Sheet, Income & Expenditure Account and Receipts & Payment Account dealt with by this report are in agreement with the books of accounts.

ii) In our opinion and to the best of our information and according to the explanations given to us, the said financial statements read together with the Accounting Policies and Notes on Accounts, subject to the significant matters stated above and other matters mentioned in **Annexure** to this Audit Report give a true and fair view in conformity with accounting principles generally accepted in India.

   a. In so far as it relates to the Balance Sheet of the state of affairs of the Sree Chitra Tirunal Institute for Medical Sciences & Technology, Thiruvananthapuram as at 31st March 2013; and

   b. In so far as it relates to Income & Expenditure Account of the deficit for the year ended on that date.

Principal Director of Audit

Annexure to Separate Audit Report

1. Adequacy of Internal Control

1.1. Internal control in purchases

A grant of `11.10[1] crore was received under Plan head for creation of capital assets during 2011-12. Expenditure incurred on the same was 12.20 *per cent* of overall release of the Plan Funds. Purchases/ procurement are made by Institute from foreign and indigenous suppliers for equipments and other fixed assets.

In terms of General Instructions relating to purchase of imported items as per Institute's Store Purchase Procedure of April 1996, when a letter of credit (L/c) is opened with the bank, the bank make payment to the supplier after verification of shipping documents and send the debit advice to the institute. Such L/c applications have to be routed through accounts division. Similar procedures have to be followed for sight draft payments also. The L/c margin and commitment deposit with the bank was to the extent of ` 60.62 crore and almost equivalent Annual Grant received by the institute.

On test check it was observed by Audit that the Accounts Division was not exercising the internal control over commitment of funds, receipt vouchers of final payments and clearance of supplies received were missing, the list of purchase orders, the funds committed there against aggregating to ` 60.62 crore, the pendency of purchase orders, L/cs and revised delivery schedule of the supplies were also not available with the Accounts Division. Audit could not vouch for the amount of ` 60.62 crore held in L/c margin and Commitment Deposits against the Foreign, Import purchase orders placed.

Institute stated that a proper register showing L/c margin and commitment deposit would be maintained by the institute jointly by the purchase division, accounts division and other divisions from the year 2012-13 onwards for effective internal control.

2. Adequacy of Internal Audit

The internal audit wing of the Department of Science and Technology is conducting the internal audit of SCTIMST. The internal audit report was not furnished to Audit. SCTIMST replied (July 2013) that first reply was sent to DST in May 2010. The information about the status of outstanding internal audit paragraphs was not available with SCTIMST.

3. System of Physical verification of assets

In terms of Rule 192(1) of GFRs, Fixed Assets should be verified at least once in a year, the outcome of the verification need to be recorded in the register and the discrepancies should be promptly investigated. The records made available to Audit, however revealed that the latest annual Physical Stock Verification of 42 divisions/sections of Hospital wing was conducted in 2009-10. Physical verification of assets for the year 2010-11 & 2011-12 is yet to be carried out. Further, latest annual Physical Stock Verification of BMT wing also having 42 divisions/sections was conducted in 2009-10. On verification of the report, some discrepancies were found which were yet to be resolved.

3.1 Asset Registers

In terms of Rule 190 (2) of the General Financial Rules, 2005 (GFR) fixed assets such as plant, machinery, equipment, furniture, fixtures etc. should be maintained in the Form GFR-40. On scrutiny it was observed that the Institute is not maintaining Asset Register for fixed assets.

4. System of Physical verification of inventories

In terms of Rule 192(2) of GFRs, consumables goods and materials should be verified at least once in a year, the outcome of the verification need to be recorded in the register and the discrepancies should be promptly investigated. The records made available to Audit, however revealed that the latest annual Physical Stock Verification of 42 divisions/sections of Hospital wing was conducted in 2009-10. Physical verification of inventories for the year 2010-11 & 2011-12 is yet to be carried out. Further, latest annual Physical Stock Verification of BMT wing also having 42 divisions/sections was conducted in 2009-10. On verification of the report, some discrepancies were found which were yet to be resolved.

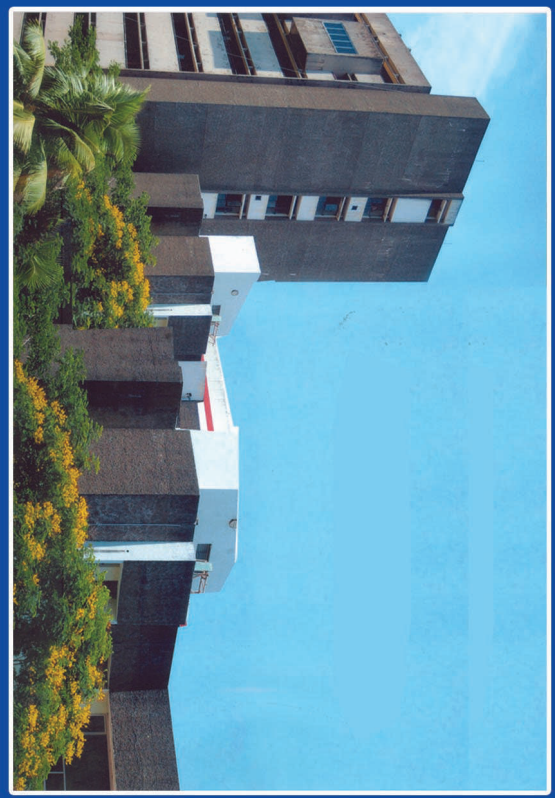
5. Regularity of payment of statutory dues

Nil

Dy. Director

Reply to Separate Audit Report on the accounts of SCTIMST for the year 2012-13

Para No. & Heading	Comments of C & AG	Reply of the Institute
(A) Revision of Accounts	SCTIMST revised the receipts and payments account based on the comments of Audit, Receipts side of the Receipt and Payment account was decreased by Rs.353.53 crore.	Both the Receipts side of the Receipts and Payments account and Payments side of the Payments accounts was decreased. This relates to amounts received at the Institute Bank which could not been assigned to a designated patient/purpose at the time of receipt in the Bank Account. An additional entry was essential at a later stage.
(B) Balance Sheet B.I. Corpus Capital Fund (Schedule 1)	Plan Grants received from Government of India Rs.71.42 crore-Government of India gave total grant of Rs.91.01 crore (Rs.61 crore for salary, Rs.18.91 crore for general purpose and Rs.11.10 crore for creation of capital assets) during the year. Thus Rs.11.10 crore should have been included in the corpus whereas the Institute has shown the same as Rs.71.42 crore. This has resulted in overstatment of corpus and understatement of Income Grant (Schedule 13) to the extent of Rs.60.32 crore.	We had shown Plan grant received as addition to Corpus Fund. The excess of expenditure over Institute generated income along with Non Plan grant as deduction from corpus fund. This method of accounting is being consistently followed by the Institute. Hence there has been not been an overall overstatement of Corpus.
(C) Income & Expenditure Account C.I. Expenditure - Audit fee	CAG had raised claim for the audit fee amounting to Rs.10.29 lakh for the period up to March 2012 which was neither remitted nor shown under liabilities.	Institute is awaiting waiver of audit fees. Further details regarding computation of audit fees for SAR/ Inspection audit/performance audit are still awaited. Once it is received the matter will be once again placed before the Competent authority for decision.
C.2 Depreciation - Rs.1434.07 lakh	Inclusion of computer and accessories under Plan and Machinery had resulted in understatement of depreciation account by Rs.17.75 lakh and overstament of fixed asset account by the same amount.	From the year 2012-13, New depreciation rates are being charged for assets as approved by DST. The audit comments relates to re-grouping of assets under Plant and Machinery and Computers. This re-grouping will be done during the year 2013-14
(D) General D.1 Accounting policy No.1 (Schedule 24)	As per policy No.1 of the significant polices (Schedule 24) of SCTIMST, financial statements are prepared on the accrual statements are prepared on the accrual method of accounting. However, it was observed that the institute had recognized its income such as income from projects, royalty etc. on cash basis.	Specific notes will be adopted from next year for accounting of income like Royalty, Interest on investments etc.
D.4 Grants in aid	The grant of Rs.91.01 crore was received and utilized during the current year viz., 2012-13	The fact stated that grant of Rs.91.01 crores received has been utilized during the year has been noted.



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