Annual Report
2013-14

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

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY

THIRUVANANTHAPURAM - 695 011, KERALA

ANNUAL REPORT

2013-14

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Sree Chitra Tirunal Institute for
Medical Sciences and Technology
Trivandrum - 695 011

Design & Printing
Vision Grafix, Trivandrum
Phone: 0471-2340914

Photography & Graphics
Medical Illustration
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.

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

Message

It is with immense pleasure that I pen my first message as President of the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram. I feel deeply honored to be associated with a vibrant Institute that has, in the last 37 years, proven its pre-eminence and uniqueness by blending medical, engineering and public health sciences under a single institutional framework. The commitment of the Institute to the needs of the sick, coupled with the strong conviction that biomedical research and technology are key to first-rate patient care, is what sets the institution apart from most others. The hospital wing of the Institute, with a team of eminent health care professionals and state-of-the-art medical technology, continues to provide high quality patient care at affordable rates. Patient load in the Departments of Cardiology, Neurology, Cardiac Surgery, Neurosurgery and Imaging Sciences & Interventional Radiology increased over the previous year, as reflected in the number of registrations, admissions and follow-up cases. A significant number of patients were provided free treatment while about 61% of the patients were offered subsidized treatment based on their socio-economic background. Notably, the Department of Cardiology completed data collection for the first-ever Heart Failure Registry in the country.

On health care delivery front, additional sub-specialty areas have been developed to provide state-of-the-art health care for neonate and infant heart ailments, heart failure, stroke, pain management and sleep medicine. I am confident that the Institute will further develop sub- specialty areas such as dedicated pediatric neurology services, including autism.

It is notable that the Institute, on behalf of the Department of Science and Technology, Government of India, has entered into a Memorandum of Understanding with ICMR, Department of Health Research, Government of India, and the Ministry of Health and Family Welfare, Government of Kerala, under the overall supervision of the Ministry of Health and Family Welfare, Government of India, to set up the Partnership Institute at Wayanad, a multi-institutional initiative for tribal health. The Sree Chitra Tirunal Institute for Medical Sciences and Technology, on its part, will set up public health initiative, in the initial phase.

The Institute has initiated the process of starting a Technology Business Incubation Facility at the Biomedical Technology Wing in collaboration with the Kerala State Industrial Development Corporation, with support and guidance from the Department of Science and Technology, Government of India. This would facilitate the Institute's participation in the proposed Research Park for Biomedical Devices and Biomaterials in the Kerala Life Science Park being developed by the Government of Kerala, through the KSIDC.

The Institute remains committed to the conception and implementation of innovative post-graduate training courses in advanced medical specialties, biomedical engineering and public health, and steps were initiated during the year to start Post-graduate Program in Transfusion Medicine.

Imbued with the spirit of unswerving devotion to its mandate, the Institute continued to surge ahead in the development of products related to health care. Hormone-releasing Intrauterine Device and Biograft CPC, which is a calcium phosphate self-setting bone system, were among products that hit the market during the year. Prototypes and materials being developed in the Institute include Paediatric and Neonatal models of Membrane Oxygenator and Arterial Filters, Electromagnetic blood flow measurement system, Revolving Permanent Magnet Portable Blood Flow Meter, Fluoropolymer-coated and hydrogel-sealed large diameter vascular graft and Mandibular Advancement Device for the Treatment of Obstructive Sleep Apnea.

Focusing on gene/drug co-delivery for anti-cancer therapy, quantum dots for drug/gene delivery, in vitro slice model for epilepsy, development of an in vitro alternative test system for Ocular Irritation and Hydroxylapatite nanomaterials, the Institute continued to push the frontiers of biological research and diagnostics as well. NABL audit on thermal and mechanical parameters was completed in December 2013, with calibration of speed as the new parameter added to the scope of accreditation.

During the year, the Institute had more than 200 research publications in major national and international journals in the areas of basic and clinical research, health sciences and biomedical technology, and several patents were filed or sealed. Gratifyingly, several members of the faculty and staff of the Institute were recipients of coveted awards at the national and state levels.

The Institute has quite an ambitious journey ahead and, inexplicably, lofty pursuits are often fraught with daunting challenges. However, individuals and institutions that are devoutly committed to their calling are bound to succeed, regardless of all the impediments that threaten to eat into their vitals from time to time. I would unhesitatingly say that the best is yet to be for the Institute because it is founded on the sacrosanct principle that service to society is the highest goal of human life. I am also confident that the bountiful support of the Department of Science and Technology, Government of India, would act as a catalyst and catapult the Institute to greater heights in the times to come.

My very best wishes to the Institute in its pursuit of excellence.

K M Chandrasekhar

President, SCTIMST

Director's Message

During the year, the newly constituted Institute Body, under the able leadership of Sri K M Chandrasekhar as President, took over the reins of the Institute to guide its journey into the future. The Institute places on record its deep appreciation of the immense contribution of its predecessor, with Dr R Chidambaram as President, spearheading the growth and all round development of the Institute during 2008-2013. During the past three decades, the Institute has been privileged to have great visionaries as Institute Body members. Under their guidance and encouragement, the Institute has grown in stature and relevance, delivering high quality health care and contributing to the commercialization of important biomedical technology-related products for affordable health care to all.

The year 2013-14 witnessed all round increase in the Institute's activities in the realms of health care delivery, public health intervention and research, biomedical technology, and research and development. In the area of patient care, there is a continuing upward trend in new patient registration and review, which strains the limited infrastructure, both space and personnel. The Institute has prioritized the creation of new space to cater to patient care-related infrastructure development, including modernization of surgical and interventional suites, patient intensive care facilities, and non-invasive, invasive and interventional laboratories. Construction of the new hospital block in the 83 cents of land adjacent to the Achutha Menon Centre would partly address these critical requirements of the Institute.

The Biomedical Technology Wing has identified several multi-disciplinary programs for the development of biomedical devices and biomaterials and has initiated the process of setting up two dedicated facilities for cardiovascular and neuro-prosthetic devices. The Institute is leaving no stone unturned in its effort to be identified as the nodal technology research center for biomedical devices, as envisaged in the policy statement of the Central government. This would help expand, in depth and scope, the research and development activities at the BMT Wing.

On commercialization of biomedical products, Institute Licensee, M/s HLL Life Care, has started commercial production of Hormone Releasing Intra uterine device, EMILY. The Central Drugs Standard Control Organization, CDSCO, Government of India, has approved issuance of Marketing License to IFGL, Bioceramics, Kolkota, for their product, Biograft CPC, for which the know how was provided by the Bioceramics Laboratory of our Institute. The Institute filed 19 patents and 1 trademark application in 2013-14.

On the Academic Front, the post-graduate program of MD in Transfusion Medicine and two Advanced Certificate Programs in Physiotherapy in Cardiac and Neurosciences have been approved for the ensuing academic session. Further, initiation of several sub-specialty programs in cardiac and neurosciences has direct relevance to first rate patient care, tapping modern technology as well as specialized skills. MoU have been signed with the Institute for Information Technology and Management, Kerala, for combined PhD in Medical Imaging, and International Cooperation Agreement with QUT, Brisbane, Australia, for a Joint PhD program.

The Masters, Doctoral and Post-doctoral programs of the Institute continue to attract large number of aspirants as indicated by the number of applications.

The 29th Annual Convocation was held on 18/5/2013. Dr K Radhakrishnan, Chairman, ISRO and the Space Commission, and Secretary, Department of Space, delivered the Convocation Address.

The first G Parthasarathi Oration, instituted in memory of Sri G Parthasarathi, the First President of the Institute, was delivered on 7th November 2013 by Prof. Ferid Murad of on the George Washington University, who was co-winner of the 1988 Nobel Prize in Physiology and Medicine.

Chitra Dhwani, an e-magazine in English and Chitralekha in Hindi, periodicals for internal circulation, are very popular among the employees and both these publications maintain high standards and present educational as well as literary reading material.

Needless to say, the strength of the Institute is its dedicated work force striving in unison to achieve the cherished goals of the Institute. We look forward to the future with a firm resolve to provide affordable health care to all, particularly with novel biomedical devices and materials developed indigenously.

Jagan Mohan A. Tharakan

HIGHLIGHTS OF THE YEAR

- Steps were initiated to start MD in Transfusion Medicine
- Supported by the ICMR, data collection of the first-ever Heart Failure Registry in the country was completed
- The first G Parthasarathy Oration was delivered at the Institute by Prof Ferid Murad, co-winner of the 1998 Nobel Prize in Physiology and Medicine
- The effort to set up a Medical Devices Research Park for encouraging and attracting entrepreneurs to the medical technology sector continued
- Central Drugs Standard Control Organization, Government of India, approved issuance of Marketing License to IFGL Bioceramics, Kolkota, for their product, BioGraft CPC, the know-how for the manufacture of which was provided by the Bioceramics Laboratory of the Institute.

Agreements signed included:

- Material Transfer Agreement with M/s Trivitron Healthcare for Iodinated PU on 12th April 2013; MoU with IITMK for PhD in Medical Imaging Technology on 20th May 2013; Extension of MoU with NIT, Trichy, for academic & research collaboration; International Cooperation Agreement with QUT, Brisbane, Australia, on 5th November 2013 for Joint PhD program; MoU with the Osaka City University on 27th August 2013 for collaboration in education, research and technology

Prototypes/materials under Development/ Projects being undertaken included:

- Development of Paediatric and Neonatal models of membrane oxygenator and arterial filters; Electromagnetic blood flow measurement system; Revolving Permanent Magnet Portable Blood Flow Meter; Fluoropolymer-coated and hydrogel-sealed large diameter vascular graft; Low molecular weight heparin nanoparticles; Mandibular Advancement Device for the Treatment of Obstructive Sleep Apnea; Injectable calcium sulfate bone cement; Dispensable and biodegradable polymeric bone cement for minimally invasive treatment of bone diseases; Tissue-engineered products – cartilage, trachea, skin, pancreatic islet; Iron oxide nanoparticle probes for molecular MR imaging; Hemostatic scaffold using biodegradable polymer and biomimetic extracellular matrix components for healing of chronic dermal wounds; Tissue-engineered skin substitute for diabetic wound healing; Biodegradable polymeric hydrogel materials; Low molecular weight heparin nanoparticles; Dural substitutes for cranial neurosurgery; Quantum dot conjugated single walled carbon nanotubes for imaging and therapy; Bioengineered hybrid skin substitutes for burn wounds; Tissue-engineered, strontium-incorporated hydroxyaapatite (SrHA) for the healing of osteoporotic bone defect; Cell sheet engineering; Regeneration of intervertebral discs

Areas of Biological Research & Diagnostics included:

- Gene/Drug co-delivery for anticancer therapy; Quantum dots for drug/gene delivery; New sensing and drug delivery probes using carbon dots (C dots); Role of Transforming Growth Factor–alpha in neuronal growth and regeneration; In vitro slice model for epilepsy; In vitro alternative test system development for Ocular Irritation; Molecular and immunotoxicological effects of Dextran-coated Ferrite and Hydroxylapatite nanomaterials

Testing & Accreditation:

- NABL audit on thermal and mechanical parameters were completed in December 2013. Calibration of speed was added to the scope of accreditation; Routine testing services for external customers made good progress, generating a total income of Rs 46 lakhs.

Patents and Publications:

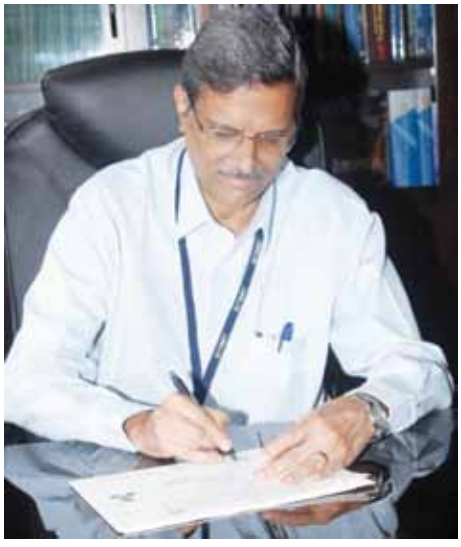
- 89 patents were sealed, 19 were filed, 13 designs were sealed and more than 225 research articles were published in major national and international journals in the areas of basic and clinical research, health sciences and biomedical technology

Dr C Kesavadas, Dr Annie John, Dr R S Jayasree, Dr Ashalatha Radhakrishnan, Ms Saramma Antony George and the Department of Transfusion Medicine were recipients of honors & awards at the national and state levels.

Annual Convocation (29th Batch) SCTIMST on May 18, 2013

Signing of MoU between IIITMK (Indian Institute of Information Technology and Management –Kerala) and SCTIMST for joint PhD programme- May 20 , 2013.

Shri. Oommen Chandy, Hon. Chief Minister of Kerala, inaugurates World No Tobacco Day on May 31, 2013.



Dr Jagan Mohan Tharakan, Professor (Senior Grade) and Head, Cardiology, takes charge as Director from Dr K Radhakrishnan on July 16, 2013.

Ascend July 29, 2013

Inauguration of Non-Invasive Brain Stimulation and Motor Physiology Laboratory in July, 2013

Exchange of MoU for collaboration in Education, Research and Technology ,SCTIMST and Osaka City University on August 27, 2013 during the visit of Prof. Y. Yokogawa, Department of Intelligent Materials, OCU, to the BMT Wing

HEATS inauguration August 30, 2013

Basic Training in Ethics in Health Research August 26-31, 2013

Valedictory function of Basic Training in Ethics in Health Research August 31, 2013

India-Singapore Co-design for Health Workshop – September 14 , 2013Singapore University of Technology and Design (SUTD)
Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST),
Christian Medical College Vellore (CMC Vellore), and the Indian Institute of Technology, Madras (IITM)

Hindi Fortnight Celebration , September 14-28 , 2013
Work shop inaugurated by Dr. Jagan Mohan Tharakan , Director, SCTIMST

A Workshop on 'Analysing Medical and Health Data Using R' at AMC , September 28 & 29, 2013.

Shri G. Karthikeyan inaugurates World Alzheimer's Day, September 21, 2013

Dr Prakash.J, Professor, Department of Politics, University of Kerala, inaugurates National Blood Donation Day Celebration October 1, 2013

Shri. Rajasenan, Film Director, inaugurates Talentine 2013 – Students' Day on October 19, 2013

International Co-operation Agreement between SCTIMST and Queensland University, Australia, for encouragement and development of cooperation and exchange in areas of mutual academic interest. November 5, 2013

The M.N. Sen Oration Award of The Indian Council of Medical Research was presented to Dr.C. Kesavadas, Professor of Radiology, by the Union Health Minister, Shri Ghulam Nabi Azad.

Ist G. Parthasarathi Oration by Dr. Ferid Murad, Nobel Laureate, George Washington University, November 7, 2013. Prof M. S. Valiathan addresses the gathering on the occasion.

Shri Ramasami, Secretary, DST, and Dr Jagan Mohan Tharakan meet Heads of Departments on Nov 16, 2013

National Epilepsy Day - November 20, 2013

Hospital Equipment Awareness Training - (HEATS) jointly organized by the Department of Pathology, Department of Clinical Engineering and Biomedical Technology Wing, SCTIMST, on December 20-21, 2013

Indo- German Symposium (30th November and 1 December, 2013)

First Anniversary of Neuro-Intervention Center held on January 18, 2014

Dr Jagan Mohan Tharakan, Director, SCTIMST, inaugurates Intensive Residential Training Programme (RTPMED2014) on Toxicity, Safety, Biocompatibility Evaluation of Materials, Medical Devices and Combination Products on February 17-19, 2014

Shri. Chandrashekhar IAS, Institute President, and Dr Jagan Mohan Tharakan meeting with Heads of Departments on February 25, 2014

National Science Day February 28, 2014

Shri.Bharat Bhushan, Chief Secretary, Government of Kerala, delivers the Keynote Address at the Science Fete on March 15, 2014

Valedictory function of joint Hindi Fortnight of TOLIC on March 27, 2014

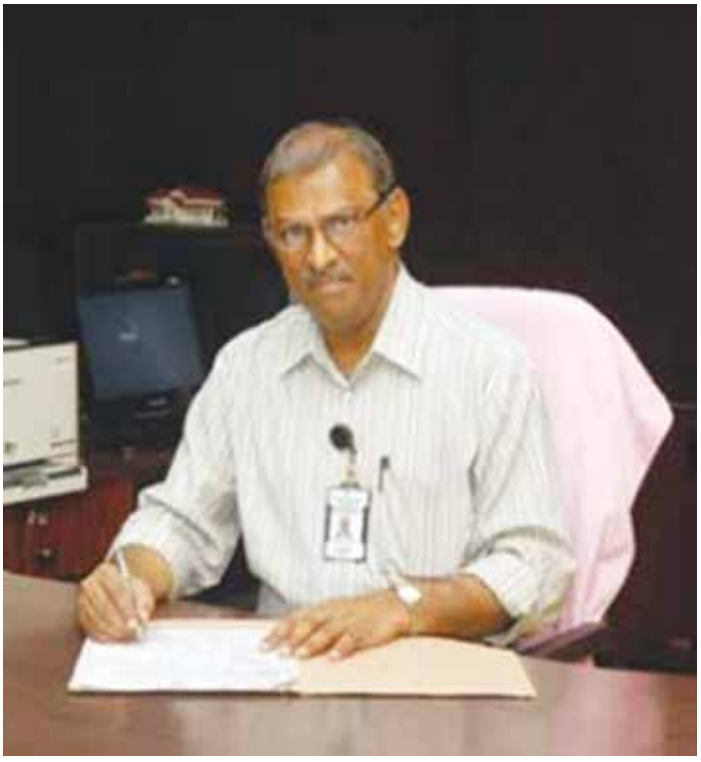
HOSPITAL WING

Our Mission

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

Our Vision

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



From the Desk of the Medical Superintendent

The number of patients seeking our help maintains the upward trend, straining our every sinew to the maximum, because we could hardly add any infrastructure facilities due to the extant austerity measures in force. We could offer quality services at affordablecosts to more patients, mainly due to a variety of benevolent health schemes of Central and State governments, especially to indigent children from other states. Bed occupancy has improved considerably.

As before, we continue to optimize utilization of the various facilities to meet the economic goals. Inpatient charges were reassessed after many years and updated to latest price levels.

We have, with the unstinting efforts of all our staff, achieved an almost complete stock verification and near-perfect asset register, with alphanumeric coding of equipment and use of computerization. Inventory management is also being updated and is expected to be completed in a year.

The resources mobilization and their proper use have reached a zenith. Unless we add more space and manpower, the futuredevelopments would face difficulties. We hope the government would ease the resources constraints soon to help us continue with our mission of helping the needy patients.

R. Sankar Kumar

HOSPITAL ADMINISTRATION

Overview

Statistics of hospital services during 2013-14 revealed that the patient load increased compared to the previous year, as reflected in the number of registrations, admissions, follow up patients and so on. The departments did their best to optimally utilize the available resources by increasing the bed turnover.

1) Routine Activities

During the year, various services in Cardiology, Neurology, Cardiac Surgery, Neuro Surgery and Imaging Sciences & Interventional Radiology registered 17484 new patients (Chart 1). A total of 10929 patients were admitted for treatment including surgical and interventional procedures (Chart 1). In the OPD, 115899 patients came for review in various Departments, including speciality clinics (Chart 2).

5.55% of the patients were provided free treatment and 60.35% patients were offered subsidized treatment based on their socio-economic background (Chart 3). The facilities available were optimally utilized for patient care services, which is evident from the data related to bed turnover (43, same as previous year) (Chart 4) and the average length of stay remained the same for the last 3 years (Chart 5). The bed occupancy rate increased from 85.36% to 92.29%(Chart 6).

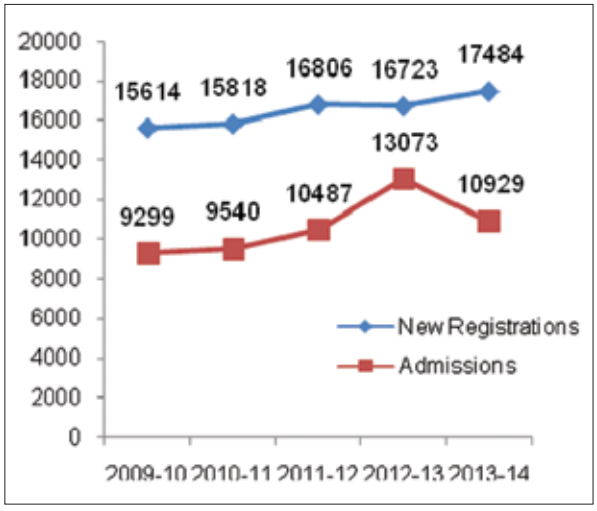


Chart 1 : New Registrations & Admissions

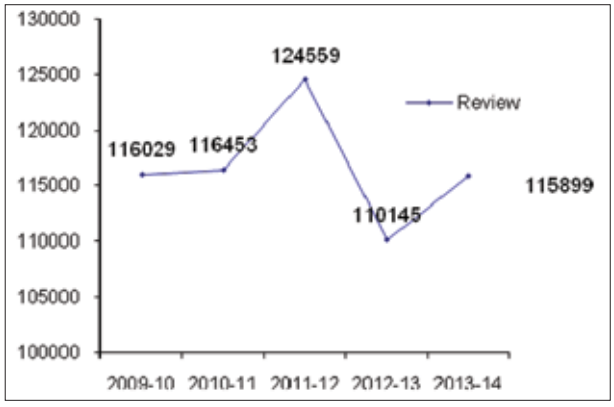


Chart 2 : Follow up

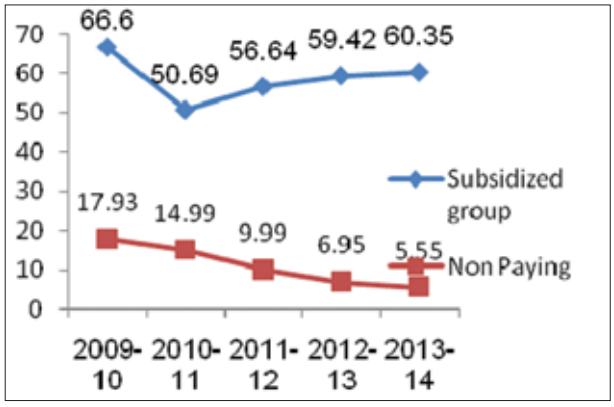


Chart 3 : Free & Subsidized Treatment

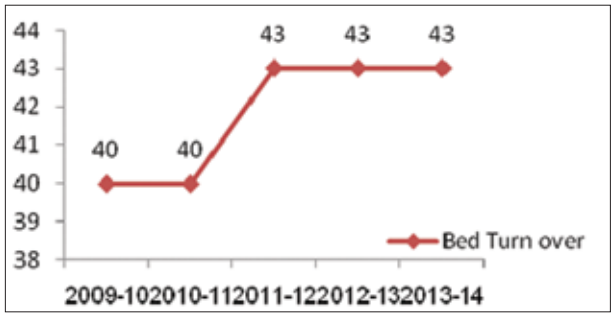


Chart 4 : Bed Turn Over

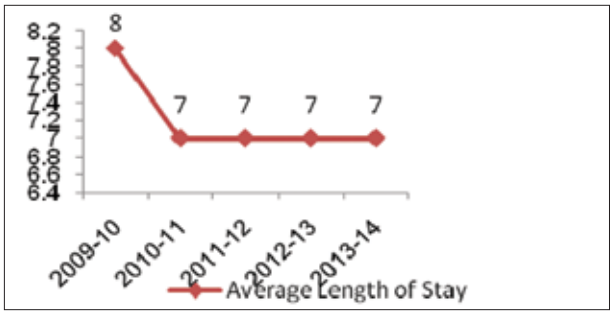


Chart 5 : Average Length of Stay

2) New initiatives during the year

- The hospital took the initiative for the implementation of Electronic Medical Records in order to computerize the hospital records. The digitization of existing medical records was started.
- Signing of MoA with the State Mission Director, National Rural Health Mission, for the implementation of RSBK project at SCTIMST for providing free treatment for children under 18 years
- The charges in the hospital were revised and introduced New IP Bill Scheme from 01.04.2013.
- Supervisory Meeting was conducted once in two months for effective and smooth functioning of the hospital.
- Started the work related to installation of a new 3 Tesla MRI.
- Continued service under various financial schemes for around 1200 patients under Karunya Benovolent Fund, around 1500 patients under ChisPlus, around 1400 patients under Thalolam Scheme and 82 patients under under Comprehensive Health Care Project for ST and so on.

3) Research

Workshops/ training programs organized during the year.

➢ Hand Hygiene Day was observed on 5th May 2013 with talks by external faculty, video demonstration and hospital visits.

World Hand Hygiene day held on 4-5-2013 was inagurated by Dr Sankar Kumar, Medical Superintendent

Objectives

Tele-Education

- To transmit CME Programmes organized in Medical Colleges, Sree Chitra Tirunal Institute for Medical Sciences & Technology and Regional Cancer Centre to doctors in various hospitals of the state
- To generate CME programmes in Medical Colleges tailored to the needs of doctors in secondary and primary referral centers and transmit the same to the doctors in the District Hospitals of the state.
- To connect Medical Colleges in the state through communication networks in order to provide a facility for virtual classroom teaching.
- To provide a connecting link to national institutes and international institutes for scientific interaction among doctors.

Tele-Consultation

- To provide expert advice available in the Medical Colleges, SCTIMST and RCC to patients attending District Hospitals through communication networks.
- To provide a forum for scientific interaction between doctors at District Hospitals and doctors at the Medical Colleges, SCTIMST, RCC and other national and international centres.
- Telecast of CME on "Common Neurological Problems in Children" through ISRO Network by Dr. Darshana Naik, Consultant Pediatric Neurologist in Asian Child Neuro Clinic & CP Center, Ahmedabad, on 22.05.2013 was arranged through NKN.
- Arranged Telecast of New Year Message by the President of India through NKN on 7th January 2014.

Usage Statistics

Dr. S.K. Jawahar had the following additional assignments during the year.

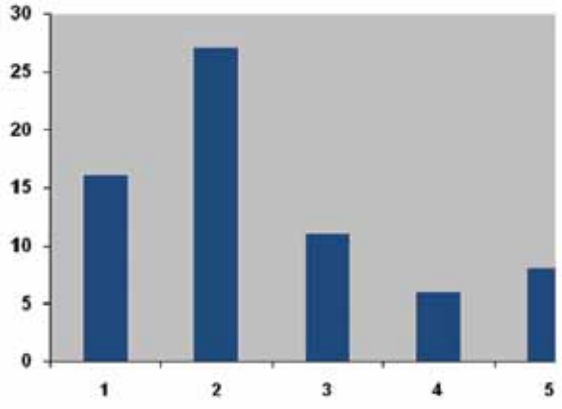
- Dr. S.K. Jawahar took charge as Principal Public Information Officer (PPIO) of the Institute with effect from May 2011. During the year, 149 applications were received by the PPIO Officer requesting information under RTI Act. All the applications were forwarded to the concerned/custodian of the documents and reply was despatched as per rules governing RTI.
- Guest Faculty of the Kerala State Institute of Health & Family Welfare, Government of Kerala, for imparting administrative and management training to the Medical Officers of the Kerala Health Services.
- Guest Faculty for M Tech and MPH programmes conducted by SCTIMST.
- Visiting Faculty at the MHA Programme (CDC), University of Kerala.
- Guide to the MHA students from the University of Kerala.

MEDICAL RECORDS DEPARTMENT

N.G. Thampi, BMRSc, MA, MBA
Senior Medical Records Officer & Head.

P.J. Varghese
Medical Records Officer.

- Medical Records Department continued to have a vital role in the maintenance of quality patient care, assisting academic, research activities and sharing responsibility in efficient management of services.
- Steps were taken to re-start scanning of Medical Records as part of computerisation of Medical Records.



1	Tele Consultation
2	CME
3	Case Discussion
4	International Project Discussion
5	Web Cast/ PhD Seminar

ACTIVITIES TABLE

1	Patients registered	17484
2	Admissions performed	10993
3	Medical Records made available for patient review purpose	139313
4	Records issued for Academic purpose	6805
5	Certificates issued	1481

STAFF DETAILS

List of Supervisory Staff attached to MS Office

Department	Name	Designation	Qualification
Hospital Administration	Dr. Sankarkumar. R	Medical Superintendent	MBBS, MS, MCh (CVTS), FAMS, FIMSA
Hospital Administration	Dr. S.K. Jawahar	Administrative Medical Officer	MBBS, Dip NB, LLB, MHA
Nursing	Dr. Sudhamani Amma	Nursing Superintendent (Acting)	MSc Nursing, PGDHRM, PhD
"	Ms. Remadevi. S	Deputy Nursing Superintendent (Acting)	BSc. Nursing and Nursing Admn.
"	Ms. Valsala Kumari. C	Sr. Nursing Supervisor	BSc. Nursing and Nursing Admn.
"	Ms Saraswathy Amma C	Sr.Nursing Supervisor	Post basic Bsc Nursing, Nursing Administration and MHRM
CSSD	Ms. Sujamani R Nair	Chief Ward Sister	Diploma in GeneralNursing, BSc. Nursing(IGNOU) Diploma Nursing Administration, PG-DHM
Infection Control Unit & Bio medical Waste Mgt	Ms. Anasooya	Infection Control Nurse	
Computer Division	Ms. Geetha. G	Scientist G	M.Tech Computer Science,PhD (Bioinformatics)
Construction Wing	Mr. Shanmughom Asari. C	Construction Engineer	B.E Civil
"	Mr. Gopinathakurup.G	Asst. Engineer	Diploma in Civil Engineering
Security & Safety	Mr. Prasanna Kumar K	Security & Safety Officer-B	Diploma in Electrical Engineering, B.Com, B E (Electrical)
	Mr. Hemanth Kumar R P		M Com, MBA

Dietary	Ms. Leena Thomas	Senior Dietician	BSc Nutrition, PG Diploma in Nutrition & dietetics
"	Ms. Jyothi Lekshmy. S	Asst. Dietician	MSc. Nutrition
Laundry	Mr. Umesh Sankar. S	Laundry Supervisor	Diploma in Textile Technology and B.Com
MSW	Dr. Jayachandran. D	Scientific officer	MA Sociology, MA Psychology and PhD
"	Ms. Rosamma Manuel	Junior Scientific Officer	MSW, LLB
Medical Records	Mr.Thampi. N.G	Senior. Medical Records Officer	BSc., BMRSc, MA
Pharmacy	Ms. Rosily Joseph	Pharmacist (Gr.I)	BSC, D pharm
Transport	Mr. Saji. M.S	Transport I/C	S.S.L.C

NURSING SERVICE

The Division of Nursing Service continued to deliver high quality patient care in Cardio-thoracic surgery, Neuro-surgery, Cardiology, Neurology and their sub-specialties.

New Initiatives

The Division implemented on-line submission of accounts of in-patient bills, barbers account and investigation requests and prepared an electronic documentation program, which is to be implemented after a successful trial run.

Patient-family teaching by the nurses, with a structured curriculum involving the patient and family, was routinely provided to all patients who underwent surgery.

Academic activities

The Division continued to provide structured orientation to newly appointed staff, on transfer and after vacancy-oriented promotion. Regular clustered continuing nursing education sessions were effectively carried out.

Higher Education

Twelve nurses underwent Certificate Course in Nursing Administration from the Continuing Adult Education and Extension Centre of Kerala University.

Ms. Shani S D, S/N acquired MSc Nursing degree in 2013.

Conferences organized by the Nursing Service Division

The International Nurses Day 2013 was celebrated with a symposium on 'Delivering quality and innovation in patient care' as the theme of the day. A meeting in collaboration with the Neurosurgeons was organized for discussing 'Home care management and rehabilitation after neurosurgery'. 125 patents that underwent surgery and their family members participated in the session.

National Conference

National Conference on 'Pediatric cardiac nursing, clinical updates - 2013' was conducted on 9th & 10th November 2013, which was attended by 335 participants from all over India.

State Conference

A state level conference was conducted on 22/12/13 on 'Basic concepts in Interventional Cardiology'. 275 nurses from all over Kerala participated in the conference.

Awards and Honors

Ms Saramma Antony George, Ward Sister, was selected for the 'Best Nurse' Award by TNAI, Kerala State.

Academic Programme of Nursing Division - Conference Conducted by Nurses

'National Programme on Pediatric Cardiac Nursing' was conducted on 9th and 10th November 2013. 345 nurses from all over India attended the event.

A state level conference on 'Basic Concepts in Interventional Cardiology' was held on 22.12.2013 at the AMC auditorium, SCTIMST, which was attended by 230 nurses from all over Kerala.

DEPARTMENT OF ANESTHESIOLOGY

NEUROANAESTHESIOLOGY

The Neuroanesthesia Division had the following Mission:

- To improve the health care of the neurologically ill
- To improve the peri-operative care of neurosurgical patients
- To contribute to the growth of Neuroanesthesia through excellent teaching, training and research

The following was the Vision of the Division to achieve the above goals:

To reduce costs in healthcare of neurologically ill

To achieve the highest standards in post-graduate education and training

Activities of the Division

Operation Theatre:

The staff of the Neuroanesthesia Division was primarily involved in the peri-operative care of patients undergoing neurosurgical procedures. Complex intracranial aneurysm clipping, resections of AV malformations, removal of skull base tumors, extra-cranial to intracranial bypass procedures, pediatric patients with large tumors and complex spine instrumentation were managed efficiently. The Division has got state-of-the-art anesthesia equipment and monitoring systems that aid in peri-operative care of these 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 was also routinely used in monitoring cerebral blood flow. Newer airway gadgets were procured for management of difficult airway.

Radiological Suite:

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

Intensive care:

The Division was actively involved in post-operative and intensive care management of critically ill neurological patients. The ICU was involved in ventilator care and invasive procedures like arterial lines, central venous catheterization, lumbar drainage, percutaneous tracheostomy. Trans-thoracic echo was done to monitor hemodynamically unstable patients admitted in neurosurgical ICU. Trans-cranial Doppler and EEG monitoring also formed an integral part of ICU management. The Division provided respiratory, hemodynamic, fluid and electrolyte, pain and sedation management and interdisciplinary consultations in the ICU.

Anesthetic and intensive care of stroke patients:

Neuroanaesthetists were part of the recently started acute stroke care unit, being actively involved in the acute and sub-acute phases of stroke. We were involved during initial assessment and stabilization in the intensive care unit and during intra-arterial thrombolysis, a specialized procedure done in the radiological suite where we monitored and provided sedation and pain relief. We were also involved in the ventilatory care, hemodynamic management, sedation of critically ill stroke patients. In addition, we provided anesthesia and peri-operative management of patients taken for decompressive craniectomy. The team was actively involved in the neurovascular meetings conducted every Wednesday for the management of patients with cerebrovascular disease.

Academic activities:

The department has well-structured academic programs with active participation of residents and faculty. Inter-departmental academic activities included faculty from other departments taking lectures and academic discussion with the residents. The faculty was also involved in teaching and training of residents of other departments, nursing staff and technicians. Various hands-on training was conducted to improve the clinical skills of residents.

Dr Arulvelan and Dr Vidhu Bhatnagar successfully completed the DM (Neuroanesthesiology) exams and Dr Vijay Sharma completed PDCC course in Neuroanesthesia in December 2013.

New initiatives during the year

Intra-operative Evoked Potential Monitoring:

Intra-operative evoked potential monitoring is a highly specialized procedure, which helps in monitoring brain functions intra-operatively. Its use brings improved care, shortens ICU and hospital stay. Few centers in India only have facility for monitoring evoked potentials. Monitoring requires modification of the technique of anesthesia and the procedure was carried out without use of muscle relaxant. Patients who were at risk of neurological damage with aneurysms, CP angle tumors, posterior fossa tumors, spine surgeries were increasingly managed with evoked potential monitoring. Increasing number of patients underwent monitoring, which helped in improved neurological outcome and shortened hospital stay.

Day care services for MRI procedures:

Many neurologically ill patients, especially children and the elderly, underwent Magnetic Resonant Imaging (MRI) of the brain and spinal cord to aid in diagnosis and management. They required 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 was started wherein patients were assessed for fitness in the special MRI OP Clinic being conducted every day. By this, there was a steady increase in the number of patients undergoing MRI and, in this group, 90% of patients were administered day care anesthesia.

Pain services:

The department was actively involved in the management of acute pain services, including post-operative pain. The facility for patient-controlled analgesia proved effective and useful.

Research activities in the Neuroanesthesia Division

- Outcomes of tracheostomy in neuromedical intensive care unit
- Risk factors and outcome of aspiration pneumonia in neuro icus
- Peri operativecardiac outcomes in patients undergoing neurosurgery
- Comparison of diastolic function between mannitol and hypertonic saline
- Effect of levobupivacaine scalp block in patients undergoing neurosurgery
- Effects of stroke volume variation on mannitol dose response
- Effects of dexmedetomidine in brain tumor patients
- Effects of dexmedetomidine in brain AV malformations

Prceedures Done	Total Number
Anesthesia In Neuro Surgery	1276
Anesthesia For Interventional Neuroradilogy	224
Anesthesia For Mri	208
Anesthesia Outside Ot Procedures	400
Percutaneous Tracheostomies	80
Neurosurgical Icu Ventilatory Care	220
Stroke Icu Care	48
Neuromedical Icu Ventilatyory Care	102

CARDIAC ANESTHESIOLOGY

Anesthesia And Peri-Procedural Care Were Provided For The Following Number Of Cases During The Period

- Adult patients undergoing surgery in adult cardiac surgical operation theatre (open heart surgeries, closed heart and thoracic operations and vascular operations): 1424 cases
- Pediatric patients undergoing surgery in pediatric cardiac surgical operation theatre (open heart cases and closed heart cases): 749 cases
- Procedures in cardiac catheterization laboratory under general anaesthesia: 499
- Procedures in Electrophysiology laboratory under general anaesthesia: 32

- Cardiac Magnetic Resonance Imaging under general anaesthesia: 40 cases
- Cardiac CT/Aortogram/pulmonary angiogram in CT suite under General anaesthesia/sedation & monitored anaesthesia: 56
- Anaesthesia in Digital Subtraction Angiography laboratory (Mostly for Endovascular stenting of aortic aneurysm aneurysm) : 26
- Short procedures done under anaesthesia in Cardiac Medical ICU, &
- Pediatric Surgical ICU: 65
- Percutaneous tracheostomy: 9 numbers

Chapter in Book

- Dr. Shrinivas Vitthal Gadhinglajkar, Subramaniam Balachundhar
- Evaluation of Mitral valve using 3D echocardiography in Problem-Based Transesophageal Echocardiography, eds. Subramaniam Kathirvel Subramaniam Balachundhar Tempe Deepak K.
- Published by CBS Publishers & Distributors ISBN 10: 8123923627 / ISBN 13: 9788123923628

Details of Honours and Awards Won by Staff and Students

Dr. K. Yuvaraj, Post-doctoral Certificate Course Resident presented a paper titled 'Surgical Outcome in children undergoing hypospadias repair under caudal epidural versus penile block' on 12/5/2013 during ISATRICON 2013. He received the 'BEST PAPER AWARD' for this paper.

Dr. Suddhadeb Roy presented a paper titled 'Stuck leaflet of St Jude Mitral prosthesis after cardiopulmonary bypass: Detection of Mechanism using intraoperative 3D Echocardiography'- (Authors: Dr. Suddhadeb Roy, Dr. Shrinivas V.G., Dr. Rupa Sreedhar) on 1/3/2014 during Eighth Annual Perioperative & Critical Care Trans-Esophageal Echocardiography Workshop, held from 28/2/2014 to 2/3/2014 in Advanced Cardiac Center at Post-graduate Institute of Medical Education and Research at Chandigarh. He received the 'SECOND BEST PAPER AWARD' for this paper.

NEW INITIATIVES

Anaesthesiologists became part of the Team for 'Organ retrieval of brain dead patients'. Liver, kidneys, cornea etc were harvested.

Examiner/Subject Expert

Dr. Rupa Sreedhar served as subject expert to select candidate for the post of Professor of Cardiac Anaesthesia at All India Institute of Medical Sciences, New Delhi. Dr. Shrinivas V.G. was External Examiner for D.M. in the subject of Cardiac Anesthesia at PGIMER Chandigarh.

Academic Staff

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

Dr. Rupa Sreedhar
Professor (DA. MD, Dip NB, PDCC)
Professor

Dr. Thomas Koshy
Professor (DA. MD, PDCC)
Professor

Dr. Shrinivas .V. Gadhinglajkar
Professor (MD, PDCC),
Professor

Dr. Prasanta Kumar Dash (MD, PDCC)
Professor

Dr. S. Manikandan, MD
Additional Professor

Dr. P. Gayatri, MD, FRCA
Additional Professor (Resigned and left the institute)

Dr. P.R.Suneel, MD
Additional Professor

Dr. K.P.Unnikrishnan, MD
Additional Professor

Dr.Satyajeet Misra, M.D
Assistant Professor (On long leave)

Dr. Smita P, MD, DM
Assistant professor

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

Dr.Subin Sukesan MD, DM
Ad-hoc Assistant Professor

Dr.Arulvelan A, MD, DM
Ad-hoc Assistant Professor

Mr. Binu Thomas
Scientific Assistant

Residents of DM course in Cardiothoracic and Vascular Anaesthesia

Dr. Reshmi Liza Jose (third year DM)
Dr. Sujatha M (third year DM)
Dr. Roshith chandran(second year DM)
Dr. Jagadeesh (second year DM)
Dr. Uvaraj.R(second year DM)
Dr. Suddhadeb Roy (second year DM)
Dr. Saravana Babu (first year DM)
Dr. Deepak Mathew Gregory (first year DM)
Dr. Keerthi Chigurupati (first year DM)
Dr. Neelam Aggarwal (first year DM)

Residents of DM course in Neuroanaesthesia

Dr. N.V.Vinod Kumar
Dr. Josemine D
Dr. Madhusoodhana Rao
Dr. Ajayprasad Hrishi
Dr. Nilima Rachael Muthachen
Dr.Soumya

Residents of Post-doctoral Certificate Course (PDCC) in Cardiothoracic and Vascular Anaesthesia

PDCC residents of 2014 batch:

Dr. Lovhale Pravin Shriram
Dr. Rajesh M.G. (PDCC resident)

PDCC residents of 2013 batch

Dr. Yuvaraj.k
Dr. Saumitra Zope
Dr. Amar Tirmanvar Rao

Residents of Post-doctoral Certificate Course (PDCC) in Neuroanaesthesia

Dr. Surabhi Sudhir Chipde
Dr. Amandeep Singh
Dr. Saurabh Bhandge

DEPARTMENT OF BIOCHEMISTRY

A. Patient services

The 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 (CCL) of this department was engaged in round-the-clock clinical diagnostic services employing sixteen technical assistants and two scientific officers.

During the year, CCL performed a total of 7,86,440 tests in Biochemistry, Hematology and Clinical Pathology as detailed below, amounting to an increase of nearly 4% over the previous year.

Biochemistry	3,03620
Hematology	1,88,488
Coagulation parameters	46,656
Blood gas and electrolytes	33,017
Miscellaneous	2.14,659

B. 1. Research Activity

1. Plasma lactose-binding immunoglobulin (LIg) dual specificity leads to immune complex formation and xenograft rejection:

We reported that lactose-binding antibody (LIg) present in normal human plasma at a concentration of about 30 microgram per ml recognized both α- and β-anomers of galactose. Further, this antibody formed immune complex with lipoprotein(a) [Lp(a)] alone among plasma lipoproteins indicating its role in Lp(a)-mediated vascular pathology which is now being increasingly implicated in vascular diseases and Alzheimer's disease. LIg also recognized non-primate glycoprotein antigens with α-galactoside-containing sugar chains.

2. LIg-desialylated Lp(a) immune complex binds to host cells:

Desialylation of host cell surface glycans is a hallmark of many infections as well as diabetes. We recently observed that LIg immune complex with desialylated Lp(a) possesses unused valencies, enabling it to bind to desialylated host cells such as RBC. Similar binding to endothelial cells could be a route for Lp(a) incorporation to atherosclerotic plaques.

3. Lp(a) :LDL adduct could be a vehicle for lipoprotein transport to macrophages:

We have communicated that most of the Lp(a) in plasma occur as non-covalent adduct with LDL and that, unlike free LDL, its adduct with Lp(a) could bind to immobilized form of galectin-1, which is the most ubiquitous lectin in human body. Since enhanced galectin-1 expression is a phenotype of activated macrophages, this recognition is a potent route for lipoprotein sequestration in macrophages leading to foam cell formation.

4. Functional characterization of high-density lipoprotein [HDL] and atherogenesis

Though HDL is generally an anti-atherogenic lipoprotein, this property can be compromised by functional impairment in HDL disorders associated with atherosclerosis and even among asymptomatic subjects during systemic inflammation. Such functionally defective HDL was found to be a pro-inflammatory particle, as it induces the release of TNF-alpha and decreases the production of anti-inflammatory cytokine, IL-10 in monocytes/ macrophages. This suggests the need for novel therapeutic approaches to prevent the transformation of functional HDL to dysfunctional form.

5) Small dense low-density lipoprotein [sdLDL] and insulin resistance

Insulin resistance (IR) plays a major role in the pathophysiology of type 2 diabetes mellitus so that identifying subjects prone to IR at an early stage of life will help develop preventive strategies. A preliminary study was

initiated, aiming at evaluating the importance of sdLDL in the prediction of insulin resistance state among volunteers from free-living population in comparison to the general method of homeostatic model assessment of IR.

6) Coronary artery disease [CAD] in the young [collaborative research with the Department of Cardiology]:

As part of a project to identify risk factors for CAD, a method was developed to assess homocysteine and asymmetric dimethyl arginine in human urine by LC-tandem mass spectrometry, in collaboration with the Polymer Processing Laboratory, BMT Wing. In addition, characterization of monocyte subsets and monocyte-platelet aggregation in blood samples from CAD patients were initiated.

7. Mitochondrial metabolism and function in type 2 diabetic heart

Accumulation of reactive oxygen species (ROS) and subsequent oxidative stress in heart tissue and damaging proteins persist in diabetic patients. A serious manifestation is dys-regulated mitochondrial metabolism. Investigations during the year focused on the expression of and alterations in inducible nitric oxide synthase and oxidative stress response proteins, NRF2 and DJ1.

8. Myocardial autophagic status in diabetic and non-diabetic conditions

Though extensive metabolic perturbations accompany diabetes, there is little information on the pathophysiologic roles of autophagy in diabetic cardiomyopathy. Ongoing studies aimed at analyzing the status of the autophagic process in diabetic human heart.

9. Analysis of neurosphere formation and autophagic status in different grades of glioma

Possible associations between gliomasphere formation and grades of tumor were analyzed in 140 patients. High grade gliomas (III and IV) were found to generate a greater mean number of secondary spheres. The expression of stem cell markers CD133, CD15 and nestin was detected mainly in higher malignant grades of glioma whereas lineage markers GFAP and β-tubulin III protein expression was present in all grades of glioma. The multipotent ability of gliomaspheres was analysed using differentiation assay and was found to produce progenies of different lineages.

2. Important events

Ph.D awarded: PhD degree to Vinod V for the work "Molecular mechanisms involved in PCBL-induced cell death in tumor cells"

Thesis submitted:

1. Kalaivani.V PhD student submitted thesis on "Studies on variations in lipoprotein(a) structure and properties"
2. Sabarinth P.S. PhD student submitted thesis on " Studies on antibodies that form immune complexes with lipoprotein(a) in plasma".
3. Padmakrishnan.C.J submitted thesis titled "Analysis of neurosphere formation and autophagic status in different grades of glioma"
4. Ms. Soumyarani.V.S. submitted her PhD thesis, " The two faces of high-density lipoprotein: oxidized-HDL elicits pro-atherogenic response in human monocytec/ macrophages"

4. Seminars/symposia conducted

Lecture on "Fasting-induced insulin resistance" by Dr. Mikkel Holm Vendelbo, M.D., PhD, Department of Clinical Medicine, The Department of Endocrinology and Diabetes, Aarhus University, Denmark, was organised on 9th December.

7. Honors to Staff and students

1. Dr. Srinivas G was awarded the ICMR International Fellowship for Young Indian Biomedical Scientists for the year 2013-14 for training in the laboratory of Prof. Sreekumaran Nair, M.D., PhD, Mayo Clinic, Rochester, MN 55905, USA.
2. Best Poster Award to Nandini. R.J at the International Symposium, 'Legacy of Nitric Oxide Discovery: Impact on Disease Biology', jointly organized by the Rajiv Gandhi Centre for Biotechnology (DBT) and Srinivasa Ramanujan Institute for Basic Sciences (KSCSTE) held from 5th to 6th November, 2013.

Staff- Details

Dr. Appukuttan.P.S., Ph.D
Professor& Head

Dr. Jayakumari.N, Ph.D
Professor

Dr. Srinivas.G, Ph.D
Scientist D

Thomas T.A, M.Sc. M.Phil.
Scientific Officer (Lab)

Jayasree K.K, M.Sc.
Scientific Officer (Lab)

Dr. Geetha.M, Ph.D
Jr. Scientific Officer (Lab)

Rajamohanan.K
Jr. Technical Officer (Lab)

Sajeevan Sagaram
Technical Asst. (Lab)-A

Vijayalekshmi.L
Jr. Technical Officer (Lab)

Radhakrishnan.B
Jr. Technical Officer (Lab)

Sreenivas.N.C., M.Sc.
Jr.Technical Officer (Lab)

Sumitha K.C, M.Sc.
Technical Asst. (Lab)-B

Santhosh Kumar. R, M.Sc.
Technical Asst. (Lab)-A

Sheeja. M, M.Sc.
Technical Asst. (Lab)-A

Sreedevi .V.S
Technical Asst. (Lab)-A

Dr. Deepa. D, Ph.D
Technical Asst. (Lab)-A

Sreekala Balan. P
Technical Asst. (Lab)-A

Manju G. Nair
Technical Asst. (Lab)-A

Ph.D Students

Genu George, M.Sc**.**
Jessy John, M.Sc.
Kalaivani.V, M.Sc.
Karthi S, M.Sc.
Sabarinath.P.S, M.Sc.
Sini S, M.Sc.
Soumyarani.V.S, M.Sc.
Nandini Rj, M.Sc.
Padmakrishnan.C.J, M.Sc.
Raji S.R, M.Sc.
Anand C.R, M.Sc.
Dhanya Krishnan, M.Sc.

PDF

Dr.Binu.S,Ph.D

DEPARTMENT OF CARDIOLOGY

The Department of Cardiology continued to provide state-of-the-art patient care services in addition to continuing its academic programs and teaching initiatives. The statistics of patient care services were as follows.

Non-Invasive diagnostic procedures:

Procedure	No of cases
ECG	34750
TMT	1280
HOLTER	1167
ECHO	35853
TEE	417
DSE	15
Grand Total	73482

Invasive diagnostic and interventional procedures:

Diagnostic procedure	No of cases
Coronary Angiogram	1634
Catheterisation	145
EPS	81
Total	1860
Interventional Procedure	
ASD device closure	227
VSD device closure	7
PDA device closure	89
Balloon Mitral Valve	131
Balloon Aortic Valve	13
Balloon Pulmonary Valve	21
PDA coil closure	13
EPS+ RF ablation	293
Balloon Atrial Septostomy	29
MAPCA coil closure	5
AV Fistula closure	
Others	29
PDA stenting	14
Coronary Intervention (PCI)	786
Total	1657
Pacemaker Implantation	
Pacemaker	205
ICD implantation	41
CRT implantation	25
Others	5
Total	276
Grand Total	3793

The activities of various Divisions of the Department were as follows:

Division of Adult Cardiology and Intervention

The Division of Adult Cardiology and Intervention mainly dealt with coronary intervention, structural heart disease and cardiac valve interventions. The Division performed about 700 coronary interventions, maintaining its position as a major interventional center. Coronary interventions were guided by state-of-the-art technologies like IVUS – Intravascular Ultrasound and FFR – fractional flow reserve estimations. Left main interventions and rotablations were routinely performed by the Division.

Structural heart disease interventions like paravalvar leak closure, RSOV closure were performed. We continued to be a large volume center for balloon mitral valvotomy, performing around 150 cases per year. These included high risk cases and pregnant patients.

Dr Peiter Stella, from University of Utrecht, Netherlands, visited the department on Jan 20, 2014, and performed OCT-guided coronary interventions. Dr Ravi Nair from Cleveland Clinic visited the Cath labs in August 2013 and December 2013 and performed complex coronary interventions.

The department completed the tender process for the acquisition of the OCT, Optical Coherence Tomography equipment, which will improve intra-coronary imaging and help in guiding coronary interventions.

COMPREHENSIVE HEART FAILURE INTERVENTION PROGRAM:

The Heart Failure Clinic registered around 350 patients into the clinic and they were followed up regularly. About 20-25 patients were followed up per clinic, which functioned in liaison with the Department of Physical Medicine.

TRIVANDRUM HEART FAILURE REGISTRY:

Supported by the ICMR, we almost completed the data collection of the first-ever Heart Failure Registry in the country, which captured all admissions with heart failure in Trivandrum urban area and Athiyannoor block panchayat, a rural area in Trivandrum District. We collected the data of 1200 patients in one year and requested extension of the project for an year to allow completion of one year of data collection.

Division of Cardiac Electrophysiology

The Cardiac Electrophysiology Division maintained its high standards in the management of cardiac arrhythmias and sudden cardiac death. The focus of the Division was on improving the previous year's results for the number of procedures while maintaining greater success rates with complex ablation procedures like ablations for ventricular tachycardias and complex atrial arrhythmias. During the year, about 370 ablations and electrophysiology procedures were performed, which was one of the largest in the country. The number of device implantations was close to 300. The Division also had the largest number of ICD and resynchronization device implants in South India. Our device clinic follows up nearly two thousand cases every year. 3D-electro anatomical mapping systems, CARTO 3 and Ensite Velocity were employed to aid in complex ablation procedures. Innovative treatment strategies included video thoracoscopic (VATS) cardiac sympathetic denervation for ventricular tachycardia storm in 5 patients. Newer initiatives planned included: a) up-gradation of the electrophysiology lab with a newer fluoroscopy system with integrated fluro reduction strategies for enhanced patient benefit and procedural success, and b) up-gradation of the device follow up clinic to cater better to the patients and to maintain a database of our device cases.

The Electrophysiology Division remained a highly sought-after training facility in the country for post-doctoral training in Cardiac Electrophysiology. Cardiology Residents and Fellows from other institutions in the state visited the department for observership and short duration in-house training. Special sessions were arranged with leading innovators in the field of Cardiac Electrophysiology. Dr.

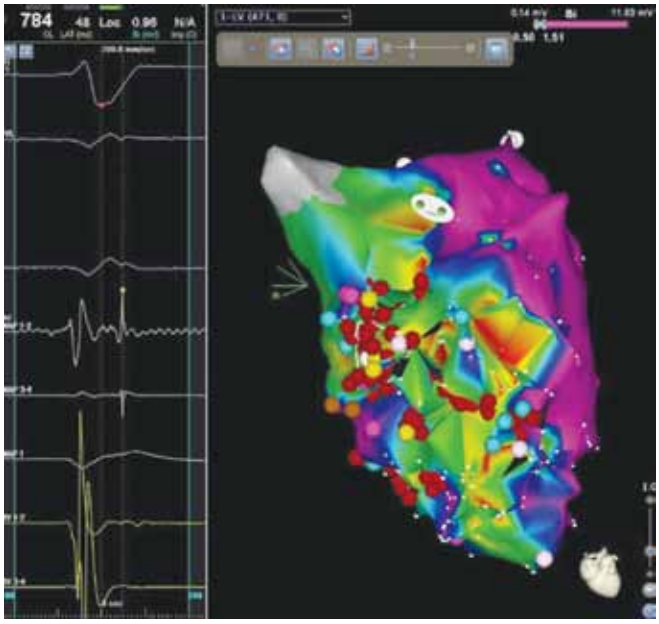


Figure showing 3D mapping of infarct scar for ablation of ventricular tachycardia

Angelo Auricchio, Director, Heart Failure Programme & Clinical Electrophysiology Unit, Fondazione Cardiocentro Ticino, Lugano, Switzerland, visited the unit and there was an in-house academic session as well as a mini symposium on device treatment in heart failure. Nine abstracts from the division were presented at the Asia Pacific Heart Rhythm Society meeting at Hong Kong in October 2013. In-house academic sessions and workshops on 3D mapping were also organised for batches of practising cardiac electrophysiologists from other institutions and observers from outside India.

DIVISION OF PEDIATRIC CARDIOLOGY

The Pediatric Cardiology Division provided interventional and diagnostic services to the entire spectrum of congenital heart disease (from newborn to adults). Advanced imaging technologies like 3D echo, cardiac MRI and cardiac CT were integrated to serve appropriate patient management, and emergency services (echo and interventions) were provided round-the-clock. Meetings with surgeons and radiologists provided scientific inputs to students, fellows and faculty.

Staff Details

Thomas Titus (Dr)
Professor Senior Grade

Ajit Kumar.V.K. (Dr),
Professor

Sivasankaran.S. (Dr)
Professor

Krishnamoorthy.K.M. (Dr)
Additional Professor

Harikrishnan.S. (Dr)
Additional Professor

Narayanan Namboodiri K.K. (Dr)
Additional Professor

Bijulal S. (Dr)
Associate Professor (On Leave)

Anees T. (Dr)
Associate Professor

Sanjay G. (Dr)
Assistant Professor

Venkateshwaran S. (Dr)
Assistant Professor

Abhilash S.P. (Dr)
Assistant Professor

Krishna Kumar M. (Dr)
Assistant Professor (Adhoc)

Postdoctoral Fellowship

Deepa S Kumar (Dr.)
PDF - Paediatric Cardiology

Harikrishnan G. (Dr.)
PDF - Adult Cardiology And Interventions

Mukund A Prabhu (Dr.)
PDF - Cardiac Electrophysiology

Senior Residents

Harihara Subramonia Sharma T.S. (Dr)
DM Cardiology

Panneer Selvam S (Dr)
DM Cardiology

Patel Nilesh Parshottambhai (Dr)
DM Cardiology

Vekariya Ketan Manubhai (Dr)
DM Cardiology

Aamir Rashid (Dr)
DM Cardiology

Anand M (Dr)
DM Cardiology

Arun Gopalakrishnan (Dr)
DM Cardiology

Bharatraj N. Banavalikar (Dr)
DM Cardiology

Nishant Gangil (Dr)
DM Cardiology

Rupesh (Dr)
DM Cardiology

Gurbhej Singh (Dr)
DM Cardiology

Hitesh Yadav (Dr)
DM Cardiology

Mahim Saran (Dr)
DM Cardiology

Priyadarshini A. (Dr)
DM Cardiology

Srinivasa Prasad B.V. (Dr)
DM Cardiology

Suraj Narasimhan A (Dr)
DM Cardiology

Technical Staff

Suji
Junior Scintific Officer

Subramanya H R
Junior Technical Officer

Reshmy P V
Technical Assistant -B

Sheeja S
Technical Assistant -A

Sethu Parvathy V K
Technical Assistant -A

Midhun S
Technical Assistant -A

Resmi Mohan
Technical Assistant -A

Shahana Sherin T P
Student

Saranya K S
Student

Vijesh Kumar
Student

Shihabudeen P K
Student

Prasoon Chandran P V
Student

Archa Krishna
Student

DEPARTMENT OF CARDIOVASCULAR & THORACIC SURGERY

Apart from conducting biomedical research in the field and imparting cardiac surgical training to young surgeons, the clinical services of the department, pertaining to adult cardiac, pediatric cardiac and thoracic vascular surgery, continued to aim at providing high end cardiac surgical care at affordable cost without compromising on quality. The Department was able to retain its reputation in niche areas like coronary surgery, valve repair, aortic surgery, endovascular procedures and neonatal surgeries. The Kerala State accorded beneficiary status to SCTIMST with regard to the Karunya Benevelont Fund and Thalolam schemes of the Government of Kerala for patients who need heart surgery.

Academic Activites

The 60th Annual Meeting of the Indian Assosiation of Cardiovascular and Thoracic Surgery, IACTSCON 2014, was conducted in February 2014. Prof.K.Jayakumar was the Organising Secretary of the meeting, which was attended by over 1200 cardiac surgeons from India, Japan, Thaiand, USA and Europe. Based on the theme 'New Challenges, Newer Solutions', IACTSCON 2014 was a well-appreciated program with interactive and fruitful deliberations on multiple aspects of adult, congenital and thoracic-vascular surgery. Hands-on training sessions on endovascular aneurysm repair (chaired by Prof.George Jacob, CMC, Vellore), Ventricular Assist Device implantation (Prof. Schmit,Germany) and Resident Sessions (Prof.A.Tendolkar) were among the highlights. Prof MS Valiathan delivered the keynote address, Prof.K.Jayakumar delivered the PK Sen Oration and Prof.M.Unnikrishnan delivered the Godrej Karai Oration. Prof.K.Jayakumar was elected Vice-President of the Indian Association of Cardiovascular and Thoracic Surgeons. The institute was well represented in the scientific sessions of IACTSCON2014, PCSI 2013 and VSICON 2013 with numerous noteworthy presentations by the faculty and residents.

As part of initializing the Orthotopic Human Heart Transplantation program, facility improvement and licensing processes are nearing completion. SCTIMST served as a donor center for two organ retrieval procedures.

Courses run by Department of CVTS

M.Ch CVTS – 4 candidates annually

M.Ch Vascular surgery – 1 candidate annually

Diploma in Clinical Perfusion – 2 candidates annually

The Department participated actively in the training of cardiac nurses and M.Tech clinical engineering students.

Clinical Services

During the year, >2000 Cardio Vascular and Thoracic operations were performed, out of which 1507 were open-heart procedures. The details are furnished below.

Adult Cardiac Operations

Open Heart : 966 procedures	
These included:	
Coronary artery bypass surgery	525
Valve replacement surgery	301
Valve Repairs	65
Surgeries for infective endocardits	6
Ascending aortic aneurysm repair	5
Aortic Dissection repairs	15
Adult congenital heart disease	5
Left Atrial Myxoma excision	6
Surgical Ventricular Restoration	1

Closed Heart - 284 procedures	
These included:	
Surgeries for complex aortic aneurysms and aortoiliac occlusive diseases	99
Advanced Endovascular Surgical Procedures	10

Lung surgery including VATS	50
Beating heart surgeries	19
Coarctation repair- adult and paediatric	11
PDA division- adult and paediatric	6
BT shunt operation	56
Thyroidectomy	5
Thymectomy	15
Thoracic tumour Excision	17

Congenital Heart Surgeries.	
Open Heart: 547 procedures These included surgeries for	
Septal defects – Atrial and Ventricular	265
Tetralogy of fallots	150
AV Canal defcts	7
TAPVC corrections	25
TGA corrections	48
Hypoplastic left heart defect correction	2
Univentricular operation	26
Homograft P A conduits	13
Truncus Repairs	2

Staff Details

Dr.K. Jayakumar M.S; M.Ch
Senior Professor and Head of Department

Dr.R. Sankarkumar M.S; M.Ch.
Senior Professor and Medical Superintendent

Dr. M. Unnikrishnan M.S; M.Ch
Senior Professor.

Dr. P.K.Praveen Varma 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.Sabarinath Menon M.S,M.Ch
Assistant Professor

Dr. Balasubramonian KR M.S,M.Ch
Assistant Professor

Dr.Bineesh KR M.S,M.Ch
Adhoc Counsultant

Perfusion Division of CVTS

Ms. Beegum Thaslim

Mr. Monsy Sam

Ms. Maya.L

Mr. Sujith V.M

Mr. Don Sebastian

Mr. Shanu PS

Mr.Rijesh R

DIVISION OF CLINICAL ENGINEERING

The responsibility of the Division of Clinical Engineering is to apply and implement medical technology to optimize health care delivery by imparting training, supervising / inspecting / auditing, and serving as technological consultants. Clinical engineers also advise medical device producers regarding prospective design improvements based on clinical experiences. The safe use and effective maintenance of the equipments in the Institute is also vested in the hands of the Clinical Engineering Division.

The activities of DCE have been grouped in the following three major categories.

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

1. Patient care / service / management.

i) As part of patient care/ services, DCE carried out routine activities and related responsibilities efficiently and effectively to ensure Patient Safety.

ii) The Central Help Desk at DCE and the online job entry system helped in monitoring the maintenance work more effectively.

iii) Data quality was ensured through proper computer entry of newly received items installed and maintained.

iv) The Equipment Control, Asset Management and Inventory management were streamlined through the introduction of new NEP, item coding and RV entry format.

v) The necessary development / correction and modification in the existing computer programs were done with the help of the computer department for better management.

vi) Data validation in the DCE maintenance program was checked and corrected at the time of issuing work permit to each job and ensure data assurance.

vii) The Stock verification had become easy as ID stickers are fixed on all equipments.

viii) All spares and accessories of all equipments were linked with the respective main equipment through proper item coding and computer programming ensuring accountability.

ix) Planned maintenance programs with proper auditing was done in critical areas to ensure safety of equipments and operators

2. Academic/ Teaching/Training

i). DCE has to maintain more than 48,000 items in the Institute, worth more than Rs.125 crores. As the primary responsibility for the care and maintenance of equipment rests with the user, it was decided to organize a series of training programs on dedicated equipments for the benefit of users like Doctors, Nurses, Technicians, Engineers, and others who handle the equipment. Well-experienced and authorized experts from the manufacturer or supplier of equipment or in-house faculty were involved in such programs.

A seminar series named "HEATS" (Hospital Equipment Awareness Training Series) was started for giving hands-on training. The first training program HEATS-1 on "Patient Monitoring for Transforming Health care" was inaugurated by Director, Dr. Tharakan, on 30th August 2013.

The following are the list of HEATS conducted this year.

HEATS-1	Patient Monitoring in Transforming Health Care	30th & 31st Aug 2014
HEATS-2	Know your Anesthesia Machine	15th & 16th Nov 2014
HEATS-3	ICU Ventilator "A Life saving Support"	28th & 29th Nov 2014
HEATS-4	Workshop on Microscopy	20th & 21st Dec 2014
HEATS-5	Digital Board	23rd Jan 2014
HEATS-6	Basic Physic on X-Ray machine	15th Feb 2014

ii). DCE provided training to M Tech. students on all Monday.

iii) Apprentice training provided training to students of BTech. Degree, Diploma & NCVT.

iv) In-service training in developing Medical Device was given to final year M.Tech

Biomedical engineering student of VIT, Vellore, Tamil Nadu.

Research/Projects /Technological consultation

i). Projects completed.

a) Completed a six sigma project on Item coding.

b) Completed a program for online registry for maintenance request.(Paper less request).

c). Completed the 1st phase of the program development for revamping and Maintaining item code and asset register preparation.

ii) Ongoing Projects

a) Six-sigma project to reduce the down time in equipment maintenance.

b) To develop a speech synthesizer in collaboration with CDAC Tivandrum and our Neurology & Physical Medicine Departments.

c) To design and develop an "External pneumatic Compression Equipment" for the treatment of DVT. (An Internally-funded project.)

d) To develop a program with the help of computer division to link the DCE maintenance program with store & purchase division.

iii) Mr. Koruthu P Varughese was nominated to the following technological consultation.

a). Technical committee member of Electromedical Equipment Section (MHD-15) of "Bureau of Indian Standards".

b). Technical Expert for Research and Manpower Development at "State Commissionerate for Persons with disabilities"

c). Expert committee member to "Kerala State Council for Science Technology and Environment" to start an Institute, dedicated for capacity building in Science and Technology based allied skills.

iv) Mr Koruthu P Varughese continued as external guide for AMIE students and guided 4 students.

v). Patent received. DCE

Received patent for "External pneumatic Compression Equipment" for the treatment of Deep Vein Thrombosis. Koruthu/Jitin

New purchases

Latest patient monitoring system MX 700 - 5 Nos. to NICU

Latest patient monitoring system MX 700 - 9 Nos. to CHICU

Latest patient monitoring system MX 700 - 4 Nos. to CMICU

Staff Details

Mr. Koruthu P Varughese. BSc (Engg), PGDIISc, PGDCA, MBA
Engineer G & Head of the Department(Acting)

Mr. G. Mohanlal. BSc (Engg), MBA
Engineer G

Mr. B. Mdhusoodanan Pillai. BSc (Engg), PGDCA, MBA,
Scientist Engineer F

Mr. G.S. Manoj. B.Tech, DOTT, MBA
Engineer B.

Mr. P. Ganesh
J.E (Electrical)

DIVISION OF CELLULAR AND MOLECULAR CARDIOLOGY

Research in cardiac biology focused on mechanisms in adverse cardiac remodelling and approaches for reverse remodeling. Experimental studies are carried out using in vivo and in vitro experimental models.

Status of ongoing research projects

Molecular mechanisms in cardiac fibroblast growth

Cardiac fibroblast growth profoundly impacts the structural remodelling of the heart post injury. Delineation of the underlying mechanisms is therefore critically important for understanding the mechanistic basis of left ventricular remodelling in pathological states. We study the molecular basis of cardiac fibroblast growth along three principal and distinct lines: 1) mechanisms that regulate the ability of these cells to enter into and exit from the cell cycle, 2) the molecular basis of apoptosis resistance that marks these cells from other cell types in the heart, and 3) regulation of two key cell surface receptors, AT1 and DDR2, that impact the growth of these cells and, in turn, the cardiac stroma. The long-term goal is to gain insights into basic molecular processes that may have implications for the pathogenesis and treatment of heart disease.

Mechanisms regulating G1-S transition in cardiac fibroblasts: This laboratory had previously identified p44/42 MAPK as a positive regulator of G1-S transition in cardiac fibroblasts. Using gain-of-function and loss-of-function approaches, we generated conclusive evidence during the year that, in cardiac fibroblasts, activated p44/42 MAPK regulates p27Kip1 expression transcriptionally and post-translationally via FOXO3a- and Skp2- dependent mechanisms. Further, we also demonstrated that FOXO3a is a master switch for G1-S transition in cardiac fibroblasts because of its dual control over p27Kip1 and p21Cip1. FOXO3a may be a potential target for therapeutic manipulation to control cardiac fibroblast hyperplasia and its sequelae. The findings have been published in the American Journal of Physiology – Heart and Circulatory Physiology.

Survival mechanisms in cardiac fibroblasts exposed to ambient stress: During the year, investigations on mechanisms underlying cardiac fibroblast resistance to ambient stress were extended to generate confirmatory evidence that ERK1/2-dependent activation of NF-κB and recruitment of anti-apoptotic defense protect cardiac fibroblasts from ambient stress. The observations were published in the Journal of Molecular and Cellular Cardiology.

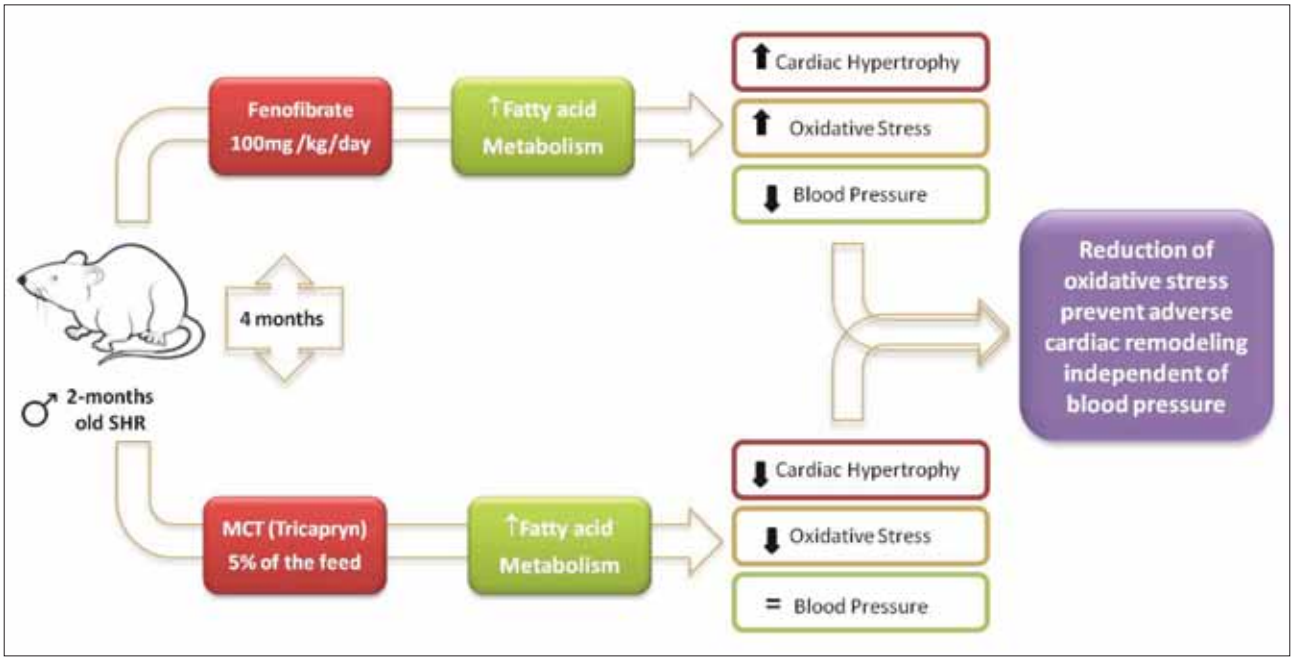
Regulation of AT1 and DDR2 expression in cardiac fibroblasts: Investigations on the regulation of the Angiotensin II receptor, AT1, in cardiac fibroblasts progressed remarkably well during the year. It was found that oxidative stress activates p44/42 MAPK that in turn promotes activation of the redox-sensitive transcription factors, NF-kB and AP-1, which act as positive regulators of AT1 gene expression. Interaction of these transcription factors with the AT1 promoter under conditions of altered redox status, resulting in the transcriptional activation of the AT1 gene, is currently under investigation.

DDR2 is a receptor tyrosine kinase that specifically binds to and is activated by collagen. Given its manifold roles in diverse cellular processes such as cell proliferation and differentiation, it is surprising that the regulation of DDR2 expression per se and regulation of cardiac fibroblast activity by DDR2, particularly proliferation and collagen synthesis, remain unexplored. Ongoing experiments, commenced in the preceding year, address these glaring gaps.

Cardiac response to agonist and substrate-mediated activation of peroxisome proliferator-activated receptor alpha in Spontaneously Hypertensive Rat

Regression of left ventricular hypertrophy (LVH) reduces the risk of adverse cardiovascular events. LVH is characterized by enhanced oxidative stress and shift in energy metabolism from fatty acid- to glucose-dependent by down-regulation of peroxisome proliferator - activated receptor a (PPAR-a). Stimulation of fatty acid metabolism and reduction of oxidative stress by reactivation of PPAR-a can possibly induce regression of LVH. Fatty acid metabolism was stimulated in Spontaneously hypertensive rats (SHR) using either the synthetic ligand fenofibrate (100 mg/kg/day) or MCT (Tricaprylin) (5% of basal diet). Though both the agonists showed up-regulation of

MCAD, expression of PPAR-a was enhanced only with MCT. On treatment with fenofibrate, despite significant decrease in blood pressure, there was progression of LVH accompanied by increased oxidative stress. Conversely, blood pressure was unaffected on supplementation with MCT, but there was regression of hypertrophy and decrease in oxidative stress. The association of oxidative stress with adverse cardiac remodeling and the dissociation of changes in blood pressure from LVH are noteworthy. The variable response to the agonists leads to the inference that stimulation of fatty acid metabolism is beneficial only when accompanied by enhanced expression of PPAR-α, possibly due to pleiotropic effects of the gene.



Human cardiosphere - derived cells have selective advantage over bone marrow mesenchymal stem cells in myocardial regeneration

Stem cell-mediated myocardial regeneration has emerged as an alternative therapy for heart failure. In the absence of promising results following transplantation of different types of stem cells for tissue repair, the ideal cell type that can regenerate the injured myocardium remains an unanswered question. Of the different types of stem cells used, cardiac stem cells and mesenchymal stem cells are reported to be relatively more efficient. Cardiac stem cells are tissue-specific and can get differentiated into cardiomyocytes and endothelial cells. Bone marrow stem cells have received the greatest attention as a source of cell transplantation therapy in the current era, with a larger number of clinical applications reported because of their ease and safety. Efficacy of cardiosphere-derived dells (CDCs) and bone marrow mesenchymal stem cells (BMSC) for myocardial regeneration was evaluated.

Atrial biopsies from patients undergoing coronary artery bypass graft surgery were cultured as explants and the properties of cardiosphere-derived cells were compared with the human bone marrow mesenchymal stem cells. Cells from passage 2-4 were used for the study. The proliferation potential was found to be comparable in the two cell types as evidenced by population doubling time assay and Ki67 immunophenotyping. Fluorimetric analysis using DCFDA showed lower intracellular levels of ROS in cardiosphere-derived cells. CDCs were found to be more resistant to oxidative stress-induced apoptosis when exposed to 100μM H2O2. The production of a variety of growth factors, including HGF, IGF-1, SDF-1, and VEGF at levels higher than that of MSC can account for the superiority of CDCs for functional myocardial repair. When stimulated, higher myogenic differentiation potential was observed with cardiosphere-derived cells (43%) than mesenchymal stem cells (12%) as apparent from Desmin, connexin 43, myocin heavy chain and troponin I . CDCs formed more endothelial tubes and branching points in 12 hours compared to mesenchymal stem cells. Superiority of tube formation observed in CDCs indicates their angiogenic

potential, which is in agreement with higher secretion of VEGF by CDCs. Survival proteins, Hif 1 alpha, Akt, pAkt and Bcl2 were analysed by western blotting after exposing to 0.1% hypoxia for 3 hours. One distinctive feature of resident cardiac stem cells is their ability to undergo consistent cardiomyogenic and angiogenic differentiation. (Figure). Mesenchymal stem cells have the disadvantage that they are prone to differentiation to adipogenic or chondrogenic, or osteogenic lineages. CDCs showed only negligible differentiation potential towards these lineages. CDCs therefore appear to be the ideal candidates for myocardial regeneration compared to MSCs.

Delhi Institute of Pharmaceutical Sciences and Research (DIPSAR), New Delhi, 31st January -1st February 2014.

Deepthi R.S, Ph.D Student, Division of Cellular and Molecular Cardiology, won the Best Poster Award in Life Sciences at the 26th Kerala Science Congress, Wayanad, for her work on the role of cardiac stem cells in myocardial regeneration.

Number of presentations by staff and students at (i) National and (ii) International conferences:4

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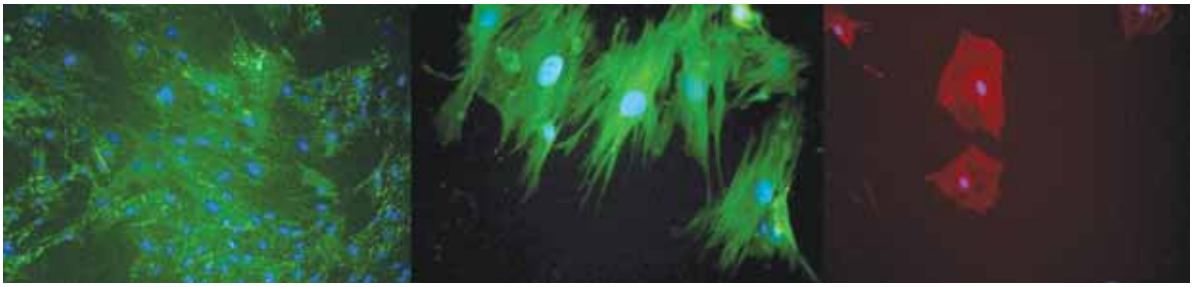

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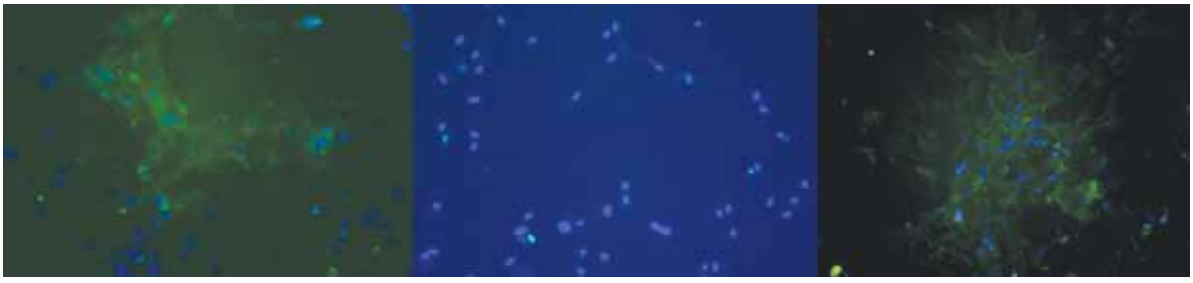


Desmin Connexin 43 Myosin Heavy Chain

Differentiation of Cardiosphere-derived cells (A) and Mesenchymal stem cells (B) to myocardial lineage

Details of Honours and Awards;

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

Dr Shivakumar was inducted into the Editorial Board of Molecular Biology Reports

Mr. Saifudeen Ismael, PhD Student, Division of Cellular and Molecular Cardiology, won the Best Poster Award for his paper entitled "Reactivation of fatty acid metabolism by medium chain triglycerides modulates oxidative stress and promotes cardiac anti-remodelling in spontaneously hypertensive rat" at the 6th International Conference on Recent Advances in Cardiovascular Sciences held at the

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

List of PhD students registered in DCMC

1. Saifudeen Ismael
2. Deepthi R.S
3. Anupama V.
4. Ajay Godwin Potnuri
5. Mereena George U.
6. Sherin S.
7. Harikrishnan V

COMPUTER DIVISION

Routine activities related to the areas of Graphical User Interface based Software development, Installation, Web Site development & updating, Network Management, Tender Publishing, Training for students/staff, OMR evaluation, Hardware and Software maintenance of all the user programs including the maintenance of PACS clients and storage backup. Hardware includes maintenance of 16 higher end servers, 155 TB storage with a remarkable uptime of 99.98% and around 1203 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 detailed below: -

I. New Initiatives

- Electronic Medical Records (EMR) for Out Patient Division
- Online Leave Application Implementation in Hospital Wing for Senior Residents
- Online application and processing for the selection of temporary staff.
- Online billing for IP Patients – Automatic IP Billing (One bill system).
- Online admission entry.
- Project Accounting with break up of heads
- Integration of Health Level 7 interface of new PACS software with HIS.
- Fixed Asset Register.
- Email enquiry for purchase.
- SMS service for blood donors.
- OPD Billing for non office hours.

II. Major Activities

New Software Development and Hardware Implementation

- DCE, Blood Bank, Accounts, Medical Records. - Modifications in GUI based program was made for maintenance requests monitoring, for new tests, deposit scheme payments and for operation record search.
- Dietary Purchase – Added new modules for the purchase of items and inventory maintenance.
- New software made for recording issue of keys from BMT Security Office.
- Modifications of existing live softwares running in various departments as per user requirements.
- Network cabling for implementation of wireless connectivity in Ladies Hostel.

III. New Purchases

Hardware

Scanners	2 nos
Server	2 nos
Storage expansion - SAS	18 TB
Storage expansion – SATA	45 TB
Windows 8 license	50 nos

IV. Others

The Computer Division provided training to staff on 'online IP billing' and 'online admissions'

Mrs. G. Geetha, Scientist G, B. Tech (E&C), M. Tech (Computer Science), PhD (Bioinformatics)

Mr. Suresh Kumar B, Engineer C, B. Tech (Computer Science), M. Tech (Computer Science)

Mr. Rejith L .R., MCA, MBA

Mr. Saji K. S., B. Tech
Computer Science

Mr. Manoj M,
3 Year Diploma in Computer Engg, BSc Maths

Mr. Anish R,
3 Year Diploma in Computer Engg, BCA

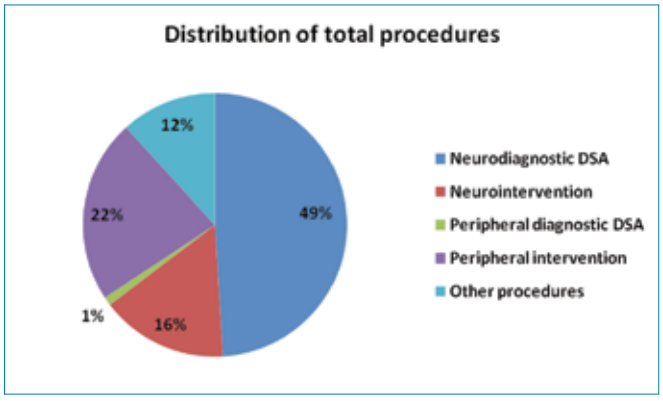
Mr. Sakilnag P.S., B.Tech
Computer Science

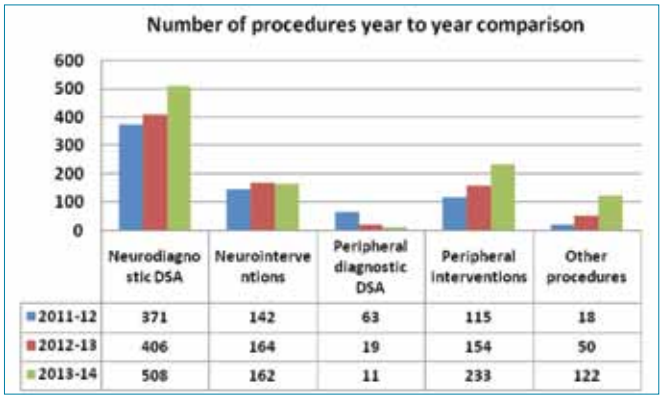
Temporary Staff

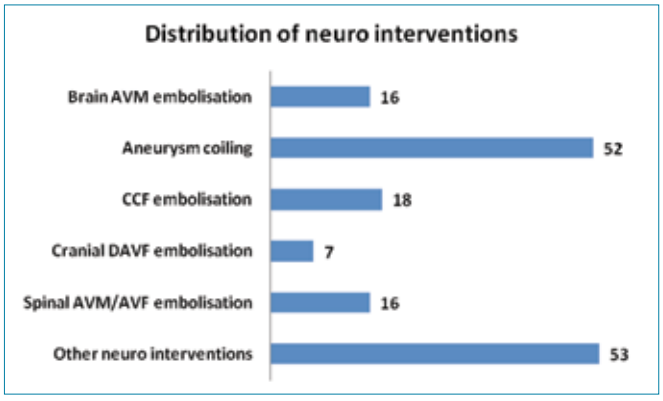
Renju A.S.
3 Year Diploma in Computer Engg
Nikhil K.P.
3 Year Diploma in Computer Engg
Anju Thankachan
3 Year Diploma in Computer Engg
Apprentices
Aswathy D.
3 Year Diploma in Computer Engg
Silpa S. Nair
3 Year Diploma in Computer Engg

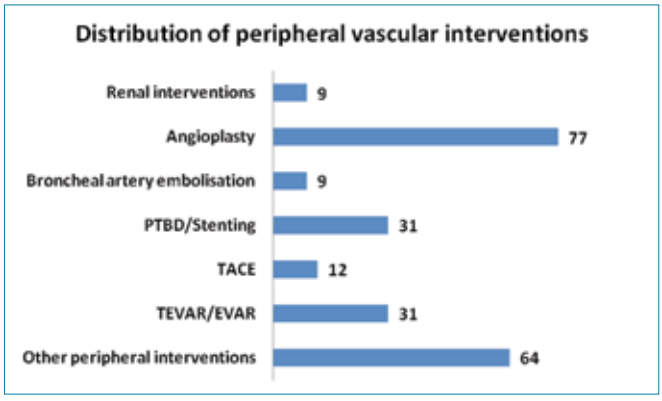
DEPARTMENT OF IMAGING SCIENCES & INTERVENTIONAL RADIOLOGY

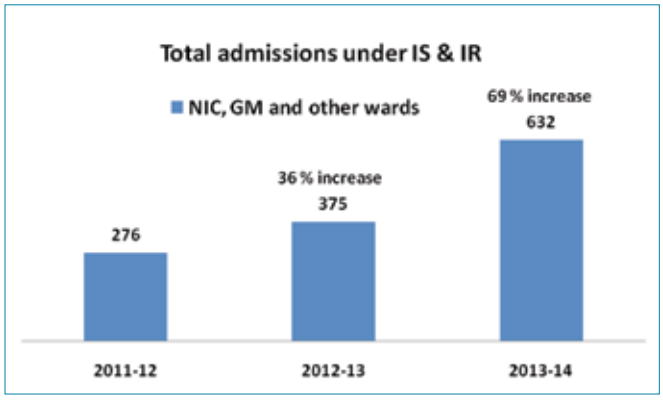
After starting the neuro intervention center (NIC), there has been a substantial increase in the number of procedures, IP admissions and OPD cases compared to the last two years. Neuro intervention center (NIC) is a tertiary care facility for the comprehensive management of patients suffering from various neuro-vascular disorders. NIC celebrated its first anniversary on on January 18th, 2014. The quality management practices coupled with a strong multidisciplinary co-operative directions of NIC has contributed significantly in achieving less than 1% morbidity and mortality. Compared to FY2012-13, 21%, 69% and 54% increases have noted in the total number of procedures, IP admissions and OPD cases respectively.

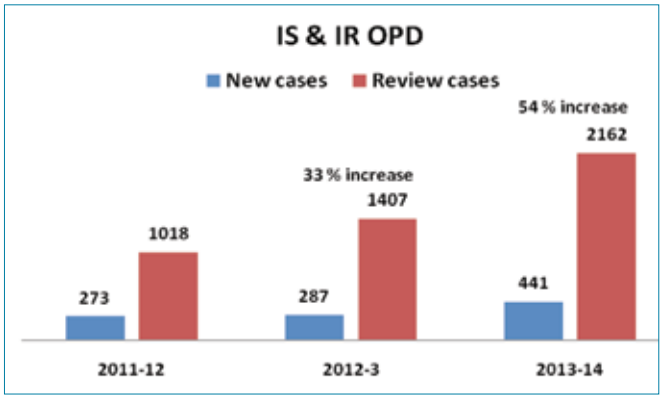












Completed Project details: Significant observations & presentations

1. "Neurobiological Marker for Population Differences: a Neuroeconomic Investigation with Anxiety & Depression Patients contrasted with Normal Population"

Neuroeconomics is an interdisciplinary science which emerged at the crossroads of neuroscience, economics, psychology & decision making. This study was an fMRI investigation to build a robust prospect theory that could explain varied behaviour of loss aversion across psychopathologies such as depression and anxiety contrasting healthy individuals. The study came out with promising results which indicated that the activity difference in neural loss aversion-related brain regions across pathological groups and healthy volunteers could be used to build neurobiological markers to identify these pathologies using decision making paradigms. The study was significant for its contribution towards neuropsychiatric and behavioral disorders as well as Neuromarketing.

2. "Self-Regulation of right inferior frontal gyrus using Real time fMRI in Post Stroke Aphasia patients"

Real-time fMRI is an advanced technique which speeds up the processing of blood oxygen level dependent (BOLD) signal, and is computed within seconds to enable (neuro-) feedback in real time to measures a person's brain activity. This study used real-time functional MRI as a neurofeedback strategy to modulate neural activity of stroke victims with expressive aphasia. The hypotheses of this study are: (i) Stroke patients with expressive Aphasia can learn to self-regulate (up-regulate) the BOLD signal in Broca's area with real-time fMRI neurofeedback; (ii) Acquired up-regulation will lead to an improvement in expression of language. The data obtained from the study suggest that the controls as well as the patient are able to up-regulate the BOLD activity in the Broca's and Wernicke's areas.

3. "OPTOSIS: Portable optical Brain-Computer Interface and Orthosis for movement restoration after stroke"

The OPTOSIS project aims to develop an integrated, portable and closed-loop Near Infra Red Spectroscopy(NIRS)-Brain Computer Interface(BCI)system for stroke rehabilitation. Controlled Neuroscientific investigations will be performed together with visual and afferent feedback using Functional Electrical stimulation(FES).When combined with the FES on the affected limb, the BCI is expected to have a greater benefit due to the contingency established between motor imagery and afferent feedback from stimulation.

Details of Honors and Awards won by staff and students

Residents:

- Dr.Praveen.A, senior resident - Winner in PG Quiz conducted during ISNR (Indian society of neuroradiology) National conference- 2013, held at NIMHANS Bangalore during 26-29 September 2013.
- Dr. Praveen. A and Dr. Resmiranjan Padhi, senior residents, won second prize in zonal round of quiz conducted for ISVIR (Indian society of Vascular and Interventional Radiology) national conference- FLOW 2014, conducted at Hyderabad on 15/03/2014.
- Dr. Anand Muraleedharan, Senior resident, won third prize in zonal round of quiz conducted for ISVIR (Indian society of Vascular and Interventional Radiology) national conference- FLOW 2014, conducted at Hyderabad on 15/03/2014.

Faculty:

1. National Bioscience Award for Career development (award given by Department of Biotechnology, Govt. of India): Awarded to Dr.C.Kesavadas, Professor of Radiology. The award was presented by Union Minister for Sciences & Technology Shri.Jaipal Reddy on 17th December, 2013 at New Delhi

Indian Council of Medical Research M.N.Sen Oration award: Awarded to Dr.C.Kesavadas, Professor of Radiology. The award was presented by Union Health Minister Shri Ghulam Nabi Azad on 24th September ,2013 at New Delhi

Diagnostic & Interventional procedures performed in the department

Interventional Radiology services:

New Registration	443
Review OP	1603
IP Admissions	639
Discharges	630
Death	3

Interventional treatment procedures

Obliteration procedures	219
Vascular recanalization procedures	148
Stroke thrombolysis	9
Pain Clinic Procedures	60

Diagnostic services

X-RAY (Department & Portable) - 36710

ULTRASOUND

Doppler studies (including neck vessel Doppler, renal Doppler, peripheral Doppler, arterial & venous mapping, ABPI)	1947
Abdomen ultrasound studies (Abdomen, KUB, Obstetrics, scrotum)	1359
Peripheral ultrasound studies (including extremities & face)	27
Neck ultrasound studies (include Thyroid & supraclavicular region)	66
Chest ultrasound studies (include thorax, breast, SOV)	37
Ultrasound guided Biopsy procedure CT	43
Neuro specialty studies (include brain, spine, neck & routine contrast studies)	5070
Neuro specialty Angiograms (include brain, neck & venous studies)	856
Cardiac & body studies (include abdomen, chest & routine contrast study)	448
Cardiac specialty angiograms (cardiac/coronary/ chest)	218
Peripheral/Aortic Angiogram	366
Pulmonary angiograms	112
Renal Angiograms	5
Extremities (include hand, foot, knee & pelvis)	4
CT guided biopsy procedures	14
MRI	
Brain studies (include routine,Angiogram,venogram,epilepsy/stroke imaging)	2988
Cardiac Studies (include anatomy, viability & other functional studies)	214
Spine studies (include C-spine, D-spine, L-S spine)	441
Joints & extremities	20
Chest & abdomen	9
Digital Subtraction Angiography	
Diagnostic Angiogram Procedures	595

Staff Details:

Dr. T.R Kapilamoorthy,	Professor & HOD
Dr.C.Kesavadas	Professor
Dr.Bejoy Thomas	Additional Professor
Dr.Jayadevan E.R	Associate Professor
Dr.Santhosh Kumar	Assistant Professor

Residents & PhD students:

DM NEUROIMAGING AND INTERVENTIONAL NEURORADIOLOGY

Praveen A. (Dr.)	Third Year
Narendra Kumar Jain (Dr.)	Third Year
Anand M (Dr.)	Second Year

Amritendu Mukherjee (Dr.)	Second Year
Sweta Swaika S S (Dr.)	Second Year
Shah Chinmay Pankajkumar (Dr.)	First Year
Aneesh Mohimen (Dr.)	First Year

PDCC CARDIOVASCULAR IMAGING AND VASCULAR INTERVENTIONAL RADIOLOGY

Brijesh Ray R S (Dr.)	First Year
Padhi Rasmiranjan (Dr.)	First Year
Pdcc Diagnostic Neuroradiology	
Srinivasan K. (Dr.)	First Year
Shah Dhaval Paresh (Dr.)	First Year

PhD students

Jija S James

Sujesh Sreedharan

Arun KM

Staff Details

M/s. Geethakumari
Senior Scientific Assistant

M/s. Medini
Junior Technical Officer

Mr. Alex Jose
Technical Assistant B

M/s. Sheeba kumari
Technical Assistant B

Mr. Johnson
Technical Assistant B

Mr. Krishnakumar
Technical Assistant B

Mr. Vikas
Technical Assistant B

Mr. Mahesh P.S
Technical Assistant B

Mr. Joy
Technical Assistant B

M/s. Sandhya
Technical Assistant A

Mr. Babunath
Technical Assistant A

MICROBIOLOGY

Overview : The Mission of the Department has been to

- Provide accurate and quick reports on all specimens sent to the Laboratory.
- Provide consultant clinical microbiology service, including advice on antibiotic administration.
- Develop molecular diagnostic services to include more infectious diseases
- Maintain the viral culture facility
- Train MD and MSc Microbiology students as observers and as Apprentice trainees, respectively, which may in the future be upgraded to a course.
- Enhance research activities

3. Routine activities: (In about 100 –250 words)

1. Homograft valve bank continued its successful program with 16 successful implants in patients with congenital heart disease, ages ranging from 7 months to 28 years. The Department checks the tissue for sterility and preserves it in liquid Nitrogen, a crucial step after harvesting from bodies that come to the mortuary of the Forensic Department in the Medical College, Trivandrum. The medical Sociologist in Microbiology interacts with the relatives and does counselling.

2. Bacteriology

- Infective endocarditis – 14 cases were followed up till discharge and advice given for appropriate antibiotic therapy. There were 9 cases of a-lytic Streptococci, one case of, one case of alpha-lytic Streptococci due to a rare species of Gram positive cocci, Kocuria kristinae(Identified by VITEK), that was resistant to Penicillin , one case of Staphylococcus aureus, one case of Staphylococcus epidermidis and two cases of Candida species (byVitek). There were 3 prosthetic valve infections.
- Hospital acquired infections – Efforts were on to make the data collection computerized and more accurate. Improved awareness and better sample collection led to better diagnosis and treatment in most cases.

3. Molecular diagnostics: TB PCR for tuberculous meningitis

   RT-PCR – procedure for purchase of equipment initiated

4. Other sections – Mycology – Introduced proper recording of isolates with description and identification, especially correlation between VITEK and corn-meal agar morphology in Candida

5. Serology – a)Introduced HCV assay in VIDAS for faster reporting.

b) Expansion of the number of tests done planned with the reagent rental agreement with ABBOTT

4. New initiatives during the year:

a) Know your lab (KYL) – Conducted for the new residents in 2014 on 19th Jan 2014. This was well-appreciated, and the session was very interactive.

b) Joined EQAS run by Indian Association of Medical Microbiologists and received certificate of participation for one year

c) Hand Hygiene Day –Arranged a talk by Dr.Anup Warrier, ID Consultant, KIMS Hospital, on use of antibiotics

5. Research

Research programs and collaborative programs. A proposal for internal faculty project, which aims to find the prevalence of different resistance phenotypes among the bacterial isolates from hospital-acquired infections. 100 samples were processed and data recording on Excel was started with the help of the statistician, Ms Jissa, from AMCHSS

6. Honours/awards to staff/students

Ms Molly Antony, Scientist F, was awarded Bharath Shiksha Ratan Award by Global Society for Health and Education on 28-4-13 at New Delhi.

Staff details with qualifications as on 31.03.2012 –

Staff Details

Dr. Kavita Raja, DCP, MD, MPhil (Clin.Epidem)	Professor and Head
Dr. Molly Antony, MSc, DMV, PhD	Scientist F
Dr. Muraleedhar Katti MSc,PhD, FISCD	Associate Professor

TECHNICAL

1. Smt.Sujatha
Scientific Assistant

Four Technical Assistants, four apprentice trainees with MSc Microbiology and two vocational higher secondary (VHS) trainees.

AUXILIARY

One unit Helper and one G4 attender.

DEPARTMENT OF NEUROLOGY

The Neurology Department comprises different sub-specialties that provide comprehensive care to patients suffering from various neurological diseases. 5876 new patients attended Neurology clinics and the inpatient admissions were 2948. The average hospital stay was 6 days and mortality rate 1.39 %. Bed occupancy rate increased by about 4 %; total bed strength 59 beds

NEUROMUSCULAR DISORDERS

This Unit catered to the evaluation, investigation and management of patients with diseases of muscles, nerves, plexus and anterior-horn cells of the spinal cord. Besides work up of patients in the outpatient clinics and in-patients in the wards, the unit also ran a Specialty Clinic on Tuesdays to follow up their disease status and response to treatment.

Patient Management Conference

A multi-disciplinary approach was adopted 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 motor and physical ability and cope with residual deficits and disabilities. This session was conducted once a week by a team of 3 neurologists with focused interest, a psychiatrist, a neuro nurse, speech therapists, physiotherapists, occupational therapist and a medico-social worker. In the current year, 52 cases were discussed.

Group Sessions

Group therapy was 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 discussed their problems, cleared their doubts and interacted with other patients. This reinforced their confidence, thereby reducing their stress, guilt and frustration. During these sessions, they also received updated information on their illness.

Clinico

Pathological Meetings were conducted once in 2 weeks, where discussions on muscle, nerve and skin biopsies of patients with neuromuscular diseases confirmed the diagnosis made on clinical and electrophysiological parameters. Pathologists from the Institute as well as the neighboring institutions participated in the session.

Activities

Neuro Muscular Review clinic attendance	1279
Large Volume Plasma Exchange Small Volume Plasma Exchange	180
High Dose IV Immunoglobulin	75
Thymectomy in Myasthenia Gravis	120
Lab Studies	16
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 was initiated in collaboration with the Rajiv Gandhi Center for Biotechnology, Trivandrum. This was done as part of post-graduate dissertation.

A Long-term Clinical Outcome Study of patients with Myasthenia Gravis based on their immunological profile in Anti-Acetylcholine Receptor and Anti-Muscle-specific Tyrosine Kinase antibodies was started.

The international, multi-center, double-blind, randomized, parallel-group trial of Interferon β 1a versus Daclizumab in

Remitting Relapsing Multiple Sclerosis (RRMS) - Protocol 205MS 301, sponsored and funded by Biogen Idec, Basel, Switzerland, was completed at site. A new study, EXTEND, an open label study Protocol 205MS303 of the Daclizumab, was initiated. Studies were initiated on Silent period in Carpal tunnel syndrome, Diabetes and Syringomyelia and Cognitive aspects in Multiple Sclerosis, the latter study done as part of PG thesis was completed.

The other projects included: 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 included: clinical 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 the National Polio Surveillance Project, Government of India, a WHO initiative, identified the Neurology Department of SCTIMST as a nodal center. Accelerated strategies were adopted to ensure interruption of wild Poliomyelitis transmission. After 2012, when India was declared free of wild Polio infection, this project initiated studies on immuno-logical and serological clues for antecedent events and associations in Guillain-Barre' Syndrome.

New studies initiated during the year were:

HLA Studies in Multiple Sclerosis in collaboration with the Rajiv Gandhi Centre for Biotechnology

Nerve Biopsy in Peripheral Nerve disease in collaboration with NIMHANS

Outcome Analysis of Guillain Barre Syndrome seen in a tertiary referral centre: A UK-based Collaborative Registry

Dr Nair was invited to the Advisory Board meeting of the 3rd Multiple Sclerosis Asia Pacific Expert (APEX) 9 November 2013 at Kyoto, Japan. He presented the experience of management of Clinically Isolated Syndrome from an Indian Perspective.

International Collaborations/ Projects

Dr A Kuruvilla was invited by the WHO as an International Consultant in Stroke Neurology for setting up Stroke Program in Mongolia - second phase of the project from 27 May 2013 to 13 June 2013. The terms of reference included the following:

- Capacity Building of staff at ASU
- Establishment of ASU with step-down unit at the 3rd Shastin Hospital
- Introduce thrombolytic treatment in acute stroke with inhouse trainings
- Conduct the project workshop for stakeholders on implementation of the project work plan.

R. Madhavan Nayar Center for Comprehensive Epilepsy Care (RMNC)

R. Madhavan Nayar Center for Comprehensive Epilepsy Care (RMNC) is the main center for epilepsy surgery in India and South-east Asia that offers first-rate yet affordable comprehensive epilepsy care. During the year, the Centre provided comprehensive care for all types of adult and pediatric epilepsy patients from all parts of India and neighboring countries. The mission of the RMNC was as follows: (1) To provide comprehensive medical, surgical, psychosocial and occupational care for patients with epilepsy, with 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 primary care physicians and the general public.

The main activities at RMNC included:

Patient care: The Center conducted two epilepsy clinics every week and provided neuropsychological and occupational counseling along with medical advice to all patients. This year, 6986 patients attended these clinics (Table 1). In addition, 1078 patients attended the two outreach epilepsy clinics at Ansar Hospital, Perumpilavu, and PHC, Changaramkulam, which are run on the first and third Sundays of every month. The clinic at Ansar Hospital was discontinued with effect from October 2013 due to logistic reasons and the main clinic functioned at PHC Changaramkulam. The epilepsy monitoring unit has six Video-EEG units for the diagnosis and pre-surgical evaluation of epilepsies. During the year, 1258 patients underwent VEEG monitoring and 110 patients underwent epilepsy surgery, which was the maximum number we have ever reached. 1500 surgeries were completed on March

14th, 2014 (Table 2,3,4). The Center has all the advanced facilities for the comprehensive care of all types of epilepsies (Table). The Center also provided special epilepsy care for women in the reproductive age group through the Kerala Registry of Epilepsy and Pregnancy (KREP). KREP also ran a special clinic for women with epilepsy in the Maternal and Child Health Hospital (WCH), Thycaud, Trivandrum.

The Center is equipped with state-of-the-art video EEG monitors used for both pre-surgical evaluation and syndromic classification of the various epilepsy sub-types. In addition, bedside EEG monitoring for management of status epilepticus was in place. Round-the-clock neurotechnologists, nursing and medical personnel took ample care of the patients. Advanced neuroimaging facilities like functional MRI (fMRI), EEG-fMRI co-registration, diffusion-tensor Imaging(DTI), volumetric MRI and T2 relaxometry were also done regularly. RMNC also subjected patients to SPECT (single photon emission computed tomography) and PET (positron emission tomography), two non-invasive methods of evaluation of people with epilepsy to identify the area of seizure origin. Implantation of electrodes inside the brain to accurately define the area of seizure origin, which is called "invasive monitoring", was also done regularly.

Research: Many research endeavors, as listed below, were underway in the field of epilepsy, including neuroimaging, neuropsychology, source imaging, nuclear imaging and epilepsy and pregnancy.

1. Study of the long-term outcome of epilepsy surgery, including seizure, psychological and quality of life outcome
2. Study of the anti-epileptic drug profile of patients following epilepsy surgery
3. Clinical, electrophysiological and pathological differences within temporal lobe epilepsy
4. Advanced imaging techniques in patients with refractory epilepsy
5. Knowledge, attitude and practise of epilepsy in different community groups
6. Development of cost-effective models of presurgical evaluation suitable to the developing world
7. Profile of psychogenic non-epileptic events
8. Predictors of depression in intractable temporal lobe epilepsy
9. Various research activities in the Kerala Registry for Epilepsy and Pregnancy

Awards and Honours

Dr Ashalatha Radhakrishnan received the "National Bioscience Award for Career Development" in October 2013 from the Honorable Minister for Science and Technology, Government of India, for the development of state-of-the-art facilities in the treatment of refractory epilepsy.

Human resource development: Four Fellows underwent post-doctoral fellowship program in epilepsy during the year. Further, many neurologists did short-term observership for variable periods of time. In addition, two PhD students and many Senior Research Fellows underwent training at the Centre. Four neuro-technologists had training in Neuro-technology.

Public awareness and welfare: Two epilepsy camps were conducted at Kasargod and Idukki. Patients attending these camps were educated on epilepsy and were provided medical advice and free medicines. National Epilepsy Day was observed on 20/11/13 by arranging a public function and a painting competition for children with epilepsy.

Table 1:RMNC: Facilities offered

Medical treatment
Psychosocial intervention
Speech and occupational therapy
Surgery for intractable epilepsy
Routine EEG
Digital Video EEG
Intra-operative electrocardiography
Intracranial monitoring
Cortical stimulation and mapping
Functional MRI
EEG-Functional MRI

Table 2: Epilepsy surgery milestones

First surgery:	March 20, 1995
200th surgery:	April 22, 1999
400th surgery:	March 25, 2002
600th surgery:	September 24, 2004
800th surgery:	January 4, 2007
1000th surgery:	January 8, 2009

1200th surgery:	March 25, 2011
1300th surgery:	March 28, 2012
1450th surgery:	September 4, 2013
1484th surgery:	December 31, 2013
1500 th surgery: March 14, 2014	

Table 3: No. of epilepsy surgeries during the last 10 years

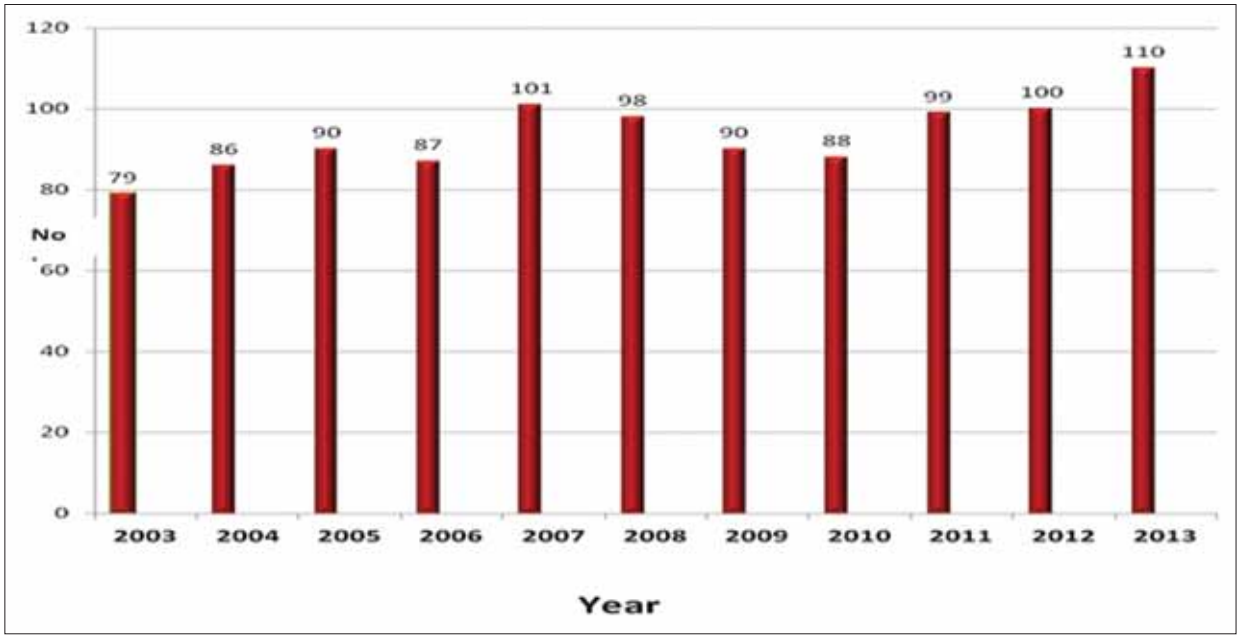
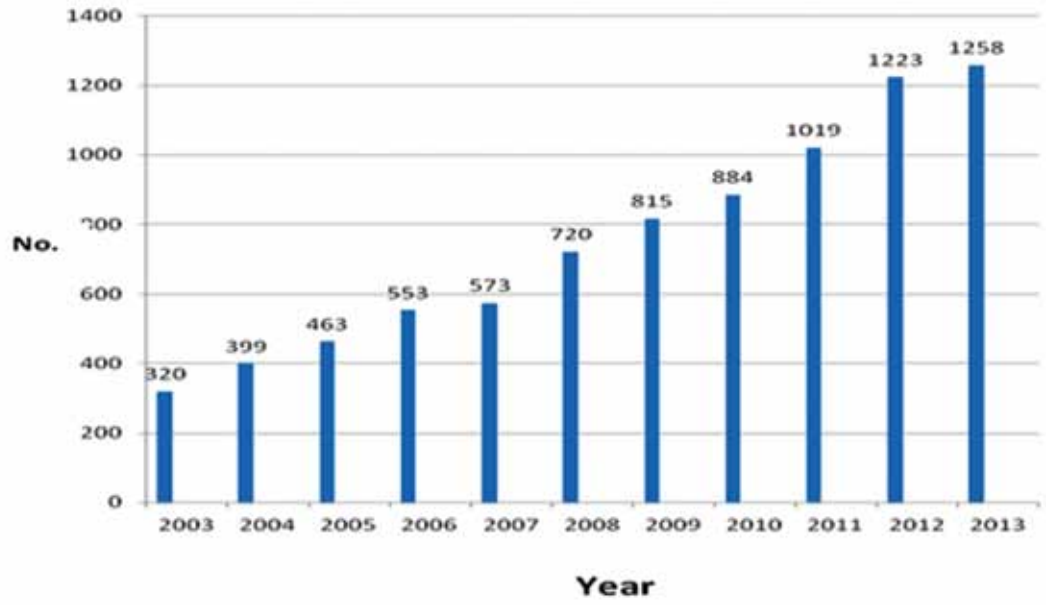


Table 4: No. of VEEG during the last 10 years



A	Name of the Division	Cognition & Behavioural Neurology Section, Department of Neurology
B	Overview of the Division	The section provides clinical services to patients with cognitive problems and dementia. It also provides advice & technical support to the Alzheimer's & Related Disorders Society of India (ARDSI), a voluntary organization that helps dementia patients and carers. The section also carries out clinical & basic science research in the field of Dementia, Cognition and Behaviour.
C	New initiatives during the year (including major capital equipment purchased and their end use)	a) Screening for cognitive impairment following stroke in collaboration with the Comprehensive Stroke Care Centre.
		b) Cognitive Rehabilitation programme in MCI and early dementia by psychologist, Ms Sunitha.
D	Programmes	
	a) Caregiver programme in Dementia on the occasion of World Alzheimer's Day	
	b) CME on dementia attended by Neurologists, Psychiatrists and psychologists from Trivandrum, Kottayam and Kochi.	
	Designated Activities	1) Conducting a Memory & Neurobehavioural Clinic every week that caters to patients with MCI and dementias.
		2) Comprehensive assessment of patients with cognitive problems admitted to the Institute.
		3) Counselling of caregivers of patients with dementia along with psychosocial support.
		4) Research activities on structural and functional neuro-imaging in dementias as well as development and validation of neuropsychological batteries.
	Research programmes and collaborative programmes	1) MCI- Sleep study
		2) Validation of the Malayalam version of Montreal Cognitive Assessment Battery in a cohort of patients with Parkinson's Disease and cognitively normal healthy controls in collaboration with the Comprehensive Care Centre for Movement Disorders
		3) Cognitive Assessment of patients with minor stroke and subtyping of cognitive impairment following stroke in collaboration with the Comprehensive Stroke Care Centre.
		4) Control based validation of neuropsychological test batteries for material specific memory impairment in patients with medically refractory temporal lobe epilepsy due to hippocampal sclerosis.
		5) "Validation of memory fMRI paradigms and its utility in pre-surgical evaluation of patients with Refractory Temporal Lobe Epilepsy-(TLE)"
		6) " Development and validation of a comprehensive clinical and neuropsychological battery for use in the Indian context for patients with Vascular Cognitive Impairment"
		7) The human brain mapping project a resting state fMRI study of healthy controls and patients with mild cognitive impairment (MCI) & degenerative dementia of the Alzheimer's type (AD)

	Workshops/training programmes held during the year	Patient care programme and CME on dementia related to World Alzheimer's Day
	Status of ongoing/routine activities	Speech Evaluation –1192
		Speech therapy – 334
		Audio Evaluation – 243
		Neuropsychological Testing –1156
		IQ Assessments –105
		Counseling Sessions –117
		Memory & Neurobehavioral Clinic Attendance – 440
		New Patients with Dementia –130
E	Important visitor/trainees (name, address, period of their visit, and lectures/ discussions)	18 Students (Sharon Lal, Rini Skaria, Reshma Krishnan, Reshma, Rabia somab, Rekha, Lois Thampy, Lavanya, Anu liza George,Monisha, Remyasree, Merin Jose, Amala Maria, Anumol, Haritha S Mohan, Indhu, Devika, Ardra S Krishna) from National Institute of Speech & Hearing -Trivandrum completed one - month internship.

Comprehensive Stroke Care Program

Annual statistics

	Procedure	Number
1	Stroke clinic attendance	2890
2	ICU admissions	390
3	Thrombolytic therapy	30
4	Carotid revascularization	28
5	Decompressive surgery	13
6	ICH evacuation	8

Activities:

A. The following activities were organized in connection with the World Stroke Day on October 29, 2013

1) A two-minute video of acute stroke treatment and prevention, telecast on the Malayalam Doordharshan TV channel and in the Trivandrum & Kollam railway stations.

2) In collaboration with IMA, a public awareness program and screening of the risk factors were done for the Secretariat employees.

3) Dr P.N. Sylaja gave a talk on Stroke on Malayalam Doordharsan and Dr Sapna Sreedharan gave a talk on Stroke on All India Radio on the World Stroke Day.

B. Training Doctors' in acute stroke treatment was initiated at the Women and Childrens' Hospital, Trivandrum, on November 12th 2013. About a 100 doctors attended the meeting, which was in collaboration with the NCD program of DHS, Trivandrum. Dr Kuruvilla , Dr Sylaja and Dr Sapna spoke on the occasion.

C. Dr P N Sylaja and Dr Girish Menon gave a talk on acute ischemic and hemorrhagic stroke for the employees of VSSC on 23/01/14. About four hundred employees attended the meeting.

The Kerala Association of Neurologists, in partnership with the Comprehensive Stroke Care service, organized the 9th National Conference of the Indian Stroke Association on 14-16 March 2014 at Taj Vivanta, Trivandrum.

There were more than 450 delegates with 12 international faculties and 36 National faculties. The topics covered included acute stroke thrombolysis, secondary prevention of stroke, newer anticoagulatants, intra-cerebral haemorrhage, large artery atherosclerosis, TIA and cardioembolic strokes.

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. The center also trains senior residents in Neurology in the diagnosis and treatment of movement disorders, offers post-doctoral fellowship course in Movement Disorders and PhD program and conducts clinical, genetic, neurophysiological and neuropharmacological research. The permanent staff of the Comprehensive Care Center for Movement Disorders includes Dr. Asha Kishore (Professor of Neurology), Dr. Syam K (Assistant Professor of Neurology) and Mr. Gangadhara Sarma (Psychologist).

Routine Activities: 1. Movement Disorder Clinic: The weekly clinic is conducted by a team consisting of Movement Disorder Specialists, 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. The past year saw a rise in the clinic attendance 2. 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. In the past year the number of treatment sessions doubled 3. 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. The number of DBS surgeries doubled in the last year compared to previous years 4. 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 neurophysiology research collaboration with Dr Sabine Meunier and Dr. Traian Popa, Hosptial Sal Petreiere, France. Dr. Sabine Meunier, Visiting Professor, and Dr. Traian Popa visited the centre and supervised the on-going collaborative projects. The program has genetic research collaboration with Dr. Manu Sharma, University of Tubingen, Germany, and Dr. Emmanuel Roze, Hospital Sal Petriere, France.

The following table shows the clinical activities of the center in the year 2013-2014.

Procedure	Number performed in 2012-2013
Movement Disorder Clinic consultations / reviews	1750
Botulinum Toxin Injections	252
Deep Brain Stimulation Surgeries and Neurostimulator Replacements	25
Deep Brain Stimulation programming sessions	58
Transcranial magnetic Stimulation	268

New Initiatives during the year:

The state-of-the art Non Invasive Brain Stimulation and Motor Physiology lab was inaugurated by the Director on 24th July 2013. The lab is equipped with the most advanced Transcranial magnetic Stimulation Systems and Neuronavigation facilities to facilitate advanced research in motor physiology.

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, 2013.

Faculty members were invited speakers at major national and international conferences.

Visits by Foreign Faculty: Dr. Sabine Meunier, Senior Researcher, INSERM, Hospital Sal Petriere, Paris worked as Visiting Professor for 30th Sep to 11th Dec 2013 as part of the Indo-French collaborative research projects in Transcranial Magnetic Stimulation. .

Other Important Events: Dr Sunitha Raj joined the center as post-doctoral fellow in Movement Disorders, in January 2014. Dr. Sreeram and Dr.Goyal completed one year post doc fellowship.

COMPREHENSIVE CENTRE FOR SLEEP DISORDERS

Clinical Section

The COMPREHENSIVE CENTRE FOR SLEEP DISORDERS (CCSD), with a staff strength of two neurologists, a visiting psychiatrist and a medical social worker, evaluated and managed over 800 patients with various sleep disorders in the last year. We have 3 polysomnography machines with facilities for video recording and PAP (Positive Airway Pressure) titration situated at the Sleep Lab in the Poojapura campus of the Institute, with studies done thrice a week. CCSD ran an Outpatient Sleep Clinic for evaluation and management of patients with primary and secondary sleep disorders, once every week on Thursday between 2 PM and 5 PM.

Yearly statistics

Procedures	Number done
Outpatient attendance	833
Polysomnography	358
PAP titration	92
Multiple sleep latency test	21

Studies/Projects undertaken

1. A community-based study on prevalence of sleep disorders in heavy vehicle drivers of Trivandrum city was completed.
2. A hospital-based study of correlation of Epworth sleepiness scale with OSA severity was completed.
3. 2 studies - Predictors of OSA severity in South Indian cohort and Predictors of high CPAP requirement in patients with moderate to severe OSA were close to completion.

AWARDS & HONOURS

- The following DM Neurology Residents won prizes at various Neurology Conferences
- Dr. Sandeep N won the Second Prize in Poster category on "BP and its variability in acute ischemic stroke – in hospital and short-term outcome" at National Stroke Conference ISACON-2014, Trivandrum in February 2014
- Dr Sruthi S Nair won the Best Paper Award on "Metabolic syndrome and CAD in Epilepsy " at E-CON-2014 held at Calcutta in February 2014
- Dr Divya K P won the Second Best Paper award on "A Rare Case of Failure to Thrive " NSI Annual Conference-2014 held at Thrissur in February 2014
- Dr Sruthi S Nair won the Best Poster Award on "Profile of Sarcoglycanopathies in a tertiary care centre" at MYOCON -2014, held at Chennai in January 2014
- Dr Deepak Menon won the Second Best Paper Award on "Clinical Profile of Mitochondrial Myopathies " at MYOCON -2014, held at Chennai in January 2014
- Dr Alok Mandliya won the "TYSA-Torrent Young Scholar Award" at the National Level held at Ahmedabad in November 2013
- Dr Deepak Menon won the Best Paper Award on "A Case Series of Spontaneous Spinal Cord herniation" at NSI Conference-2013 held at Alappuzha in October 2013
- Dr Divya K P won the Third Place in the Award Paper Category for "Stroke in Young" at the NSI Conference-2013 held at Alappuzha in October 2013
- Dr Divya K P won the Third Place in Neurology Quiz at the National Neurology Conference IANCON 2013 held at Indore in October 2013
- Dr Sandeep N won the First Place in Epilepsy Quiz at Epilepsy Conclave held at Bengaluru in March 2013
- Dr Divya K P won the Best Paper Award for "Implication of the Long Styloid process in Internal Carotid artery dissection" at the National Stroke Conference ISACON-2013 held at Ludhiana in March 2013
- Dr Sujit Jagtap won the Best Paper Award in Epilepsy for "Clinical, neuroimaging and electrophysiological characteristics of patients with medically refractory Eating Epilepsy" at the National conference of Indian Academy of Neurology, Indore 2013.

Staff List

Prof. Muralidharan Nair
Head of the Department

Prof. C. Sarada

Prof. Sanjeev V Thomas

Prof. Asha Kishore

Abraham Kuruvilla
Additional Professor

Dr. P N Sylaja
Additional Professor

Dr. Ashalatha R
Associate Professor

Dr. C. Rathore
Associate Professor

Dr. Sajith. S
Assistant Professor

Dr. Syam. K
Assistant Professor

Dr. Ramsekhar Menon
Assistant Professor

Dr. Sapna ES
Assistant Professor

Staff of EEG lab

Nandini V.S.
Preetha Govind G.
Salini K.R.
Shana N. Nair
Pradeep M.J.
Anees C.A.

Temporary staff

Rejith R.S.
Deepa Paul Miranda

Neuropsychologist

Aley Alexander
MA Psychology

Mr. Gangadhara Sarma
Psychologist

Sunitha Justus
MA Psychology

Deepak.S
MPhil-Psychology

Sociologist

Lekha V S
MA Sociology

Speech Therapist

Manju Mohan
MSc Speech Language Pathology

Occupational Therapist

Ms Lincy Philip

Ph.D Scholars

Aswathy P. M
MSc-Lifescience, JRF

Jairani P. S
MSc-Lifescience, JRF

Sheela Kumari R
MSc, Mphil -Physics

DEPARTMENT OF NEUROSURGERY

2013-14 was an year of consolidation as well as achievement for the Division of Neurosurgery which continued its pursuit of excellence. As we move forward, the Mission of the Division remains unchanged - to provide world-class neurosurgical care and advanced neurosurgical knowledge through research and innovation and to ensure the best academic environment for neurosurgical education.

Patient Care services: The Department recorded an increase in the number of patients seeking surgical care. A total of 1436 surgeries were performed and the surgical spectra ranged from surgeries for surface gliomas to complex neurovascular surgeries, skull base surgeries and high end functional neurosurgery. With a minimum of two epilepsy surgeries and one surgery for movement disorder every week, the department performs the highest number of functional neurosurgeries in the country. A notable addition last year was the significant increase in the number of therapeutic procedures performed for pain relief with the active association of anesthetists. We also expanded our repertoire of cerebrovascular and skull base surgeries by performing an increasing number of complex neurovascular procedures including microvascular anastomosis for cerebral perfusion. Nearly fifty percent of the surgical patients who sought high-end neurosurgical services were from outside Kerala.

The Neurosurgical Residency Training Program received full accreditation with all the final year residents successfully completing their residency program and performing exceptionally well in the exit examination. The residency training program remained central to our teaching education mandate, and the neurosurgical programs continued to attract the best medical school applicants from across the country. Neurosurgery observers from almost all the teaching institutes in Kerala and Tamil Nadu visited the department during the year.

The faculty members and residents: Prof S Nair performed another 55 cases of vestibular schwannomas, establishing the department as the leading center for vestibular schwannomas in the country. Dr Girish Menon provided a substantial boost to surgeries for Arteriovenous malformations and microvascular anastomosis. Dr. Mathew and Dr. George were closely associated with the epilepsy surgery program and Dr. Krishnakumar with surgery for movement disorders. Dr. Gopalakrishnan went on an year's study leave to Vancouver, Canada, to train under Prof. Steinbok in pediatric neurosurgery. Dr. Krishnakumar contributed significantly to the spine program, and a spine subdivision was created in neurosurgery to provide continued support to the growing Neurosurgical Spine Program. Dr. Easwer and Jayanand Sudhir were in charge of the neuro-oncology services, which continued to be the backbone of the surgical program. Dr. Easwer, along with colleagues from the Department of Anesthesiology, developed the program for minimally invasive procedures for pain. Dr. George Vilanilam received a scholarship to attend the Annual Congress of Neurological Surgeons, USA, at San Francisco and do an observership at UCSF, USA.

Awards and accolades: Faculty and students of the department were invited speakers at several major national and international conferences. Dr. Arun PS, final year resident, won the best paper award at the Annual Meeting of the Neurological Society of India for his paper on vagal nerve stimulation for refractory epilepsy.

Research Dr. Jayanand's research on computational fluid dynamics to predict risk of aneurysm rupture, funded by STEC, Kerala, and in collaboration with VSSC, yielded important results. Dr. Girish's work on dural substitute using bovine pericardium, a project supported under the Institute's technology development fund, made good progress and was in its second stage. Dr. Easwer consolidated his research on tissue engineering by filing another patent application on drug delivery using nanoparticles. Dr. Girish and Dr. K Srinivasan (AMCHSS) developed an E-log for neurosurgical operations in collaboration with post-graduate students from IIITMK, Trivandrum, using faculty research funding.

A summary of the operative procedures done during the year is as follows

Table : 1

Intracranial aneurysms	156
AVMs	29
Cavernoma	17
Vestibular schwannoma	55
Other CP angle tumors	21
Microvascular decompression	04
Pituitary tumors	73
Craniopharyngioma	18
Spinal tumors	49
Cervical degenerative disease	39
Lumbar degenerative disease	23
AAD	13
Chiari malformation	21
Gliomas	204
Meningiomas	116
Colloid cyst	11
Pediatric and adolescent posterior fossa	39
Epilepsy Surgery	104
Movement disorder	31
Endoscope assisted procedures	83
Others	330
Total	1436

Patent applications

1. Patent application 5009/CHE/2013* *A process for manufacture of Nano Porous Bioceramic bodies for bone implantation,drug delivery and Tissue Engineering applications. HK Varma, Easwer HV.

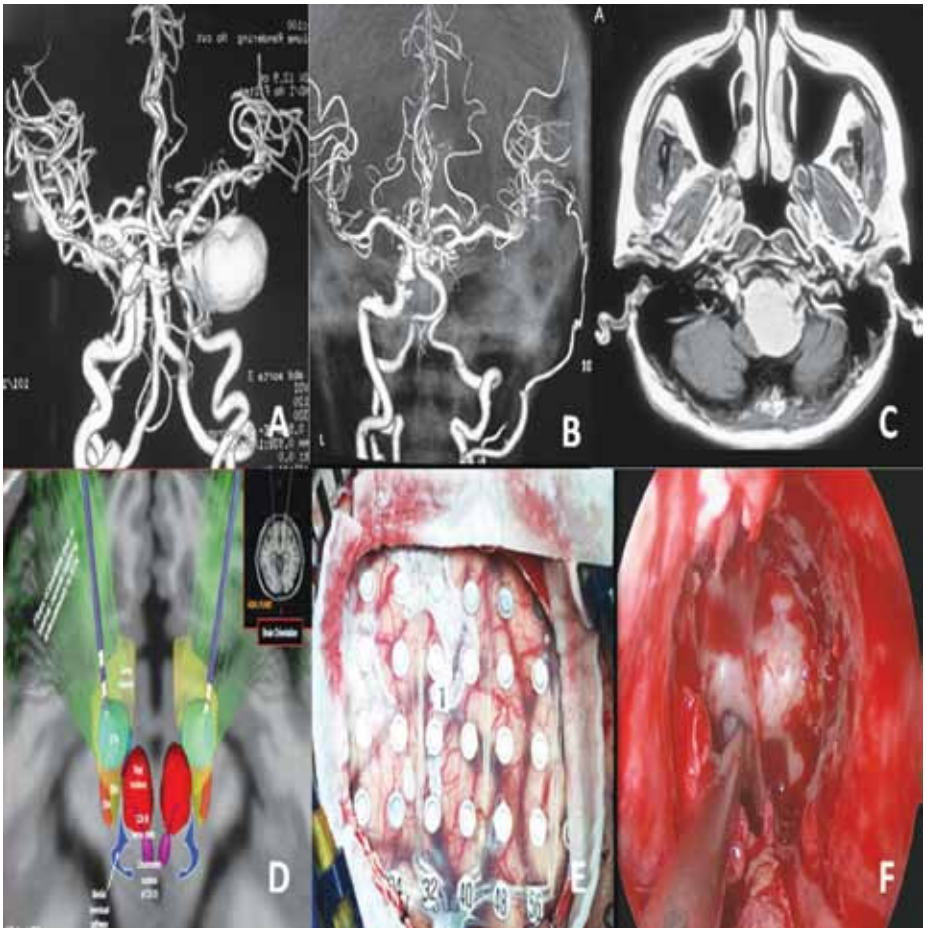


Fig 1 Few illustrative examples of complex neurosurgical procedures performed in our department.
Fig 1 A & B – EC IC bypass and carotid ligation for a giant cavernous aneurysm,
Fig 1 C : large foramen magnum meningioma
Fig 1 D Deep brain stimulation of Subtalamic nucleus for parkinsonism
Fig 1 E Surface recording prior to epilepsy surgery
Fig 1 F Endoscopic surgery for pituitary tumours

Staff Details

Faculty:

Suresh Nair MCh
Professor & Head of the Department

Girish Menon MCh, Dip N B
Professor

Mathew Abraham MS,FRCS, MCh
Associate Professor

H V Easwer MCh
Associate Professor

K. Krishnakumar MS,MCh
Assistant Professor

CV Gopalakrishnan MS, MCh
Assistant Professor

George Vilanilam MS, MRCS, MCh
Assistant Professor

Jayanand Sudhir B.
Assistant Professor (adhoc)

Post doctoral Fellow

Arun PS MCh
Post doctoral Fellow in Neurovascular surgery

Saravanan S MCh
Post doctoral Fellow in Skull base urgery.

MCh Trainees (residents).

Dr. Amit Updhyaya MS

Dr. Bhaumik Thakur MS

Dr. Debabrata Sahana MS

Dr. Sanjeev Kumar MS

Dr. Adam K MS

Dr. Chandrashekhar T S MS

Dr. Varun Agarwal MS

Dr. Vishal Dabare MS

Dr. Sridutt BS MS

Dr. Ranjit N MS

Dr. Vishal T MS

Dr. Vihang S MS

DEPARTMENT OF PATHOLOGY

Routine patient care services were carried out smoothly. Table 1 gives the number and type of various investigations done in the Department during the year. The two cryomicrotomes in the Department malfunctioned concurrently beyond repair and hence muscle biopsy testing had to be stopped in the last few months, awaiting replacement of these vital equipments. Meanwhile, alternate approaches were initiated to develop laboratory technology based on the use of low-temperature embedding media such as polyethylene glycols for sectioning of unfixed muscle biopsies and other tissues at lower than ambient temperatures using the regular microtome itself.

Support for Cardiac Transplantation Programme was ensured and capability for Neuropathology diagnostic service was strengthened by sending Dr. R.N. Amita, Ad-hoc Consultant in Pathology, as a short-term Observer to the Departments of Pathology at AIIMS, New Delhi and NIMHANS, Bangalore.

Regular classes for clinico-pathological case discussions, seminars on specific topics, and gross pathology demonstrations were very popular with Clinical Residents and Faculty from various departments – Cardiovascular Thoracic, Cardiology, Neurology, Neurosurgery and Imaging Sciences. Classes and demonstrations were held for MD Pathology students from various medical colleges in Kerala. The Department took part in conducting "Know Your Lab" lectures for clinicians, residents and nurses, aimed at improving patient services.

A clinico-pathological study (MCh Neurosurgery student's dissertation) of prognostic factors and developmental markers in medulloblastomas was initiated with the Departments of Neurosurgery and Biochemistry. The clinico-pathological study on myasthenia gravis and thymomas with Neurology and CVTS Departments continued. Enzyme immunohistochemical procedures for identifying proteoglycans in rheumatic valves were initiated by Dr. Deepa, PhD Scholar, with Institute Fellowship.

Dr.Santhosh Kumar B joined the Department with the mentorship of Dr. S. Sandhyamani in January 2013 under the DST Fast Track Scheme for Young Scientists. The project has the overall goal of rapid characterization of cancer biomarkers using fluorescence optical biopsy method. To accomplish this goal, a multi-disciplinary team was brought together in an Optical Biopsy Lab, with expertise in Biohysics, Photonics and Pathology. With this project, a Leica DFC 450C digital camera was added to the existing microscope in the Department of Pathology, along with Interactive Measurement Software. Dr. Santhosh Kumar gained valuable skills in fluorescence spectral and microscopic imaging and data analysis from the FCS Workshop at IISc., Bengaluru. Stained sections of various lung tumors were observed under transmitted light microscope and the same were subjected to fluorescence microscopic studies. The fluorescence appearance of various cells and components were observed and noted for further comparison with fluorescence spectral emission studies and analysis. However, fluorescence emitted from glass slides (substratum for tissue sections) was found to interfere with the native fluorescence of the tissues. In our search for a non-fluorescent substratum as a substitute for costly and fragile material such as quartz, we could identify an excellent non-fluorescent substratum. We found that anodized aluminium with chemically modified surface can act as a non-fluorescent substratum to use in fluorescence spectral studies and fluorescent microscopic imaging. An Indian patent application was filed for this product. Three manuscripts from the preliminary work of this DST Fast Track project are under publication in various international journals.

The Pathology Department organized a two-day Microscopy Workshop on 20th and 21st Dec 2013, jointly with the HEATS – 4 programme of the Department of Clinical Engineering. There was enthusiastic response from students of different specialities – MD Pathology, MTech in Clinical Engineering, MPhil and PhD in Biotechnology, MLT in laboratory Technology, from Trivandrum, other centres in Kerala and even neighbouring states of Tamil Nadu and Karnataka. Besides enlightening lectures by experts in microscopy, there were practical demonstrations on various types of routine and sophisticated microscopes available at the Hospital Wing and at the BMT Wing, followed by a hands-on training on trouble-shooting and how to dismantle and reassemble a microscope.

The lectures by the experts were published along with a comprehensive well-appreciated handbook on Basic to Advanced Microscopy as The Proceedings of the Microscopy Workshop.

Patent:

1. Indian Patent Application with patent reference number: 5169/CHE/2013, Dated 14/11/2013.

   Title: Surface modified material as non-reflecting and inert substratum for microscopic imaging and spectral studies of biological and non-biological samples.

Inventors: Dr. S. Sandhyamani, Dr. Santhosh Kumar B.

Table 1.

List of diagnostic investigations carried out in Pathology Department (2013-2014)	
Histopathology (Neuro, Cardio-Vascular &Thoracic Biopsies)	1478
Rapid Cytology / Frozen Sections	466
Muscle Biopsy	39
Cytology	83
Autopsy	2
Reference Biopsies	29
Immunology Tests: (on an average)	300/month

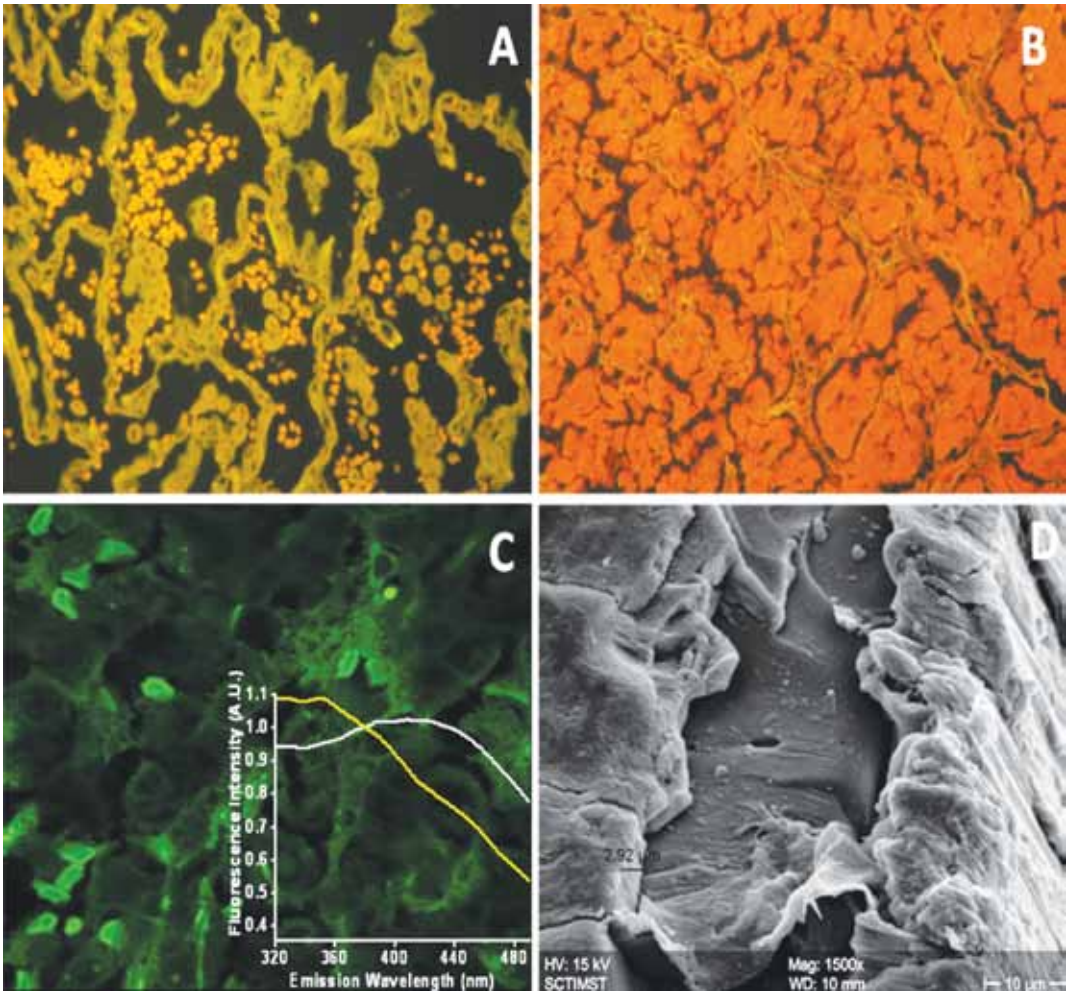


Fig. 1A. Autofluorescence of normal lung tissue.

Fig. 1B. Secondary fluorescence of lung tumour tissue stained with acridine orange.

Fig. 1C. Autofuorescence of lung tumour tissue. Inset shows higher fluorescence emission spectrum by tumour (white line) tissue than by normal (yellow line) lung tissue.

Fig. 1D. Scanning electron-microscopy image of chemically modified anodized aluminium substratum, showing the thickness of the surface deposit.

Fig. 2. (Microscopy Workshop – photographs will be edited and inserted by MIU)
Fig. 2A. Mr. Koruthu Varughese speaking during the Inaugural Session of the Microscopy Workshop, with Dr. Sandhyamani, Dr. Sankarkumar, Dr. Balaraman Nair and Dr. Sankar
Fig. 2B. Organizers of the Microscopy Workshop with Staff of the Pathology Department and student delegates.

Staff:

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

Dr. Neelima Radhakrishnan, MD, DNB
Ad-Hoc Consultant (till October 2013)

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 (on Maternity & Childcare Leave since April 2013)

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

Mr. Omanakuttan
Unit Helper

Dr. Deepa Surendran, MVSc
PhD Scholar (Institute Fellow)

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

PAIN CLINIC

Clinical services:

- Total patients seen in the clinic: 601 (New registrations: 242, Review: 359)
- 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 68 patients

Break-up of the major Interventional Pain procedures:

- Radiofrequency ablation for Trigeminal Neuralgia: 37
- Back pain interventions: 28
- Other radiofrequency procedures: 3

Cervical epidural injection

- Minor interventions performed (nerve block, plexus block, musculo-skeletal injections/infiltrations, trigger pint/joint space injections): in 50 patients.

New Initiative

We started cervical epidural steroid administration for relieving pain of cervical spondylosis.

Academic activities:

1. Refresher Course on Pain and Palliative Medicine was conducted at SCTIMST on 7/12/2013 and 8/12/2013. This was conducted jointly by Dr. Odette W Spruijt, Peter MacCallum Cancer centre Melbourne Australia, Dr. M.R. Rajagopal, Chairman, Pallium India, and Dr. Rupa Sreedhar, Professor of Anaesthesia, SCTIMST. The objective of this CME was to spread awareness among doctors and social workers regarding the prevalence, types, diagnosis, investigations and treatment options of different chronic cancer and non-cancer pain conditions.
2. Indo-German Symposium and Workshop on "Innovating Translational Research for Neurorehabilitation and Pain Management"conducted at SCTIMST on 30th November to 1st December 2013. Dr. Nilay Chatterjee spoke on 'Translational Research in Pain Management' at the Workshop.

SCTIMST Pain Clinic in media:

A detailed feature on the Pain Clinic SCTIMST was published in 'Manorama Arogyam' in the October 2013 issue.

DEPARTMENT OF TRANSFUSION MEDICINE

Overview

The Department continued to provide transfusion support to surgical and interventional procedures. The number of units of blood collected increased by 6% and there was also an increase in voluntary blood donors by 6%. The number of blood mobile camps was increased from six to seven per month to increase voluntary blood donation. Plasma supply to the Thrombosis Research Unit at the BMT Wing for the preparation of fibrin glue continued.

Statistics

Total Blood collected	8139 units
Total Components prepared	19517
Total Components transfused	17780

New Initiatives: Steps were initiated to start MD in Transfusion Medicine. A new faculty joined the Department. A Quality Policy and Quality Manual was prepared as a first step to obtain accreditation for the department. Donor communication through mobile phone was initiated. Regular meeting of the Hospital Transfusion Committee and staff meeting helped to improve the activities of the department. The process of implementing Immunoflurescent Test (IFT) for screening of donated blood units to enhance blood safety was initiated during the year.

Programs

The Department organized a talk on Advances in Blood Safety Practices on 20th July 2013. Dr. Tulika Chandra (Head of Dept. of Transfusion Medicine, KGMC, Lucknow) gave a talk on NAT – An Advanced Level in Blood Safety.

National Blood Donation Day was observed on 1st October 2013 by felicitating 60 blood donor organizers and repeat blood donors. Dr. Prabash J. (Professor, Dept. of Political Sciences, University of Kerala) inaugurated the function and gave the keynote address. Dr. Easwer (Associate Professor of Neurosurgery) felicitated the function.

Awards

The Department received the 2013 Best Blood Bank in the State Award, instituted by the Kerala Sate Blood Transfusion Council, for retaining the maximum number of repeat regular blood donors during the year.

Training

Two DBBT students successfully completed the course and both secured placement in reputed Centres.

15 Medical Officers in two batches from the State Health Services underwent training in Modern Blood Banking Techniques in the Department.

Staff Details

Dr. Jaisy Mathai
Scientist G and Head

Dr. P.V. Sulochana
Scientist G

Dr. Sathyabhama S.
Scientist F

Dr. Debasish Gupta
Professor (Ad hoc)

Dr. Usha Kandaswamy
Scientific Officer (MSW)

Mrs. Sheela Devi
Scientific Officer

Mrs. Sindhu P.N.
Junior Scientific Office

The Physical Medicine & Rehabilitation (PMR)

Department currently offers support services to the clinical specialties.

1. During the year 2013 – 14, the patient care services were:

Sl No	Clinical specialty	No of sessions
1	Neurosurgery	3090
2	Cardiac Surgery	5874
3	Paediatric Cardiac Surgery	4421
4	Neuromedicine	3324
5	OPD	5644
6	NeuroIntervention	140
7	Cardiology	167

2. The Physiotherapy section under PMR works from 8 am to 6 pm. One more physiotherapy session has been added for patients in the CHICU.

3. A Rehabilitation Clinic was started functioning from April 2012. The clinic functions from 8 am to 10 am on Tuesdays and Wednesdays. It receives patients with rehabilitation needs. Last year, more than 300 patients had consultations in the Clinic.

4. The PMR is an active participant in the Pain Clinic. Various physiatric interventions are being done in the clinic. Patients who need physiotherapy are being seen in the PMR department.

5. New Equipment: The PMR has acquired newer equipment like the Dynamic Stair Trainer, FES system and a motorised wheelchair for persons with disability.

6. Advanced Certificate Programme in Physiotherapy: Two new programmes in Physiotherapy in Cardiovascular Sciences and Neurological Sciences have been approved. These are 1-year programmes and are to start from the coming academic year.

7. Observership: The PMR now offers regular short-term Observer training to students in Physiotherapy.

8. Examinership: P V Vijesh, MPT PhD, officiated as external examiner for the BPT programme of M G University, Kottayam.

9. List of Staff:

   - Visiting Professor: Dr U Nandakumaran Nair
   - Senior Physiotherapist: Ms G. Deepa
   - Physiotherapists – A: Mr K Aji, Dr PV Vijesh, Mr S Rahool, Ms Jijimol George

10. Workshops:

a. Dr U Nandakumaran Nair, Department of PMR was a member of the Organizing Committee for the Indo-German Workshop on "innovating Translational Research for Neuro Rehabilitation and Pain Management" on 30 November and 1 December 2013 at the SCTIMST. He chaired a session on the ICF.

b. Dr U Nandakumaran Nair attended the IAPMR National Conference at Chennai in January 2014 and presented a lecture on Interventional Pain Management.

BIOMEDICAL TECHNOLOGY WING

Our Mission

- To develop innovative healthcare technologies and translate them into patient care
- To undertake research in frontier areas of biomedical science & engineering
- To generate competent biomedical professionals through education & training
- To offer internationally accepted medical device testing & evaluation

Our Vision

To become a global leader in developing and translating affordable healthcare technologies through innovative research, education & training by 2020

FROM THE DESK OF THE HEAD OF BIOMEDICAL TECHNOLOGY WING

For the Biomedical Technology Wing, the year 2013-14 provided a unique opportunity to enhance its technology development and translational research activities. A proposal for the setting up of a Medical Devices Research Park at the proposed Life Sciences Park being set up by the Government of Kerala was submitted to the Department of Science and Technology, Government of India. This initiative is expected to augment the infrastructure support for translating the technologies developed at the Institute to industrial level by providing inputs in detailed engineering, regulatory compliance, pre-clinical evaluation and market seeding.

On the technology transfer front, the hormone-releasing intrauterine contraceptive device, EMILY, reached commercial stage after the successful completion of clinical evaluation. The Institute continued to support the industry, M/s. HLL Life care Ltd, Thiruvananthapuram, by providing product release testing services. Another product developed here, the calcium phosphate based self-setting bone cement, the technology for which was transferred to M/s. IFGL Bioceramics, Kolkata, received the approval from the Indian Medical Device Regulatory Agency, the Central Drugs Standard Control Organization, Government of India.

On R&D, many projects made substantial progress during the year. The pre-clinical evaluation and technology documentation for the improved tilting disc heart valve and hydrogel-coated vascular graft reached the final stages. Both are continued R&D projects, sponsored by the industry, M/s. TTK Healthcare Ltd, Thiruvananthapuram. Another R&D project for the development of pediatric and neonatal membrane oxygenator, sponsored by M/s. South India Drugs and Devices, Chennai, progressed well.

Projects for development of electromagnetic flow measurement system, ceramic-coated coronary stent, and dural substitutes for cranioplasty and injectable bioceramic products made substantial progress. In the biological products segment, the tissue engineered bone graft for large segmental bone defects is being taken up for clinical evaluation at the Christian Medical College, Vellore. The tissue engineered corneal endothelial construct, cartilage, pancreatic islet, wound care construct and bio-artificial liver programs also show promising results.

During the year, BMT Wing continued to build productive partnerships with industry as well as academic institutions. Memoranda of understanding (MOU) were signed with M/s. Trivitron Healthcare, Chennai; Indian Institute of Information Technology and management – Kerala (IIITM-K); National Institute of Technology, Trichy; Osaka City University, Japan and Queensland University of Technology (QUT), Australia.

The quality management system being practised at the Biomedical Technology Wing went through the periodic auditing of the third party accreditation agencies. The surveillance audit in the area of biological evaluation of materials was successfully carried out by Le Comité Français d'Accréditation (Cofrac, France). The National Accreditation Board for Testing and Calibration (NABL, India) carried out its audit of the calibration facilities and extended the accreditation for two years.

The academic activities, PhD programs, M Tech in Clinical Engineering and M Phil in Biomaterials Technology continued smoothly during the year. The BMT Wing provided training to many young technicians as part of its apprenticeship-training program.

Generation of intellectual property continued to be the focus of applied research at the BMT Wing. Applications for nineteen new patents and one trademark were filed during the year. Over 90 research publications during the year with average impact factor of about 3.0 signifies the state of competitive research in the campus.

On the whole, in the year 2013-14, the Biomedical Technology Wing strove to excel in all its areas of activities like medical device development, biomaterials research, accredited testing and calibration services and academic programs.

Neelakantan Nair O.S.
Acting Head

BIOMEDICAL TECHNOLOGY WING

Product Development and Technology Transfer & Industrial Linkages

The status and progress made in the various product development projects during the year by the different laboratories of the BMT wing are described below:

Artificial Organs

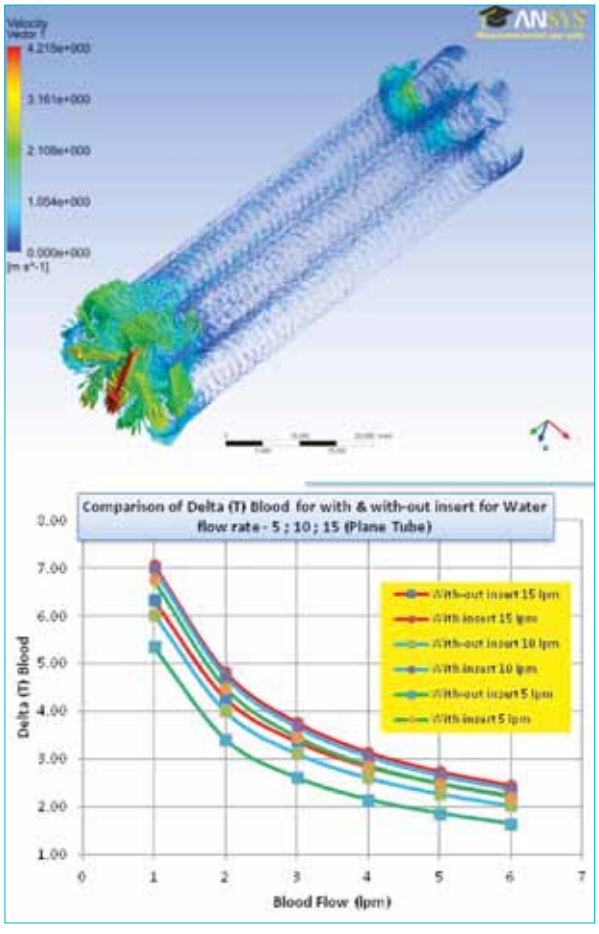
Modelling & Prototyping Laboratory

Development of Cardiopulmonary Devices

An industry-sponsored project for development of cardiopulmonary devices was initiated with support from SIDD Lifesciences, Chennai, for the development of Paediatric and Neonatal models of Membrane Oxygenator and arterial filters. Significant progress was made in the initial design of oxygenators as described below.

Activities during the year

- Initial specification file for the Oxygenator was developed after a survey of available devices in the market. Four different models of heat exchangers were developed and the Computational Fluid Dynamics (CFD) evaluation of these was conducted in ANSYS software. Using CFD technique, flow profiles for fluid as well as the heat transfer performance of the designs were estimated.
- The procedure for potting of heat exchangers in potting machine and the pre processing technique of heat exchanger tubes, using chemical methods were standardized.
- Devices fabricated using these processes were subjected to in vitro evaluation in simulated conditions. Based on the evaluation, improvement in design of heat exchanger was achieved.



- Preliminary CAD design of two gas exchanger modules for membrane oxygenator was designed, for paediatric and neonatal use. The CFD analysis was conducted to optimise the flow pattern in the device. An alternate route for prototype fabrication was explored in rapid ptototyping technique and another device was fabricated by conventional method.
- In vitro evaluation set up for bloodless oxygen transfer estimation was implemented with cutomised reservoir and chemical analysers. Experiments were conducted in this set up to validate the procedure and later the device sample fabricated was evaluated.

Electromagnetic Blood Flow Meter

- Functional prototype of electromagnetic blood flow measurement system was developed, which has an electromagnetic probe and measuring instrument that processes the signal obtained from the probe and display the flow rate. The system works on the principle of electromagnetic induction where a voltage proportional to its velocity is induced across the conductive fluid like blood or priming fluids such as saline when subjected to a magnetic field.
- The probe consists of an electromagnet and its signal conditioning circuit, which can be easily fitted on to the tube carrying the fluid. During its operation, the electrodes attached to the tube capture the induced voltage proportional to the velocity of flow.
- The instrument processes the signal by extracting the flow related information from the signal and displays the corresponding flow rate in liters per minute. Improved electromagnetic design could enable the system to have a sensitivity of more than double that of existing technology.
- Also improved signal processing techniques consisting of better filtering and signal extraction resulted in a miniaturized electronic circuitry with better performance than previous technologies.

- The prototype was tested on an extracorporeal circuit with blood analogous fluid as the medium and actual flow rates versus displayed flow rate on the prototype were studied. Results showed that the prototype developed has accuracy more than 95% and has very less signal rift and instability issues.

Revolving Permanent Magnet Portable Blood Flow Meter

A novel method for measuring the flow rate of blood and other conductive fluids was developed with a set of high intensity permanent magnets revolving in the vicinity of the fluid carrying tube and producing a sinusoidally varying magnetic field across the fluid column. This magnetic field induces a voltage proportional to the velocity of its flow. Since electromagnetic coils and its power electronic circuitry are not used, the size of the system can be miniaturized and also the induced signal is having high signal to noise ratio and no spurious voltages. This together with other characteristics resulted in development of a better flow meter without the need of a separate probe and an instrument for signal processing and measurement.

- A prototype was developed that consists of a mechanism for rotating the magnets and electronics for signal processing, and is battery-powered and hence no considerable safety issues as in conventional electromagnetic flow meter. Test in an extra corporeal circuit showed that the new method has an accuracy of better than 95% and is on par with other techniques of flow measurement.

Biomaterial and Biological Products

Bioceramics Laboratory

Central Drugs Standard Control Organization (CDSCO), Government of India, approved issuance of marketing license to IFGL Bioceramics, Kolkota, for their product BioGraft CPC. The know-how for the manufacture of this product was provided by Bioceramics Laboratory. This is calcium phosphate self-setting bone cement for various dental infra bony defect filling application. The product is being manufactured by IFGL Bioceramics at their factory situated in Rourkela, Orissa.

Biosurface Technology

Oral Heparin : Low Molecular Weight Heparin Nanoparticles – Loading and release profile

Heparin nanoparticles were developed using 48000 IU of low molecular weight heparin (LMWH). The loading of LMWH is 445 ± 11.8 IU/ 100mg.

The LMWH nanoparticles showed pH sensitive release with a low release of less than 10% at acidic pH and around 60% release at pH 6.8 for a period of 6 hours. In vivo efficacy evaluation is underway.

Dental Products Laboratory

Development of Drug Releasing Intrauterine Device Project

Commercial production of EMILY started during the year and estimated that around 12000 units had been marketed by HLL Lifecare, the industry partner till the end of March 31st 2014. Sterility and stability tests were carried out during this period. Product is currently being used by gynecologists all over the country. Continuous technical support was provided to industry by the lab throughout the year.

Technology Transfer (Relicensing) of Dental Composites and bonding agent

Three companies expressed their interest in commercializing dental composites and dental bonding agent. Visits were made to two of the industries to assess the feasibility of technology transfer and discussion was held at the BMT Wing with the third company.

Technology transfer of Caries Removal agent

Discussion was held in March 2014 with industry personnel at BMT Wing with regard to technology transfer and clinical trials. Training was imparted to industry personnel as part of technology transfer. Production facility has been set up in Perumbavoor, Kerala, by M/s Toms International, the industry patner. Visits were made to examine the facility. Trial production is expected to commence by April 2014.

Technology transfer of Glass Ionomer cement

There was a visit to ASPR, Chennai, in June 2013 to discuss the course of action on technology transfer of glasss ionomer cement. Though the pulp and dentine test was planned for February 2014, it got delayed to May 2014 due to CPCSEA suggestions. As soon as the test is over, the technology transfer activities are expected to gain momentum.

Division of In Vivo Models & Testing

An internal TDF project was sanctioned to fabricate valved conduit with decellularised bovine pericardium and evaluate it in sheep orthotopic implantation at pulmonary position, for the purpose of proving the concept.

During project evaluation, it was suggested that the conduit may be subjected to in vitro evaluation before implanting in sheep. Accordingly, an in vitro set up was developed to evaluate static leak, regurgitation (under pulsatile flow) and for visualisation of valve closure/ opening under pulsatile flow.

After initiation of the project, it was suggested to pre-fabricate the valved conduit to make it ready for implantation during surgery instead of fabricating it on the table, so that eventually this can be developed as an 'off the shelf' product.

A series of templates were developed for the purpose of pre-fabricating a three cusp valve conduit with the help of Precision Fabrication Facility, BMT Wing. They were evaluated for static leak, regurgitation and valve closure using the in vitro set up. Eventually, after seeing higher leak and poor repeatabilty for three cusp valves, a two cusp design was suggested. Hand made two cusp valve was evaluated and the performance was marked as control. Templates for bicuspid valve was fabricated and bicuspid valve versions were made and evaluated (see figure below). Version 15 was finalised because of its performance and three samples from this version was tested for repeatability with respect to static leak, regurgitation and valve opening/closure (Table below).

Estimation of static valve leak at different pressure heads of Valve version 15 (data of 3 valves of the same design-Version 15)

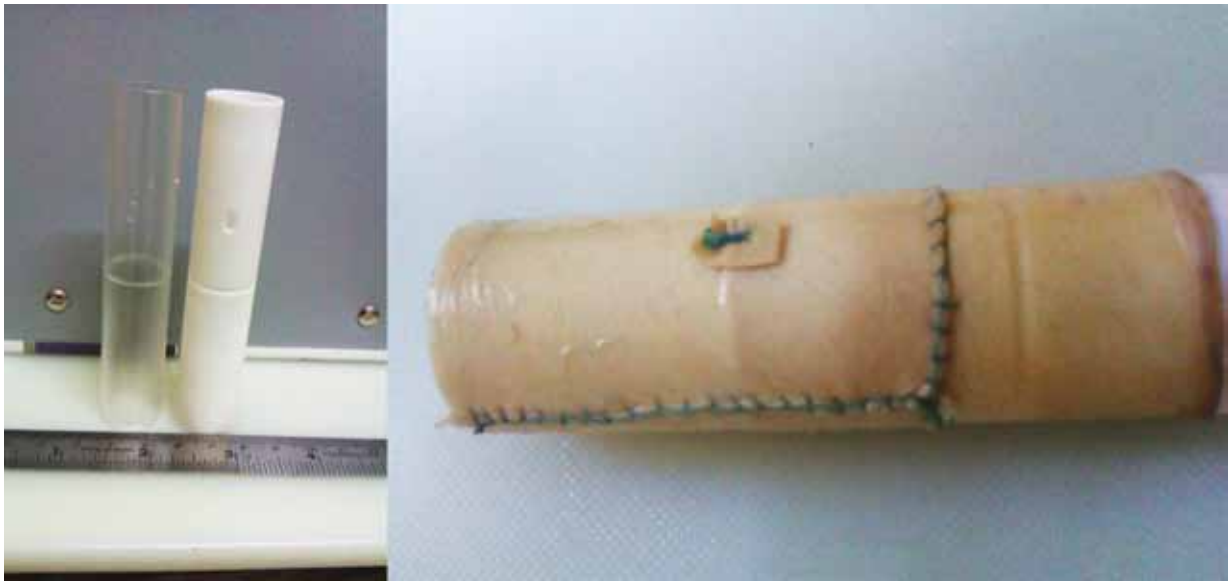
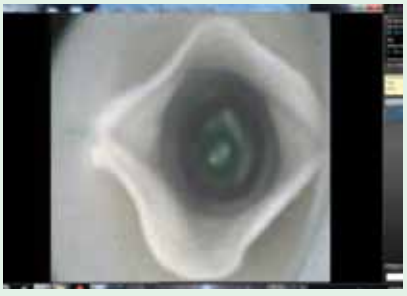
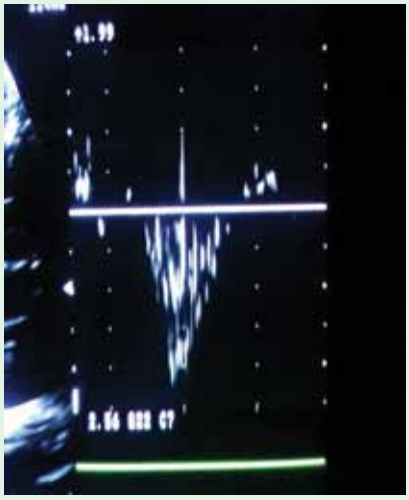
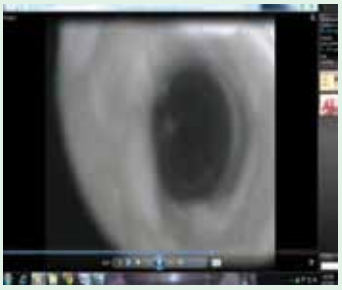
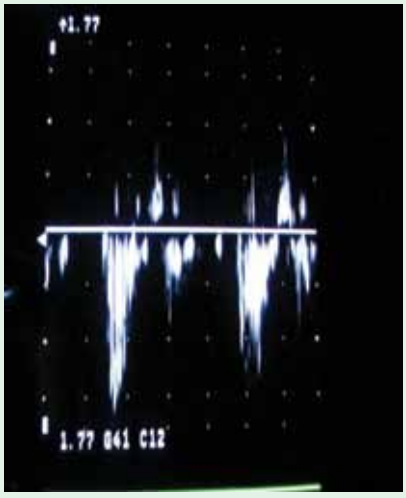
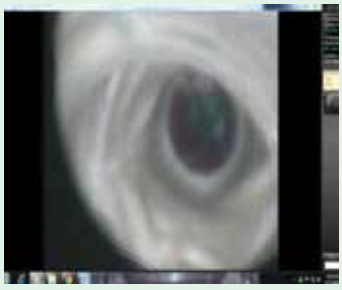


Figure showing templates for biscupid valve on the left and on the right completed prototype bicuspid valve with pledgeted vertical commissure sutures is seen before removing it from the template

Regurgitation at flow rate of 1.27L/ minute	Pressure Head at mm Hg	Valve static leak at ml/minute	Valve closure/ opening at avg 180/20mmHg pressure
Valve conduit 4 Regurgitation= 9.27% 	40	5.5	
	40	5.5	
	40	6	
	120	12	
	120	11	
	120	11	

Valve conduit 1 Regurgitation=10.1% 	40	8	
	44	5	
	37	5	
	84	7	
	121	7	
	125		
Valve conduit 3 Regurgitation= 11% 	44	8	
	40	8	
	40	8	
	140	16	
	128	15	
	129	15	

Expression of interest was shown by an Indian Medical Devices Company for transfer of technology of non-detergent-based decellularisation and non-calcifying glutaraldehyde treatment of pericardium and the technology transfer is expected soon.

Division of Tissue Engineering & Regenerative Medicine

Development of novel scaffold materials for tissue engineering of different tissue types utilizing different fabrication methods like freeze drying, gas foaming, electrospinning etc. is ongoing. Materials developed were also shared with other laboratories for collaborative projects. Industry has envinced interest in polymer macrocapsules for immunoisolation and some scaffolds for cartilage tissue regeneration.

Experimental Pathology

The division developed techniques for isolating biomaterial grade scaffolds from cholecyst (gall bladder), small intestine and urinary bladder, which have potential clinical applications. The cholecyst-derived scaffold was found useful as skin - graft substitute and wound healing matrix in animal models. Efforts for technology transfer were initiated.

Polymer Laboratory

Under the DST-sponsored project **'Dispensable and biodegradable polymeric bone cement for minimally invasive treatment of bone diseases'**, clinical grade biodegradable and dispensable bone cement was prepared. The blood compatibility of clinical grade bone cement material was studied by measuring the hematological parameters (platelet, Leukocyte (WBC), Erythrocyte (RBC) count and haemoglobin content) after exposure to human blood. 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 elicited no hemolysis. The percentage of haemolysis was found to be 0.04, which lies within the permissible limit of 5%. The absence of fibrin degradation product in the blood after exposure to the material revealed that the material does not elicit any adverse response leading to thrombus formation. Assay on partial thromboplastin time (PTT) indicated prolonged coagulation suggesting blood compatibility. There was no significant difference in PTT values for samples analysed immediately and after 30 min incubation in blood plasma. The data also suggested that the present bone cement material does not have any leachable activator for coagulation pathways. Studies on in vitro blood-material interaction reveal blood compatibility of the bone cement material. Clinical trials are being planned.

Under the project 'Biodegradable polymeric composite materials for orthopedic fixation devices', mechanically favorable and degradable nanocomposites consisting in situ polymerized biodegradable copolyester and hydroxyapatite (HA) were prepared. In-situ polymerization of inorganically modified biodegradable poly(polyol sebacate)-co-poly(trimethylol propyl fumarate) and poly(propylene fumarate) with hydroxyapatite were carried out. Raman spectral imaging clearly reveals a uniform homogenous distribution of HA in the copolymer matrix. The mechanical studies reveal improved mechanical properties formed when crosslinked with methyl methacrylate (MMA) when compared to N-vinyl pyrolidone (NVP). The SEM micrographs of the copolymer nanocomposites reveal a serrated structure reflecting higher mechanical strength, good dispersion, and good interfacial bonding of HA in the polymer matrix. In vitro degradation of the copolymer cross-linked with MMA was relatively more than that of NVP and the degradation decreased with an increase in the amount of the HA filler. In vitro bioactivity of these composites was carried out in stimulated body fluid (SBF). The aged samples were analysed using AFM and Energy Dispersive X-Ray Analysis (EDAX). The mechanically favorable and degradable MMA-based nanocomposites also had favorable bioactivity, blood compatibility, cytocompatibility and cell adhesion.

Polymer Processing Laboratory

Development of fluoropolymer coated and hydrogel sealed large diameter vascular graft

The graft underwent performance evaluation as per ISO 7198 (1998) for pre-clinical safety and gross & histopathological evaluation, compliment activation studies, Ames test to evaluate genotoxicity potential, etc. and successfully completed all these tests. Currently technology documentation of the process is ongoing. The technology transfer to industry will be done shortly and steps are being taken by the industry partner M/s TTK Healthcare ltd to begin clinical implantation within a year.

Development of Mandibular Advancement Device for the Treatment of Obstructive Sleep Apnea

Prototype models of oral mandibular advancement device were designed and moulds for molding prototype devices were machined. A few prototype models were molded out of silicone rubber based formulations. The prototype device offered advancement of the mandible. Preliminary tests in a patient showed that saliva limits the retention of the device to a great extent and it is required to change the design to improve the retention capability of the device.

Thrombosis Research Unit

Fibrin Glue production: Formalities for starting the scale-up facility were underway. The standard operating procedures is ready for submission to the Drugs Controller in Trivandrum for arranging the inspection by the DCGI and to get approval for the use of the facility to produce Fibrin Glue for multi-centric trials.

The technology profile for antivenom development was shared with two Industries for possible transfer and commercialization of the product. Patent application was filed for production of antivenom against a mixture of two hemotoxins and a mixture of tow neurotoxins, which is a novel approach.

Improvement was made in the products developed for delivery of curcumin for treatment of cancer. Evaluation of the products in animal lung cancer model was underway.

Diagnostics and Instrumentation

Microbiology

Shelf life evaluation of UTI kit components were completed during the year

Toxicology

The development of an in vitro pyrogen test kit for the evaluation of pyrogenicity using human whole blood made progress. 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 be studied.

Technology Transfer & Project coordination

Technology Business Division

Technology Business Division (TBD) interfaces between Institute and Industries for technology transfers and collaborative research activities. Customer Service Cell (CSC), which is the single contact point for all testing services for external and internal customers is a part of TBD. The division also co-ordinated the approval and monitoring of the TDF and OHF research projects, monthly reports, annual reports, DST reports and the research conclave RESCON.

MedTech RESEARCH PARK initiative

In order to strengthen the institute's linkages with industry and to attract entrepreneurs and industry to the medtech sector, the division took the initiative to conceptualise the setting up of a research park for medical devices sector. A project proposal was submitted to DST for funding support. Interactions continued with KSIDC for taking the proposal forward.

The division continued to support Institute in MOUs and agreements with external organisations and the following were coordinated during 2013-14:

- Material Transfer Agreement with M/s Trivitron Healthcare for Iodinated PU on 12th April 2013.
- MoU with IITMK for PhD in medical imaging technology on 20th May 2013.
- Extension of MoU with NIT, Trichy for academic & research collaboration on 15th July 2013.
- MoU with Osaka City University for promotion of cooperation in education and research on 27th August 2013.
- International Cooperation Agreement with QUT, Brisbane, Australia for Joint PhD programme on 5th November 2013.

The division extended support to various labs and programmes in technology commercialisation efforts. Some of these projects included xenogenic skin graft materials, decellularised bovine pericardium, caries removal agent, UTI kit.

Project Co-ordination

The division co-ordinated the application review and approval process of five TDF internal funded projects. A new OHF scheme for funding internal research projects was introduced and the implementation of the same was coordinated. The 13th Annual RESCON was conducted during 20th March, 3rd April and 10th April 2013.

Intellectual Property Rights 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.

a. Patent granted during this financial year: Nil

a. Number of fresh Patent applications Submitted to IP Cell:17

b. The patent applications filed through the IPCell:19

Patent Applications Filed					
Sl.No	Ref No	Application No	Date of Filing	Title of Invention	Inventors
1.	IPTRU031.Y13	1516/CHE/2013	03/04/2013	Fibrin wafer/disc as a biological carrier for sustained delivery of curcumin	Lissy Kalliyanakrishnan, Lakshmi Sreedharan Pillai
2.	IPTRU032.Y13	2200/CHE/2013	20/05/2013	Development of soluble albuminated curcumin for application in cancer therapy	Lissy Kalliyanakrishnan, Christina Thomas
3.	IPTER033.Y13	1639/CHE/2013	10/04/2013	Polymer-siloxane hybrid scaffold for tissue engineering applications and process there of	Prabha Damodaran Nair, Bindu Presannakumaran Nair,
4.	IPBST034.Y13	2138/CHE/2013	15/05/2013	Catheter assisted therapeutic delivery device	Kaladhar Kamalasanan, Neethu Mohan Ramshekhar Narayanan Menon, Sachin Jayachandra Shenoy, Renuka Rajamma Nair, Chandra Prakash Sharma
5.	IPEXP035.Y13	2338/CHE/2013	29/05/2013	A procedure for fabricating xenograft using mammalian cholecyst derived extracellular matrix for wound healing applications	Deepa Revi, Thapasimuthu Vijayamma Anilkumar, Jaseer Muhamed Ceethakulath Jamaludheen,
6.	IPTRU036.Y13	3131/CHE/2013	13/07/2013	Production of pure IGY against mixture of two neurotoxins (anti-neurotoxins) and two hemotoxins (anti-hemotoxins) for neutralizing the effects of envenomation in snake bite patients	Lissy Kalliyanakrishnan, Soumya Krishnamoorthy
7.	IPMPL037.Y13	2894/CHE/2013	28/06/2013	High sensitive current controlled electromagnetic blood flow meter	Sarath Sasidharan Nair, Nagesh Divakara Panickar Sulochana, Vinod Kumar Viswanathan Pillai
8.	IPTER038.Y13	4060/CHE/2013	11/09/2013	Polyhedral oligomeric silsequioxane-pluronic hybrid vesicles useful for drug delivery applications and process thereof	Bindu Presannakumaran Nair, Prabha Damodaran Nair

9.	IPBCL039.Y13	5009/CHE/2013	06/11/2013	A process for the manufacture of nanoporous bioceramic bodies for bone implantation, drug delivery and tissue engineering applications	Parimanathu Kovilakom Rama Varma Hari Krishna Varma, Sekhara pillai Vijayan, Sivadasan Suresh Babu, Annie John, Hariharan Venkat Easwer.
10.	IPTER040.Y13	5049/CHE/2013	08/11/2013	Biomimetic nanofiber assembled hydrogels as hybrid scaffolds for engineering of complex tissues and the interfaces and the process there of	Neethu Mohan, Prabha Damodaran Nair
11.	IPTER041.Y13	4867/CHE/2013	29/10/2013	Porous scaffold for tissue engineering	Prabha Damodaran Nair, Neena Aloysious
12.	IPHOW042.Y13	5169/CHE/2013	14/11/2013	Surface modified material as non reflecting and inert substratum for microscopic imaging and spectral studies of biological and non biological samples	Samavedam Sandhyamani, Santhosh Kumar Bhaskara Pillai
13.	IPEXP044.Y13	5649/CHE/2013	07/12/2013	A method for fabricating corneal-grafts using mammalian cholecyst-derived extracellular matrix.	Thapasimuthu Vijayamma Anilkumar, Sainulabdeen Anoop, Syam Kunnekkatu Venugopal
14.	IPMPL045.Y13	19/CHE/2014	03/01/2014	A battery operated hand held portable Blood or conducting fluid flow measuring device exhibiting high sensitivity, zero warm up time, minimum signal drift, lower heat dissipation and power losses	Sarath Sasidharan Nair, Nagesh Divakara Panickar Sulochana
15.	IPINL046.Y13	046/CHE/2014	06/01/2014	An external pneumatic compression device For prevention of deep vein thrombosis	Jithin Krishnan, Koruthu Puthenparampil Varughese
16.	IPEXP047.Y13	6194/CHE/2013	31/12/2013	A method for fabricating bio-artificial skin graft by loading cells on cholecyst extracellular matrix for wound healing applications.	Deepa Revi, Anoopkumar Thekkuveettil, Thapasimuthu Vijayamma Anilkumar
17.	IPEXP048.Y13	6135/CHE/2013	27/12/2013	A procedure for fabricating and using decellularized porcine cholecyst as muscle graft for repairing full or partial thickness abdominal defect/hernia	Dhanush Krishna Balakrishnan Nair Syam Kennekkattu Venugopal Narayanan Divakaran Nair Thapasimuthu Vijayamma Anilkumar

18.	IPBST049.Y13	160/CHE/2014	14/01/2014	Surface coatings for phenotype regulation of adherent cells	Kaladhar Kamalasanan, Chandra Prakash Sharma
19.	IPBST051.Y14	1103/CHE/2014	04/03/2014	Sublingual delivery of insulin Biomaterials / Biological Research and Development Activity	Kaladhar Kamalasanan, Chandra Prakash Sharma

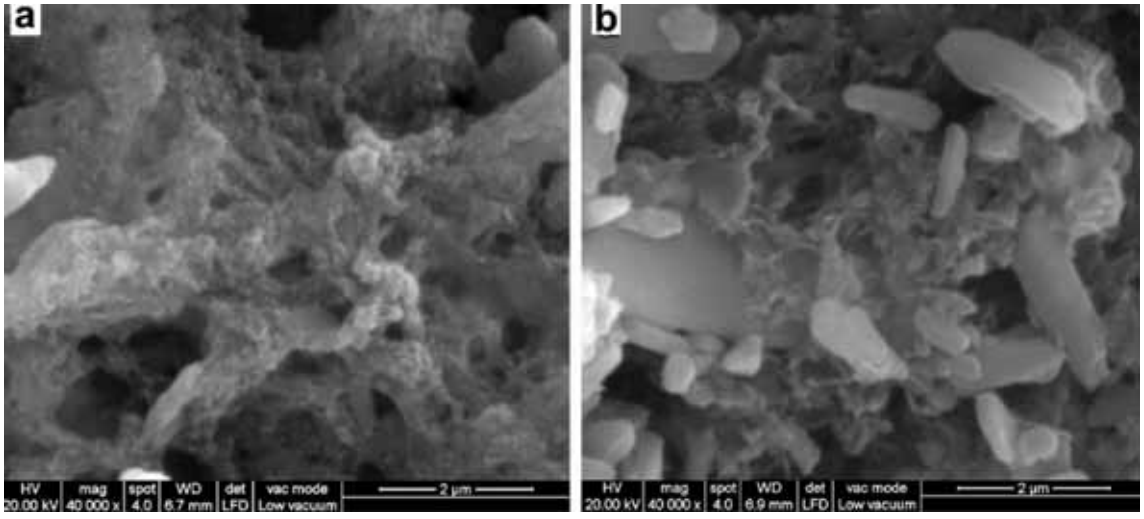
Trademark(India)						
Sl.No	REF NO	Trademark Application No	Date of Filing	Title	Issued for	Developed By
1	TMDLC001.Y13	2581438	19/08/2013	RAXACOAT	Protective diamond like carbon coating for metallic implants	Manoj Komath

Biomaterials / Biological Research And Development Activity

Bioceramics Laboratory

Injectable calcium sulphate bone cement

Bioceramic lab had developed the technology of a flowable calcium-sulfate-phosphate cement. This is a bioactive self-setting composition, which is injectable through a needle, and could be used as a bone filler cement. The cement powder consists of calcium sulfate and hydrogen orthophosphate combination and, upon wetting with hydraulic medium in specified liquid to powder ratio, it gets converted to a set crystalline composition Ca(SO4,HPO4). The setting time and compressive strength of the cement were optimized to clinical requirements. It was found to be biocompatible and osteoconductive. This injectable cement will be useful for minimally invasive management of cancellous bone fractures, endodotic and periodontal repair and will be a generic drug delivery medium for antibiotic, growth factors and osteoclast suppressors.



Micromorphology of the set calcium-sulphate-phosphate cement showing the network of intercalating fine particle contributing to the enhanced mechanical properties

Pulsed laser deposition and in vitrocharacteristics of triphasic 'HASi' composition on titanium

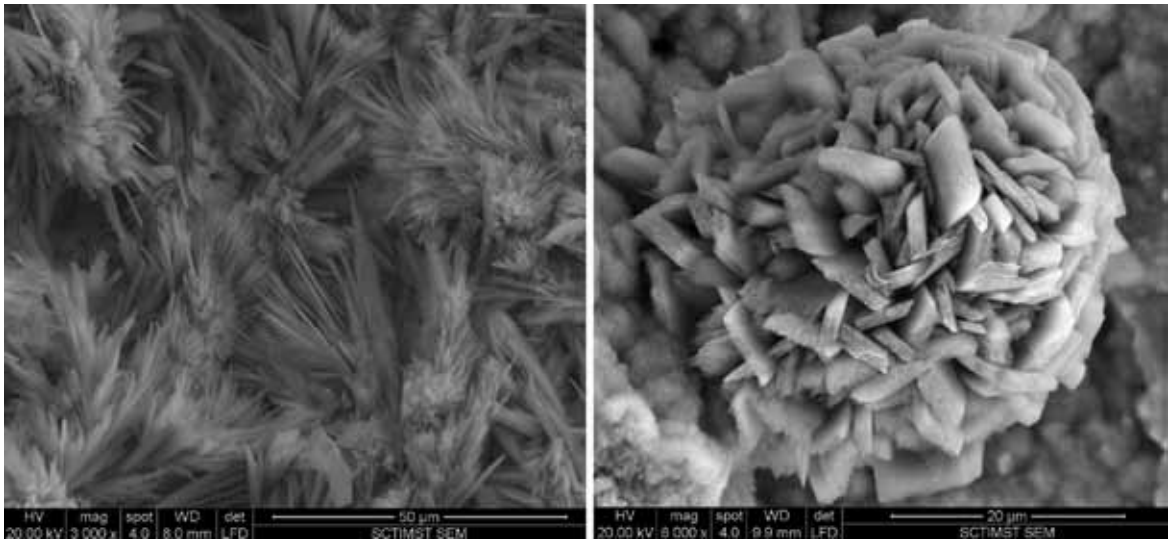
Stable adherent bioactive coatings based on HASi were developed onto the titanium substrate by pulsed laser deposition technique. The target prepared by high temperature firing of HASi composition efficiently undergoes laser deposition under controlled atmosphere and substrate temperature. The resultant coating is composed of wollastonite, whitlockite and apatite as major phases, as identified through XRD and FTIR analysis. The HASi deposit adhered well onto the titanium alloy substrate. The dissolution studies in SBF showed that the glassy/amorphous silicate content in the coating undergoes early dissolution. It indicates the possible early integration of the coated implant to the host tissue. The HASi coating surface was able to form apatite layer when immersed in SBF, proving it to be bioactive. The coating was stable under cell culture conditions and showed compatibility with MSCs in 24 h. The phenomenon of MSCs and in vitro behavior of HASi deposit on titanium demonstrated future possibility of adherent bioactive coating on metallic implants.

Hydrothermal synthesis of Hydroxyapatite bioceramics

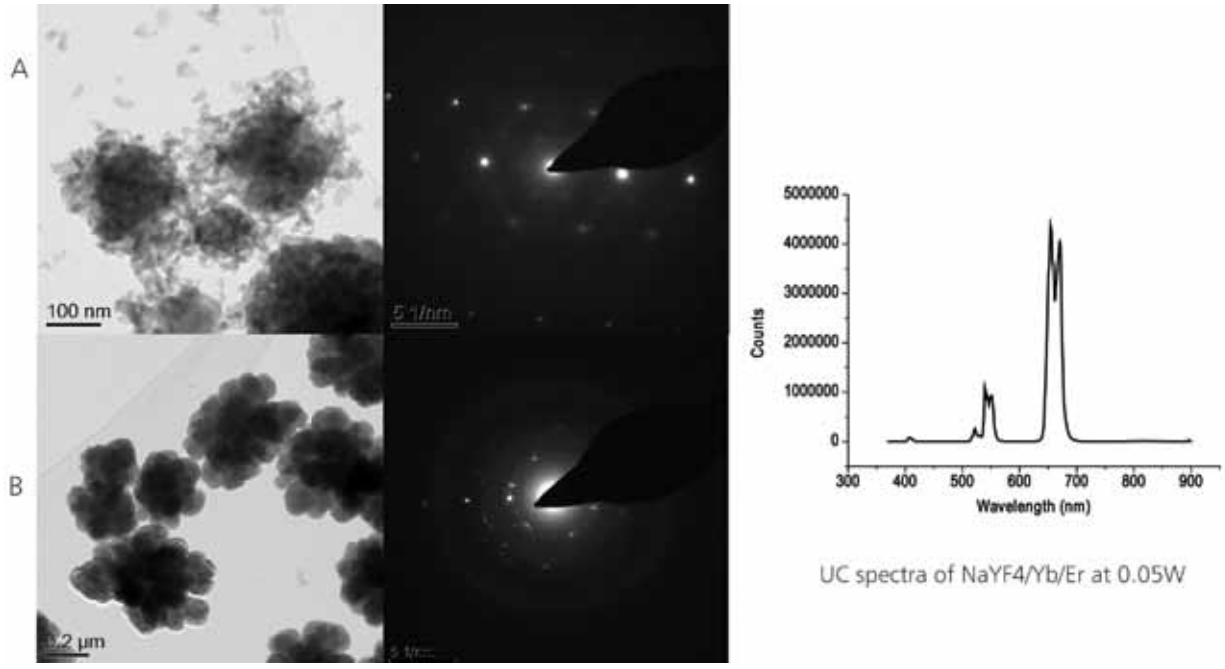
Novel methods of hydrothermal synthesis were carried out to prepare highly crystalline hydroxyapatite and its substituted counter parts starting from custom made precursor materials. Different calcium salt pre-forms were prepared prior to hydrothermal treatment. These precursors were hydrothermally treated by varying the kinetic as well as thermodynamic parameters to attain maximum phase conversion. Experimental parameters such as temperature, pressure, precursor chemistry, shape and pH etc were varied and performed hydrothermal treatment to obtain exotic hydroxyapatite bioceramics. These new generation scaffolds may find unique applications both in dentistry and orthopaedics.

Rare earth-based up-conversion nanomaterials for biosensor applications

Rare earth-doped nanomaterials are strongly fluorescent, low in toxicity and the luminescence of lanthanide doped inorganic materials/nanoparticles is characterized by narrow emission band widths, long fluorescence lifetimes and a range of emission wavelengths from visible to mid-infrared. In particular, lanthanide doped nanoparticles offer high photochemical stability and long fluorescent lifetime up to several milliseconds. Lanthanide-doped upconversion materials, which can produce visible radiation under near-infrared excitation, have attracted growing interest in biomedical imaging and sensing because it avoids autofluorescence from tissues and biomarkers. Different upconversion systems mainly NaYF4/Yb3+/Er3+ based systems with different Yb3+/Er3+ compositions have been studied. The nanoparticles prepared were investigated by TEM. The upconversion spectrum of the prepared nanomaterial under 980nm laser excitation has been studied. The utilization of these upconversion systems for biosensor applications is in progress.



Environmental Scanning Electron Microscopy images of Hydrothermally derived Bioceramic scaffolds

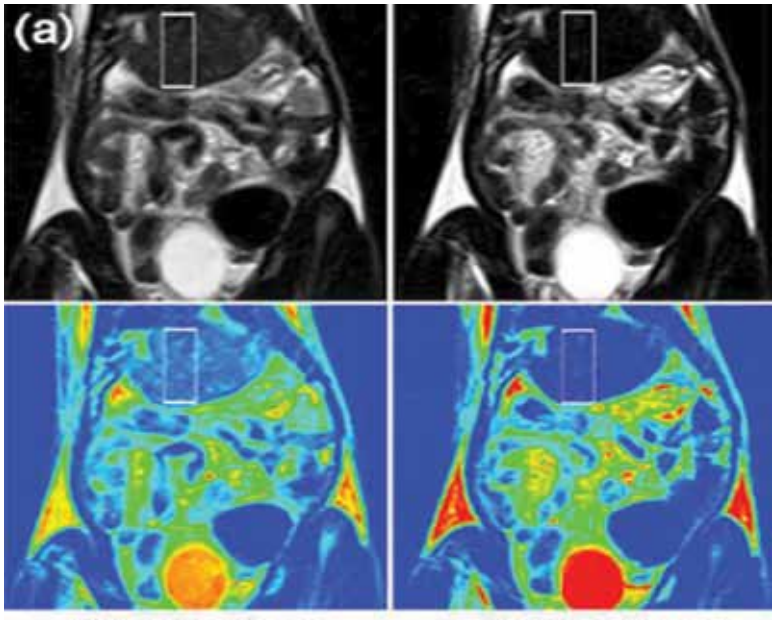


TEM images of (A) NaYF4-18mol%Yb3+:2mol%Er3+ (B) NaYF4-18mol%Yb3+:2mol%Er3+-PVP

Biophotonics Laboratory

Development of iron oxide nanoparticle probes for organ specific molecular MR imaging

Iron oxide-based multimodal nanoparticles are increasingly being considered for biomedical application due to its good biocompatible and stable nature. Of all the biomedical applications, imaging modalities helpful for disease diagnosis gains prime importance and Magnetic Resonance Imaging modality gathered more acceptance because of the absence of ionizing radiation. Utilizing the advantages of optical imaging along with MRI, the bimodal nanoprobes serving as contrast agents for both techniques have to be developed.



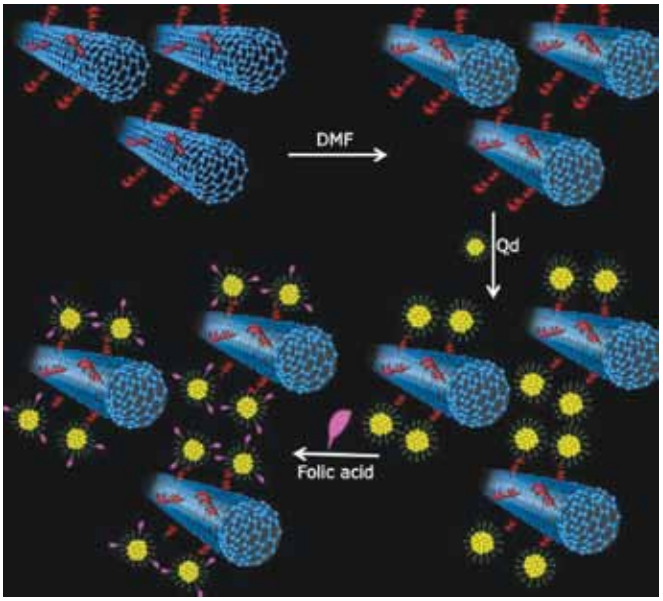
Pre and post contrast in-vivo MR images using citrate coated USPIONs

Superparamagnetic Ironoxide nanoparticles (SPIONs)-based multimodal nanoprobes were synthesized and modified for use as MR and Optical imaging-based contrast agents. The probes were tested in vivo on liver fibrosis-induced Wistar rat models using MRI and optical imaging techniques

Quantum dot conjugated single walled carbon nanotubes for imaging and therapy

Hybrid nano materials are one of the most promising candidates in various fields because of the various properties of the parental nano materials. We developed a hybrid system based on carbon nanotube (CNT) and qantum dot (Qd) and it was modified for tumor targeting. Targeted photothermal therapy was demonstrated at the cellular level. In vivo tumour imaging and therapy with this system is in progress.

Schematic representation of the development of hybrid nanosystem FaQd@CNT



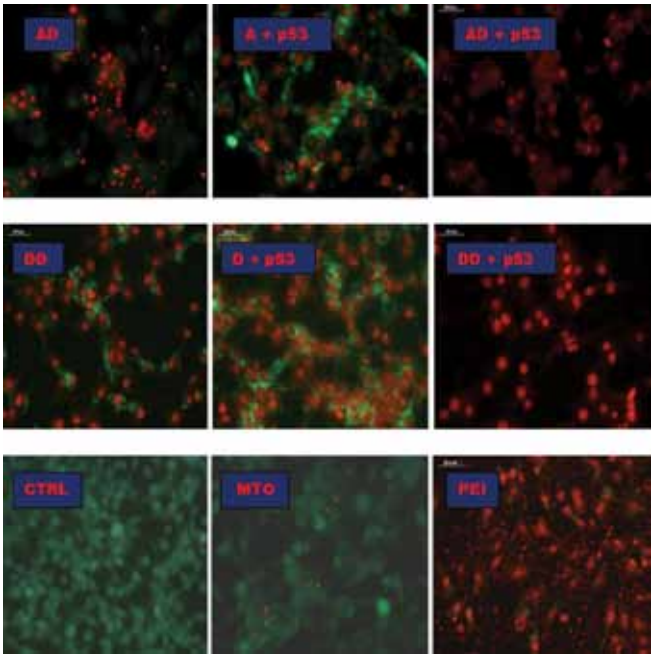
Schematic representation of the development of hybrid nanosystem FaQd@CNT

Biosurface Technology

Gene/Drug co-delivery for anticancer therapy

Gene therapy is one of the promising strategies to treat cancer by the introduction of required genetic material into specific target cells of a patient. Nanotechnology in association with combined therapy is now an upcoming promising strategy to tackle this disease more effectively.

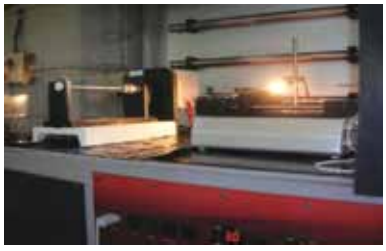
We developed a haemocompatible non-viral gene delivery vector, which can carry the therapeutic gene (p53) and the anticancer drug that can have a synergistic effect on cancer cells. p53, a tumor suppressor protein, and the anthracenedione mitoxantrone dihydrochloride were chosen as a model gene and drug, respectively, in this study. The non-viral vector used was pullulan-PEI-cyclodextrin conjugate, which could load the therapeutic gene as well as the anticancer drug. Apoptosis caused by gene, drug and combined drug and gene was confirmed by Live Dead Assay. There is an evident synergy between drug, gene and combined drug and gene obtained. The optimised material (drug loaded, gene loaded and combined drug and gene loaded) demonstrated high apoptotic activity after 24hr incubation in two cancer cell lines and it was also observed that drug alone did not show significant apoptosis.



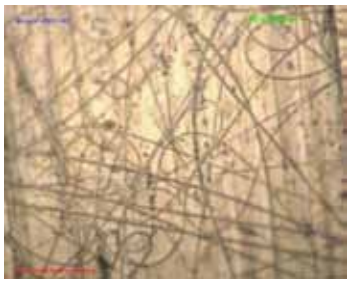
Dental Products Laboratory

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

The project came to an end during the current year. Final technical report was prepared and submitted to CSIR. Electrospun Biodegradable scaffolds prepared using terpolymer of lactide, glycolide and caprolactone were modified with biological moieties. After cytotoxicity tests, animal experiments were conducted during the year with rabbit as the model. Evaluation is in progress.



Electrospinning set up for preparing scaffolds



Optical Microscopic Imaging of Electrospun Terpolymer Fibers

Quantum dots as drug carriers for cardio-vascular applications

Final project report was prepared and submitted to DST during the year.

Bioengineered hybrid skin substitutes for burn wounds

The project got 6 months extension. Synthesis was optimized for PLGC copolymer (80:10:10) and characterized. PLGC scaffolds were fabricated using electrospinning technology and physico-chemical properties were evaluated for wound dressing applications. Scaffolds were biologically modified using fibrin matrix. Skin regeneration is evaluated in vitro seeding skin fibroblasts on modified scaffolds by estimating cell proliferation and extracellular deposition. Animal experiments are in progress. Control samples were identified.

Silicone based hydrogel was also prepared for temporary wound dressing applications. Its physico-chemical characteristics were evaluated and optimized.

Burn wound dressing material developed at the lab

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.

Preclinical evaluation of tissue engineered skin substitute for diabetic wound healing

As part of extension of the project concerned with development of the wound dressing material, a TDF proposal was submitted and got approval. A project staff was recruited and work has been initiated to carry out the preclinical evaluation. A proper control material is being identified.

Division of In vivo models & testing

The division developed and patented a non-detergent based process for decellularisation of bovine pericardium for application as cardiac patch. Preclinical evaluation of this product was completed in 2011 and expression of interest from industry was invited through SCTIMST web site.

DIMT also completed the proof of concept study on a non-calcifying glutaraldehyde treated bovine pericardium for similar application. A company expressed interest in taking up both the technologies., viz, decellularised bovine pericardium and glutaraldehyde treated bovine pericardium. Standardizing this technology for buffalo pericardium since bovine pericardium is not available in the required quantity in northern India is also being explored as an industry sponsored project. This project will also cover conduct of necessary preclinical tests required to obtain necessary regulatory approval for human use.

Division of Laboratory Animal Science

Technical services were offered to sister labs for oral intubation and gavaging in day-old rat pups and adult rodents, tail vein cannulation in adult rats and injection of dye for MRI, induction of a tumour cell line-based cutaneous tumor model in mice and anesthetizing followed by gastric intubation and gastric delivery of oral heparin in rabbit model. 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 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 included 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 was assessed for heavy metals and pesticides. Animal feed was checked for fungal toxin, 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 was also done based upon state of art procedures, making use of the services of Experimental Pathology and Microbiology Divisions. Technical assistance to support research was given upon request from scientists. This included simple procedures like blood collection, oral gavage, and complex procedures like timed pregnancy, and interventional animal models.

Division of Tissue Engineering & Regenerative Medicine

During the year, work continued in the different programs related to tissue engineering in the areas of pancreas and blood vessel and cartilage as follows:

In the Indo-Danish program on musculoskeletal stem cells in tissue regeneration, new biodegradable polymers for tissue engineering application are being synthesised.

In the area of cartilage, a successful large animal preclinical study in goats was completed. The study for physeal defects using injectable hydrogel and chondrocytes was carried out at CMC Vellore in collaboration with Dr Vrisha Madhuri which gave requisite data for planning a pilot human study.

Signal encapsulated nanofibers for tissue engineering applications

Electrospun nanofibers encapsulated with raw materials like chondroitin sulfate was found to promote the formation of hyaline cartilage. Similarly sol-gel derived bioactive active glass encapsulated in nanofibers was found to enhance mineralization in both chondrocytes and mesenchymal stem cell differentiation to osteogenic lineage. These nanofiber membranes had potential application in generating raw material gradients within 3D scaffolds for osteochondral tissue engineering. Raw materials are good alternatives to expensive growth factors in clinical translation of tissue engineered products.

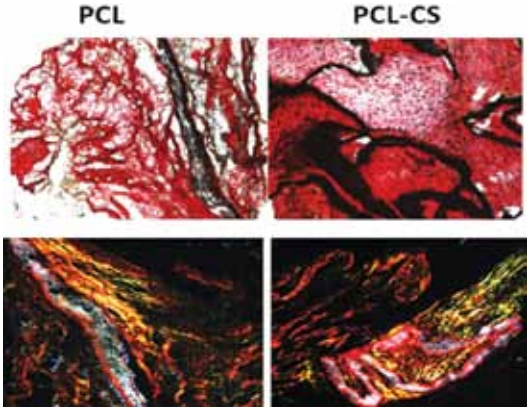


Figure caption: Enhanced collagen production in nanofibers encapsulated with chondroitin sulfate (PCL-CS) when compared to poly(caprolactone) (PCL) nanofibers. Top panel: (Sirius red staining for collagen) bottom panel: (collagen fibers in polarized light)

Microspheres for controlled delivery of drugs

Controlled release formulations of Bevacizumab from PLGA microspheres for osteochondral defect study in rats were standardised. Scaffolds were provided to the partner sites for their ongoing studies. Successful review of Indo-Danish program by Joint committee of DBT and Denmark Ministry 24-26th November 2013 at Delhi

Perfusion bioreactor for cartilage tissue engineering

A new bioreactor chamber for the effective application of perfusion of growth medium and dynamic compression loading was developed and validated for sterility. A shape memory scaffold based on chitosan-agarose (CAG-scaffold)

was developed. Perfusion of growth medium alone and the combination of dynamic compression loading plus perfusion of growth medium on chondrogenesis of hUCMSC in a three dimensional scaffold was carried out

Tracheal Tissue engineering

Interactions with Prof Michael Detamore, Kansas University, Dr Ravi Nayar Otolaryngologist and Dean of Research at HealthCare Global Enterprises in Bangalore and Dr Jaikrishnan of KIMS Hospital Trivandrum kickstarted a tracheal tissue engineering program at the Division. For the Bioengineering of tracheal construct – Identification of suitable scaffold material and conditions is ongoing.

Scaffolds for skin tissue engineering

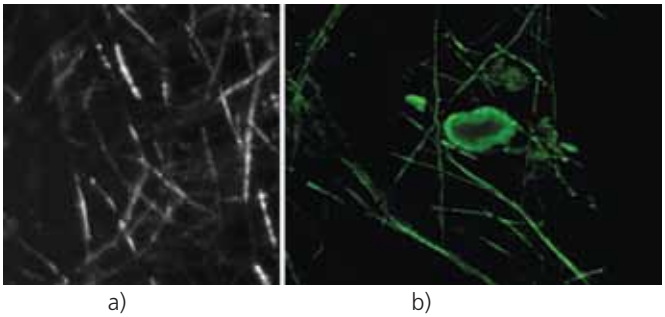
In the area of skin, in a Fast track project, isolated hair follicle stem cells from whisker hair were obtained from rabbit cadaver. Keratinocytes and fibroblasts were also isolated from rabbit skin. To grow these cells in 3D culture, cells were seeded on Ge-Vac electro sun membrane prepared at different concentration. The work is in progress.

Pancreatic islet tissue engineering

Here, we focused on differentiation of Islet-like clusters from rat adipose mesenchymal stem cells on 3-dimensional biomimetic nano fibrous scaffold.

Immuno isolation capsules were prepared for large animal studies and the culture conditions for differentiation human adipose mesenchymal stem cells on 3 dimensional scaffold was scaled up for implantation in large animal model.

An ongoing study of a pancreatic construct was developed with cell-seeded scaffold packed in immuno isolation capsule and implanted in to intra peritoneal cavity of diabetic pig in underway.

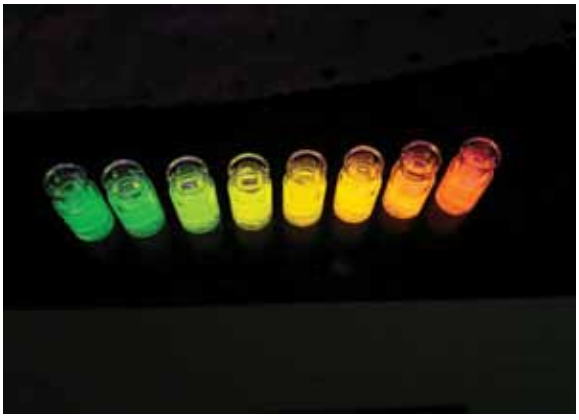


a) b)

Figure caption: a. Nanofibrous 3D scaffold b. Viable rat islets in 3D scaffold

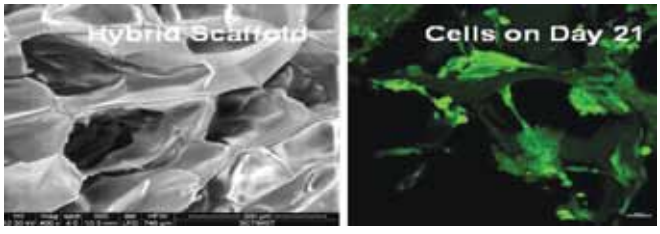
Biomaterials for cell based assays, gene delivery and quantum dots for drug/gene delivery and imaging

Other biomaterials prepared included (a) Functionalized honeycomb polymeric membranes were prepared that could be used as a tool for cell-based assay at bench top. This novel and versatile tool required low sample volumes of assay reagents and eliminated many of the steps involved in the conventional wet technique, without compromising on the sensitivity. (b) Cationic polymer (PEI) conjugated silica nanoparticle system for gene/drug delivery, (c) Fluorescent quantum dots prepared using N-acetyl L- cysteine as capping agent in aqueous medium (images : In natural light and under UV(365 nm) showing fluorescence.



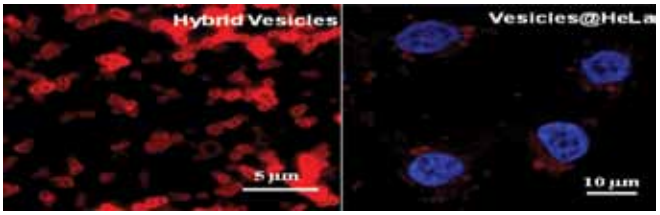
Hybrid Scaffold bearing Inter-Polymer-Siloxane Schiff's Base Linkages for Bone Tissue Engineering

Polymer-siloxane scaffold bearing inter-polymer- siloxane Schiff's base linkage was fabricated and in vitro evaluation established enhanced osteogenesis.



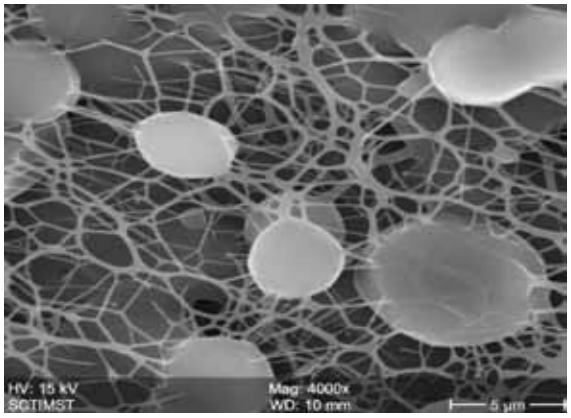
Hybrid Vesicles for Targeted Anti-Cancer Drug Delivery

POSS-F68 vesicles, which can have potential for targeted intracellular anti-cancer drug-delivery when used in combination with folic acid and a chemotherapeutic, were developed.



Co-electrospun membrane of vesicles and polymer for tissue engineering applications

A nano-fibrous mesh of polycaprolactone (PCL) incorporating microvesicles was fabricated through co-electrospinning, for controlled delivery applications in tissue engineering.



Experimental Pathology

The division developed tissue engineering scaffolds from porcine cholecyst, small intestine and urinary bladder intended to be used for skin graft, hernia repair, cardiac patch, wound healing etc. The biocompatibility studies of the scaffold are ongoing. Research is going on, to prove the suitability of these scaffolds for critical size wounds and diabetic wounds.

Histopathology

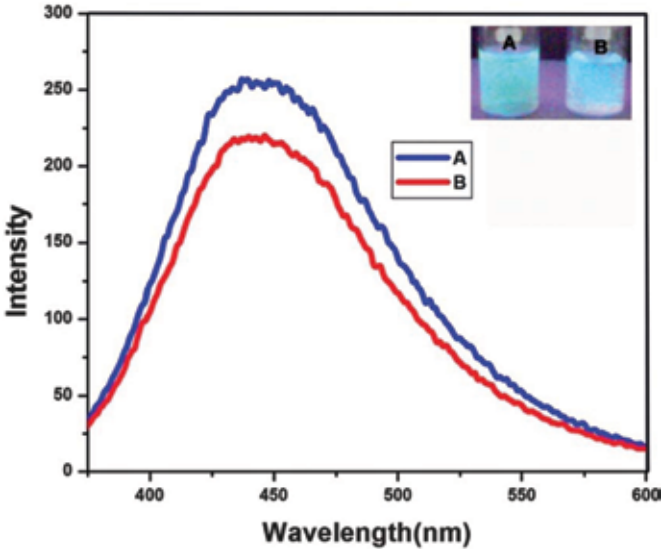
Studies continued on clinically retrieved heart valves and orthopaedic implants as part of a DBT-sponsored project. Macroscopic and microscopic examinations were carried out, along with molecular studies like immunohistochemistry and RT-PCR. Orthopaedic plates and screws were found to undergo different types of mechanical changes following long term residence in the body. The changes lead to release of material debri, which was found in surrounding tissue by microscopy as well as confirmed by ESEM-EDAX analysis. This continuous presence of foreign bodies in the tissue elicited chronic inflammation and fibrosis.

"Colour Atlas of Tissue Response to Biomaterials" was published through Jaypee Publishers and the project was funded by the Department of Science and Technology, Government of India.

Laboratory for Polymer Analysis

The laboratory's major research efforts were largely focused on the synthesis and evaluation of new materials for drug delivery and sensing applications. The highlight of the major findings during this period are delineated below.

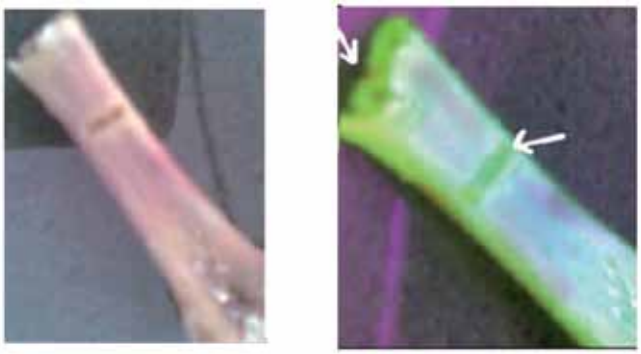
Quantum dots have evoked much interest particularly for their unparallel performance as probes for optical imaging of living and nonliving components. Unfortunately, as widely known, QDs carved out of heavy metals, are toxic



Fluorescence spectra of (A) Cdots and (B) modified C dots (inset the corresponding photographic images).

to living systems even at a low concentrations. Recently emerged version of carbon based nanomaterials, dubbed as carbon dots, were found to possess many of the features of semiconductor QDs. The notable attraction of these materials are their water solubility, chemical inertness, easiness in functionalization, high fluorescence along with the most required nontoxicity and biocompatibility. Stemming from their excellent optical properties, these materials have shown considerable promise in a variety of applications particularly in the area of bioimaging. Recently we attempted to design new sensing and drug delivery probes using carbon dots (C dots). Towards this end, we synthesised C dots modified with appropriate drug and calcium binding ligands to dock onto calcium ions releasing points such as bone crack.

The images show that fluorescence is almost unaffected by the modification. Apart from depositing the drug at the specified site, the inherent fluorescence of the C dots also enables the visualization of the crack. The figure depicted below reflects the immense possibilities of modified C dots as theranostic agents.

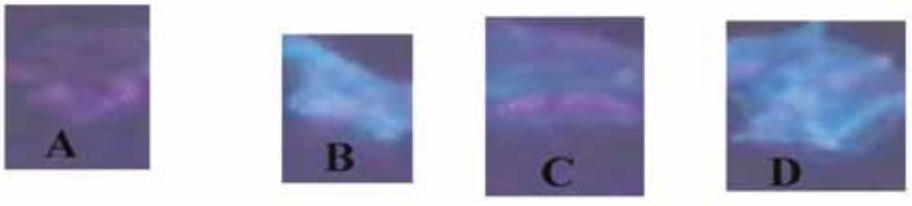


Bone under 365 nm light (left panel) and after incubating with modified C dots. Enhanced fluorescence can be seen from the freshly cut portions (right panel)

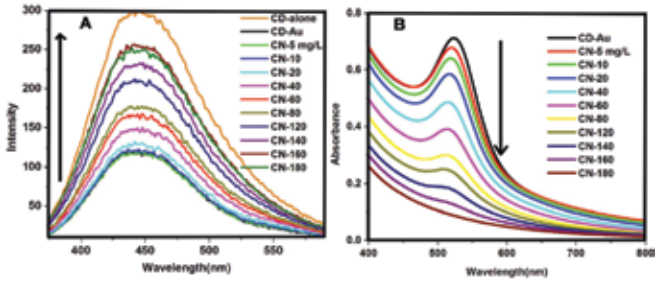
We have attempted to generate fluorescence ON-OFF sensors for different analytes by using a combination of C dots and nanoparticles such as gold. An example is highlighted below. The fluorescence of C dots was found to be quenched in the presence of gold nanoparticles. The fluorescence was found to be revived in the presence of highly toxic cyanide ions, which are well known for their ability to form complex with gold. This strategy allowed the detection of CN ions in dual modes namely fluorescence and optical absorption.

The goal of the ongoing ICMR project is to design simple, cost effective non enzymatic methods in an easy to read out format for the detection of glucose in fluids such as blood, urine and tear. In connection with this programme, significant efforts were made to create functionalized materials capable of binding glucose followed by observable changes in light emission or absorption. A recipe obtained by combining fluorescent carbon dots and glucose binding moieties showed glucose detection with a concomitant changes in fluorescence intensity with glucose's concentration. Another interesting outcome was the possibility of embedding modified C dots in matrices such as paper and polymers. These strips can qualitatively provide the presence of glucose in fluids by dipping and subsequently exposing to 365 nm light. The figures shown below points out this possibility.

In addition to developing sensing methodologies, we also attempted to synthesise new nano materials as drug delivery carriers. The primary focus was to design nano vehicles possessing features like biodegradability, cytocompatibility and fluorescence. Optical properties such as fluorescence can ensure the entry of the vehicles into the specific target. Polymers and oligomers possessing above features were synthesised and characterized. Some of the materials showed responsiveness towards entities such as ions. Focussing on this, we have made efforts to design "on demand drug delivery systems".

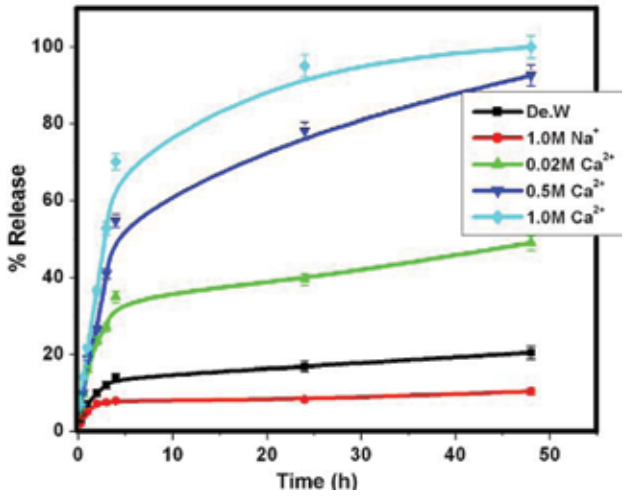


Polymer strips embedded with Cdots and glucose binding ligands. (A)Polymer as such, (B) Polymer and fluorophore (see the blue colour), (C) Polymer, fluorophore and glucose binding molecule (It is clear that fluorescence is significantly quenched by the glucose binding molecule), (D) Polymer, fluorophore, glucose binding ligand and glucose (see the blue colour Quenched fluorescence is revived in the presence of glucose)



(A) Fluorescence emission increases with the concentration of CN- ions
(B) Surface Plasmon Resonance absorption intensity on the other hand decreases with the amount of CN-

One of the matrices we synthesised swelled significantly in Ca2+ solution and this property in turn allowed rapid release of the payload at specific sites. These polymers can be introduced at the predetermined sites and the rapidly formed solid complex can plug for example the bone crack. The Ca2+ responsiveness of the gel can initiate the speedy release of the ingredients. This matrix seems to have potential to target Ca2+ rich sites like bone crack and subsequently empty drug or growth factors to facilitate rapid bone repairing. Strategies aimed at targeting damaged bones could open up new paradigms for the precise treatment of fractured bones.



The figure shows the increased release of the drug in response to concentrations of Ca ions.

Molecular Medicine

Axonal development and its regeneration pathways

In CNS, neuronal growth factors play an important role in cellular differentiation and survival of neuronal cells. These neurotrophic factors are also involved in development of functional neuronal network. Brief treatment of neuronal growth factor (NGF) differentiates the PC12 cells into neuron-like cells, which is one of the interesting model systems to study early development of neurons and its survival to injuries.

We studied the adaptability of PC12 cells to physical injury. The regeneration ability of the cells was assessed using quantifying morphological parameters, neurite sprouting percentage and neurite length. We found that the regeneration of PC12 neurites was significantly faster after injury than the normal sprouting of neurites during differentiation, both in terms of increase in sprouting percentage and neurite length. This behavior partially resembles regeneration of peripheral neurons after injury.

The complexities of differentiated and regenerated neurites were analyzed using Sholl analysis. The data suggested that there is an increase in number and length of dendrites around the soma. The dendritic branching also showed significant increase. PC 12 cells over-expressing Synaptotagmin I GFP fusion protein were generated in the laboratory to understand whether Syt1 has a role in axonal growth. We observed a significant variation in the neurite length in regenerating neurons after injury in these modified cells compare to control cells, suggesting an increased vesicular targeting in cells expressing Syt1.

We also looked at the pattern of distribution and localization of post synaptic protein NR1 (an NMDA subunit) and pre-synaptic protein Syt1. Both these proteins showed changes in localization as the network gets established. As the neurite length increased, on each day of differentiation, NR1 and synaptotagmin were found to be targeted to their functional sites. NR1

Figure 1. Cenorobditis elegans: one of the best models to study the development of nervous system.

was targeted to the post- synaptic terminal, especially to dendritic spines. Syt1 was found to target to the axonal terminal as well as vesicles. The data suggest that PC12 cells can be used to develop a functional neuronal network to study a) how synapses are formed, b) which molecular pathways attracts dendritic and axonal movements and c) how network behave after an injury. The major advantage of the model is its easiness to develop a network within a short experimental period.

As an extension of this cellular model, we used Cenorobditis elegans, a nematode, to study the axonal developmental pathway in an animal model (Figure 1). The worm facility was established in the laboratory and will be developing various siRNA knockout models to study the development of the nervous system.

Role of Transforming growth factor – alpha (TGF-alpha) in neuronal growth and regeneration

Neuronal growth is induced mainly through neurotrophic factors. In addition to these factors, there is evidence that TGF-alpha induces neuronal growth, especially the dopaminergic neurons. Since TGF expression is very limited in brain, its effect on cellular growth is not studied in detail. This study aims to analyse the actively growing neurons on transport synaptic vesicles to the axonal terminal and the microtubule dynamics, and the phosphorylation-dephosphorylation cycles of actin and tubulin. It is essential to understand the variations in cellular architecture to predict the success of functionally active neuroregeneration. The main focus of the work is to understand the dynamics of microtubules in the growing axons under neuronal growth factor and TGF alpha.

Development of in vitro slice model for epilepsy

Understanding the cellular mechanisms of epileptogenesis will help us determine new therapeutic targets to prevent/ cure epilepsy. Cell death and cognitive impairment are common manifestations in different forms of epilepsies. NMDA receptor subtypes (GluN2-3) contribute differently to learning and memory and excitotoxicity. So, studying the NMDA receptor subtype will give us detailed information regarding the mechanism of epileptogenesis. As a first step in understanding the mechanism of epileptogenesis, we created in vitro slice models of epilepsy (Figure 2), and will study the role of different NMDAR subtypes in epileptogenesis and seizure formation.

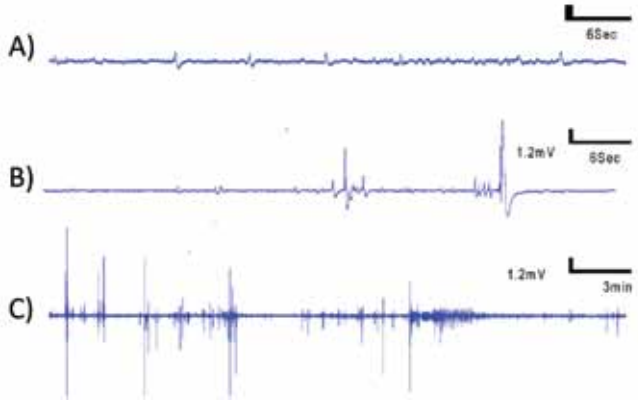
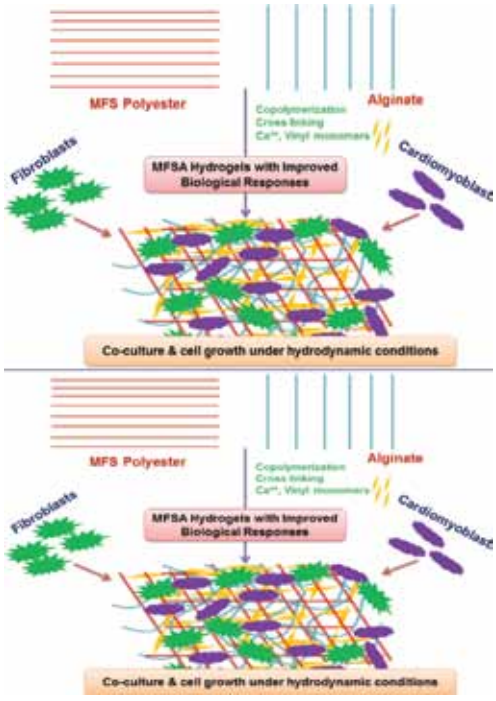


Figure 2. Epileptic activity induced by application of KCl for 5 minutes in hippocampal slices of rat pups. A) interictal spikes B) Ictal spikes C) in vitro recording of ictal and interictal epileptic activity from hippocampal slices (30 minutes recording)

Polymer Laboratory

In the project on biodegradable polymeric hydrogel materials, biosynthetic hybrid copolymer poly (sebacate-co-fumarate-co-manitol)-alginate was synthesized by copolymerization with alginate. The hybrid copolymer was then cross-linked with poly ethylene glycol diacrylate (PEGDA)/DEGDMA to form the hydrogel scaffolds. Both the hydrogel scaffolds exhibited better physiochemical and mechanical properties. Studies on RBC aggregation, hemolysis and platelet adhesion revealed blood compatibility. The plasma protein adsorption was evaluated by SDS-PAGE analysis. The relative absence of fibrinogen adsorption and extensive albumin passivation were observed with these hydrogels that support better cell response and biocompatibility. Collagen synthesis by L929 cells was quantified by Sirius red assay. The collagen deposition with the PEGDA- and DEGDMA-based hydrogels was found to be around 30% and 50%, respectively, which are optium for cardiac tissue engineering. Long-term cell culture under static conditions demonstrated cell viability. Fibroblast infiltration on the hydrogels was quantified for 30 days by MTT assay. Cell viability with PEGDA- and DEGDMA-based hydrogels was found to be around 60% and 90%, respectively, after 30 days. Cell culture with H9c2 cells under hydrodynamic conditions (rotary cell culture system) demonstrated viability greater than 50% after 10 days with cluster of cells homed on the pores of the hydrogels. These hydrogels supported the co-culture of L929 fibroblasts and H9c2 cardiomyoblasts as evident by the viability. On comparing the two hydrogels, the PEGDA cross-linked one was superior to its DEGDMA counterpart due to the hydrophilicity of the former.



An injectable hydrogel was also prepared for cardiac tissue engineering. The injectable hydrogel material was formulated using pegylated- carboxy terminated poly (propylene fumarate) and PEGDA. The setting characteristics were studied. The HeLa and L929 cells were encapsulated at high cell density in the injectable hydrogel material. MTT assay and Neutral red staining demonstrated cell viability. Luminescent nanogels was also prepared for theranostic applications for the treatment of cancer. Luminescent nanogel polymer was prepared with L- Glycine -CTPPF-co-PEG-co-Citrate - acrylic acid/diethyl amino methyl methacrylate. The size of the nanogels were measured using DLS meaurment. The size of the nanogels were found to be 160 nm.

Polymer Processing

Four different approaches were carried out in designing dural substitutes for cranial neurosurgery. They displayed good tensile strength, burst strength and suture retention strength. All the membranes were cytocompatible. Surface modification of electrospun polycarbonate urethane with polydimethyl siloxane further improved the biostability of the membranes. The incorporation of amoxillin trihydrate loaded layer onto polycarbonate urethane improved the efficacy of the membranes by providing better antibacterial properties. Overall, the present approaches enabled us in designing various new and improved dural substitutes which could be used in cranial neurosurgery but further implantation studies in suitable animal model and histopathological evaluations are required to completely understand the in vivo performance of the developed membranes.

Thrombosis Research Unit

Skin tissue engineering initiatives made considerable progress. The focus was for obtaining improved biodegradable and biomimetic scaffold for in vitro construction of skin substitute and for use of the scaffold as an aid for autologous stem/cell transplantation. Two important achievements made were (i) antimicrobial scaffold development and (ii) proof-of-concept study for evaluating the effect of scaffold and autologous cells for healing acute wound in diabetic rabbits.

For in vitro evaluation of scaffold to construct skin substitute, adipose-derived mesenchymal stem cells (ADMSC) were seeded directly on silver nano particles (Ag-NP) incorporated PLGC-fibrin scaffold (Fig). The content of Ag-NP in the scaffold was optimized to get antimicrobial

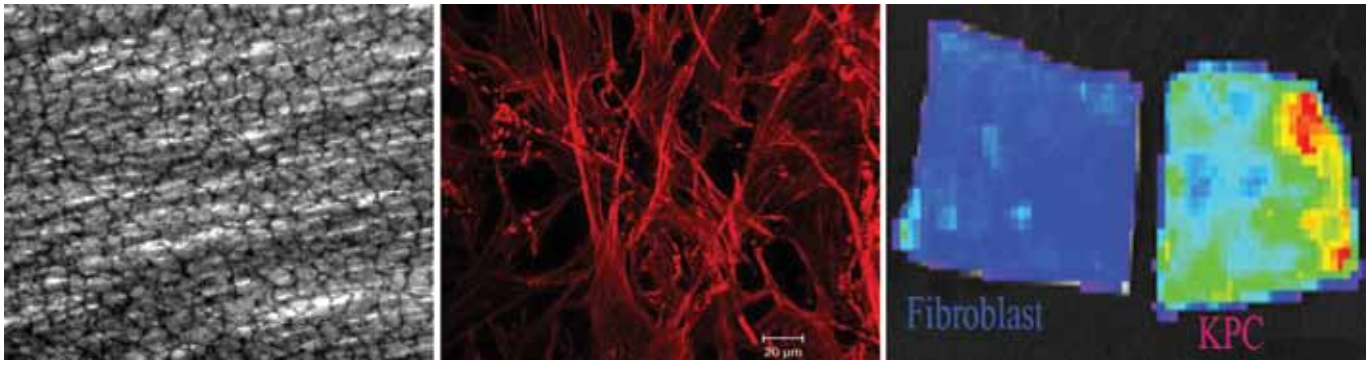


Fig. Electro spun biodegradable PLGC combined with fibrin net work; Fig1 B, actin-stained ADMSC derived fibroblast on scaffold; Fig1 C, Fluorescent labelled ADMSC-derived keratinocyte precursor cells seeded on fibroblast grown scaffold and co-cultured for 5 days.

effect and at the same time to obtain differentiation of ADMSC on the scaffold to create dermal-like tissue (Fig 1B). Co-survival of lineage committed keratinocytes and fibroblasts derived from ADMSC on the Ag-NP containing biomimetic, biodegradable scaffold was proven (Fig)

Feasibility of autologous stem cell transplantation, aided by degradable scaffold, for healing wound after experimental surgery was confirmed. The study proved that autologous cells promote regeneration of full thickness skin wounds in diabetic rabbits. For dermal regeneration, fibroblasts isolated from punch biopsy and pre differentiated endothelial progenitors were used and to untreated wounds (Fig A) the scaffold alone was found to promote wound healing (Fig B) but the quality of regenerated wound was similar to native skin in terms of epithelial structure, collagen organization, development of skin appendages (Fig C) and with more angiogenesis in cell transplanted sites. The methods standardized for isolation and differentiation of cell mixture is easy and practical for translation of the technology into clinical practice

Stem cell research focused on obtaining differentiated neural cell and cardiomyocytes. Stem cell sources employed were peripheral blood, bone marrow and adipose tissue.

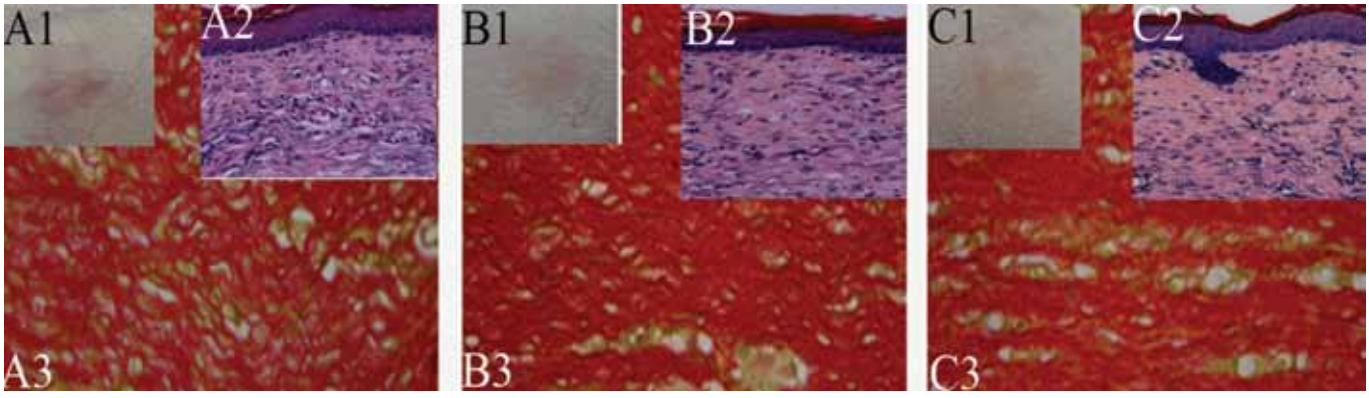


Fig.A, Healing of control, untreated wound site; A1, Visible scar in the healed area; A2 H&E stained wound site showing fibrotic tendency; A3, Sirus red stained collagen -less dense/organized as compared to native skin. B. Healing in scaffold treated wound area; B1, Minor scar in the healed wound area; B2, H&E stained wound site with thin epidermis and healed dermis; B3, Sirus red stained collagen denser/organized as compared to control. C. Healing in cell transplanted wound area; C1, No visible scar; C2 H&E stained wound site with thin epidermis and healed dermis and appendage; C3, Sirus red stained collagen -dense and well organized and equivalent to that in normal skin.

lineage committed keratinocyte precursors for epidermal repair. In figure comparison of healed wound site in rabbit model 28 days after surgery is shown. The hybrid hemostatic scaffold supported growth of transplanted cells and accelerated wound regeneration. As compared

The multi-potent adult progenitor cells (MAPC) in human peripheral blood mononuclear cells (PBMNC) fraction were cultured on neural specific niche and obtained differentiated neurons that expressed tyrosine hydroxylase (TH), which is an indicator of dopamine synthesis (Fig 3A).

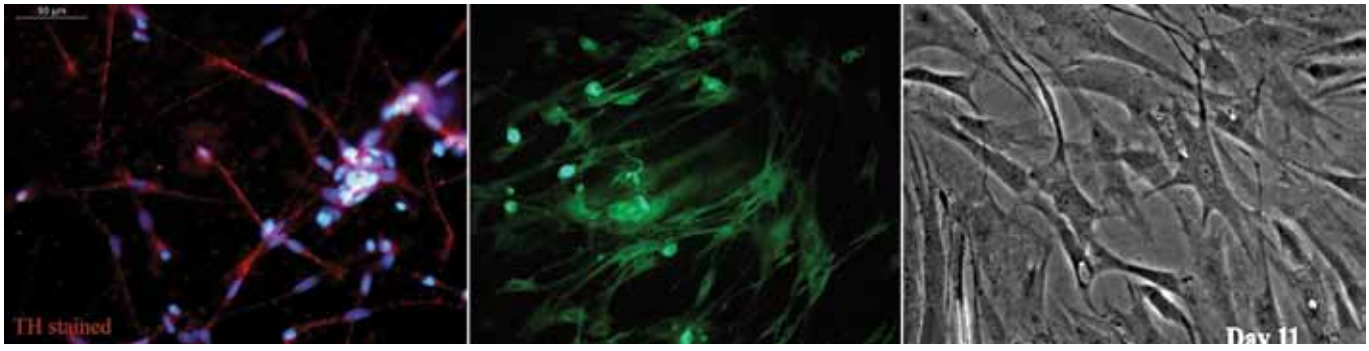


Fig result of stem cell differentiation: 3A, Neurons derived from circulating MAPC expressed tyrosine hydroxylase ; 3B, Neuron-like cells derived from BDMSCS expressed synaptophysin; 3C, Cardio myocyte-like cells derived from ADMSC.

Differentiation of bone marrow- derived mesenchymal stem cells (BDMSCs) on the neuron specific and in-house standardized niche also resulted in β-tubullin3+ immature neurons that showed synaptophysin expression (Fig 3 B), suggesting their ability to make synaptic connections. The main protein synaptophysin, which is responsible for synapse formation, was found expressed in PBMNC-derived neurons.

Comparative Analysis of Platelet Proteome and role of circulating platelet proteins in endothelial dysfunction among diabetic and healthy Individuals showed a clear difference in the proteome profiling of two groups. LC-MS analysis revealed more than 40% difference in the proteomic profiling between the groups. Effect of these proteins were studied on endothelial cells in vitro and it was observed that in the presence of secretory platelet proteins, endothelial cells showed pro thrombotic phenotype with the high expression of von Willibrand factor (vWF).

The effect of quantum dot conjugated urokinase prepared at dental products laboratory was tested for fibrinolytic activity. In vitro dose-dependent clot lysis was established when the drug was in the conjugated state. It was observed that these modified quantum dots were cyto compatible at the dose effective for clot lysis.

Tissue Culture Laboratory

Cell sheet engineering with cardiomyocytes

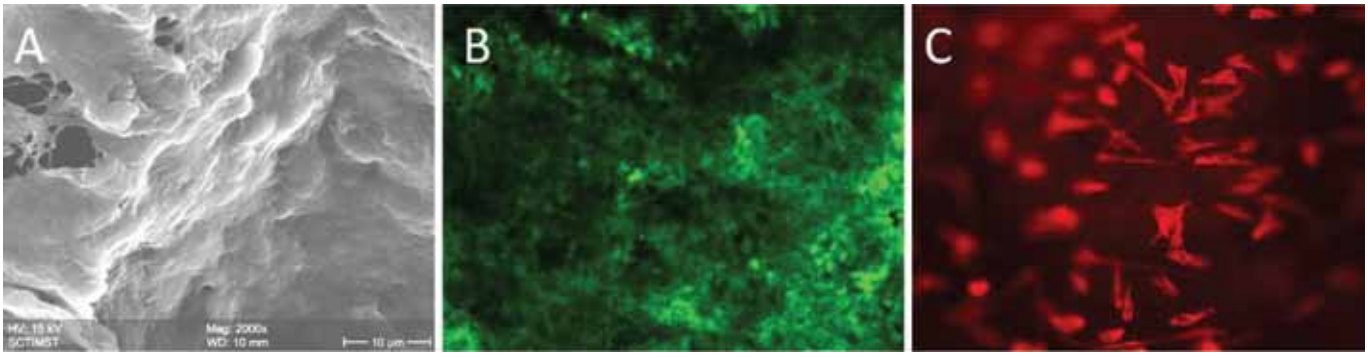
Harvesting confluent cell sheets as monolayer or multilayer is achieved by culturing cells on thermoresponsive cell culture substrates. N-Isopropylacrilamide-Co-Glycidylmethacrylate (NGMA) has been proposed as a cytocompatible thermoresponsive polymer for corneal tissue engineering. This unique scaffold-free approach using thermoresponsive culture surface to construct tissue engineered myocardial patch using umbilical cord mesenchymal stem cells is ongoing. The laboratory initiated feasibility studies in optimizing differentiation of stem cells to myocardial lineage and subsequent development of cardiac patch.

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

Terminally differentiated keratinocytes from murine skin was successfully isolated and characterized. To get improved proliferation in cell culture, isolation methods were modified to obtain cells from murine pups.

Keratinocyte cultured on thermoresponsive substrate can be retrieved as cell sheet. Polyethylene terephthalate (PET)-based material modified with thermoresponsive poly(N-isopropylacrylamide)-co-glycidyl methacryrale (NGMA) polymer was selected as the base substrate for cell culture. Human keratinocyte cell lines were transferred to new surface by temperature variation and a stamping tool. The transferred cell patches were viable, spread and grow as normal. 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.

Biomimetic scaffolds that mimic natural extracellular matrix to micro and nanoscale level can be obtained by electrospinning technique. Non-woven blend mats were synthesised from Chitosan (CS) and poly (ε-caprolactone) (PCL). The CS-PCL mats were characterized by SEM, FTIR, tensile test, swelling properties, Water Contact Angle analysis, surface profilometry and TGA. The cyto-compatibility of the CS-PCL mats was analyzed using L-929 cells by direct contact and MTT assay. The potential



Human Keratinocyte cell line on CS-PCL blend fibrous mat showing good (A) cell adhesion, (B) cell viability and (C) cell morphology.

of CS-PCL for skin tissue engineering was assessed using human keratinocytes (HaCaT) by measuring cell adhesion (Fig), viability, proliferation and actin distribution and L-929 cell lines.

Thermoresponsive Substrate functionalized with Stromal Extra Cellular Matrix Proteins for Corneal Tissue Engineering

Corneal cells isolated from tissue require specific in vitro conditions such as growth factors and ECM proteins. Hence NGMA culture surface was functionalized with corneal stromal ECM proteins to facilitate adhesion and growth of isolated corneal cells in suspension. goat cornea was decellularized and ECM proteins was isolated and conjugated to NGMA culture surface. The biofunctionalized surface (NGMA-StroPro) was characterized by FTIR and in vitro analysis was done using primary goat corneal cells. Isolated corneal cells adhere on NGMA-StroPro and expressed cell morphology. Protein conjugation did not affect the thermoresponsiveness of NGMA. Further investigation to fine tune the protein content on NGMA will enhance and cell adhesion and cell retrieval.

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. To this end, the methodology for rabbit corneal endothelial cell isolation was standardized and in vitro culture conditions were optimized. The isolated and cultured cells were characterized for corneal endothelial-specific markers by both immunofluorescence staining and RT-PCR. These isolated cells were 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 (Fig 2). The cell sheets thus generated were characterized morphologically for intact cell-cell contact by scanning electron microscopy. Functionality of these cell sheets are being assessed by immunofluorescence and RT-PCR.

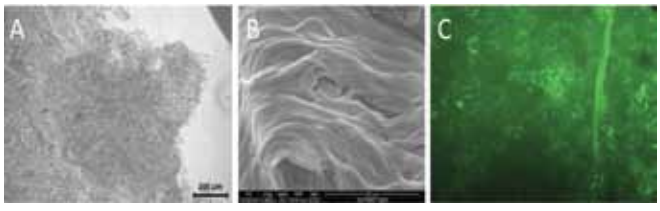


Fig 2. Rabbit corneal endothelial cell sheet as observed under (A) SEM and (B) ESEM. Cell sheet also expressed characteristic marker Na^{+}-K^{+} ATPase.

Toxicology

Molecular and immunotoxicological effects of Dextran coated Ferrite and Hydroxylapitite nanomaterials

The work included 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

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. In vitro assay for monitoring inflammatory markers is underway

Transmission Electron Microscopy Lab

Skeletal Tissue Engineering research activities under the ambit of the TEM Laboratory focus on evaluation of biomaterials (ceramics, hydrogel, decelluarized tissue etc) in reconstruction of skeletal tissues under normal & pathological conditions. Current projects, as highlighted below; focus on cell source evaluation, developing suitable scaffolds and preparing pathological models of analysis.

Cell-Based Tissue-Engineered Fabrication Of Osteochondral Constructs

Bioceramic scaffolds have been utilized to reconstruct normative structures in the Osteochondral compartment. Visualization of cell structural components in detail can

provide clues to the cell development, proliferation & differentiation pathways.

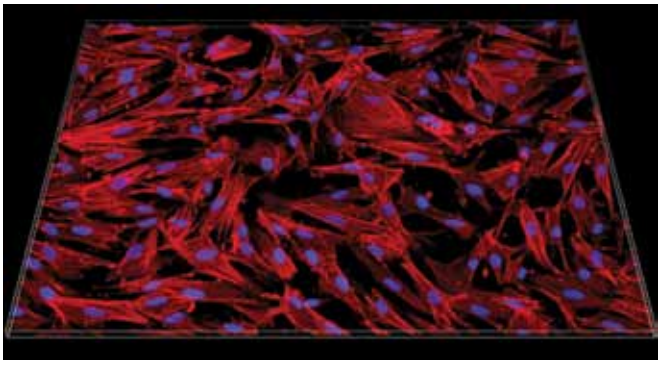


Fig. Confocal Laser Scanning Micrograph (Mag. 20 X) - Actin filaments stained red (Rhodamine Phalloidin) with nuclei stained blue (DAPI), providing an unique window into cell structure.

In this image a 3D reconstruction of rabbit adipose-derived stem cells was achieved using freshly stained cells with a short duration of fixation at low temperature. Cells washed with ice-cold PBS, permealized in 1% Triton – X 100, stained & mounted with anti-fade mounting medium.

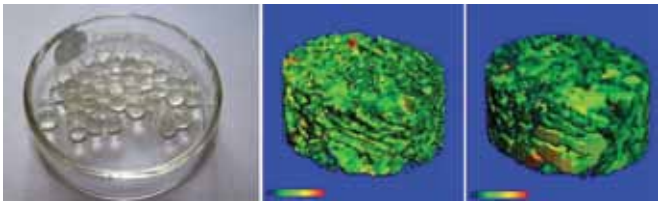


Fig Alginate Beads Micro CT- alginate beads Wall Thickness Micro CT- alginate beads Pore Distribution

Regeneration of Intervertebral discs – A tissue engineering approach

Alginate, a natural polymer, was selected as a candidate scaffold for the regeneration of the Nucleosus Pulposus (NP) of the IVD. Combination of alginate with Strontium chloride provided a porous radiopaque hydrogel that can accommodate cells. This hydrogel showed 74.28% of porosity, which mimics the extracellular matrix of NP (Fig)

Evaluation of tissue engineered Strontium incorporated hydroxyaapatite (SrHA) for the healing of Osteoporotic bone defect in sheep model

Tissue Engineering Strategies focused on developing repair solutions for fracture fixation under osteoporotic conditions were evaluated. To evaluate strategies in development for use in such scenarios, an Osteoporotic Model was developed in sheep via ovariectomy & a calcium deficient diet.

Fig.5. The representative radiographs of tibial bone of sheep before and after Osteoporotic induction, depicting loss of trabecular patterning at the condylar region.

Testing, Quality System And Technical Services Related Activity

Calibration Cell

- Accreditation by NABL: NABL audit on thermal and Mechanical parameters were completed in 2013 December. Calibration of speed was the new parameter added to the scope of accreditation.
- Calibrations performed: A total of 350 calibrations were performed for Health care Industries, Clinical laboratory and internal customers. Out of these, 300 numbers were accredited calibrations.
- Developed and validated a new work procedure for calibration of carbon dioxide in incubators.
- Participated in ILC in volume parameters with Fluid Control Research Institute (FCRI), Palakkad.

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 conformity with the requirements of the standards.

Following were the major activities of the Quality Cell during the period from April 2013 to March 2014

a. COFRAC surveillance assessment was conducted on 12-14 March 2013. Corrective actions on seven non-critical observations made during the assessment were carried out and reported back to COFRAC for improvement of the system (Annexure-1, List of Accredited Tests).

b. NABL Assessment

NABL re-assessment of Calibration cell for thermal and mechanical calibration was completed from 14-15th December 2013. Corrective actions on reported NC's were carried out and conveyed to NABL. Subsequently, NABL granted accreditation for two more years from 14.02.2014.

c. Training: Three training programmes – Two "Introductory training for newcomers" were supported by Quality Cell. An internal training / refresher course in Laboratory Quality Management System was arranged in May 2013.

d. Management review

- A Management Review Committee (Annexure-2) meeting was held on 12th June 2013.
- Two Technical Management Committee (Annexure-3) meetings were held on 18th June 2013 & 19th December 2013.

e. Internal Audits carried out:

- 20th – 30th May 2013. Total of 22 Non-conformities reported.
- 18th – 28th November 2013. Total of 29 Non-conformities reported.

f. Documents initiated/revised

The following were revised / issued during the period

i. 157 system procedures & work procedures- Common as well as those of different laboratories.

ii. Lab notebooks – 36 Nos

iii. Registers & Logbooks – 89 Nos

iv. Corrective/ preventive actions/ Accident reports.

- A total of 30 CARs were generated during this period by different laboratories
- No preventive actions were raised this year.
- Two accidents were reported during the period.

Testing Services - Customer Service Cell

The Customer Service Cell (CSC), which is part of the Technology Business Division, continued to offer single window service to customers availing testing services.

The testing services for the year 2013-14 showed a greater demand for biocompatibility evaluation. There were increased requests for evaluation of blood /platelet storage system from the Industry.

Apart from routine tests, the following new studies were initiated during the period:

- Biofunctional & histological evaluation of Everolimus coated bioresorbable polymeric stent system from Nao Therapeutics Ltd

- Proof of Concept study for short-term LV support using a novel device in sheep model from TTK Healthcare Ltd
- Raising antibodies in Rabbit model against specific hormones from HLL Lifecare Ltd
- Toxicity study of materials from Eucare Pharmaceuticals Ltd
- In vitro evaluation of cellular uptake & cytotoxicity of nanomaterials from IIST
- The following studies were completed and reports were issued:
- Post-transfusion recovery of RBCs in an animal model from M/s HLL Lifecare Ltd
- Dose ranging studies for DES with predicate device from Sahajanand Medical Technologies
- Study on temperature measuring instruments with sensors in compaction system from TTK Healthcare Ltd
- Biological, structural and stability studies on fabric matrial used or rotary cuff repair device from SITRA
- In vivo genotoxicity test – chromosomal aberration & micronucleus from M/s HLL Lifecare Ltd

Description	External Test Requests			Internal Test Requests		
	2011-12	2012-13	2013-14	2011-12	2012-13	2013-14
No. of work orders	672	585	614	335	438	326
No. of test materials	2097	1879	2325	997	1968	1078
Income (Rs in lakhs)	34.41	39.68	46.61	22.80	12.18	8.01

Bioceramics Laboratory

Various tests are offered by the Lab for the internal and external customers include

1. X-Ray Powder Diffraction
2. Scanning Electron Microscopy, Environmental Scanning electron Microscopy and EDS analysis.
3. Inductively coupled plasma Emission Spectroscopy for elemental analysis

Dental Products Laboratory

The lab extended the testing facilities to both internal and external customers and recorded 58 Raman spectra, 185 FT-IR spectra, 58 UTM testings, 32 thermocycling samples, 19 VHN samples and 6 micro CT samples during the year.

Division of In Vivo Models & Testing

The division provided a platform for pre-clinical animal evaluation of medical devices for in-house developed medical devices as well as providing animal models for research . The following studies were carried out in this division:

1. Pre-clinical evaluation of fluoro-passivated and hydrogel sealed vascular graft in pig model. (Preclinical study).
2. Rabbit kerato-prothesis evaluation. (Research)
3. Sheep osteoporotic model for tissue engineered ceramic evaluation.(Research)
4. Pig diabetic model was made for evaluation of artificial pancreas. (Research)

Division of Laboratory Animal Science

The Division facilitates research and testing using small laboratory animals by imparting care, welfare and management of small laboratory rodents and rabbits. The care and welfare is effected as per ISO 10993 Part-II for testing facility of which quality system is based on ISO/IEC 17025; 2005. The animal house is CPCSEA-registered. DLAS set up a state-of-the-art experimental animal facility with Individually Ventilated Cages (IVC) System and changing stations. The HVAC system was also revamped for maintaining the macro environment for the experimental animals. The division also offered several animal models used for biomedical research by various investigators. The division also carries out a bi-annual training session for budding researchers in ethics and technicalities of small laboratory animal handling and this course is attended by MSc and PhD scholars from all over the country.

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.

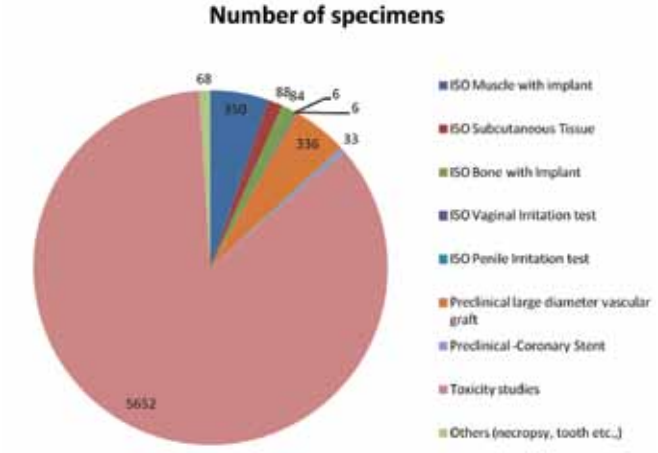
- Health monitoring of small laboratory rodents and rabbits is improved by the introduction of a sentinel animal plan.
- Prepared and established a procedure for microbiological and pathological assessment for health in laboratory animals and norms for sampling for the same.
- Animal health was ascertained 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 the previous year figures of Rabbits = 186, GP =255, Mice 424, Rat= 148 from the same floor space available.

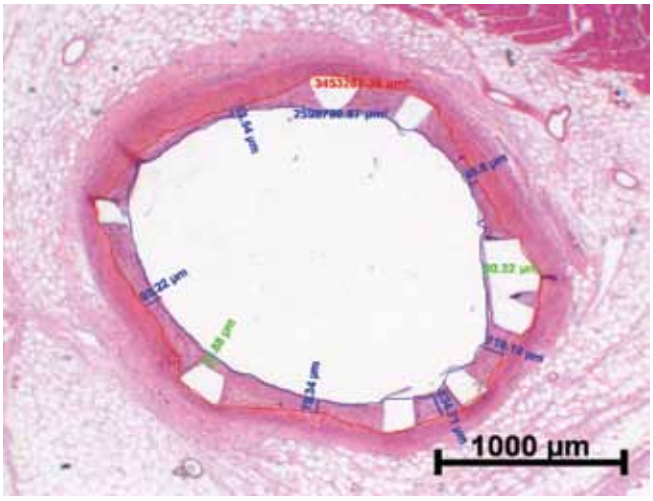
Experimental Pathology Laboratory

The laboratory offered diagnostic necropsy and histopathology services to both internal and external researchers.

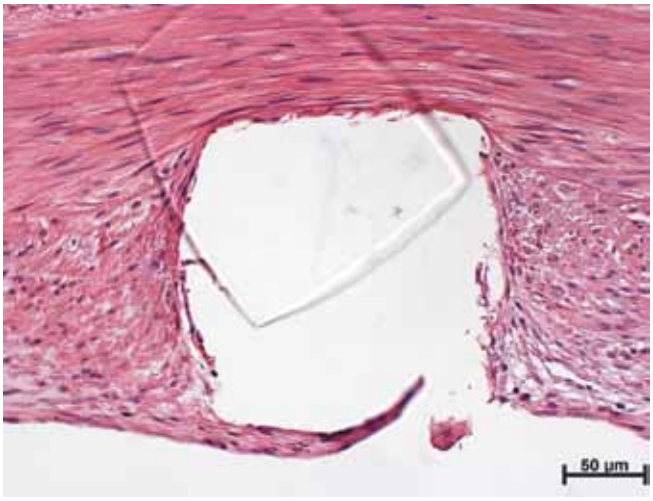
Histopathology Laboratory

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-



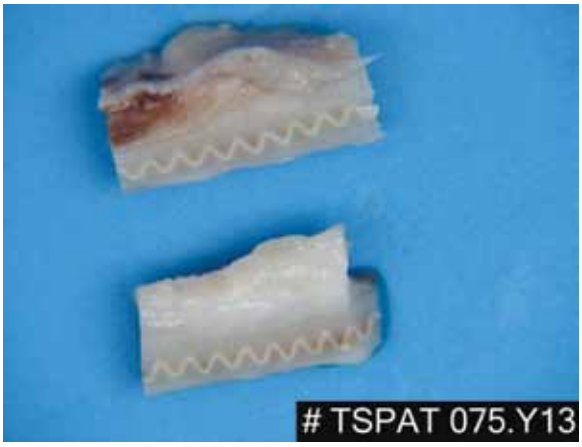


A. Coronary blood vessel with degradable polymer stent

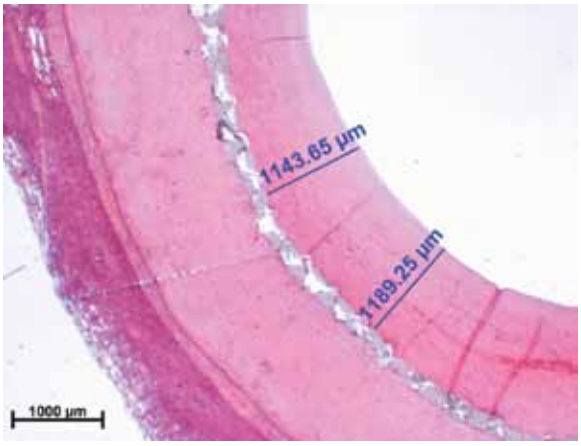


B. Degradable polymer stent strut and neointima

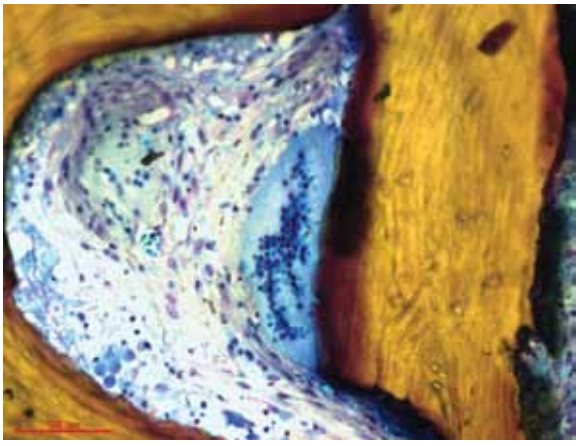
C. Vascular graft in descending aorta



D. Vascular graft- thick neointima and graft crimps



E. Vascular graft with thick neointma



F. Bone graft: multinucleated giant cell on a fragment of dead bone.

modified bone implants. Student based studies from International Institutes which includes histopathological studies on bone grafts, orthodontic screws, decellularised tissue as conduits and corneal substitutes were also been carried out.

Lab 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. Laboratory's analytical services are under the quality policy of the Institute.

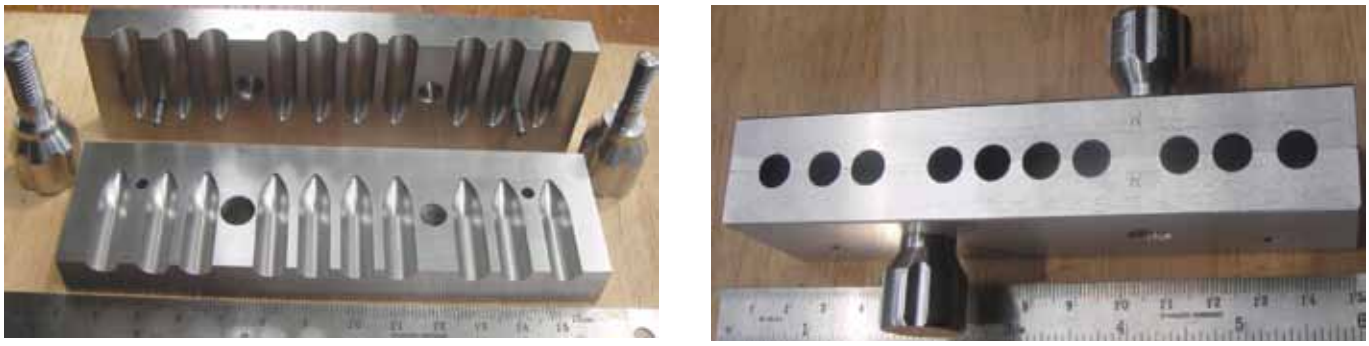
Microbiology

The lab offers both accredited and non-accredited tests. 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 tests offered by the division and the number of tests performed during the year were as shown below.

Sl No	NAME OF TEST	Number of requests [number of samples]
	Accredited test	
1	Sterility Test	19 (30)
2	Invitro genotoxicity assay- the bacterial reverse mutation (AMES) Assay	2(2)
	Test in support of accredited facilities	
3	Microbiological monitoring of air	20 (48)
4	Water Analysis	19(49)
5	Sentinel screening for pathogens in small experimental animals.	22(22)
	Non - accredited tests	
6	Spore Viability Test	3 (3)
7	Bioburden Analysis	1(1)
8	Anti- microbial activity testing	8 (20)
9	Culture/ Staining	4 (7)
10	Growth Promotion Study in Media Validation	4(16)
11	Anti- microbial activity by Parallel streak method	3(11)

Precision Fabrication Facility

The division supports and facilitates technical services in designing and fabricating of jigs & fixtures, mould making, prototype component machining activities using conventional and CNC machines. Nearly 75 work orders were executed during the year 2013-14 as described below:

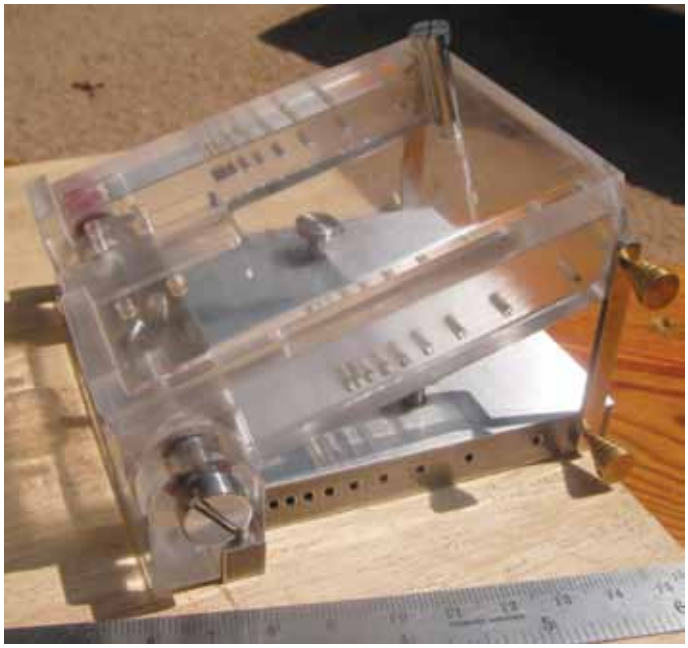


1. Completed the designing and machining of multi cavity mould assembly to Hospital CVTS Dept.

2. Completed the machining of 3 sets of Electromagnetic Flow meter components Polypropylene- casing, cover and bottom part) to MPL

3. Completed the machining of Mandibular Advancement Device mould Core & Cavity to DTL

4. Completed the machining of Needle penetration test setup fixture to DTL to study the penetration forces on graft materials

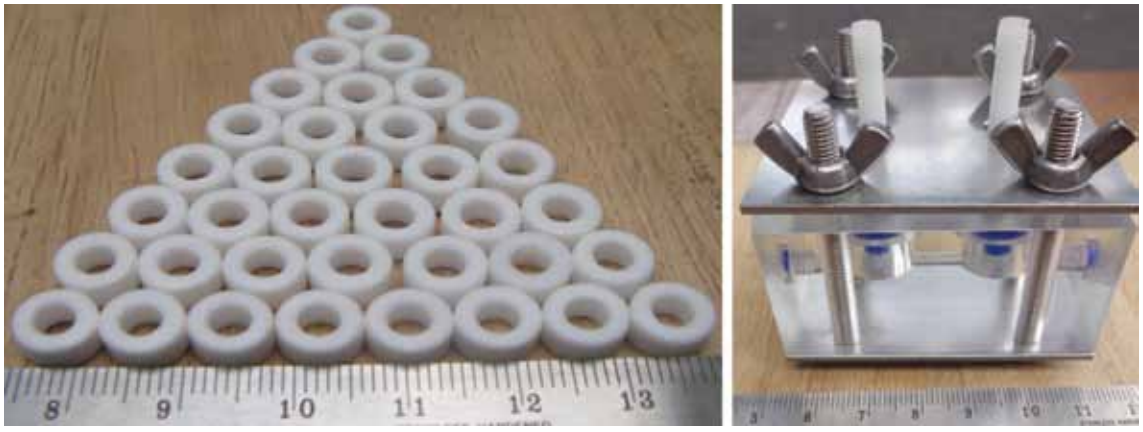


5. Completed the machining of stainless steel valve sizer to DIMT lab. Mandibular advancement device fixture to DTL.

6. Completed the machining of vascular graft coating fixture components to DTL.

7. Completed the machining of different size blanks for testing the coating to CCF lab.

8. Completed the machining of different Teflon moulds, sample preparation rings and Teflon plug to TEM, TIC and MPL lab.



9. Designed and completed the machining of perfusion chamber unit to DTERT lab.

10. Completed the machining of theremowell and thermometer fixture to MPL

11. Completed the machining of Heat exchanger shell and Hemi spherical steel ball with a cavity to MPL

12. Designed and completed the machining of 2 nos. of Polypropylene mould to DTERT lab.

13. Designed and completed the machining of the radius profile in the supplied E-core assembly (Top & Bottom) for the Electromagnetic blood flow meter set up to MPL.

14. Completed the machining of 2 Opitcal couplers using Delrin material for interfacing the Microscope in DTL lab.

15. Completed the machining of one Teflon mould of 25mm x 0.2mm cavity size using 90 dia. Teflon rod to DPL.

16. Designed and completed the machining of two nos. of threaded adapter for interfacing Keyence Micrsocope in DTL lab.

17. Completed the machining of cutting 14nos. of SS strip in wire cut EDM to External PG student (Dental) thesis work on chargeable basis.

18. Completed the machining of Mounting rods 2 nos. for the Vascular graft coating fixture to DTL.

19. Completed the machining of 10nos. of Delrin Bushes for making valve stents to DIMT lab.

20. Designed and completed the machining of Stainless steel bottom cavity of subdural electrode mould to INL lab.

21. Completed the machining of 100 nos. of SS coins of size 12mm dia x 2mm thick blanks to CCF.

22. Completed the machining of flat profile in the electromagenetic blood flow core assembly for MPL.

23. Completed the machining of Core and Cavity assembly in acrylic material for the Mandibular Advancment Device project to DTL.

24. Completed the machining 5 nos. of of Teflon mould with O'ring grooves to PAT lab.

25. Designed and completed the machining of 5 nos. of Stainless Steel Valve sizer to DIMT lab.

26. Designed and completed the machining of Teflon mould with 8 cavity to cast samples for conducting mechanical testing to TEM lab.

27. Completed the machining of 30nos. of Teflon rings and 15nos. of Teflon Disc to TIC lab.

28. Completed the machining of Light Transmission fixture, for examining the heart valves discs to DTL lab.

29. Designed and machined one Teflon mould with 3 cavity rectangular profile of size 60 x 10 x 1mm to DPL.

30. Designed a suitable cutting tool and completed the machining of thread profile in 10nos. of heat exchanger Aluminium tube for the pediatric oxygenator project to MPL lab.

31. Completed the machining of cutting 39 nos. of CP Ti 2mm dia. wire to 10mm length for using negative control RM in muscle implantation studies to CAC lab.

32. Completed the machining of 47 nos. of spectrofluorometry microscopy Aluminium slides to size (75mm x 25mm x 3mm) from the supplied material for Hospital Pathology Department.

33. Designed and fabricated a fixture setup to TRU lab for giving impact load to mice.

34. Completed the machining of Acrylic Shell body and two end caps for the heat exchanger project of oxygenator to MPL.

35. Completed the machining of 70 nos. of Aluminium tube with outside thread profile for the heat exchanger part of the oxygenator project to MPL.

36. Designed and completed the machining of Dental fixture for an External PG student project work on chargeable basis.

37. Designed and completed the machining of 6 nos. of Stainless Steel cell culture dishes to TIC lab.

38. Designed and fabricated a split mould for casting polymer rod of star shape to Polymer Division.

39. Designed and fabricated a needle penetration test setup fixture to DTL to study the penetration forces in vascular graft material.

40. Designed and fabricated a one SS template and 5 nos. of Teflon tubes for fabrication of valve conduit to DIMT lab.

41. Designed and fabricated two types of SS loading pin to suit the Instron machine for conducting test on dental samples for an external PG student project work on chargeable basis.

42. Designed and fabricated slice chamber and platform for slicer to MOM lab.

43. Completed the machining of elliptical shaped threaded shaft and P.P. Housing for an experimental setup to DTL lab.

44. Completed the machining of 12 nos. of Stainless Steel Rings to PAT.

45. Designed and completed the machining of HASi cylindrical rod holding fixture to BCL.

Polymer Processing Laboratory

About 61 work orders and 232 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

There was a continuous flow of test requests for blood compatibility evaluation. Major customers were blood bag manufacturers and coronary stent manufacturers.

In-line filters were also evaluated for leuko reduction using an accurate flow cytometry technique. The support included technical consultation to industries for choice of meaningful test reports for blood compatibility, based on the end use of the material/device. To assess recovery of transfused RBC after storage for various periods of storage in PVC blood bags Cr1 labelled cell transfusion recovery was studied in rabbits and meaningful reports were provided for the bag manufacturing Industry. All effort was made to meet customer satisfaction, and support the device-manufacturing Industries.

Several samples were tested for internal customers who are developing materials for various applications. Blood compatibility testing was also carried out with modification of test protocol to suit the customer needs, which included academic purposes/students research. The core flow cytometry facility managed by the division was extended to faculty and students of the entire Institute which included researchers from the Hospital Wing.

Tissue Culture Laboratory

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.

Toxicology

The main aim of the division is 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 is 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	7
2	Maximization test for delayed hypersensitivity	8
3	Intracutaneous Test	11
4	Acute systemic toxicity test	22
5	Test for local effects after Implantation in muscle	8
6	Pyrogen Test	6
7	Vaginal Irritation Test	2
8	Penile irritation	1
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	2
13	Bone Implantation	2
14	Animal skin irritation Test	7
15	Haemolysis	2
16	Sub chronic toxicity	1
17	Acute oral toxicity	1

Completed & Ongoing GLP Studies		
No	Title	Sponsor
1	Mammalian erythrocyte Micronucleus test of Copper T Material	M/s HLL Life Care Trivandrum Completed
2	Mammalian Bone marrow chromosome aberration of Copper T Material	
3	90 day sub-chronic toxicity by intraperitoneal implantation of Copper T material in wistar rats	M/s HLL Life Care Trivandrum Ongoing

COLLABORATIVE WORK	
Immunotoxicity of Dextran Coated Ferrite nanomaterials (DST, New Delhi)	completed
Dermal Toxicity of Dextran Coated Ferrite nanomaterials (DST, New Delhi)	completed
Dermal Toxicity of hydroxyapatite nanomaterials (DST, New Delhi)	completed
Carcinogenicity combined with chronic toxicity of Dextran Coated Ferrite nanomaterials (DST, New Delhi)	140 rats (ongoing)
Carcinogenicity combined with chronic toxicity of hydroxyapatite nanomaterials (DST, New Delhi)	140 rats (ongoing)
WATER ANALYSIS	
Physico Chemical Analysis of Potable Water for various Divisions	24 Samples.

Transmission Electron Microscopy

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

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

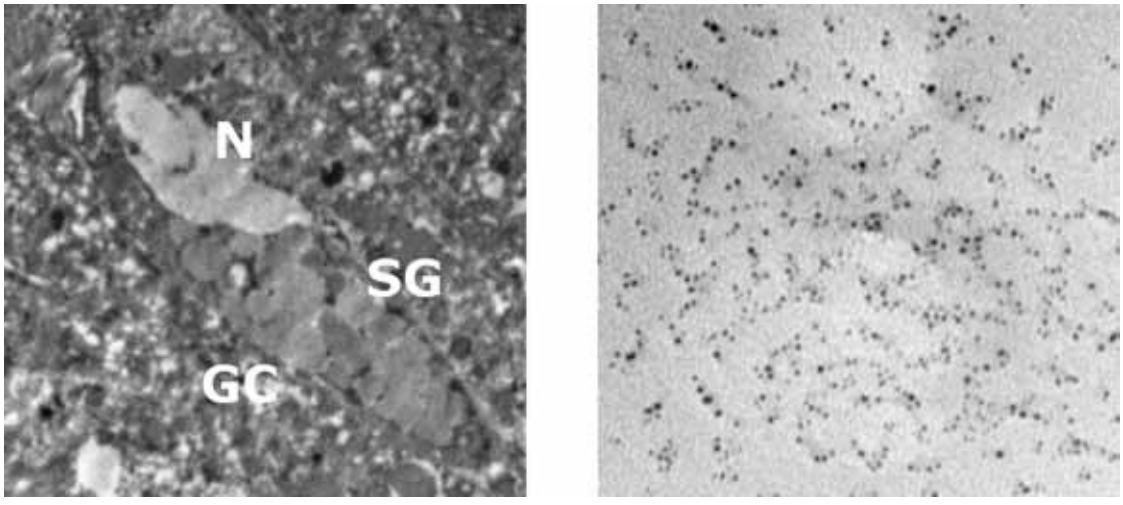


Fig. 1 & 2: Transmission Electron Micrographs of the intestinal mucosa of Anguilla bicolor bicolor showing the goblet cell with eccentric nucleus and secretory granules (Fig 1); CaF2 Nanoparticles depicting spherical morphology (Fig 2).

HONOURS & AWARDS

- Dr TV Anilkumar was conferred Fellowship of the International Academy of Toxicologic Pathology
- Dr. Annie John received "ICMR Kshanika Oration Award - 2010" by Indian Council Of Medical Research (ICMR) on 25/09/2013 from Union Health Minister Shri Ghulam Nabi Azad
- Dr. Annie John was awarded the JSPS BRIDGE Fellowship Program (FY2013-2014) - at the Kyoto University, Kyoto, Japan. (October 29 - Dec 14th, 2013)
- Dr.R.S.Jayasree was selected as the Australia Award Ambassador by the Australian High Commissioner to India at New Delhi on March 28th, 2014
- Dr Harikrishnan V S obtained Travel Award 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.
- Dr. H.K.Varma was awarded visiting professorship by the King Saud University, Riyadh, Saudi Arabia. He will be associated with College of Applied Medical Sciences under the Department of Dental Health
- Ms. S.Sandhya, Ph D student of Bioceramics lab bagged the BEST POSTER AWARD in the IUMRS-ICA-2013. She presented the work entitled "Development of a Versatile Drug Eluting Bioactive Bone Filler Cement" (Co-authored by S. Sureshbabu , H. K. Varma and Manoj Komath)
- Ms. Ariya Saraswathy won the best poster award for her presentation titled "Super Paramagnetic Iron Oxide nanoparticles for in-vivo Magnetic Resonance Imaging of liver fibrosis", in the 2nd International Conference on Advanced Functional Materials, ICAFM held at Trivandrum during 19th -21st Feb 2014.
- Mr. Niraj Patel (JRF) got best poster award for poster titled "Reduced ultrasonic vocalizarions in pups born to REM sleep deprived mothers in rat model: An early marker for depression!" in The International Conference on Integrative and Comparative Physiology & 1st Annual meeting of the Society for Evolutionary and Integrative Biology, SEIB-2013 held at University of Kerala, Trivandrum from 18-20 December 2013
- Mr. Francis B Fernandez, PhD student in the Transmission Electron Microscope Laboratory, BMT Wing, won the best paper award (First) in Health Sciences stream for the paper titled "Cell Ceramic Mediated Tissue Engineered Approaches for Osteochondral Reconstruction in Orthopaedics", (Francis Fernandez, Dr. H. K. Varma, Dr. Annie John) during the XXV Kerala Science Congress at Technopark, 29th January – 1st February 2013.
- Mrs. Beena G Mohan, PhD student in the Transmission Electron Microscope Laboratory, BMT Wing, won the best paper award (First) in Life Sciences stream for the paper titled "Mesenchymal Stem Cells for Repair of Rabbit Segmental Bone Defect", (Beena G Mohan, Dr. H. K. Varma, Dr. Annie John) during the XXV Kerala Science Congress at Technopark, 29th January – 1st February 2013.
- Mrs. Susan Mani, Technical Assistant, Division of Cellular & Molecular Cardiology, SCTIMST, won the best poster award (First) in Health Sciences stream for the paper titled "Cell – Ceramic Substitute to mend Broken Bones in a Diabetic Milieu", (Susan Mani, Francis B Fernandez, P.V.Mohanan, Michael Gelinsky, Dr. H. K. Varma, Dr. Annie John) during the XXV Kerala Science Congress at Technopark, 29th January – 1st February 2013.
- Joice Tom J won best poster award for poster on "Assessment of Bone Quality and Stem Cell potential with aging" at Third Euro-India International Conference on Nanomedicine and Tissue Engineering, Kottayam, Kerala, August 9-11 August 2013
- Ms. Lakshmi R Nair recieved BAJPAI – SAHA AWARD for the Best Student Paper Presentation of the

Society for Biomaterials and Artificial Organs (India) for the work entitled "Differentiation of human umbilical cord mesenchymal stem cells towards myocardial lineage using a cytidine analogue on thermo-responsive polymer" at the II International Conference on Medical Materials, Devices and Regenerative Medicine (MMDRM 2014), 11- 13 January, Kathmandu, Nepal.

- Dr. Anwar Azad received the Carl Storm International Diversity (CSID) Fellowship to attend 2013 Tissue Repair and Regeneration Gordon Research Seminar and Gordon Research Conference, USA.
- Best Poster award for the Poster presentation entitled 'Assessment of nanohydroxyapatite toxicity on mouse bone marrow mesenchymal stem cells' (by Syama S, Reshma SC, Gayathri V, Mohanan PV) at the 2nd International Summit on Toxicology, 7-9 October, 2013, Las Vegas, USA.

FUNCTIONS, WORKSHOP AND CONFERENCES ORGANISED BY DEPARTMENT /STAFF :

Title of Event and Theme	Date and Venue	Organized by
Bi Annual Training Programme in Handling of Small Laboratory Animals	June 1 to 7, 2013 BMT wing	Division of Laboratory Animal Science
Bi Annual Training Programme in Handling of Small Laboratory Animals	Dec 16 to 21, 2013 BMT wing	Division of Laboratory Animal Science
INDO-DANISH Seminar	17-19 Sept 2013 Odense University, Denmark	Dr Prabha D. Nair with Prof Moustapha Kassem of Odense Unversity, Denmark
ISO/IEC 17025:2005 Laboratory management system	23-08-2013 BMT wing	Quality Cell
Training Programme on 'Toxicity, Safety, Biocompatibility Evaluation of Materials, Medical Devices and Combination Products'	17-19 Feb 2014 Hotel Residency Tower, Trivandrum	Dr. PV. Mohanan

BIOMEDICAL TECHNOLOGY WING

Dr. Chandra P. Sharma,FBSE
(till 28th February 2014)
Acting Head, BMT Wing

Mr OS Neelakantan Nair
Acting Head, BMT Wing

Mr. C.V. Muraleedharan, M.Tech
Associate Head, BMT Wing

ARTIFICIAL ORGANS

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,
Modelling & 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. 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
(till 28th February 2014)
Senior Scientist G & Scientist In Charge

Dr. M. R. Rekha, PhD
Scientist D & Scientist In Charge

Mr. Willi Paul, MSc
Scientific Officer (Instruments)

Ms. Jasmin Joseph, MSc
Technical Assistant (Instruments)-A

CALIBRATION CELL

Mrs. Leena Joseph, B.Tech
Engineer D & Scientist In Charge

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

Mr Rajesh R.P, B.Tech, MBA
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
(Relieved on 7/2/2014)
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, MLAS (FELASA-D)
Scientist C

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

Mr. Sarath kumar R.S
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)

EXPERIMENTAL PATHOLOGY

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

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

HISTOPATHOLOGY

Dr. A. Sabareeswaran, MVSc
Scientist D & Scientist In Charge

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

Mr Thulaseedharan N.K BSc, MLT
Jr. Technical Officer

Mr. Joseph Sebastian, BSc MLT
Technical Assistant - A

INSTRUMENTATION LABORATORY

Dr. Niranjan D. Khambete, MTech, PhD
(till 31st December 2013)
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

MICROBIOLOGY

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

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

Dr. P. Ramesh, PhD
Scientist F, Quality Manager

Mrs. Leena Joseph, B.Tech
Engineer D & Dy.Quality Manager

Dr. Anugya Bhatt, MSc, PhD
Scientist C& Dy.Quality Manager (GLP Studies)

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

SLEEP DISORDERS RESEARCH LAB

Dr. Kamalesh K Gulia, PhD
Scientist D & Scientist-in-Charge

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 CULTURE

Dr. T. V. Kumary, PhD
Scientist G & SIC Tissue Culture Laboratory

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

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

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

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

TISSUE ENGINEERING AND REGENERATIVE TECHNOLOGIES

Dr. Prabha D. Nair, PhD
Scientist G & Scientist In Charge

V.Geetha, MSc
Technical Assistant A

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
(till 31st January 2014)
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

Dr. Remya. NS, MSc MLT, PhD
Technical Assistant A

TRANSMISSION ELECTRON MICROSCOPY

Dr. Annie John, PhD
Scientist F & Scientist In Charge

ACHUTHA MENON CENTRE FOR HEALTH SCIENCE STUDIES

FROM THE HEAD OF AMCHSS

In the year 2013-14, the Achutha Menon Centre for Health Science Studies (AMCHSS) continued its luminous activities in public health research, training and consultancies.

The 10 core faculty members of the AMCHSS published 30 peer reviewed journal articles. In addition, two book chapters were published. One of these chapters was a commentary on altruism in organ donation in a book titled "the future of bioethics" published by the Oxford University Press and the other was on inequities of health in Tamil Nadu in a book titled "Development narratives: the political economy of Tamil Nadu" published by the Academic Foundation. Nine of the 11 MPH dissertations were internally peer reviewed and uploaded as working papers on the Institute website.

One of the completed projects supported by the United Nations Population Fund consisted of preparing a technical guidance document on the characteristics of a gender-responsive and human rights-based approach to family planning programs, and how to plan and implement and monitor such programs. Another project on the health impact of use of technology by women envisaged helping village women in the optimal use of various household technologies. The project on capacity building of women health workers was designed to equip health workers with portable laptops to improve the surveillance of public health activities. This idea was incorporated into the upcoming e-health project of the State Government. An evaluation of the Accredited Social Health Activist (ASHA) component of the national rural health mission was completed.

A new project initiated in the year was supported by the Ford Foundation that consists of three activities. The first is a study of factors influencing women's postpartum reproductive intentions and their achievements in two states of India: Jharkhand and Kerala; the second is a study of young women's (18- 28 years) awareness and exercise of their reproductive rights in Thiruvananthapuram District, Kerala. The third is a synthesis of research on sexual and reproductive rights in India produced during 2000-2013.

On 31st May, World No Tobacco Day function was inaugurated by the honorable Chief Minister of Kerala at the AMC auditorium. The function was jointly organized by the Kerala Government Health Department, AMCHSS, Regional Cancer Centre and various NGOs working in the field of tobacco control. SCTIMST Director, Regional Cancer Center Director, Executive Director of Kerala Voluntary Health Services and President of the Regional Cancer Association participated. An international training program for the Asian Collaboration for Excellence in Non-communicable Diseases (ASCEND) trainees was inaugurated by the Director of Kerala Health Services. Prof Brian Oldenburg, Monash University, Australia, Program Director of ASCEND gave a brief overview of the program. Prof Shah Yasin ASCEND, Program Director, Malaysia, and Dr Chamil Senavirathne ASCEND Network Coordinator, Sri Lanka, spoke on the ASCEND activities in their respective countries.

Dr. Meena Daivadanam completed her PhD with the support of the prestigious Erasmus Mundus Scholarship. Eleven MPH students and one DPH student completed their respective programs from our institute. From two of our affiliated Institutes (National Institute of Epidemiology Chennai and CMC Vellore), seventeen and five MPH students, respectively, completed their programs.

K.R. Thankappan

ACHUTHA MENON CENTRE FOR HEALTH SCIENCE STUDIES

Overview

The important activities undertaken by the Achutha Menon Centre for Health Science Studies (AMCHSS) for the year 2013-14 are given under the following categories: (1) Publications, (2) extramural research projects (3) Honors and awards won by staff and students (4) details of conferences/seminars/workshops organized (5) List of PhD, MPH and DPH students, and (6) other important activities.

The 10 core faculty members of the AMCHSS published 30 peer reviewed journal articles. In addition, two book chapters were published. One of these chapters was a commentary on altruism in organ donation in a book titled "The future of bioethics" published by the Oxford University Press and the other was on inequities of health in Tamil Nadu in a book titled "Development narratives: the political economy of Tamil Nadu" published by the Academic Foundation. The protocol paper of one of the major research projects, "the Kerala Diabetes Prevention program", was published this year. Indo-Swiss Symposium on Cohorts and Bio-banks with special reference to chronic non-communicable diseases was also published.

One of the completed projects supported by the UNFPA consisted of preparing a Technical Guidance Document on the characteristics of a gender-responsive and human rights-based approach to family planning programs, and how to plan, implement and monitor such programs. The first draft was presented to UNFPA and WHO and other international organizations invited by UNFPA, in New York in the last week of November 2013. Based on comments and suggestions, the document was revised and updated and a few sections were added in response to a request to align it with a WHO document on human rights based approaches to contraception.

Another project completed during the year was on the health impact of use of technology by women. This project envisaged helping village women in the optimal use of various household technologies. Women volunteers were selected from two block Panchayat areas in Trivandrum district and were given a series of orientation-cum-training sessions on topics on household technologies and their relevance to health. They were asked to share their experience/learning with selected households in the community on a monthly basis. With the help of their community associates, the volunteers identified the crucial information needs of village women for optimal use of various household technologies to lead a healthy life. Their learning was written in Malayalam and a booklet is being printed for wider dissemination of this experience.

The project on capacity building of women health workers was completed. This project was designed to equip health workers with portable laptops to improve the surveillance of public health activities. This idea was incorporated into the upcoming e-Health Project of the state government, which is funded by the Government of India through the World Bank supported "India e-Deliver of Public Services DPL project".

An evaluation of the Accredited Social Health Activist (ASHA) component of the national rural health mission in seven districts was completed this year. The objectives of the evaluation were to understand the current status of the implementation of the ASHA program in Kerala, assess the stakeholder perspectives and effectiveness and review the structures, processes and mechanisms of the key functions. The evaluation was carried out through a mix of qualitative and quantitative methods among the ASHA workers, junior public health nurses, supervisory staff, district and state level program managers and beneficiaries.

A new project that consists of three activities was initiated during the year, supported by the Ford Foundation. The activities include, study of factors influencing women's postpartum reproductive intentions and their achievements in two states of India: Jharkhand and Kerala; study of young women's (18- 28 years) awareness and exercise of their reproductive rights in Thiruvananthapuram district, Kerala; and, synthesis of research on sexual and reproductive rights in India produced during 2000-13.

On 31st May, World No Tobacco Day function was inaugurated by the honorable Chief Minister of Kerala at the Achutha Menon Centre Auditorium. The function was jointly organized by the Kerala Government Health Department, AMCHSS, Regional Cancer Centre and various NGOs working in the field of tobacco control. SCTIMST

Director, Prof K Radhakrishnan, presided over the function. Dr Paul Sebastian, Director of Regional Cancer Center (RCC), Saju Itty of Kerala Voluntary Health Services and Janardana Iyer of RCA offered felicitations. The technical session that followed was moderated by Sri Rajeev Sadanandan, Principal Health Secretary, Government of Kerala. The Director of Public Instructions, Sri A Shajahan, Sri P Vijayan, Commissioner of Police, Trivandrum, John Britas, Managing Director Malayalam Communications Ltd, and T Madhukumar, Regional Director, Central Board of Film Certification, presented tobacco control activities of the respective departments.

An international training program for the Asian Collaboration for Excellence in Non-communicable Diseases (ASCEND) trainees was inaugurated by Dr PK Jameela, Director of Health Services. Dr R Sankar Kumar presided over the function. Dr Paul Sebastian, Director, RCC, delivered the key note address on the role of tobacco control in the prevention and control of NCDs. Prof Brian Oldenburg, Monash University, Australia, Program Director of ASCEND, gave a brief overview of the program. Prof Shah Yasin, ASCEND Program Director, Malaysia, and Dr Chamil Senavirathne, ASCEND Network Coordinator, Sri Lanka, spoke on ASCEND activities in their respective countries.

Dr. Meena Daivadanam completed her PhD during the year. She received the prestigious Erasmus Mundus Scholarship for her PhD program and spent part of her study time in the Karolinska Institute, Sweden. Six PhD students continued their program in the current year and two new PhD students joined in January 2014. Eleven MPH students and one DPH student completed their respective programs from our institute. From two of our affiliated Institutes (NIE Chennai and CMC Vellore), seventeen and five MPH students, respectively, completed their programs. Eighteen students were given certificates for participating in the Workshop on 'Analysing Health and Medical Data using 'R'. Seven external students along with the 19 MPH students completed the short course on Ethics in Health Research.

Honors to Staff

Dr Biju Soman was nominated Member of the Project Management Committee (PMC) of the upcoming Centre-State Technology Transfer Institute (CSTTI) of Kerala State Council for Science, Technology and Environment. (KSCSTE). He was also nominated Member of the National Council of Pallium India, a charitable trust registered under the Societies Registration Act.

Honors to Students

Four MPH students of the 2012 batch (Tintu T James, Komal Raycha, Dinta Suresh, Suganthi J) were selected for two months' field placement in the Bielefeld University, Germany, during November –December 2013, supported by a grant received from the German Government. Two PhD students (Elezebeth Mathews and Tulsi Ram Bhandari) spent three months in the Bielefeld University under the Student Exchange Program, supported by the Bielefeld University.

WORKSHOP

In continuation of the ASCEND training program that concluded on August 01, 2013, there was a three day writing Workshop for the cohort one trainees of the ASCEND during August 2-5, 2013. The chief editor of the Asia Pacific Journal of Public Health Prof Wah Yun and Dr K R Thankappan were the key resource persons for the writing Workshop. Six trainees from the cohort one participated in the Workshop.

Dr V Raman Kutty, Professor, conducted a Workshop on 'Analysing Health and Medical Data using 'R' on 26-27 September. The Workshop was attended by 18 participants from outside the department - Ph D students from other departments of the Institute, Kerala University, Rajiv Gandhi Centre for Biotechnology, and Centre for Development Studies, as well as faculty (Dr Sarma and Dr Mala Ramanathan) and four senior MPH students.

SEMINAR

World No Tobacco Day

A two-day program on World No Tobacco Day was organized on May 30 and 31, including painting competition for school children and distribution of prizes to the winners by the Chief Minister of Kerala.

Vigilance Awareness Week

Dr K R Thankappan, in his capacity as Vigilance Officer, organized a seminar on "Promoting Good Governance - positive contribution of vigilance' in the seminar hall of AMCHSS on October 31, 2013. Dr D Babu Paul, former Chief Secretary, Government of Kerala, delivered the keynote address. Prof Jaganmohan Tharakan, Director, SCTIMST, presided over the meeting. The circular from the Chief Vigilance Commissioner, Government of India, was translated into local language, and both the English and Malayalam versions were uploaded on the Institute website.

AMC Seminars

Dr Murphy Halliburton from the Department of Anthropology, Queens College, and the Graduate Center, City University of New York (CUNY), USA, gave an AMC seminar on "Socio-cultural Factors in Recovery from Schizophrenia: Considering Kerala and the "Developing Country Advantage" in Treatment of Psychopathology" on 4th February 2014.

SHORT COURSES

A one-week course (17-24 June) on Basic Statistics for the students of Diploma in CVTS/ Neuro Nursing program was conducted by Ms Jissa VT. The objective of the course was to familiarize the participants with the basic concepts of Statistics to undertake a small clinical project as part of their program.

Basic Biostatistics Course

The 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 the course.

The objective of the course was to familiarize the participants with common statistical terminologies and design issues in biomedical and clinical research. Broad topics discussed in this course were descriptive statistics, design of studies, statistical inference, bias, 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 2013, this course was conducted twice. Dr V Raman Kutty and P S Sarma were the course instructors.

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 26-31, 2013. 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 audio visual-based cases and mock ethics review to achieve the goals. In all, 26 participants completed the course.

Table 2. List of PhD students
PhD Students who successfully completed their PhD in 2013-14
Meena Daivadanam (Guide Dr K R Thankappan)
PhD Students who joined in previous years and continued in the year 2013-14
Elezebeth Mathews (Guide Dr K R Thankappan)
Uma V Sankar (Guide Dr V Raman Kutty)
Rekha M Ravindran (Guide Dr V Raman Kutty)
Tulsi Ram Bhandari (Guide Dr V Raman Kutty)
Thankachi Yamini Ramachandran (Guide Dr T K Sundari Ravindran)
Neena Elezebeth Philip (Guide Dr T K Sundari Ravindran)
PhD students who joined in the year 2014
Devi N (Guide Dr K R Thankappan)
Sreejini J (Guide Dr T K Sundari Ravindran)

Table 3. List of MPH students

List of MPH students who successfully completed their MPH program in December 2013	
Sl No	Name
1	Vishal Raina
2	Merryson Roy Mathew
3	Remya. S
4	Komal Raycha
5	Suganthi. J
6	Kamaruddeen. M
7	Elsa Mary
8	Dinta Suresh
9	Ann Mary James
10	Shamim begam. N
11	Tintu. T. James
List of MPH students in the second year	
Sl No	Name
1	Joanna Sara Valson
2	Anna Ninan
3	Jayalakshmi Rajeev
4	Shammy Rajan
5	Anna Pius
6	Veena Saroji H
7	Anand T N
8	Priyanka.S
9	Jasmine Jomichen

10	Shilpa Nair S
11	Aravind L R
12	Kirti Sundar Sahu
13	Dona Boban
14	Kadam Sanjay Ramrao
15	Sunu .C. Thomas
16	Almas Shamim
17	Rohan Thakur
18	Parvathy Mini Pradeep

List of MPH students who joined in January 2014

Sl. No	Name
1	Bandagar Sanjay Babasaheb
2	Bevin Vinay Kumar V N
3	Prittty Titus
4	Aakshi Kalra
5	Minu Abraham
6	Souvik Pyne
7	Shreeporna Bhattacharya
8	Nayana E P
9	Peeyush
10	Tijo George
11	Aayam Gupta
12	Athulya Thomas
13	Shabna D S
14	Sambit Kumar Behera
15	Vishnu Nataraj

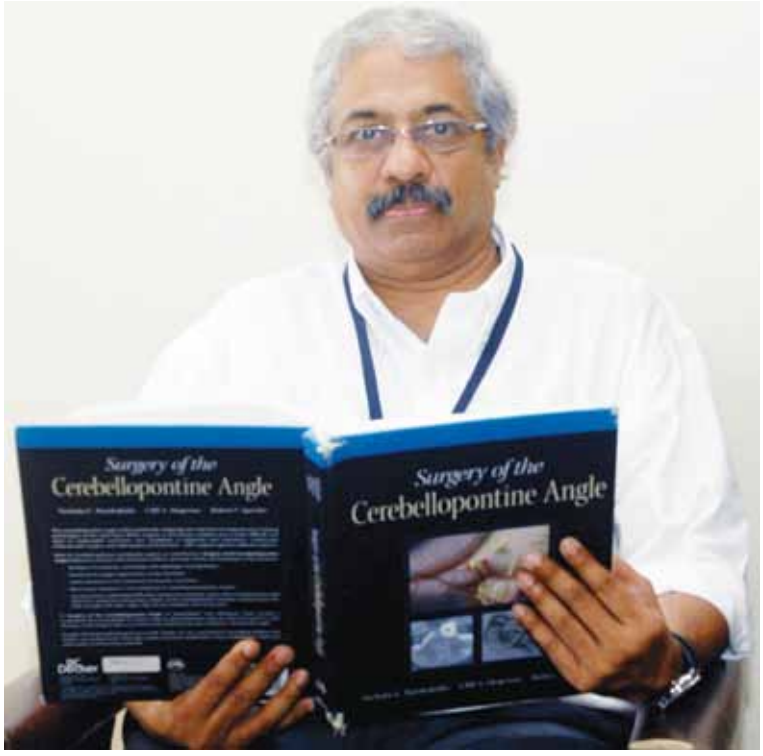
Table 4. List of DPH students

List of DPH students who completed the program in December 2013	
Sl No	Name
1	Shinde Vaibhav Dattatraya (Dr)
List of DPH students who joined in January 2014	
Sl. No	**Name**
1	Balasaheb Sarjerao Dawkar (Dr.)
2	Sunil Ankushrao Nakhate(Dr.)
3	Kakade Vinod Abasaheb(Dr.)
4	Avinash Pandharinath Patil(Dr.)
5	Gavhane Sanjeevani Chitambar (Dr.)

Table 5. Staff details

Sl No	Name and degree	Title
1	Dr K R Thankappan MD, MPH	Professor and Head
2	Dr V Raman Kutty MD, MPH	Professor
3	Dr T K Sundari Ravindran, PhD	Professor
4	Dr P Sankara Sarma PhD	Professor
5	Dr Mala Ramanathan PhD, MA	Additional Professor
6	Dr Biju Soman MD, DPH	Associate Professor
7	Dr K Srinivasan PhD	Associate Professor
8	Dr Ravi Prasad Varma MD	Assistant Professor
9	Dr Manju R Nair MBBS, MPH	Scientist C
10	Mrs VT Jissa MSc	Scientist B
11	Ms Jayasree Neelakantan	Upper Division Clert

ACADEMIC AFFAIRS



FROM THE DEAN'S DESK

"Knowledge isn't power unless it is applied"

Dale Carnegie

The year that has just gone by has been eventful and momentous for the academic section of Sree Chitra Tirunal Institute for Medical Sciences & Technology, Trivandrum. Be it a specialist surgeon, a lateral thinking doctoral scholar, a budding epidemiologist, a biotechnological genius, we have a course of study for each and everyone, helping them to scale greater heights. Our institution has been a 'torch bearer' in bringing together clinicians, basic scientists and public health experts under a single roof to mentor growing young minds.

It is with great pride that I mention the achievements of our senior resident doctors, doctoral scholars, public health scientists and students of various other courses of study. Our students are truly the "upper crust" of the academic elite, having been chosen through a very competitive selection procedure. In addition to the DM/MCh super-speciality courses, PDF programs, PhD courses, MPH, we also have MTech in Clinical Engineering in co-ordination with IIT Chennai and CMC Vellore. Our annual convocation this year was honored to have the presence of the Governor of Kerala, Her Excellency Smt. Sheila Dikshit, and our new Institute President, Shri K M Chandrasekhar.

We strive endlessly to re-invent our courses of study, their syllabi and offer not just knowledge and degrees, but scientific and worldly wisdom in its truest sense. Knowledge is power only when applied and we hope our efforts would make a significant difference to humankind. The future appears exciting and we look forward to many more academic courses and a larger, vibrant student and faculty force.

I gratefully acknowledge the Director, all Associate Deans, the Registrar, Deputy Registrar and all in the academic section for their contribution in making the process of teaching and learning such a memorable experience for all our students .I take this opportunity to recognize and appreciate the painstaking efforts of our faculty and the fervent zeal for excellence of our students which has taken this institute to a new high.

Prof Suresh Nair

DIVISION OF ACADEMIC AFFAIRS

The Institute is committed to the development of innovative post-graduate training programs in advanced medical specialties and biomedical engineering and technology, and to participate in public health reforms through research, training and interventions.

Post-doctoral programmes (DM/MCh/PDCC) are conducted in 14 disciplines. Post- Doctoral Fellowships (Post DM/MCh), organized by faculty trained in the concerned sub-specialty area, provide an excellent opportunity to obtain advanced training. The departments of Neurology, Cardiology, Neurosurgery and Cardiovascular and Thoracic Surgery offer the Post-Doctoral Fellowship. A total of 11 seats are available for these PDF programs. PhD, Master of Public Health, Diploma in Public Health and MPhil Biomedical Technology programs are conducted in the Institute. SCTIMST has been conducting eight medical technology-related diploma courses and two specialty-nursing courses.

The joint programmes of SCTIMST, IIT Madras and CMC Vellore – "MTech in Clinical Engineering" and "PhD in Biomedical Devices and Technology" address the issue of capacity building for reducing India's dependence on import of medical devices.

Affiliated programmes of the Institute offered at the National Institute of Epidemiology, Chennai, include: 1. Master of Public Health (Epidemiology and Health Systems), and 2. PG Diploma in HIV and Epidemiology (PGDHE). At the Christian Medical College, Vellore, the following courses are offered as affiliated programmes of the Institute.

1. Master of Science in Bioengineering
2. PhD in Bioengineering
3. Master of Public Health

PROGRAMMES ON OFFER - 2013

Post-doctoral courses	Ph.D./Master's	Other Programmes
1. DM Cardiology	16. PhD	Joint Programmes: 1. M Tech. (Clinical Engineering) 2. Ph.D. (Biomedical Devices and Technology) Affiliated Programmes with other Centres: 1. Master of Public Health (Epidemiology and Health Systems) - at NIE, Chennai 2. PG Diploma in HIV Epidemiology - at NIE, Chennai 3. M.S. (Master of Science in Bio- engineering) - at CMC, Vellore 4. Ph.D.--Bioengineering - at CMC, Vellore 5. Master of Public Health (MPH) - at CMC, Vellore
2. DM Neurology	17. Master of Public Health (MPH)	
3. DM Neuroimaging and Interventional Neuroradiology	18. M Phil (Biomedical Technology)	
4. DM Cardiothoracic & Vascular Anaesthesia	**Diplomas**	
5. DM Neuroanaesthesia	Cardiovascular & Thoracic Nursing	
6. MCh Cardiovascular & Thoracic Surgery	Neuro-Nursing	
7. MCh Vascular Surgery	Cardiac Laboratory Technology	
8. MCh Neurosurgery (after M.S)	Operation Theatre Technology	
9. MCh Neurosurgery-5-year course (after MBBS and 1 year Senior house surgency/ Residency in General Surgery)	Neuro-Technology	
10. Post-doctoral certificate course in Cardiothoracic and Vascular Anaesthesia	Advanced Medical Imaging Technology	
11. Post-doctoral certificate course in Neuroanaesthesia	Medical Records Science	
	Clinical Perfusion	
	Blood Banking Technology	
	Diploma in Public Health	
12. Post-doctoral certificate course in Cardiovascular Imaging and Vascular Interventional Radiology		

Post-doctoral courses	Ph.D./Master's	Other Programmes
13. Post-doctoral certificate course in Diagnostic Neuroradiology		
14. Post-doctoral certificate course in Vascular Surgery		
15. Post-doctoral Fellowship (Post DM/MCh./DNB*)		

**from MCI recognized institute*

Student Enrolment

The student strength for DM/MCh degree, Post-doctoral Certificate courses and post DM/MCh Fellowships during the year was 54. The Institute has, as of now, 82 students for the PhD programme and 4 students for the MPhil programme. The Master of Public Health program has 33 students. The Institute has 70 scholars for the various Nursing- and Technology-related Diploma programs. The affiliated programs at the NIE, Chennai, have enrolment of students for the MPH program and students for the PG Diploma program. The three affiliated programs at CMC, Vellore, have students on roll.

MOU/Agreement with foreign/international Institutions/Universities

1. An MOU for collaboration in education, research and technology was signed between the Institute at Osaka City University on 27th August 2013.
2. The existing MoU for academic and scientific research collaboration with NIT, Trichy, was extended for a further period of three years with effect from 4th August 2013.
3. An MoU with the Indian Institute for Information Technology and Management Kerala (IIITMK) was signed on 20th May 2013, recognizing IIITMK as a center for conducting PhD program of the Institute.

Convocation

The Annual Convocation of the 29th batch of graduates was held on 18th May 2013. The convocation address was delivered by the Chief Guest, Dr. K. Radhakrishnan, Chairman, Indian Space Research Organization.

64 graduants received degree.

Short-term training/ Observership

Candidates sponsored by Government/Autonomous Institutions/Health Sector organizations, approved medical/dental/nursing/engineering colleges, paramedical institutions were provided short-term training. The training/observership was arranged in consultation with the respective department/discipline and the time and duration of the training were decided. Observers from various institutions all over the country spent varying periods from one week to 3 months in different departments of the Institute.

National Science Day 2014 Celebrations

National Science Day 2014 was celebrated on 28th February 2014 in the Institute. Several science-related events were organized on the occasion of the National Science Day in the Institute premises. A large number of students participated in the competitions, including posters and essays, and the theme was "Fostering Scientific Temper".

Progressive use of Hindi

The Institute complied with the provisions relating to the Official Languages Act, Rules and Instructions and Directives of the Government of India.

During the year, various competitions were held for the employees in Hindi. Hindi Fortnight/Hindi Day was observed. 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 Town Official Language Implementation Committee meetings.

Library

The Hospital Wing library has a collection of 14974 books and 15668 back volumes of journals. During the current year, 270 books and 25 back volumes were added and 112 journals were subscribed to. The BMT Wing library has a collection of 10800 books and 6019 back volumes of journals. During the current year, 75 books and 64 journals and 1 database, Materials for Medical Devices Database were subscribed to.

Electronic access to most of the journals that are subscribed to was activated and is available in both the campuses. Digitization of theses and dissertations of the institute was completed and uploaded in the institutional repository.

Being part of the National Knowledge Resource Consortium, the library has access to full text articles of a number of journals in addition to those subscribed to.

The information management system and library automation are based on Microsoft SQL Server 2005. Library information is made available in the Internet.

Number of students awarded degree/Diploma During 2013-14

SL.No.	Name of Programme	Total Numbers	Remarks
1	DM	13	
2	MCh	9	
3	MPhil	10	
4	MPH	11	
5	PhD	9	
6	PDF	12	
7	PDCC	6	
8	DPH	1	
9	MPH	17	NIE Chennai
10	MPH	5	CMC Vellore
11	PhD	3	CMC Vellore

Number of students enrolled as on 31.03.2014

SL.No.	Name of Programme	Total Numbers	Remarks
1	DM	58	
2	MCh	30	
3	MPhil	5	
4	MPH	33	
5	PhD	82	
6	PDF	11	
7	PDCC	9	
8	DPH	4	

PUBLICATIONS

Books / chapters in books

- Balram S and Bhuvaneshwar GS. Commercialisation of Medical devices-A regulatory perspective. Regulatory Requirements for Drug Development and Clinical Research. Chapter 21, 269-293, ICMR 2013.
- Mira Mohanty, Sabareeswaran A, Sulekha Baby, Joseph Sebastian and Caroline S Diana (2013). Color Atlas of Tissue Response to Biomaterials. JayPee Publishers; New Delhi.
- Paul W, R Deepa, TV Anilkumar, and CP Sharma. Chitin and Chitosan Derivatives for Wound-Healing Applications. In Advances in Drug Discovery and Developments: Chitin and Chitosan Derivatives (Editor, Kim S). Chapter 14, New York, CRC Press, 2014 by Taylor & Francis Group, LLC, 243-257.
- Vibin M, Vinayakan R, Annie John and Annie Abraham, Microscopical Studies of Surface Functionalized Quantum dots for cellular imaging applications. Biomedical applications of Nanostructured Materials. pg 357-362.Macmillan publishers

Publication in journals

- Abhilash S, Namboodiri N. Reuse Potential of Pacemakers and Implantable Cardioverter-defibrillators - Some Real World Data. Indian Pacing Electrophysiol J 2013;13:99-100.
- Abhilash SP, Namboodiri N. Sudden cardiac death - Historical perspectives. Indian Heart J 2014;66S1:S4-S9.
- Ahmed K oloyo, Olusoga A Sofola, Chikodi N Anigbogu, Renuka R Nair, Harikrishnan S Vijayakumar and Adelaide C Fernandez. Testosterone reduces vascular relaxation by altering cyclic adenosine monophosphate pathway and potassium channel activation in male Sprague Dawley rats feda high salt diet. Ther ADV Cardiovasc Dis 2013; 7(2) 75-85 DOI:10.1177/1753944713479996.
- Alex SM, Sharma CP. Nanomedicine for gene therapy. Drug Delivery and Translational Research 2013; 3: 437-445.
- Aloysious N and Nair PD. Enhanced survival and function of islet like clusters differentiated from adipose stem cells on a three dimensional natural polymeric scaffold: An in vitro study. Tissue Engineering Part A. 2013; DOI:10.1089/ten.TEA.2012.0615. IF4.64.
- Amita R, Sandhyamani S, Unnikrishnan M. Extensive unilateral pulmonary tuberculosis with segmental atresia of peripheral bronchus. Lung India 2014; 31 (91): 94-5.
- Amita RN, Sandhyamani S, Balasubramoniam KR. Primary primitive neuroectodermal tumor of lung: a case report. Indian Journal of Pathology and Microbiology 2013; 56: 479-80.
- Amita R, Sandhyamani S, Unnikrishnan M, Kapilamoorthy TR. Moderately differentiated peripheral adenocarcinoma lung with cilia. International Journal of Surgical Pathology 2014; 22 (6): 540 –3.
- Amita R, Sandhyamani S, Abraham M, Nair S, Praveen A, Kapilamoorthy TR. Intracalvarial schwannoma – a case report with review of literature. Neurology India 2014; 62: 222 – 4.
- Anilkumar TV, Vineetha VP, Ravi D, Muhamed J, Rajan A. Biomaterial properties of cholecyst-derived scaffold recovered by a non-detergent/enzymatic method. J Biomed Mater Res Part B 2014;00B:000–000. IF 2.308.
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EXTERNALLY- AND INTERNALLY-FUNDED RESEARCH PROJECTS

Principal Investigator/ Responsibility	Project Title	Funded By	Total cost	Status
Dr. S.K. Jawahar	Tele Health & Medical Education	Planning Board, Government of Kerala	Rs. 3 lakhs	Ongoing
Dr. K. Jayakumar Ms. Molly Antony Dr. S.K. Jawahar	Clinical Application of Cryopreserved Homograft Valves in Cardiovascular Surgery	Technology Development Fund, SCTIMST	Rs. 8.96 lakhs	Ongoing
Dr Vidhu Bhatnagar Dr P Gayatri	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	SCTIMST	Rs.50000	Completed
Dr Josemine Davis Dr S Manikandan	The effect of Dexmedetomidine on cerebral blood flow and SjVO2 in patients with brain arteriovenous malformations' Prospective randomised control study"	SCTIMST	Rs. 50000	Completed
Dr Smita Vimala	'Comparison of propofol and servo fluorine induced burst suppression on cerebral blood flow and oxygenation'. status ongoing study.	SCTIMST	Rs. 45000	Completed

Principal Investigator/Responsibility	Project Title	Status
Dr. Shrinivas Dr. Rupa Sreedhar	Intraoperative changes in pulmonary venous Doppler flow profile before and after surgical closure of atrial septal defect.	Completed
Dr. Poornima Kasthuri, Dr. Rupa Sreedhar Dr. Krishnamurthy Dr. Shrinivas V.G.	Comparison of Sevoflurane and Desflurane when used for device procedures in Cardiac Catheterization laboratory	Completed
Dr.Omprakash.S Dr. Prasanta Kumar Dash Dr. Ru[pa Sreedhar	The Correlational Study Between Pa CO_2 - $ETCO_2$ gradient and Right Ventricular Outflow tract gradient in relation to Pulmonary blood flow in Patients with Tetralogy of Fallot, Pre and Post Intracardiac Repair	Completed

Principal Investigator/Responsibility	Project Title	Externally-funded project for technology development
Dr Shrinivas Gadhinglajkar R. Ravindrakumar (The Director, CDAC) Dr NiranjanKhambete Dr Rupa Sreedhar Biju C. Oommen (Additional Director, CDAC).	Development of Video Laryngoscope for Tracheal Intubation	Request for funding has been approved by the Department of Information Technology for an externally-funded project with the Centre for Development of Advanced Computing (CDAC), Vellayambalam, Trivandrum.
Principal Investigator/Responsibility	Project Title	Internally-funded project
Dr Shrinivas Gadhinglajkar Dr NiranjanKhambete Dr Rupa Sreedhar	Technology development of a portable resuscitation trolley	An industry-collaborated project for the design and manufacture of a portable resuscitation trolley with Lakshmi Technology and Engineering Industries Ltd, Coimbatore, Tamil Nadu. (TDF number P6037).

Principal Investigator/Responsibility	Project Title	Status
Dr Niranjan Khambete, Scientist F, SCTIMST Dr Shrinivas Gadhinglajkar	Technology development of a medical electrical safety analyzer	The product is now awaiting technology transfer.

Principal Investigator	Project Title	Funded By	Total cost	Duration	Status
	Disease-dependent changes in composition of human serum immune	Complexes; UGC, New Delhi		2008-2013.	
	Immune complex formation between dietary and microbial polysaccharides and anti-polysaccharide antibodies	C.S.I.R. New Delhi:		2010	ongoing
	Identification of extravascular human glycoconjugates recognized by human plasma anti-anti-carbohydrate antibodies.	C.S.I.R. New Delhi.		2012	ongoing
	LDL receptors on human macrophages	KSSTEC, Trivandrum		2013	ongoing

PI - Dr. Harikrishnan.S , Dept. of Cardiology: Co-investigator: Dr.N. Jayakumari, Dept. of Biochemistry	Coronary Artery Disease in the Young	KSCSTE, Govt. of Kerala		3 years	Ongoing
Dr. Kamalesh K Gulia, Scientist-D/ Neurophysiologist, Comprehensive Centre for Sleep Disorders, BMT Wing; Co-investigator: Dr.N. Jayakumari, Department of Biochemistry	Effects of short- and long-term administration of alpha-asarone on oxidative stress and anxiety alleviation in insomnia model in rats	C.S.I.R. New Delhi			Ongoing

Principal Investigator (PI) and Co-Investigators	Project Title	Funded By	Total cost	Duration	Status
Dr.Harikrishnan.S (PI) Dr.Bijulal. S Dr.Sanjay G	Pilot Study For Establishing Nationwide Network Of Registries On Management Of Acute Coronary Event (Mace Registry)	Indian Council for Medical Research	RS:100,000	1 Year	Sanctioned
Dr.Harikrishnan.S (PI) Dr.JaganmohanTharakan DrJayakumari.N Dr.Anugya Bhatt	Coronary Artery Disease In The Young	Kerala State Council for Science, Technology and Environment	RS. 1,300,000	3 Year	Completed
Dr.Harikrishnan.S (PI) Dr.Renuka Nair Dr.Mukund A Prabhu	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
DR.Harikrishnan S (PI) Dr.Sanjay G Dr.Anees.T	Comprehensive Heart Failure Intervention Program	ICMR – Indian Council for Medical Research	Rs. 5,415,301/-	2 Year	Ongoing
Dr JA Tharakan (PI) Dr K Jayakumar Dr Harikrishnan S Dr Sanjay G Dr Bijulal S DrKapilamoorthy	ISCHEMIA: International Study of Comparative Health Effectiveness With Medical and Invasive Approaches	National Institutes of Health, US & New York University Medical Centre		5 years	Site initiated.

Dr K R Thankappan (PI) Dr Sivasankaran DrRevi Prasad varma Rekha M Ravindran	Community Interventions for Health	Oxford Health Alliances	US$ 690,000	Until June 30 2016	Ongoing
Dr KR Thankappan (PI) Dr S Sivasankaran T Sathish NeenaPhiliph AnoopVelayudhan	Kerala Diabetes Prevention Program	National Medical And Health Research Council Australia	AU $ 1.03 Million	2011-2015	Ongoing
Dr Bijulal (PI) DrDeepa	Magnitude of ventricular unloading in single ventricle of left ventricular morphology following Bi- directional Glenn or Fontan operation –A 3D Echo cardio graphic study	Nil	Nil	1.5 year	Ongoing
Dr Venkiteswaran (PI) Dr Krishnamoorthy Dr Sivasankaran Dr Bijulal	Intermediate and short terms outcomes of Cribriform device closure of multiple atrial septal defects IEC 544/2014	Nil	nil	1 year	Ongoing
DrNileshpatel (PI) DrVenkiteswaran Dr Sivasankaran DrHarikrishnan S	Incremental value of three dimensional echo in rheumatic mitral stenosis	Nil	Nil	1year	Ongoing
DrAnees (PI) Dr Narayanan Namboothiri DrJagan Mohan Tharakan	Evaluation of protocol for suspected Channelpathy and Channelopathy registry	SCTIMST	150000	3 year	Ongoing

Principal Investigator (PI) and Co-Investigators	Project Title	Funded By	Total cost	Duration	Status
	Homograft Valve Bank project				
	Steroids in Cardiac Surgery	SCTIMST as part of international trial			
	Comprehensive Heart Failure Program				
	Mitochondrial metabolosim in diabetic hearts				

	Autophagy and its markers in human diabetic hearts				
	Autocrine and paracrine mechanisms in cardiac stem cell signalling following hypoxic injury				

Principal Investigator (PI) and Co-Investigators	Project Title	Funded By	Duration	Status
Dr. K Shivakumar	Molecular basis of cardiac fibroblast resistance to oxidative stress	Department of Biotechnology, New Delhi	3 years	Ongoing
Dr. K Shivakumar	Regulation of the cardiac fibroblast cell cycle by p44/42 MAPK	Indian Council of Medical Research, New Delhi	3 years	Ongoing
Dr. K Shivakumar	Molecular mechanisms in wound healing in the heart: Regulation of the cardiac fibroblast AT1 receptor	Department of Biotechnology, New Delhi	3 years	Just sanctioned
Dr. R.Renuka Nair	Autocrine and paracrine mechanisms in human resident cardiac stem cell signalling following hypoxic injury	Kerala State Council for Science Technology and Environment	3 years	Ongoing

Principal Investigator (PI) and Co-Investigators	Project Title	Funded By	Total cost	Duration	Status
Dr.C.Kesavadas	Self-Regulation of Broca's Area (right inferior frontal gyrus) using Real time fMRI in Post Stroke Aphasia patients	Funded by Department of Biotechnology, Govt. of India	Rs.9.01 lakhs	2 years	Completed
Dr.C.Kesavadas	Neurobiological Marker for Population Differences: A Neuroeconomic Investigation with Anxiety & Depression Patients contrasted with Normal Population	Department of Biotechnology, Govt. of India	Rs.7.61 lakhs	2 years	Completed
	OPTOSIS: Development of Portable Optical Brain-Computer-Interface and Orthosis for Movement Restoration after Stroke	Collaboration project with Germany, Turkey & Spain	Rs.35.82	3 years	

Principal Investigator (PI) and Co-Investigators	Project Title	Funded By	Status
	The Influence of Sleep Architecture on the Severity of Memory Disruption in Amnestic Mild Cognitive Impairment	Kerala State Council for Science, Technology and Environment	Ongoing
	Validation of memory fMRI paradigms and its utility in pre-surgical evaluation of patients with Refractory Temporal Lobe Epilepsy-(TLE)	Science and Engineering Research Board	
	Development and validation of a comprehensive clinical and neuropsychological battery for use in the Indian context for patients with Vascular Cognitive Impairment	Indian Council of Medical Research	
	The human brain mapping project: a resting state fMRI study of healthy controls and patients with mild cognitive impairment (MCI) & degenerative dementia of the Alzheimer's type (AD)	Cognitive Science Research Initiative	

Principal Investigator (PI) and Co-Investigators	Project Title	Funded By	Duration	Status
Dr P.N.Sylaja Dr Kasia Lipska	A study on Pre-diabetes and insulin resistance in patients with ischemic stroke and TIA	NIH, USA		Completed
Dr P.N Sylaja Dr Aneesh Singhal	Indo-US Collaborative Stroke Registry and Infrastructure Development	NIH and DB	2 years	Ongoing
Dr.P.N.Sylaja	International Stroke Perfusion Imaging Registry		3 years	Ongoing
Dr.P.N.Sylaja	Effectiveness of computer-based language therapy software (Malayalam version) for post-stroke patients with aphasia	Centre for Disability Studies, Government of India	2.5 years	Ongoing
Dr.P.N Sylaja	The ATTEND- Trial- Family led rehabilitation of stroke in India.	National Health and Medical Research Council of Australia	3 years	Ongoing

Principal Investigator (PI) and Co-Investigators	Project Title	Funded By	Total cost	Duration	Status
Dr Asha Kishore	Encoding of interhemispheric interactions in mirror dystonia: a window to the physiology of dystonia	Dystonia Medical Research Foundation, USA.	Rs. 40 Lakhs	2 years	Ongoing
Dr. Asha Kishore	Cerebellar modulation of the ventral premotor-motor cortex interaction in shaping the motor output	Center for Neurological Research of the Sal Petriere, Paris.	Rs. 4 Lakhs	2 years	Ongoing
Dr. Asha Kishore	Developing experimental therapeutics using Transcranial magnetic stimulation for Movement disorders	Center for Neurological Research of the Sal Peteriere, Paris	Rs 5 Lakhs	2 years	Ongoing
Dr Syam K	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)	Pre-proposal accepted by ICMR for funding.	Rs. 9.5 Lakhs	4 years	Initiated
Dr.Asha Kishore	Cerebellum and cortical Plasticity: The case of Dystonia.	Dystonia coalition NIH, ICMR	Rs.9.23 lakhs	2 years	Completed
Dr Asha Kishore	Identification of gene involved in restless leg syndrome by combining whole genome linkage and whole genome sequencing				Ongoing

Principal Investigator (PI) and Co-Investigators	Project Title	Funded By	Total cost	Status
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. Principal Investigator	Schering-Plough	5 Lakhs	Completed.

Principal Investigator (PI) and Co-Investigators	Project Title	Total cost	Duration	Status
Dr Asha Kishore	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.	Rs. 5 Lakhs	2 years	Ongoing
Dr. Asha Kishore	Elucidation of molecular interactions between autophagy and alpha-synuclein in a cell line with endogenous alpha-synuclein: relevance to Parkinson's disease	Rs 3 Lakhs	4 years	Ongoing
Dr. Asha Kishore	Study of factors that promote aggregation of alpha synuclein and their influence on the clearance mechanisms: relevance to sporadic Parkinson's disease.	Rs. 5 Lakhs	4 years	Ongoing
Dr Asha Kishore	Is dopamine deficiency the cause of reduced associative sensori–motor plasticity in healthy elderly?			Ongoing
Dr Asha Kishore	Evaluation of the role of abnormal cerebellar processing function in early stages of Parkinson's disease		1.5 years	Ongoing
Dr Asha Kishore	Ten year -outcome of bilateral subthalamic nucleus Deep Brain Stimulation in PD			Ongoing
Dr Syam K	Effect of bilateral subthalamic nucleus Deep Brain stimulation on Non-motor Symptoms in PD			Ongoing

Title	Principal Investigator	Funding agency	Status
International , randomized double-blind, controlled study of Rindopepimut / GM-CSF with adjuvant Temozolamide in patients with newly diagnosed surgically resected EGFR vIII positive glioblastoma	Suresh Nair	Celldex Therapeutics, Inc., 119 Fourth Avenue, Needham, MA 02494, USA	Pre screening
Hemodynamic imaging of intracranial aneurysms using computational fluid dynamics	Girish Menon	STEC, Govt of Kerala	Ongoing
Image processing for improving diagnostic accuracy in gliomas by magnetic resonance Imaging (MRI) and histopathology	Suresh Nair	STEC, Govt of Kerala	Ongoing
Multiple Drug Resistant Bacterial Biofilms on Implanted Catheters – A Reservoir of Infection	Easwer HV Pradeep Kumar		Ongoing
Preclinical animal studies on decellularised bovine pericardium as dural substitute Principal investigator	Girish Menon	TDF, SCTIMST	Ongoing
Developing an E Log for neurosurgical procedures	Girish Menon	Internal Faculty funding, SCTIMST	Ongoing

Principal Investigator (PI) and Co-Investigators	Project Title	Funded By	Total cost	Duration	Status
Dr. R. Jayasree, Dr. P.R. Harikrishna Varma, Dr. A.K. Gupta, Dr. P.V. Mohanan, Dr. S. Sandhyamani.	Synthesis, characterization and in vivo evaluation of novel iron oxide nano particles for organ specific molecular MR Imaging.	Board of Research In Nuclear Sciences (DAE, Govt. of India).	Rs. 60,00,000/-		Ongoing
Dr. Santhosh Kumar B. – Fast Track Fellow with Dr. S.Sandhyamani (Mentor) and Dr. R.S. Jayasree (Co-Investigator).	Fluorescence Optical biopsy: A novel diagnostic tool for rapid characterization of cancer biomarkers	DST-SERB Fast Track Scheme for Young Scientists	Rs. 25,00,000/-	3 years	Ongoing

Principal Investigator	Title	Funding Agency	Cost	Duration	Status
Dr. Lizymol P.P & Lt. Col (Dr) Manu Krishnan (INMAS) Project Coordinator : Dr. Kalliyana Krishnan V.	Development of a dental restorative based on inorganic organic hybrid resin for the prevention of Barodontalgia (Joint Collaborative Project with DRDO)	DRDO	19 Lakhs	3 Years	Newly initiated
Dr. A. Maya Nandkumar	Rapid UTI diagnostic kit with antibiotic sensitivity	DST	24.29 Lakhs		Newly initiated
Dr. T.V. Kumary	Adult Stem Cells As Alternate Cell Sources For Ocular Surface_Regeneration	DST	47 Lakhs	3 Years	Newly initiated
Dr. Anugya Bhatt	Do platelets in patients with type II diabetes release proteins which can activate aortic endothelial cells?" KSCSTE funded project	KSCSTE	22.90 Lakhs	3 Years	Newly initiated
Dr. V. Kalliyana Krishnan	Preclinical evaluation of tissue engineered skin substitute for diabetic wound healing	INTERNAL-INSTITUTE TDF	4.02 Lakhs	1 Year	Newly initiated
Mr. Rajkrishna Rajan	Intellectual Property Information Management System	INTERNAL-INSTITUTE TDF	2.34 Lakhs	1 Year	Newly initiated
Dr. Anil Kumar P.R.	Polymeric platform for developing 3D organotypic culture for in vitro toxicity evaluation	INTERNAL-INSTITUTE TDF	1.98 Lakhs	1 Year	Newly initiated
Dr. H.K..Varma	Synthesis of oxide based magnetic nanoparticles for biocompatibility studies, magnetic hyperthermia and MRI applications	DST	17 Lakhs	3 Years	Ongoing
Dr. Rekha M.R.	Nonviral gene delivery vectors for therapeutic gene and siRNA delivery for glioma targeting: In vitro evaluation of cationized pullulan based materials	DBT	36.11 Lakhs	3 Years	Ongoing

Dr. Chandra P Sharma	Development of nanodevices for DNA delivery and cell transfection using Elastin Like Polymers (ELPs) coupled to cell interaction motifs	DST	12 Lakhs	2 Years	Ongoing
Dr. Lissy K Krishnan	Differentiation of Circulating Adult Stem cells to Neurons for regenerative therapy of parkinsons disease and spinal cord injury models	DST	26.50 Lakhs	3 Years	Ongoing
Dr. P.P.Lizymol	Development of smart dental composites consisting of calcium containing resins and fillers	KSCSTE	14.65 lakh	3 year	Ongoing
Dr. Anoopkumar Thekkuveettil	Role of Transformation growth factor - alpha in neuronal growth and regeneration	KSCSTE	14.96 Lakhs	3 Years	Ongoing
Dr. Anil Kumar PR	Cell sheet engineering on electrospun scaffolds for efficient cell supply in skin tissue engineering	DST	19.44 Lakhs	3 Years	Ongoing
Dr Lissy Krishnan Dr V Kalliyanakrishnan Co PI	Bioengineered hybrid skin substitute for burn wounds	KSCSTE & HLL Lifecare, Trivandrum	27.00 Lakhs	3 Years	Ongoing
Dr. R.S.Jayasree	Detection of Zinc in epileptic condition using ratiometric fluorescent molecular probes	DBT	85.02 Lakhs	3 Years	Ongoing
Dr.R.S. Jayasree	Gold Nanorods for Targeted Phodynamic Therapy and Fluorescence Imaging	ICMR	41.00 Lakhs	3 Years	Ongoing
Project Coordinator and Principal PI : Dr Prabha D. Nair	Musculoskeletal Stem cells in tissue regeneration	DBT India and Danish Ministry of Science & Technology	637.89 Lakhs	4 Years	Ongoing
Dr Prabha D. Nair Co PI	Exploring the potential of Islet like cell aggregates generated from mesenchymal stem cells of human placenta for treating type I Diabetes in NOD mice by immunoisolation approach	DBT	80.81 Lakhs	3 Years	Ongoing

Dr Neethu Mohan – P.I and Mentor : Dr Prabha D. Nair	In vitro osteoarthritic model to evaluate the regenerative capability of implants or engineered constructs"	DST	18 Lakhs	3 Years	Ongoing
Dr Babitha S- P.I	An in vitro skin tissue engineering approach for evaluating the potential of hair follicle derived stem cells- implication to wound healing	DST	25 Lakhs	3 Years	Ongoing
Dr Bindu P Nair - DST INSPIRE Faculty- PI	Polymer Inorganic Hybrid Scaffolds with Cell Adherent Surfaces and Enhanced Mechanical Properties for Osteochondral Tissue Engineering	DST	83 Lakhs	5 Years	Ongoing
Dr Shiny Velayudhan PI Dr Prabha D. Nair Co PI	Controlled delivery of biological molecules using biodegradable microneedles	DBT	43.8 Lakhs	3 Years	Ongoing
Dr. TV Anilkumar	Development of Bio artificial skin grafts from mammalian derived scaffolds	DBT	45 Lakhs	3 Years	Ongoing
Dr K. Sreenivasan	Non-enzymatic Blood glucose measurement system	ICMR	46.34 Lakhs	3 Years	Ongoing
Dr C. Radhakumary	Visible light induced insitu gelling Multifunctional Hydrogels as Potential Wound Dressings'	DBT	39.80 Lakhs	3 Years	Ongoing
Dr Kamalesh K Gulia	The effects of maternal sleep deprivation on cognition in the offspring in an animal model	DST	42.47 Lakhs	3 Years	Ongoing
Dr Kamalesh K Gulia	To investigate the effects of short and long term administration of alpha-asarone on oxidative stress and anxiety alleviation in insomnia model in rats	CSIR	26.80 Lakhs	3 Years	Ongoing
Dr. Annie John (Co- PI)	Treatment of Large Segmental Bone Defects with Custom Made Triphasic Hydroxyapatite Scaffolds loaded with Autologous MSCs in children - Clinical Trial at CMC Vellore.	DBT	80 Lakhs	3Years	Ongoing

Dr. Annie John	Regeneration of Intervertebral discs – A tissue engineering approach.	KSCSTE	15.99 Lakhs	3 Years	Ongoing
Dr. PV. Mohanan	Molecular and immuno - toxicological effects of Dextran coated Ferrite and Hydroxylapitite nanomaterials	DST	49.40 Lakhs	3 Years	Ongoing
Dr. PV. Mohanan	In Vitro alternative test system development for Ocular Irritation	ICMR	40.11 Lakhs	3 Years	Ongoing
Dr. Anugya Bhatt	Role of platelet protein on endothelial cell and smooth muscle proliferation	Internal SCTIMST	1.5 Lakhs	3 years	Ongoing
Dr. Lissy Krishnan	In vitro differentiation of adipose derived mesenchymal stem cells for myocardial regeneration	Internal SCTIMST	1.5 Lakhs	3 years	Ongoing
Dr. Baju S. Dharan	Application of decellularised bovine pericardium for fabrication of a novel valved conduit for RVOT reconstruction in sheep model	INTERNAL-INSTITUTE TDF	9.91 Lakhs	3 years	Ongoing
Dr. Girish Menon	Preliminary evaluation of glutaraldehyde treated bovine pericardium for dura substitute application was sanctioned with as PI.	INTERNAL-INSTITUTE TDF	1.53 Lakhs	6 months	Ongoing
Dr.A.Sabareeswaran	Biphasic Hydroxyapatite based keratoprosthesis evaluation in a rabbit model	INTERNAL-INSTITUTE TDF	1.95 Lakhs	2 years	Ongoing
Dr. Sachin J Shenoy	Characterisation and documentation of baseline reference data of in house bred Ankamali Swine for application in Biomedical Research.	INTERNAL-INSTITUTE OHF	1.5 Lakhs	1 Year	Ongoing

Dr Annie John	Evaluation of tissue engineered Strontium incorporated hydroxyaapatite (SrHA) for the healing of Osteoporotic bone defect in sheep model.	INTERNAL-INSTITUTE OHF	2.5 Lakhs	3 Years	Ongoing
Dr Kaladhar Kamalasanan	Supported and preprogrammed brain nodules with regenerative capacity to treat Severe Spinal Cord Injury(SCI)	INTERNAL-INSTITUTE OHF	1.6 Lakhs	1 Year	Ongoing
D.S. Nagesh	Development of Paediatric and Neonatal Membrane Oxygenators and arterial filters	SIDD Lifesciences Ltd.	35.00 lakh	2 year	Ongoing
Dr Lissy Krishnan	Construction of tissue engineered blood vessel (TEBV) using adipose derived mesenchymal cells and evaluation of future translation into autologous use	INTERNAL-INSTITUTE OHF	2.5 Lakhs	2 Years	Ongoing
Dr.HK Varma	Pulsed laser coating of bioactive ceramic composite on titanium bone implants	KSCSTE	6.35 Lakhs	3 Years	Completed
Dr. Lissy K Krishnan	A Biomimetic approach to construct a tissue engineered autologous skin substitute from the circulating progenitor cells to treat diabetic wounds"	CSIR	10.33 Lakhs	3 Years	Completed
Dr A Maya Nandkumar	Epithelial -mesenchymal interactions in Tissue engineered hybrid artificial lung - role of angiogenic factors	DBT	46.10 lakh	3 year	Completed
Dr. TV Kumary	Differentiation of foetal progenitor cells and fabrication of a prototype of bioreactor for bioartificial liver	DBT	59.56 lakh	1 year	Completed

Dr. Anil Kumar PR	Development and Feasibility study of Polymeric Scaffolds for Tissue Culture Under Simulated Microgravity	Indian Institute for Space Science and Technology	25.00 lakh	3 year	Completed
Dr Lissy Krishnan	In vitro and Preclinical evaluation of curcumin released from biodegradable drug carriers	ICMR	15.00 lakh	2 year	Completed
Dr. R.S.Jayasree	Quantum dot conjugated single walled carbon nanotubes for imaging and therapy	DST	3.44 Lakhs	2 Years	Completed
Dr. R.S.Jayasree	Development of iron oxide Nanoparticle probes for organ specific molecular MR imaging	BRNS, DAE, Govt. of India	35.00 Lakhs	4.5 Years	Completed
Dr. M.Jayabalan	Dispensable and biodegradable polymeric bone cement for minimally invasive treatment of bone diseases – product validation	DST	32.07 lakh	3 year	Completed
Dr. Annie John	Cell-based Tissue-Engineered Fabrication of Osteochondral Constructs	DBT	45.34 Lakhs	5 Years	Completed
Dr Maya Nandkumar	Development of UTI Rapid diagnostic kit	INTERNAL-INSTITUTE TDF	1.96 Lakhs	18 months	Completed
Dr. Roy Joseph	Development of Mandibular Advancement Device for the Treatment of Obstructive Sleep Apnea	INTERNAL-INSTITUTE TDF	9.98 Lakhs	2 years 6 months	Completed
Dr. Roy Joseph	Pre-clinical evaluation of fluoropassivated and hydrogel sealed vascular graft	M/s. TTK Healthcare Ltd	36.70 Lakhs	3 Years 9 months	Completed

Principal Investigator/ Responsibility	Project Title	Funded By	Total cost	Duration	Status
K R Thankappan, P S Sarma S Sivasankaran Yamini Thankachi GK Mini Sreedevi Padmajam	Building Capacity for Tobacco Cessation in India and Indonesia	Fogarty International Centre of the National Institutes of Health	US $ 472,500	Five years Up to 30 June 2014	Ongoing
K R Thankappan S Sivasankaran Rekha M Ravindran C U Thresia	Community Interventions for Health	Oxford Health Alliance	US $ 690,000	Five Years Up to 31 March 2015	Ongoing
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 for all the countries	Five years up to June 30, 2015	Ongoing
K R Thankappan S Sivasankaran Sathish T Elezebeth Mathews Sajitha B	Kerala Diabetes Prevention Program	National Health and Medical Research Council, Australia	AUD 1.03 Million	Five years up to June 30, 2016	Ongoing
K R Thankappan Ravi Prasad Varma Mini GK Tintu James	Improving the Control of Hypertension In Rural India (CHIRI): Overcoming barriers to diagnosis and effective treatment.	GACD & the National Health and Medical Research Council Australia	200,000 AUD	Three years up to June 30, 2017	Ongoing
K R Thankappan V Raman Kutty TK Sundari Ravindran Biju Soman K Srinivasan	Advances in Research on Globally Accessible Medicine (AROGYAM)	ICSSR	21.6 lakhs	Three years up to June 2016	Ongoing
V Raman Kutty Mala Ramanathan	Impact of type 2 Diabetes on women's lives and wellbeing.	Women Component plan of DST	19.85 lakhs	Four years until June 30, 2015	Ongoing
TK Sundari Ravindran	'Research Initiative on factors influencing women's reproductive choices'.	The Ford Foundation, India	US$ 75,000	30 months starting October 2013	ongoing

Mala Ramanathan	Ethical analysis of maternal health and reproductive health outcomes using secondary data	NIH, USA	Rs.1,50,909	12 months, up to Feb 2015	Ongoing
TK Sundari Ravindran	Preparation of a Technical Guide on integration of gender, human rights and culture into the roll out of UNFPA Family Planning Strategy 2012-2020.	United Nations Population Fund, New York.	US$ 28,000	November 2013 – March 2014	completed
Biju Soman Manju Nair S Harikrishnan	Capacity Building for Women Health workers	Women Component Plan of DST	Rs 10 lakhs	Three years extended up to September30, 2013	Completed
Biju Soman PS Sarma	Health Impact of Use of Technology by women	Women Component Plan	Rs 20 lakhs	Three years extended up to September 30, 2013	Completed
Manju R Nair P S Sarma	Evaluation of the ASHA (accredited social health activist) component of the National Rural Health Mission (NRHM) Kerala	Government of Kerala (State Health Systems Resource Centre, Kerala)	Rs 9.40 lakhs	February 2013 to February 2014	Completed

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Ex-officio Principal Secretary
Executive Vice President, KSCSTE
Kerala State Council for Science, Technology and Environment
Sasthra Bhavan, Pattom,Thiruvananthapuram 695004
Kerala, INDIA.

Prof. Sneh Anand
Professor
Dept. of Biochemical Engineering
Indian Institute of Technology Delhi
Hauz Khas, New Delhi-110 016, INDIA.

Dr. Shyam Sundar
Professor of Medicine
Institute of Medical Sciences
Banaras Hindu University
Varanasi - 221 005 (India)

Dr. Jaganmohan A Tharakan
Director (In-charge)
Sree Chitra Tirunal Institute for Medical Sciences and Technology
Thiruvananthapuram - 695 011.

Shri. Neelakantan Nair O.S.
Ag.Head, Biomedical Technology Wing
Sree Chitra Tirunal Institute for Medical Sciences and Technology
Poojappura, Thiruvananthapuram - 695 012.

Dr. Unnikrishnan M.
Professor Of CVTS (Sr.Grade)
Sree Chitra Tirunal Institute for Medical Sciences and Technology
Thiruvananthapuram - 695 011.

Finance Committee Sctimst

Dr. K. Radhakrishnan (Chairman)
Director (upto 15.07.2013)
SCTIMST
Thiruvananthapuram

Dr. Jaganmohan A. Tharakan
(Chairman)
Director (from 16.07.2013)
SCTIMST
Thiruvananthapuram

Secretary to the Government of India
Ministry of Science and Technology
Technology Bhavan
New Mehrauli Road
New Delhi

Ms. Anuradha Mitra IDAS
Joint Secretary to Government of India &
Financial Advisor,
Department of Science and Technology
New Delhi

Dr. Chandra P. Sharma
Ag. Head (upto 28.02.2014)
BMT Wing, SCTIMST
Thiruvananthapuram

Mr. O.S. Neelakandan Nair
Ag. Head (from 01.03.2014)
BMT Wing, SCTIMST
Thiruvananthapuram

Ms. Shiny George Ambat
Financial Advisor (Ex officio Convener)
SCTIMST
Thiruvananthapuram

Building Committee Sctimst

Dr. K. Radhakrishnan
(Chairman)
Director (upto 15.07.2013)
SCTIMST
Thiruvananthapuram

Dr. Jaganmohan A. Tharakan
(Chairman)
Director (from 16.07.2013)
SCTIMST
Thiruvananthapuram

Secretary to the Government of Kerala
Health & Family Welfare
Thiruvananthapuram

Shri. K.N.S Nair
Head, Engineering Maintenance Division
VSSC (Retd.)
"Deepti", Kazhakuttam
Thiruvananthapuram

Dr. Chandra P. Sharma
Ag. Head (upto 28.02.2014)
BMT Wing, SCTIMST
Thiruvananthapuram

Mr. O S Neelakandan Nair
Ag. Head (from 01.03.2014)
BMT Wing, SCTIMST
Thiruvananthapuram

Mr. K.M Nair
Former Head CMD (Retd.)
VSSC/ISRO
(A member co-opted by the
Director as and when necessary)

Ms.Shiny George Ambat
Financial Advisor (Ex officio Convener)
SCTIMST
Thiruvananthapuram

Institutional Ethics Committee (Iec)

Shri. Justice M. R. Hariharan Nair
(Chairman)
'LIVRA-57', Link Valley
Kakkanad, Eranakulam,
COCHIN-682030

Director
SCTIMST
Thiruvananthapuram

Dr. C.P.Sharma
Acting Head, B.M.T. Wing
Poojappura, Thiruvananthapuram

Smt. J. Lalithambika I A S
"Abhilash", Golf links Road
Thiruvananthapuram -695041

Dr. K. A. Kumar
Koikkal, T.C. 13/598,
Near Ulloor Bridge, Pattom Palace P.O.
Thiruvananthapuram -695004

Dr. P.G. Premila
7 C, Kowdiar Manor
Jawahar Nagar
Thiruvananthapuram -695041

Dr. Rema M. N
"Manjush", Puthupally Lane
Medical College PO
Trivandrum-695011

Dr.M D Gupte
K 502, West End Village
Bhusari Colony, Paud Road
Kothrud, Pune– 411 038.

Dr. S. N. Pal
Flat No. B-607, ICON Apartments
Near Jal-Vayu Vihar,
Sector - CHI -3, Greater Noida,
PIN – 201310, INDIA

Dr. R V G Menon
H No: 22, Haritha
Kesavadev Road
Poojapura
Thiruvananthapuram-12

Dr. Meenu Hariharan
Abha, 20/167
7, No.8, Sasthri Nagar
Karamana,
Thiruvananthapuram – 695002

Dr.S.Sivasankaran
Professor
Dept.Cardiology
SCTIMST, Thiruvananthapuram

Dr.Anoop Kumar T.
(Member Secretary)
Scientist 'E'
Molecular Medicine
SCITMST, BMT Wing
Thiruvananthapuram

Ms.Sreepriya. C.S
(Coordinator)
Executive Secretary to Director .Cum . Ethics Committee Coordinator
SCTIMST, Thiruvananthapuram

Institutional Committee For Stem Cell Research (Icscr)

Shri. Justice M.R. Hariharan Nair
(Chairman)
'LIVRA-57' Link Valley
Kakkanad, Ernakulam , Cochin- 682030

Director
SCTIMST
Thiruvanathapuram

Head
Biomedical Technology Wing
Thiruvanathapuram

Dr. R. V. G. Menon
H.No.22, Haritha, Kesavadev Road,
Poojappura, Thiruvananthapuram-695012

Dr. Vikram Mathews
Professor of Clinical Hematology
Christian Medical College, Vellore 632004

Dr. Jackson James
Scientist-E1, Neurobiology Division
Rajiv Gandhi Center for Biotechnology
Thiruvananthapuram, 695014

Dr.K.Jayakrishnan
KJK Hospital
Thiruvananthapuram

Dr. Renuka Nair
Scientist 'G' (Sr.Grade) C M Cardiology
SCTIMST, Thiruvananthapuram

Dr.Prabha D Nair
(Member Secretary)
Scientist G, Division of Tissue Engineering & Regeneration Tech.
BMT Wing, SCTIMST, Thiruvananthapuram

Dr.Lissy K. Krishnan
Scientist G, Thrombosis Research Unit, BMT Wing
SCTIMST, Thiruvananthapuram

Dr. Anoop T,
Scientist F, Molecular Medicine, BMT Wing,
SCTIMST, Thiruvananthapuram

Ms.Sreepriya.C S (Coordinator)
Executive Secretary to Director.Cum.Ethics Committee Coordinator
SCTIMST, Thiruvananthapuram

STATEMENT OF ACCOUNTS

- Balance Sheet
- Income & Expenditure Account
- Schedules Forming Parts of Accounts
- Receipts & Payments Account of the year 2013-2014
- Provident Fund Account for the year ended 31.03.2014
- Accounts of NCMMR, Trivandrum
- Separate Audit Report

BALANCE SHEET AS AT 31ST MARCH 2014

		2013-14	2012-2013
CORPUS/CAPITAL FUND AND LIABILITIES	Schedules	[Rs.]	[Rs.]
CAPITAL FUND	1	2541256081	2584413442
RESERVES & SURPLUS	2	559945101	460849639
EARMARKED ENDOWMENT FUNDS	3	226864981	261440621
SECURED LOANS & BORROWINGS	4	0.00	0.00
CURRENT LIABILITIES & PROVISIONS	7	116638013	155141371
TOTAL		3444704177	3461845074
ASSETS			
FIXED ASSETS	8	1500549362	1476923022
INVESTMENTS FROM EARMARKED ENDOWMENT FUNDS	9	659715439	578801098
CURRENT ASSETS , LOANS, ADVANCES ETC.	11	1284439375	1406120953
MISCELLANEOUS EXPENDITURE (TO THE EXTENT NOT WRITTEN OFF)		0.00	0.00
TOTAL		**3444704177**	**3461845074**
SIGNIFICANT ACCOUNTING POLICIES	24		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25		

Sd/-
FINANCIAL ADVISOR

Sd/-
DIRECTOR

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2014

INCOME	Schedules	2013-14	2012-13
		[Rs.]	[Rs.]
Income from Sales / Services	12	793644742	488840451
Grants Received from Govt of India(Salary,General,Non Plan)	13	814805000	195919478
Fees/Subscription	14	6308905	6910864
Income from Investments (Income on Investment from earmarked/endow. Funds transferred to Funds)	15	43495498	23967405
Income from Royalty, Publication etc	16	184392	272560
Interest Earned	17	134094394	93326443
Other Income	18	25715672	18401941
Total		1818248603	827639142
EXPENDITURE			
Establishment Expenses	20	948316422	885686843
Other Administrative Expenses	21	783569405	607850584
Bank Charges	23	174730	189686
Depreciation (Net Total at the year-end-corresponding to Schedule 8)		146995944	143407167
Total		1879056501	1637134280
Balance being Excess Expenditure over Income		60807899	809495138
Add: Transfer to Special Reserve Account		62908664	60495283
BALANCE BEING DEFICIT CARRIED TO CAPITAL FUND		123716563	869990421
SIGNIFICANT ACCOUNTING POLICIES	24		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25		

Sd/-
FINANCIAL ADVISOR

Sd/-
DIRECTOR

SCHEDULES		
PARTICULARS	**2013-14**	**2012-13**
	[Rs.]	**[Rs.]**
SCHEDULE 1 - CORPUS/CAPITAL FUND		
Balance as at the beginning of the year	4044379953.35	4085196272.32
Less Depreciation up to the end of the previous year	1459935061	1316527893.36
Net balance at the beginning of the year	2584444892.05	2768668378.96
Add: Plan Grants received from Government of India	95893000.00	714190522.00
Add: Grants received from Others for Capital Assets(WCP)	0.00	0.00
Less:Contribution towards Corpus/Capital Fund	0.00	0.00
Deduct: Balance of net expenditure transferred from the Income and Expenditure Account	123716562.77	869990421.20
Less:Value of Assets Written off during the year	15365248	28455037.53
DeductTransfer to BMT/Add Transfer from CHO	0.00	0.00
BALANCE AS AT THE YEAR-END	2541256081.27	2584413442.23
SCHEDULE 2-RESERVES AND SURPLUS:		
1. Capital Reserve:		
As per last Account	0.00	0.00
Addition during the year	0.00	0.00
Less:Deduction during the year	0.00	0.00
2. Revaluation Reserve:		
As per last Account	0.00	0.00
Addition during the year	0.00	0.00
Less:Deduction during the year	0.00	0.00
3. Special Reserves:		
As per last Account	460849639	408563899.45
Addition during the year (Current year transfer- Increase in provision)	99095462.47	52285739.53
Less: Deductions during the year		
4. General Reserve:		
As per last Account	0.00	0.00
Addition during the year	0.00	0.00
Less: Deductions during the year	0.00	0.00
TOTAL	559945101.45	460849638.98
SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS		
a) Opening balance of the funds		
b) Additions to the funds:		
i. Donations/grants	0.00	0.00
ii. Income from Investments made on account of funds	0.00	0.00
iii. Other additions (Specify nature)	0.00	0.00
TOTAL (a+b)		
c) Utilisation / Expenditure towards objective of funds		
i. Capital Expenditure	0.00	0.00
- Fixed Assets	0.00	0.00
- Others	0.00	0.00
Total (Detailed Schedule Attached)		
ii. Revenue Expenditure		
- Salaries, Wages and allowances etc.	226864981.28	261440621.19
- Rent	0.00	0.00
- Other Administrative expenses	0.00	0.00
Total	226864981.3	261440621.19
TOTAL (c)		
NET BALANCE AS AT THE YEAR-END (a+b+c)	226864981.28	261440621.19

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS

Project Code	Name Of Grantee/Principal Investigator	FUND-WISE BREAK UP			TOTAL	FIXED ASSETS	
		OPENING BALANCE	ADDITIONS TO FUND				
			GRANTS	OTHER RECEIPTS			
5000	Proj-Miscellaneous	2568097.00	3984872.00	0.00	6552969.00	0.00	
5008	Dr.C.Kesavadas	10916.00	0.00	0.00	10916.00	0.00	
5033	Mph Programme	1480.00	0.00	0.00	1480.00	0.00	
5040	Proj. Dr.Asha Vijayaraghavan	1101754.70	0.00	0.00	1101754.70	0.00	
5055	Grant/Rockfeller Foundation,Usa	686120.00	0.00	0.00	686120.00	0.00	
5065	M.D.Pharma(Dr,Asha)	398586.50	0.00	0.00	398586.50	0.00	
5078	Project Grant/Dr Mala Ramanathan	5810.00	0.00	0.00	5810.00	0.00	
5082	T V Hemalatha/Healthawareness Program	127537.00	0.00	0.00	127537.00	0.00	
5088	Double Blind Placebo Cont. Parallel	63023.00	0.00	0.00	63023.00	0.00	
5091	Euro Reg. Of Epilepsy & Pregnancy	71796.00	0.00	0.00	71796.00	0.00	
5094	Kerala State Aids Control Society	41560.00	50000.00	0.00	91560.00	0.00	
5100	Amc/Mac Arthur Foundation/02-70546	46315.05	0.00	0.00	46315.05	0.00	
5103	Clinical Trial/Quintailspec/Dr.Radhakrishnan	314637.00	0.00	0.00	314637.00	0.00	
5108	Eval.Sub-Types Dementia/Dr.Mathura	15800.50	0.00	0.00	15800.50	0.00	
5110	Tobacco Cessation & Research / Dr.Thankap	4900282.94	4126406.00	5380.00	9032068.94	0.00	
5119	Stake Holder-Percept/Inst.Rev Bo	151589.73	0.00	0.00	151589.73	0.00	
5128	Indent. Of Macobacterial/Dst/V.V.Radhakrishn	136107.00	0.00	0.00	136107.00	0.00	
5130	Tele-Health & Medical Education/Jawahar	783854.00	0.00	0.00	783854.00	0.00	
5133	Community Based Intervention/Who	215059.00	0.00	0.00	215059.00	0.00	
5135	A 16-Week,Double Blind/Asha Kishore	1586036.00	0.00	0.00	1586036.00	0.00	
5137	Mechanism Of Anticancer/Dae, Brs	2761.00	0.00	0.00	2761.00	0.00	
5139	A 24 Week, Multicenter/Dr. Mathuranath	2602046.78	0.00	0.00	2602046.78	0.00	
5140	Harvard School Of Public Health	91794.32	0.00	0.00	91794.32	0.00	
5142	Banking For Better Health-Medisave	153911.36	0.00	0.00	153911.36	0.00	
5146	Development Of Spect	11026.00	0.00	0.00	11026.00	0.00	
5147	Development Of Spect	39137.00	0.00	0.00	39137.00	0.00	
5150	Protocol 6002-Int 001	326796.60	0.00	0.00	326796.60	0.00	
5153	Dev Ref. Manual For	155802.00	0.00	0.00	155802.00	0.00	
5155	Comm Based Detection	209315.00	0.00	0.00	209315.00	0.00	
5156	Tsunami Project	272266.50	0.00	0.00	272266.50	0.00	
5159	Ncd Risk Factor	71123.00	0.00	0.00	71123.00	0.00	
5160	Brain Maping & Basic Neurogenetic/Dr.P.S M	161154.00	0.00	0.00	161154.00	0.00	
5161	Dose Ranging Study:cghr	1754923.00	0.00	0.00	1754923.00	0.00	
5167	Proj/Survival Mechanism	209319.00	0.00	0.00	209319.00	0.00	
5168	Proj/Vermeer Study	1381616.00	0.00	0.00	1381616.00	0.00	
5170	Dr.Asha Kishore	1802261.00	0.00	0.00	1802261.00	0.00	

(Amount Rs)

UTILISATION						TOTAL EXPENDITURE	NET BALANCE
CAPITAL EXPENDITURE		REVENUE EXPENDITURE					
OTHERS	TOTAL	SALARIES /WAGES	RENT/ CONSUMABLES	OTHER ADMN EXP	SUB TOTAL		
0.00	0.00	3850583.00	962646.00	585341.00	5398570.00	5398570.00	1154399.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	10916.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1480.00
0.00	0.00	88800.00	0.00	18739.00	107539.00	107539.00	994215.70
0.00	0.00	0.00	0.00	0.00	0.00	0.00	686120.00
0.00	0.00	0.00	0.00	398586.50	398586.50	398586.50	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5810.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	127537.00
0.00	0.00	0.00	0.00	63023.00	63023.00	63023.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	71796.00
0.00	0.00	0.00	0.00	1090.00	1090.00	1090.00	90470.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	46315.05
0.00	0.00	0.00	0.00	314637.00	314637.00	314637.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	15800.50
0.00	0.00	1530878.00	825178.00	3311583.00	5667639.00	5667639.00	3364429.94
0.00	0.00	0.00	0.00	33378.00	33378.00	33378.00	118211.73
0.00	0.00	0.00	0.00	0.00	0.00	0.00	136107.00
0.00	0.00	180000.00	0.00	22907.00	202907.00	202907.00	580947.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	215059.00
0.00	0.00	187500.00	0.00	0.00	187500.00	187500.00	1398536.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	2761.00
0.00	0.00	0.00	0	0.00	0.00	0.00	2602046.78
0.00	0.00	0.00	0	0.00	0.00	0.00	91794.32
	0.00	0.00	0.00	0.00	0.00	0.00	153911.36
0.00	0.00	0.00	0.00	0.00	0.00	0.00	11026.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	39137.00
0.00	0.00	36000.00	250.00	0.00	36250.00	36250.00	290546.60
0.00	0.00	0.00	0.00	0.00	0.00	0.00	155802.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	209315.00
0.00	0.00	34500.00	0.00	0.00	34500.00	34500.00	237766.50
0.00	0.00	0.00	0.00	0.00	0.00	0.00	71123.00
0.00	0.00	0.00	0.00	161154.00	161154.00	161154.00	0.00
0.00	0.00	30000.00	0.00	315569.00	345569.00	345569.00	1409354.00
0.00	0.00	0.00	0.00	0.00	209319.00	209319.00	0.00
0.00	0.00	0.00	0.00	3026.00	3026.00	3026.00	1378590.00
0.00	0.00	180000.00	0.00	0.00	180000.00	180000.00	1622261.00

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS

Project Code	Name Of Grantee/Principal Investigator	FUND-WISE BREAK UP			TOTAL	FIXED ASSETS	
		OPENING BALANCE	ADDITIONS TO FUND				
			GRANTS	OTHER RECEIPTS			
5173	Dr.Dinesh Nayak	596561.00	0.00	0.00	596561.00	0.00	
5174	Changes In Sleep Wakefulness-Dr.Mohanku.	49317.00	0.00	0.00	49317.00	0.00	
5175	Surgical Trail In Lobar Intracerebral	39125.27	0.00	0.00	39125.27	0.00	
5176	Women Component Plan	59065.25	0.00	0.00	59065.25	0.00	
5180	Dr.Kannan Srinivasan	18308.00	0.00	0.00	18308.00	0.00	
5181	Dr.Asha Kishore	-14350.00	0.00	0.00	-14350.00	0.00	
5182	Dr.Sanjeev.V.Thomas	1432407.00	0.00	0.00	1432407.00	0.00	
5183	Dr.K.R.Thankappan	4654076.92	0.00	24253.00	4678329.92	0.00	
5184	Dr.Jawahar	1363238.00	500000.00	0.00	1863238.00	0.00	
5187	Dr.Sanjeev.V.Thomas	180586.00	0.00	0.00	180586.00	0.00	
5188	Dr.K.Radhakrishnan	175723.00	0.00	66574.00	242297.00	0.00	
5189	Dr.Harikrishnan	1012.00	0.00	0.00	1012.00	0.00	
5190	Dr.Malaramanathan	42210.00	0.00	0.00	42210.00	0.00	
5191	Dr.Asha Kishore	206378.00	461609.50	0.00	667987.50	0.00	
5192	Dr.K.R.Thankappan	271161.50	0.00	0.00	271161.50	0.00	
5193	Dr.Malaramanathan	71796.00	0.00	0.00	71796.00	0.00	
5194	Dr.K.R.Thankappan	863069.00	0.00	0.00	863069.00	0.00	
5198	Dr.Renuka Nair	14542.00	0.00	0.00	14542.00	0.00	
5199	Dr. Jayakumar	973627.00	896000.00	0.00	1869627.00	0.00	
5201	Dr.Asha Kishore	3839899.50	0.00	0.00	3839899.50	0.00	
5203	Study In Mri - Isir	45243.00	0.00	0.00	45243.00	0.00	
5205	Dr.Suresh Nair	213090.00	0.00	0.00	213090.00	0.00	
5207	Dr.Jaysree/A.K.Gupta	6692.00	0.00	0.00	6692.00	0.00	
5209	Dr.S.Harikrishnan	13040.00	0.00	0.00	13040.00	0.00	
5210	Dr.K.R.Thankappan	993906.00	0.00	0.00	993906.00	0.00	
5212	Dr.S.Harikrishnan	192733.00	155170.00	0.00	347903.00	0.00	
5213	Amc Fund	40923.00	0.00	3568399.00	3609322.00	0.00	
5214	Dr.Asha Gopinathan	47616.00	0.00	0.00	47616.00	0.00	
5216	Dr.Asha Kishore	1053692.10	0.00	0.00	1053692.10	0.00	
5217	Dr.K.Srinivasan	954577.50	0.00	0.00	954577.50	0.00	
5219	Dr.Biju Soman	1199511.00	0.00	1760.00	1201271.00	0.00	
5220	Dr.Biju Soman	760049.00	0.00	0.00	760049.00	0.00	
5221	Dr.V.Ramankutty	505017.00	0.00	9956.00	514973.00	0.00	
5224	Dr.C.Kesavadas	255020.00	300000.00	0.00	555020.00	0.00	
5226	Dr.G.Srinivas	693770.00	0.00	0.00	693770.00	0.00	
5227	Dr.Muralidharan Nair	737734.00	219819.00	15860.00	973413.00	0.00	
5228	Dr.S.Harikrishnan	557483.00	0.00	34.00	557517.00	0.00	

(Amount Rs)

UTILISATION						TOTAL EXPENDITURE	NET BALANCE
CAPITAL EXPENDITURE		REVENUE EXPENDITURE					
OTHERS	TOTAL	SALARIES /WAGES	RENT/ CONSUMABLES	OTHER ADMN EXP	SUB TOTAL		
0.00	0.00	0.00	0.00	596561.00	596561.00	596561.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	49317.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	39125.27
0.00	0.00	0.00	0.00	0.00	0.00	0.00	59065.25
0.00	0.00	0.00	0.00	0.00	0.00	0.00	18308.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-14350.00
0.00	0.00	630962.00	4400.00	125217.00	760579.00	760579.00	671828.00
0.00	0.00	185812.00	103183.00	2204136.00	2493131.00	2493131.00	2185198.92
0.00	0.00	0.00	0.00	676917.00	676917.00	676917.00	1186321.00
0.00	0.00	0.00	0.00	5141.00	5141.00	5141.00	175445.00
0.00	0.00	0.00	0.00	242297.00	242297.00	242297.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1012.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	42210.00
0.00	0.00	216667.00	135384.00	186143.00	538194.00	538194.00	129793.50
0.00	0.00	0.00	0.00	14424.00	14424.00	14424.00	256737.50
0.00	0.00	0.00	0.00	0.00	0.00	0.00	71796.00
0.00	0.00	20100.00	0.00	842969.00	863069.00	863069.00	0.00
0.00	0.00	0.00	0.00	8400.00	8400.00	8400.00	6142.00
0.00	0.00	440401.00	185458.00	0.00	625859.00	625859.00	1243768.00
0.00	0.00	65124.00	0.00	145464.00	210588.00	210588.00	3629311.50
0.00	0.00	0.00	0.00	0.00	0.00	0.00	45243.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	213090.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	6692.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	13040.00
0.00	0.00	0.00	0.00	10.00	10.00	10.00	993896.00
0.00	0.00	91290.00	198354.00	9585.00	299229.00	299229.00	48674.00
0.00	0.00	0.00	0.00	3609322.00	3609322.00	3609322.00	0.00
0.00	0.00	7903.00	0.00	39713.00	47616.00	47616.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1053692.10
0.00	0.00	0.00	0.00	0.00	0.00	0.00	954577.50
0.00	0.00	90000.00	4541.00	57566.00	152107.00	152107.00	1049164.00
0.00	0.00	40000.00	64386.00	5540.00	109926.00	109926.00	650123.00
0.00	0.00	33500.00	0.00	61341.00	94841.00	94841.00	420132.00
0.00	0.00	133120.00	49900.00	226782.00	409802.00	409802.00	145218.00
0.00	0.00	0.00	319510.00	17168.00	336678.00	336678.00	357092.00
0.00	0.00	248062.00	0.00	103687.00	351749.00	351749.00	621664.00
0.00	0.00	0.00	69999.00	487518.00	557517.00	557517.00	0.00

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS

Project Code	Name Of Grantee/Principal Investigator	FUND-WISE BREAK UP			TOTAL	FIXED ASSETS	
		OPENING BALANCE	ADDITIONS TO FUND				
			GRANTS	OTHER RECEIPTS			
5229	Dr.C.Kesavadas	220237.00	0.00	0.00	220237.00	0.00	
5232	Dr.Asha Kishore	387370.00	0.00	0.00	387370.00	0.00	
5233	Dr. Bejoy Thomas/Dr.C.Kesavadas	91.00	0.00	0.00	91.00	0.00	
5234	Dr.R.Asha Latha	794717.00	236359.00	25737.00	1056813.00	596689.00	
5235	Regulation Of The Cardiac Fibroblast C..	167889.00	631193.00	1184.00	800266.00	0.00	
5237	Kerala Diabetes Prevention Program(K-Dpp	5314255.18	3697730.73	50000.00	9061985.91	0.00	
5238	Improving Localization In Lesion Nega...	263916.00	0.00	0.00	263916.00	210000.00	
5240	Autocrine And Paracrine Mechanisms In ..	176154.00	319833.00	100000.00	595987.00	0.00	
5243	Steroids In Cardiac Surgery	1922559.00	128905.00	0.00	2051464.00	0.00	
5244	Molecular Basis Of Cardiac Fibroblast ..	959063.00	0.00	0.00	959063.00	0.00	
5245	Improving Localization In Lesion N..	1229912.00	400000.00	0.00	1629912.00	742383.00	
5246	Comprehensive Heart Failure	2974440.00	2465312.00	0.00	5439752.00	0.00	
5247	A Phase 3, 12-Week, Double Blind, Pla...	2108464.40	723521.70	0.00	2831986.10	0.00	
5248	A Phase 3, Double Blind, Placebo And A..	1263322.70	832501.80	0.00	2095824.50	0.00	
5249	Cnrs-Indo-French Project	594651.00	0.00	0.00	594651.00	0.00	
5250	Diabetes, Prediabetes And Insu	1734.00	0.00	0.00	1734.00	0.00	
5251	Neurobiological Marker Of Population D..	267283.00	0.00	0.00	267283.00	0.00	
5252	Indo-Us Collaberative Stroke	606373.00	0.00	0.00	606373.00	0.00	
5253	Indo-Swiss Symposium On Cohort	216139.00	0.00	0.00	216139.00	0.00	
5255	Privatization Of Healthcare	336910.50	0.00	0.00	336910.50	0.00	
5256	Healthy Life Style	3327826.00	1352818.00	14715.00	4695359.00	0.00	
5257	Pulmonary Hypertension,Bmprii	134404.00	0.00	0.00	134404.00	0.00	
5258	Determine The Brain Behaviour	32639.00	0.00	0.00	32639.00	0.00	
5259	Efficacy Of The Theta Burst	480846.00	0.00	1333.00	482179.00	0.00	
5260	Influence Of Sleep Architectur	427547.00	205360.00	38790.00	671697.00	0.00	
5261	Image Processing For Improving	182175.00	134035.00	0.00	316210.00	42525.00	
5262	Haemodynamic Imaging	852500.00	0.00	0.00	852500.00	748159.00	
5263	Mitochondria Specific Anti-Oxi	472743.00	450431.00	0.00	923174.00	0.00	
5264	Fluorescence Optical Biopsy	509677.00	700000.00	0.00	1209677.00	46725.00	
5265	Developing Physcian Education	0.00	0.00	463685.00	463685.00	0.00	
5266	Rapid Assessment Of The Scheme	36754.00	37235.00	0.00	73989.00	0.00	
5267	Evaluation Study Of The Asha	752000.00	0.00	0.00	752000.00	66500.00	
5269	Surveillance Of Jaundice	299700.00	0.00	0.00	299700.00	0.00	
5270	Estimation Of Autoantibodies -	0.00	274450.00	2900.00	277350.00	0.00	
5271	Development Of A Computer Based Language	0.00	191000.00	0.00	191000.00	0.00	
5272	Portable Optical Brain-Comp	0.00	2705400.00	0.00	2705400.00	0.00	
5274	Improving The Control Of Hypertension .	0.00	3879305.82	50000.00	3929305.82	0.00	

(Amount Rs)

UTILISATION						TOTAL EXPENDITURE	NET BALANCE
CAPITAL EXPENDITURE		REVENUE EXPENDITURE					
OTHERS	TOTAL	SALARIES /WAGES	RENT/ CONSUMABLES	OTHER ADMN EXP	SUB TOTAL		
0.00	0.00	65884.00	85137.00	8436.00	159457.00	159457.00	60780.00
0.00	0.00	0.00	0.00	143494.00	143494.00	143494.00	243876.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.00
0.00	596689.00	129245.00	90590.00	5367.00	225202.00	821891.00	234922.00
0.00	0.00	199447.00	169558.00	29285.00	398290.00	398290.00	401976.00
0.00	0.00	1090803.00	1261583.00	2983641.00	5336027.00	5336027.00	3725958.91
0.00	210000.00	23943.00	0.00	0.00	23943.00	233943.00	29973.00
0.00	0.00	54000.00	276224.00	199830.00	530054.00	530054.00	65933.00
0.00	0.00	0.00	0.00	1900535.00	1900535.00	1900535.00	150929.00
0.00	0.00	0.00	559721.00	117251.00	676972.00	676972.00	282091.00
0.00	742383.00	160467.00	2860.00	202281.00	365608.00	1107991.00	521921.00
0.00	0.00	1057005.00	0.00	491543.00	1548548.00	1548548.00	3891204.00
0.00	0.00	152140.00	30907.00	31790.00	214837.00	214837.00	2617149.10
0.00	0.00	0.00	0.00	56190.00	56190.00	56190.00	2039634.50
0.00	0.00	0.00	0.00	0.00	0.00	0.00	594651.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1734.00
0.00	0.00	208000.00	36367.00	0.00	244367.00	244367.00	22916.00
0.00	0.00	442194.00	78764.00	80051.00	601009.00	601009.00	5364.00
0.00	0.00	0.00	0.00	216139.00	216139.00	216139.00	0.00
0.00	0.00	0.00	0.00	9669.00	9669.00	9669.00	327241.50
0.00	0.00	0.00	40594.00	36556.00	77150.00	77150.00	4618209.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	134404.00
0.00	0.00	0.00	0.00	32639.00	32639.00	32639.00	0.00
0.00	0.00	192436.00	0.00	202351.00	394787.00	394787.00	87392.00
0.00	0.00	111463.00	256933.00	13681.00	382077.00	382077.00	289620.00
0.00	42525.00	120000.00	0.00	18500.00	138500.00	181025.00	135185.00
0.00	748159.00	0.00	0.00	83531.00	83531.00	831690.00	20810.00
0.00	0.00	169758.00	234499.00	103101.00	507358.00	507358.00	415816.00
0.00	46725.00	420000.00	0.00	124940.00	544940.00	591665.00	618012.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	463685.00
0.00	0.00	50000.00	0.00	20079.00	70079.00	70079.00	3910.00
0.00	66500.00	132960.00	0.00	206293.00	339253.00	405753.00	346247.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	299700.00
0.00	0.00	0.00	180400.00	0.00	180400.00	180400.00	96950.00
0.00	0.00	38400.00	0.00	34059.00	72459.00	72459.00	118541.00
0.00	0.00	81755.00	0.00	35.00	81790.00	81790.00	2623610.00
0.00	0.00	12419.00	29324.00	50035.00	91778.00	91778.00	3837527.82

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS

Project Code	Name Of Grantee/Principal Investigator	FUND-WISE BREAK UP			TOTAL	FIXED ASSETS	
		OPENING BALANCE	ADDITIONS TO FUND				
			GRANTS	OTHER RECEIPTS			
5275	Encoding Of Interhemispheric -	0.00	2124660.00	0.00	2124660.00	87000.00	
5276	Validation Of Fmri	0.00	500000.00	0.00	500000.00	0.00	
5277	Vascular Congnitive Impairment	0.00	365624.00	0.00	365624.00	0.00	
5278	Indo-German Symposium -	0.00	564520.00	19891.00	584411.00	0.00	
5279	Family Led Rehabilitation After Stroke..	0.00	123762.00	0.00	123762.00	0.00	
5280	Development Of A Technical Guide: Inte.. -	0.00	1717400.00	0.00	1717400.00	0.00	
5281	Ldl Receptor On Macrophages -	0.00	340400.00	0.00	340400.00	0.00	
5282	Indian –European Research	0.00	990000.00	136713.00	1126713.00	0.00	
5283	Research Initiative On Factors -	0.00	2583370.00		2583370.00	0.00	
6054	Proj/Dr Radhakrishnan Neurology	322454.54	0.00	0.00	322454.54	0.00	
6055	Movement/Dr. Asha Kishore	-324704.00	0.00	187500.00	-137204.00	3147824.00	
6058	Athiyanoor Sct Action/Dr.K.R.T	21006.00	0.00	0.00	21006.00	0.00	
6064	Speech Therapy	-883914.00	0.00	0.00	-883914.00	0.00	
6065	Comprehensive Centre For Sleep Dis Ord.	-2044123.00	0.00	258000.00	-1786123.00	1679767.00	
6068	Dr.Sajith.S	150000.00	0.00	0.00	150000.00	0.00	
6070	Dr.Bejoy Thomas/Dr.Gayathri.P	42366.00	0.00	0.00	42366.00	0.00	
6071	Dr.S.K.Jawahar	37644.00	0.00	0.00	37644.00	0.00	
6072	Comprehensive Stroke Care	-8952899.00	0.00	0.00	-8952899.00	0.00	
6073	Dr.Kiron.S	2119.00	0.00	0.00	2119.00	0.00	
6074	Dr.Divyata Fanjendr Hingwala	721.00	0.00	0.00	721.00	0.00	
6075	Dr.Bijulal.S	114755.00	0.00	420.00	115175.00	0.00	
6076	Scanning The Medical Records As Part ..	21448.00	800000.00	200.00	821648.00	0.00	
6077	Tac	-140000.00	0.00	0.00	-140000.00	0.00	
6078	Design & Development Of Minimally Inv...	90000.00	0.00	0.00	90000.00	0.00	
6079	Estimation Of Auto Antibodies	58447.00	0.00	0.00	58447.00	0.00	
6080	Comprehensive Pain Clinic	479500.00	0.00	0.00	479500.00	0.00	
6081	Validation Of A Clinical Proto	149100.00	0.00	0.00	149100.00	0.00	
6082	Nosocomial Infection	150000.00	0.00	0.00	150000.00	0.00	
6083	Comparison Manitol And Hes	6200.00	0.00	0.00	6200.00	0.00	
6084	Neuro Intervention Centre(Nic)	-894508.00	0.00	5539.00	-888969.00	83763.00	
6085	Prevalence- Metabolic Syndrom	41900.00	0.00	0.00	41900.00	0.00	
6086	Spp 1 Genotype	50000.00	0.00	0.00	50000.00	0.00	
6087	Autonomic Dysfunction	130500.00	0.00	1870.00	132370.00	0.00	
6089	The Effects Of Propofol	0.00	45000.00	0.00	45000.00	0.00	
6090	Study On The Effect Of Dexmede	0.00	45000.00	0.00	45000.00	0.00	
6091	Public Health Documentation -	0.00	842969.00	0.00	842969.00	0.00	
6092	Comparison Of Sevoflurane -	0.00	50000.00	0.00	50000.00	0.00	

(Amount Rs)

UTILISATION						TOTAL EXPENDITURE	NET BALANCE
CAPITAL EXPENDITURE		REVENUE EXPENDITURE					
OTHERS	TOTAL	SALARIES /WAGES	RENT/ CONSUMABLES	OTHER ADMN EXP	SUB TOTAL		
0.00	87000.00	128904.00	0.00	90123.00	219027.00	306027.00	1818633.00
0.00	0.00	65574.00	0.00	35.00	65609.00	65609.00	434391.00
0.00	0.00	78736.00	0.00	28746.00	107482.00	107482.00	258142.00
0.00	0.00	0.00	0.00	510411.00	510411.00	510411.00	74000.00
0.00	0.00	45000.00	0.00	1061.00	46061.00	46061.00	77701.00
0.00	0.00	185804.00	0.00	29121.00	214925.00	214925.00	1502475.00
0.00	0.00	107874.00	0.00	0.00	107874.00	107874.00	232526.00
0.00	0.00	0.00	0.00	192877.00	192877.00	192877.00	933836.00
0.00	0.00	0.00	0.00	1126.00	1126.00	1126.00	2582244.00
0.00	0.00	70000.00	0.00	252454.00	322454.00	322454.00	0.54
0.00	3147824.00	120000.00	0.00	1173.00	121173.00	3268997.00	-3406201.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	21006.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-883914.00
0.00	1679767.00	802010.00	0.00	13877.00	815887.00	2495654.00	-4281777.00
0.00	0.00	0.00	0.00	150000.00	150000.00	150000.00	0.00
0.00	0.00	0.00	19200.00	23166.00	42366.00	42366.00	0.00
0.00	0.00	0.00	0.00	37644.00	37644.00	37644.00	0.00
0.00	0.00	4776470.00	0.00	3768.00	4780238.00	4780238.00	-13733137.00
0.00	0.00	0.00	0.00	2119.00	2119.00	2119.00	0.00
0.00	0.00	0.00	0.00	721.00	721.00	721.00	0.00
0.00	0.00	0.00	5290.00	0.00	5290.00	5290.00	109885.00
0.00	0.00	422939.00	0.00	398709.00	821648.00	821648.00	0.00
0.00	0.00	250355.00	0.00	0.00	250355.00	250355.00	-390355.00
0.00	0.00	0.00	0.00	90000.00	90000.00	90000.00	0.00
0.00	0.00	0.00	57976.00	471.00	58447.00	58447.00	0.00
0.00	0.00	31500.00	0.00	0.00	31500.00	31500.00	448000.00
0.00	0.00	0.00	0.00	5610.00	5610.00	5610.00	143490.00
0.00	0.00	0.00	32972.00	66.00	33038.00	33038.00	116962.00
0.00	0.00	0.00	0.00	6200.00	6200.00	6200.00	0.00
0.00	83763.00	4997177.00	0.00	7538.00	5004715.00	5088478.00	-5977447.00
0.00	0.00	23320.00	0.00	0.00	23320.00	23320.00	18580.00
0.00	0.00	0.00	50000.00	0.00	50000.00	50000.00	0.00
0.00	0.00	0.00	16060.00	0.00	16060.00	16060.00	116310.00
0.00	0.00	0.00	8120.00	0.00	8120.00	8120.00	36880.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	45000.00
0.00	0.00	86400.00	0.00	9777.00	96177.00	96177.00	746792.00
0.00	0.00	0.00	49980.00	0.00	49980.00	49980.00	20.00

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS

Project Code	Name Of Grantee/Principal Investigator	FUND-WISE BREAK UP			TOTAL	FIXED ASSETS	
		OPENING BALANCE	ADDITIONS TO FUND				
			GRANTS	OTHER RECEIPTS			
6093	Evaluation Of Vascular Graft	0.00	149000.00	0.00	149000.00	0.00	
6094	Epce For Dvt Treatment -	0.00	90000.00	0.00	90000.00	0.00	
7101	Advance To P I	-57390.00	3033855.00	0.00	2976465.00	0.00	
7102	Amount Payable To Project Staff	2153.00	0.00	0.00	2153.00	0.00	
		61466530.34	44424827.55	5050693.00	110942050.89	7451335.00	
	Other Projects						
1014	New Pension Scheme	11281167.00		59390882.00	70672049.00	0.00	
1301	Employees Pension Fund	128220193.65		98092649.00	226312842.65	0.00	
1075	Patient Welfare Fund	3238891.35		743419.00	3982310.35	0.00	
1077	Institutional Ethics Committee Fund	7479068.00		4291551.00	11770619.00	0.00	
1078	Dr. Richard A Cash & Dr K Mohands Award	83066.00		0.00	83066.00	0.00	
1080	Staff Benevolent Fund	2120196.25		2257445.00	4377641.25	0.00	
1079	Vice Chancellors Conference Fund - Hospital	168437.00		35584.00	204021.00	0.00	
1081	Continuum - Special Cme Publication Fund - Hospital	51707.00		0.00	51707.00	0.00	
5000	Project Suspense	868782.00	617488.00	0.00	1486270.00	0.00	
5057	Dynamic Orthopaedic Pvt Ltd, Hydroxy	6787.55	0.00	0.00	6787.55	0.00	
5089	Detec & Treat Of Cancer By Laser	3959.00	0.00	0.00	3959.00	0.00	
6045	Role Of Platelet Proteins On The Endothe	146700.00	0.00	0.00	146700.00	88627.00	
7000	Miscelleneous Project	30944.09	0.00	0.00	30944.09	0.00	
7001	Pro;Sahajanand Vascu;Dr.Aurthur	3812642.75	454471.00	0.00	4267113.75	3708328.00	
7002	Dr.Toms Laboratory, Dr. K.Krishnan	13876.00	0.00	0.00	13876.00	0.00	
7003	Proj:d.S.T. Dr.P.V. Mohanan	2537.40	0.00	0.00	2537.40	0.00	
7004	Proj:atmrf:dr Lissy Krishnan	551.25	0.00	0.00	551.25	0.00	
7005	Project:dynamic Orthopaedics	13656.00	0.00	0.00	13656.00	0.00	
7006	Proj: D.S.T. D.S.Nagesh	183888.00	0.00	0.00	183888.00	0.00	
7008	Nmitli, Project C.S.I.R	295328.90	0.00	0.00	295328.90	0.00	
7009	Chitosan Based Wained Dressing	4761.75	0.00	0.00	4761.75	0.00	
7011	Dst-Fab: Clinically/Sig:shape Of Heva	213826.00	0.00	0.00	213826.00	0.00	
7014	Aurolab,Aravind Eye Hospital	13674.00	0.00	0.00	13674.00	0.00	
7015	Ttk.Healthcare.Development Of Valv	39424.00	0.00	0.00	39424.00	0.00	
7016	Indo-German Committee Meeting-Dst	5407.00	0.00	0.00	5407.00	0.00	
7017	Hindustan Latex.Evalu:blood Bag	1129180.50	0.00	0.00	1129180.50	0.00	
7018	All India Council For Techni:edu:sh	339919.00	0.00	0.00	339919.00	0.00	
7019	Dst.Niranjan	69847.00	0.00	0.00	69847.00	0.00	

(Amount Rs)

UTILISATION						TOTAL EXPENDITURE	NET BALANCE
CAPITAL EXPENDITURE		REVENUE EXPENDITURE					
OTHERS	TOTAL	SALARIES /WAGES	RENT/ CONSUMABLES	OTHER ADMN EXP	SUB TOTAL		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	149000.00
0.00	0.00	0.00	6317.00	0.00	6317.00	6317.00	83683.00
0.00	0.00	0.00	0.00	2980605.00	2980605.00	2980605.00	-4140.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	2153.00
0.00	7451335.00	25425584.00	6502565.00	27133634.50	59271102.50	66722437.50	44219613.39
0.00	0.00	0.00	0.00	159294.00		159294.00	7686826.05
0.00	0.00	0.00	0.00	105965167.00		105965167.00	120347675.65
0.00	0.00	0.00	0.00	159294.00		159294.00	3823016.35
0.00	0.00	0.00	0.00	11770619.00		11770619.00	0.00
0.00	0.00	0.00	0.00	27006.00		27006.00	56060.00
0.00	0.00	0.00	0.00	1909293.00		1909293.00	2468348.25
0.00	0.00	0.00	0.00	204021.00		204021.00	0.00
0.00	0.00	0.00	0.00	0.00		0.00	51707.00
							134433633.30
0.00	0.00	0.00	0.00	585776.00	585776.00	585776.00	900494.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	6787.55
0.00	0.00	0.00	0.00	0.00	0.00	0.00	3959.00
0.00	88627.00	0.00	171612.00	0.00	171612.00	260239.00	-113539.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	30944.09
0.00	3708328.00	0.00	0.00	0.00	0.00	3708328.00	558785.75
0.00	0.00	0.00	0.00	0.00	0.00	0.00	13876.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	2537.40
0.00	0.00	0.00	0.00	0.00	0.00	0.00	551.25
0.00	0.00	0.00	0.00	0.00	0.00	0.00	13656.00
0.00	0.00	0.00	0.00	2814.00	2814.00	2814.00	181074.00
0.00	0.00	0.00	0.00	295328.00	295328.00	295328.00	0.90
0.00	0.00	0.00	0.00	0.00	0.00	0.00	4761.75
0.00	0.00	0.00	0.00	0.00	0.00	0.00	213826.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	13674.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	39424.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5407.00
0.00	0.00	0.00	415084.00	15778.00	430862.00	430862.00	698318.50
0.00	0.00	0.00	0.00	0.00	0.00	0.00	339919.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	69847.00

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS

Project Code	Name Of Grantee/Principal Investigator	FUND-WISE BREAK UP			TOTAL	FIXED ASSETS	
		OPENING BALANCE	ADDITIONS TO FUND				
			GRANTS	OTHER RECEIPTS			
7020	Ifcpar-Dr.Jayakrishnan	188.00	0.00	0.00	188.00	0.00	
7022	Dst-Lbfdpsbc-Dr.Sharma	79385.00	0.00	0.00	79385.00	0.00	
7023	Dev: Hydro-Cephalus-Hindustan Latex	45510.00	0.00	0.00	45510.00	0.00	
7026	Dev.Heart Valve-Dst.Muralee	2522.00	0.00	0.00	2522.00	0.00	
7027	Sted-Dr T V Kumary-Invitro	5089.00	0.00	0.00	5089.00	0.00	
7029	Donerg/Life Science Board	6876.00	0.00	0.00	6876.00	0.00	
7031	Dbt/Dr P V Mohan/Dev Invitropyro	79064.00	0.00	0.00	79064.00	0.00	
7032	Dst. Dr. Annine/Bone Regeneration	29166.00	0.00	0.00	29166.00	0.00	
7033	Biofunctional Evaluation Dr. Umasanker	72581.00	0.00	0.00	72581.00	0.00	
7034	Dst. Dr. Nirmala Rachel	14664.00	0.00	0.00	14664.00	0.00	
7035	Dst-H.K.Varma	95433.00	0.00	0.00	95433.00	0.00	
7036	Invitro Hemo Campability/ Dr. Lissy	-16905.00	0.00	0.00	-16905.00	0.00	
7037	Invivo Evaluation/ Sted/Dr. Lissy	6205.00	0.00	0.00	6205.00	0.00	
7039	Jnc/Asr/Dr. Mohanan/Study Of Accute…..	44684.00	0.00	0.00	44684.00	0.00	
7040	Biomed/ C.V. Muraleedharan	44000.00	0.00	0.00	44000.00	0.00	
7041	Csir-Grant-Asha S Mathew,Phd Student	55973.00	0.00	0.00	55973.00	0.00	
7042	Csir-Grant-Bernadette K. Madathil,Phd	25870.00	0.00	0.00	25870.00	0.00	
7043	Csir-Grant-Sailaja.G.S.Srf	9067.00	0.00	0.00	9067.00	0.00	
7044	Lisi No Trial Trial Merind	21672.65	0.00	0.00	21672.65	0.00	
7045	Nirmala Rachel, Csir	14063.00	0.00	0.00	14063.00	0.00	
7047	U.G.C. Grant- Research Fellow	300935.00	0.00	0.00	300935.00	0.00	
7048	Csir Grant- Josena Joseph	47473.00	0.00	0.00	47473.00	0.00	
7049	Csir Grant - Mary Varghese	35837.00	0.00	0.00	35837.00	0.00	
7050	Interest-Project Account	0.00	2166554.00	0.00	2166554.00	0.00	
7051	Csir Grant - Manitha B Nair	12062.00	0.00	0.00	12062.00	0.00	
7052	Dbt/Dr.Prabha/Dev. Of Temp - Res - Co-Oply	-229010.25	0.00	0.00	-229010.25	0.00	
7053	Dr.Sreenivasan/Devel.Of Temp.Res.Co-Oply	22619.00	0.00	0.00	22619.00	0.00	
7054	Dst-Dr.Anoop-Diff:expr:rat Brain……	44434.00	0.00	0.00	44434.00	0.00	
7055	Csir-Nmitli Scheme-C.V.Muraleedharan	756552.00	0.00	0.00	756552.00	0.00	
7056	D.S.T.Royjoseph, Bone Graft Sub:spinal	110047.00	0.00	0.00	110047.00	0.00	
7057	Dst - Project.Dr.Jayabalan	14471.00	0.00	0.00	14471.00	0.00	
7059	Dbt-Dr. Prabha D Nair, Islet Immun…..	67574.00	0.00	0.00	67574.00	0.00	
7060	Icmr Project/ Sudhakar Muthalee	119392.00	81645.00	0.00	201037.00	0.00	
7061	Dr. Umasankar/Prelimi:evalu:biodegradable	241.00	0.00	0.00	241.00	0.00	
7062	Dr. Lizy-Sahaja:eva "Stent"Invitro…..	102361.00	0.00	0.00	102361.00	0.00	
7063	Dr.P.V.Mohan, Shajanad	-10824.00	0.00	0.00	-10824.00	0.00	
7065	Dr.T.V.Kumari, Dbt.Biogene	38659.00	0.00	0.00	38659.00	0.00	

(Amount Rs)

UTILISATION						TOTAL EXPENDITURE	NET BALANCE
CAPITAL EXPENDITURE		REVENUE EXPENDITURE					
OTHERS	TOTAL	SALARIES /WAGES	RENT/ CONSUMABLES	OTHER ADMN EXP	SUB TOTAL		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	188.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	79385.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	45510.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	2522.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5089.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	6876.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	79064.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	29166.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	72581.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	14664.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	95433.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-16905.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	6205.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	44684.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	44000.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	55973.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	25870.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	9067.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	21672.65
0.00	0.00	0.00	0.00	0.00	0.00	0.00	14063.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	300935.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	47473.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	35837.00
0.00	0.00	0.00	0.00	2166554.00	2166554.00	2166554.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	12062.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-229010.25
0.00	0.00	0.00	0.00	0.00	0.00	0.00	22619.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	44434.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	756552.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	110047.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	14471.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	67574.00
0.00	0.00	76645.00	0.00	0.00	76645.00	76645.00	124392.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	241.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	102361.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-10824.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	38659.00

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS

Project Code	Name Of Grantee/Principal Investigator	FUND-WISE BREAK UP			TOTAL	FIXED ASSETS	
		OPENING BALANCE	ADDITIONS TO FUND				
			GRANTS	OTHER RECEIPTS			
7067	Dbt.Dr.Jayabalan,Dev:&Studies…..	-27459.00	0.00	0.00	-27459.00	0.00	
7069	Vssc - Project. D.S. Nagesh	162627.00	0.00	0.00	162627.00	0.00	
7070	Cho Project - 5146 Jayasree	-872.00	0.00	0.00	-872.00	0.00	
7071	Stec-Project: Dr.Maya Nandkumar	-2164.00	0.00	0.00	-2164.00	0.00	
7072	Sahajanand Med.Tech. C.V.Muralidharan	76292.00	0.00	0.00	76292.00	0.00	
7073	Study Project:dr.P.V.Mohanan	-95386.00	0.00	0.00	-95386.00	0.00	
7074	Study Project: Clri- Dr.Mohan	289303.00	0.00	0.00	289303.00	0.00	
7075	Study Project - Biosync Sci	11935.00	0.00	0.00	11935.00	0.00	
7076	Arrow International : Dr.Umashankar	399773.00	0.00	0.00	399773.00	0.00	
7077	Umhou Senembyu:dr.Umashankar	603714.00	0.00	0.00	603714.00	0.00	
7079	D.B.T.Dr.Sreenivasan,Designning.... - Bmt Project	-186.00	0.00	0.00	-186.00	0.00	
7080	Dbt-Dr.Maya- Tissue Engineering Hybrid	-391887.00	0.00	0.00	-391887.00	0.00	
7081	Usv Ltd. Mumbai - Dr.Mohan	88349.00	0.00	0.00	88349.00	0.00	
7082	Indo-Us Joint Project	878.00	0.00	0.00	878.00	0.00	
7083	Arrow Haemo Dialysis	30882.00	0.00	0.00	30882.00	0.00	
7085	Dr.R.V.Thampan - Csir	26381.00	0.00	0.00	26381.00	0.00	
7086	Hormone Releasing Intra Devices	-86027.00	0.00	0.00	-86027.00	0.00	
7087	Csir - Kaladhar - St	39103.00	0.00	0.00	39103.00	0.00	
7090	Proj/7090/Tissue Engineers Vascular	411977.00	0.00	0.00	411977.00	0.00	
7092	Proj/7092/Sea Food	98387.00	0.00	0.00	98387.00	0.00	
7093	Proj/7093/Csir Grant-Lpa	73396.00	0.00	0.00	73396.00	0.00	
7095	Proj/7095/Csir Grant-Viola.B.Morris	22072.00	0.00	0.00	22072.00	0.00	
7097	Proj/7097/Accelerated Ageing	2042224.00	0.00	0.00	2042224.00	0.00	
7098	Proj/7098/Evaln Of Ntu Drug	1201985.00	0.00	0.00	1201985.00	750000.00	
7099	Proj/7099/Bcl	7011.00	0.00	0.00	7011.00	0.00	
7100	Proj/7100/Itr Programme	4079.00	0.00	0.00	4079.00	0.00	
7101	Proj/7101/Csir/Sonia.T.A	2650.00	0.00	0.00	2650.00	0.00	
7103	Proj/7103/Csir/Vidyaraj	5682.00	0.00	0.00	5682.00	0.00	
7104	Proj/7104/Csir/Renjith.P.Nair	22286.00	223360.00	0.00	245646.00	0.00	
7105	Proj/7105/Csir/Arjun Namboodiri	26821.00	0.00	0.00	26821.00	0.00	
7107	Proj/7107/Csir/Neena & 2 Fellows	34863.00	255937.00	0.00	290800.00	0.00	
7108	Proj/7108/Csir/Francis.B.Fernandez	43469.00	279200.00	0.00	322669.00	0.00	
7109	Proj/7109/Csir/Tara.S	83692.00	0.00	0.00	83692.00	0.00	
7110	Proj/7110/Csir/Deepa.R	30057.00	279198.00	0.00	309255.00	0.00	
7111	Proj/7111/Csir/Sheeja Liza Easo	12264.00	186170.00	0.00	198434.00	0.00	
7112	Proj/7112/Icmr/Jaseer Mohammed	24480.00	254720.00	24140.00	303340.00	0.00	

(Amount Rs)

UTILISATION						TOTAL EXPENDITURE	NET BALANCE
CAPITAL EXPENDITURE		REVENUE EXPENDITURE					
OTHERS	TOTAL	SALARIES /WAGES	RENT/ CONSUMABLES	OTHER ADMN EXP	SUB TOTAL		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-27459.00
0.00	0.00	9152.00	0.00	0.00	9152.00	9152.00	153475.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-872.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-2164.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	76292.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-95386.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	289303.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	11935.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	399773.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	603714.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-186.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-391887.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	88349.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	878.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	30882.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	26381.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-86027.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	39103.00
0.00	0.00	0.00	0.00	281473.00	281473.00	281473.00	130504.00
0.00	0.00	0.00	47213.00	49181.00	96394.00	96394.00	1993.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	73396.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	22072.00
0.00	0.00	96407.00	57511.00	136225.00	290143.00	290143.00	1752081.00
0.00	750000.00	0.00	0.00	0.00	0.00	750000.00	451985.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	7011.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	4079.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	2650.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5682.00
0.00	0.00	207360.00	38286.00	0.00	245646.00	245646.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	26821.00
0.00	0.00	237600.00	8514.00	0.00	246114.00	246114.00	44686.00
0.00	0.00	259200.00	0.00	46475.00	305675.00	305675.00	16994.00
0.00	0.00	43200.00	0.00	36481.00	79681.00	79681.00	4011.00
0.00	0.00	259200.00	0.00	1588.00	260788.00	260788.00	48467.00
0.00	0.00	172800.00	8528.00	11300.00	192628.00	192628.00	5806.00
0.00	0.00	259200.00	0.00	18032.00	277232.00	277232.00	26108.00

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS

Project Code	Name Of Grantee/Principal Investigator	FUND-WISE BREAK UP			TOTAL	FIXED ASSETS	
		OPENING BALANCE	ADDITIONS TO FUND				
			GRANTS	OTHER RECEIPTS			
7113	Proj/7113/Kscste/Rathikala	16886.00	300323.00	0.00	317209.00	0.00	
7200	Joint Programe/M.Tech	831961.00	0.00	19009.00	850970.00	0.00	
7210	Proj/7210/Csir/Soma Dey	87395.00	279200.00	0.00	366595.00	0.00	
7220	Cost Of Animal Feed	1796561.00	227277.00	272126.00	2295964.00	0.00	
7230	Proj/7230/Csir/Manju.S	12421.00	0.00	0.00	12421.00	0.00	
7240	Proj/7240/Csir/Sunitha Chandran	12594.00	279200.00	0.00	291794.00	0.00	
7250	Proj/7250/Csir/Kiran.S.Nair	10532.00	186133.00	0.00	196665.00	0.00	
7260	Proj/7260/St0x083y09/Dr.P.V.Mohanan	171352.00	0.00	0.00	171352.00	0.00	
7270	Proj/7270/Kscste/Mayuri.P.V.	84300.00	0.00	0.00	84300.00	0.00	
7280	Proj/7280/Csir/Susan.M.Alex	20583.00	279200.00	0.00	299783.00	0.00	
7290	Proj/7290/Csir/Rakhi.A	22603.00	0.00	0.00	22603.00	0.00	
7300	Proj/7300/Csir/Ariya Saraswathy	13104.00	0.00	0.00	13104.00	0.00	
7310	Pharmacokinetic Evaluation Of Miv-Dr.Uma	448400.00	0.00	0.00	448400.00	0.00	
7320	90 Day Sub-Chronic Toxicity -Dr.P.V.Mohanan	310674.00	0.00	0.00	310674.00	0.00	
7330	Y.M.Thasneem - Ugc Grant	19065.00	287200.00	0.00	306265.00	0.00	
7350	Ugc Grant - Laxmi.R.Nair - Bmt Project	38200.00	245400.00	0.00	283600.00	0.00	
7360	Mammalian Bone Chromosome-Dr. P. V. Mohanan	266292.00	0.00	0.00	266292.00	0.00	
7370	Validation Of Eto Sterilsation System-	183097.00	0.00	0.00	183097.00	0.00	
7375	Icmr Project- Ms. Renu Ramesh	0.00	139600.00	0.00	139600.00	0.00	
7385	Csir Grant - Caroline Diana Sherly	0.00	149388.00	0.00	149388.00	0.00	
7390	Toxicity Study Of Materials Dr. P V Mohanan	0.00	422800.00	0.00	422800.00	0.00	
7395	Raisng Antibodies In Rabits - Dr V.S. Harikrishnan	0.00	112855.00	13794.00	126649.00	0.00	
7400	Csir Grant :Shaiju S Nazeer	0.00	255236.00	29040.00	284276.00	0.00	
7401	Csir Grant - Mr Rajesh	0.00	278455.00	0.00	278455.00	0.00	
7402	Proof Of Concept Study - Dr Uma Shankar	0.00	114776.00	0.00	114776.00	0.00	
7403	Icmr Grant - Parvathy R S	0.00	129373.00	0.00	129373.00	0.00	
7404	Biofunctional And Histilo - Dr Uma Shankar	0.00	579407.00	0.00	579407.00	0.00	
7405	In Vitro Evaluation Of Cell- Dr T V Kumar	0.00	68158.00	0.00	68158.00	0.00	
7406	Csir Grant - R Arathi	0.00	353344.00	0.00	353344.00	0.00	
8001	Proj/8001/Program Support &Tissue	378698.00	0.00	57659.00	436357.00	17862.00	
8002	Proj/8002/Program Support & Tissue	-113437.00	0.00	455938.00	342501.00	0.00	
8003	Proj/8003/Program Support & Tissue	816153.00	0.00	0.00	816153.00	0.00	
8004	Proj/8004/Program Support & Tissue	-278345.00	0.00	0.00	-278345.00	0.00	
8005	Proj/8005/Program Support & Tissue	213350.00	0.00	0.00	213350.00	0.00	
8006	Proj/8006/Bioconjugation Nano Mat.	-226843.00	0.00	0.00	-226843.00	0.00	
8008	Proj/8008/Csir Grant-Padmaja.P.Nambi	12990.00	0.00	0.00	12990.00	0.00	

(Amount Rs)

UTILISATION						TOTAL EXPENDITURE	NET BALANCE
CAPITAL EXPENDITURE		REVENUE EXPENDITURE					
OTHERS	TOTAL	SALARIES /WAGES	RENT/ CONSUMABLES	OTHER ADMN EXP	SUB TOTAL		
0.00	0.00	38839.00	20758.00	0.00	59597.00	59597.00	257612.00
0.00	0.00	11871.00	130547.00	107556.00	249974.00	249974.00	600996.00
0.00	0.00	259200.00	11452.00	16149.00	286801.00	286801.00	79794.00
0.00	0.00	0.00	817048.00	0.00	817048.00	817048.00	1478916.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	12421.00
0.00	0.00	259200.00	0.00	27932.00	287132.00	287132.00	4662.00
0.00	0.00	172800.00	0.00	15250.00	188050.00	188050.00	8615.00
0.00	0.00	21367.00	0.00	0.00	21367.00	21367.00	149985.00
0.00	0.00	0.00	0.00	84300.00	84300.00	84300.00	0.00
0.00	0.00	259200.00	0.00	1065.00	260265.00	260265.00	39518.00
0.00	0.00	0.00	0.00	10000.00	10000.00	10000.00	12603.00
0.00	0.00	0.00	0.00	7000.00	7000.00	7000.00	6104.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	448400.00
0.00	0.00	52000.00	0.00	0.00	52000.00	52000.00	258674.00
0.00	0.00	259200.00	0.00	0.00	259200.00	259200.00	47065.00
0.00	0.00	230400.00	0.00	11985.00	242385.00	242385.00	41215.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	266292.00
0.00	0.00	0.00	0.00	5189.00	5189.00	5189.00	177908.00
0.00	0.00	129600.00	0.00	0.00	129600.00	129600.00	10000.00
0.00	0.00	137497.00	0.00	0.00	137497.00	137497.00	11891.00
0.00	0.00	94092.00	0.00	51677.00	145769.00	145769.00	277031.00
0.00	0.00	48355.00	0.00	27588.00	75943.00	75943.00	50706.00
0.00	0.00	236903.00	29040.00	0.00	265943.00	265943.00	18333.00
0.00	0.00	222914.00	0.00	1099.00	224013.00	224013.00	54442.00
0.00	0.00	0.00	0.00	14029.00	14029.00	14029.00	100747.00
0.00	0.00	99840.00	0.00	0.00	99840.00	99840.00	29533.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	579407.00
0.00	0.00	0.00	0.00	8331.00	8331.00	8331.00	59827.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	353344.00
0.00	17862.00	0.00	14644.00	283851.00	298495.00	316357.00	120000.00
0.00	0.00	0.00	0.00	228247.00	228247.00	228247.00	114254.00
0.00	0.00	0.00	33576.00	520000.00	553576.00	553576.00	262577.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-278345.00
0.00	0.00	0.00	297128.00	0.00	297128.00	297128.00	-83778.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-226843.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	12990.00

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS

Project Code	Name Of Grantee/Principal Investigator	FUND-WISE BREAK UP			TOTAL	FIXED ASSETS	
		OPENING BALANCE	ADDITIONS TO FUND				
			GRANTS	OTHER RECEIPTS			
8009	Proj/8009/Dbt/Dr.T.V.Anilkumar/De…Tissue	-719313.00	0.00	0.00	-719313.00	0.00	
8010	Proj/8010/Dbt/Dr.Niranjan/Implated…. Control	221565.00	0.00	0.00	221565.00	0.00	
8011	Proj/8011/Nanofront/Dr.Niranjan/Intramas	139900.00	0.00	0.00	139900.00	0.00	
8012	Proj/8012/Vssc/Dr.Niranjan/Design Studies	2148623.00	0.00	0.00	2148623.00	0.00	
8014	Proj/8014/Dbt/Dr.Roy Joseph/Dev….V.Graft	-17063.00	0.00	0.00	-17063.00	0.00	
8015	Proj/8015/Dr.Anoopkumar/Programme…	4566.00	0.00	0.00	4566.00	0.00	
8016	Proj/8016/Dbt/Dr.Umashankar/Deve….Appln.	-181065.00	131876.00	0.00	-49189.00	0.00	
8017	Proj/8017/Ayutech/Dr.Umasankar	560666.00	244384.00	0.00	805050.00	0.00	
8018	Proj/8018/Icmr/Dr.P.V.Mohanan	-55191.00	0.00	0.00	-55191.00	0.00	
8019	Proj/8019/Stec/Dr.P.Ramesh	121490.00	3781.00	0.00	125271.00	0.00	
8020	Proj/8020/Csir/Dr.Lissy Krishnan	-400903.00	0.00	380178.00	-20725.00	0.00	
8021	Proj/8021/Angiogenesis Exp/Dr.Umashankar	79036.00	0.00	0.00	79036.00	0.00	
8022	Proj/8022/Air Pollution/Sujesh Sreedhar	96433.00	0.00	0.00	96433.00	0.00	
8023	Proj/8023/Kscste/Dr.H.K.Varma	165277.00	0.00	65600.00	230877.00	0.00	
8024	Proj/8024/IIT/Dr.P.R.Anilkumar	44780.00	0.00	0.00	44780.00	0.00	
8025	Proj/8025/	409011.00	0.00	0.00	409011.00	0.00	
8026	Proj/8026/	3339.00	0.00	0.00	3339.00	0.00	
8027	Proj/8027/Dr.P.V.Mohanan	79732.00	0.00	0.00	79732.00	0.00	
8028	Proj/8028/Dr.Diksha Painuly	149658.00	0.00	0.00	149658.00	0.00	
8030	Proj/Study/Dr.Umashankar	373234.00	0.00	0.00	373234.00	0.00	
8031	Proj/8031	-198495.00	0.00	0.00	-198495.00	0.00	
8032	Proj/8032/O.S.N.Nair	128471.00	0.00	0.00	128471.00	0.00	
8033	Proj/8033/Dev. Of Iron Oxide-Dr.R.S.Jayasree	-53952.00	985752.00	0.00	931800.00	0.00	
8034	Proj/8034/Fluro Passi…Dr.Roy Joseph	901538.00	232585.00	39274.00	1173397.00	0.00	
8035	Proj/Evaln Of Sewing Ring-Dr.Umashankar	22201.00	0.00	0.00	22201.00	0.00	
8036	Proj/Dev Of Calcium Sulphate-Dr.Manoj	225059.00	0.00	0.00	225059.00	0.00	
8037	Proj/Medical Device Ret - Dr.Mira Mohanty	928476.00	0.00	0.00	928476.00	0.00	
8038	Proj/Dev Of Mission Program - Dr.Gsb	1182638.00	0.00	0.00	1182638.00	0.00	
8039	Proj/Dispensable & Biodegr- Dr.Jayabalan	-213801.00	0.00	0.00	-213801.00	0.00	
8040	Proj/Synthesis Of Oxide-Dr.H.K.Varma	-15101.00	0.00	0.00	-15101.00	0.00	
8041	Proj/Dev Of Nano Devices Dna-Dr.C.P.Sharma	178142.00	200000.00	0.00	378142.00	0.00	
8042	Proj/Bioengineered Hybrid -Dr.Lissy Krish	-416570.00	1467122.00	183489.00	1234041.00	0.00	
8043	Proj/Molecular Immunotox-Dr.P.V.Mohanan	258440.00	900000.00	0.00	1158440.00	0.00	
8044	Proj/Tissue Engineering-Bernadette	231080.00	800000.00	0.00	1031080.00	0.00	
8045	Proj/Colour Atlas Of Tissue-Dr.Mira	-1405.00	0.00	0.00	-1405.00	0.00	
8046	Proj/Diff. Of Adult Pro - Dr.Asha.S.Mathew	739755.00	0.00	0.00	739755.00	0.00	

(Amount Rs)

UTILISATION						TOTAL EXPENDITURE	NET BALANCE
CAPITAL EXPENDITURE		REVENUE EXPENDITURE					
OTHERS	TOTAL	SALARIES /WAGES	RENT/ CONSUMABLES	OTHER ADMN EXP	SUB TOTAL		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-719313.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	221565.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	139900.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	2148623.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-17063.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	4566.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-49189.00
0.00	0.00	157920.00	0.00	0.00	157920.00	157920.00	647130.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-55191.00
0.00	0.00	0.00	42869.00	118.00	42987.00	42987.00	82284.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-20725.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	79036.00
0.00	0.00	0.00	0.00	96739.00	96739.00	96739.00	-306.00
0.00	0.00	135375.00	70557.00	14000.00	219932.00	219932.00	10945.00
0.00	0.00	0.00	0.00	41845.00	41845.00	41845.00	2935.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	409011.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	3339.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	79732.00
0.00	0.00	0.00	87927.00	39399.00	127326.00	127326.00	22332.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	373234.00
0.00	0.00	33375.00	4040.00	56449.00	93864.00	93864.00	-292359.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	128471.00
0.00	0.00	302358.00	120770.00	127155.00	550283.00	550283.00	381517.00
0.00	0.00	157469.00	266260.00	52739.00	476468.00	476468.00	696929.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	22201.00
0.00	0.00	103841.00	0.00	121218.00	225059.00	225059.00	0.00
0.00	0.00	101308.00	130775.00	696393.00	928476.00	928476.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1182638.00
0.00	0.00	151132.00	36019.00	28891.00	216042.00	216042.00	-429843.00
0.00	0.00	0.00	0.00	15236.00	15236.00	15236.00	-30337.00
0.00	0.00	0.00	150246.00	227896.00	378142.00	378142.00	0.00
0.00	0.00	137274.00	572320.00	224516.00	934110.00	934110.00	299931.00
0.00	0.00	354807.00	332876.00	104280.00	791963.00	791963.00	366477.00
0.00	0.00	206500.00	242447.00	318369.00	767316.00	767316.00	263764.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1405.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	739755.00

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS

Project Code	Name Of Grantee/Principal Investigator	FUND-WISE BREAK UP			TOTAL	FIXED ASSETS	
		OPENING BALANCE	ADDITIONS TO FUND				
			GRANTS	OTHER RECEIPTS			
8047	Proj/Invivo Genotoxicity-Dr.P.V.Mohanan	467651.00	0.00	0.00	467651.00	0.00	
8048	Proj/Studies Dr.Kamalesh Gulia	27798.00	0.00	0.00	27798.00	0.00	
8049	Proj/New Vision Biomat-Dr.C.P.Sharma	-44861.00	0.00	0.00	-44861.00	0.00	
8050	Proj/Genotoxicity Study-Dr.P.V.Mohanan	233306.00	0.00	0.00	233306.00	0.00	
8051	Proj/Invitro Alte.Test-Dr.P.V.Mohanan	511061.00	1073952.00	508704.00	2093717.00	595972.00	
8052	Proj/Roll Of Tranformn Growth-Dr.Anoop	-15065.00	458333.00	0.00	443268.00	0.00	
8053	Proj/Development Of Smart../Dr.Lizymol.Pp	435188.00	375029.00	0.00	810217.00	0.00	
8054	Proj/Musculaskeletal Stem Cell/Dr.Pdnair	5840573.00	0.00	666247.00	6506820.00	0.00	
8055	Proj/Musculaskeletal Stem /Dr.H.K.Varma	344386.00	0.00	0.00	344386.00	0.00	
8056	Proj/Dr.A.C.Jayalekshmi	56369.00	0.00	0.00	56369.00	0.00	
8057	Proj/Invitro Preclinical / Dr.Lissy	125637.00	344139.00	0.00	469776.00	88756.00	
8058	Proj/Aorc Fellowship/Mayuri.P.V.	151975.00	0.00	19200.00	171175.00	0.00	
8059	Proj/Cell Sheet Engg-Dr.P.R.Anilkumar	170930.00	0.00	0.00	170930.00	0.00	
8060	Proj/Development Of Skin Graft	945199.00	939020.00	53832.00	1938051.00	1107473.00	
8061	Proj/Visible Light Induced../Dr.Radhakumari	567028.00	487854.00	0.00	1054882.00	0.00	
8062	Proj/Accelerated Areing../Mr.C.V.Murali	213728.00	0.00	0.00	213728.00	0.00	
8063	Proj/Effects Of Material Sleep/Dr.K.Gulia	107564.00	749600.00	0.00	857164.00	2833.00	
8064	Nonviral Gene Delivery Vectors- Dr.Rekha	262000.00	1685600.00	42074.00	1989674.00	12661.00	
8065	Proj/8065/Rate Earth Based Materials	537170.00	0.00	7350.00	544520.00	241209.00	
8066	To Investigate The Effects Of/ Dr.Gulia	1134314.00	0.00	0.00	1134314.00	739045.00	
8067	Quantum Dot Conjugated -Dr.R.S.Jayasree	46854.00	100000.00	0.00	146854.00	0.00	
8068	Inspire Research Project -Dr.Bindu.P.Nai	1056444.00	1691680.00	2100.00	2750224.00	8536.00	
8069	Proj/8069/Studies Biodegradable	42516.00	0.00	0.00	42516.00	0.00	
8070	Proj/8070/Pinspire Faculty Award-Dr.Shiv	1591969.00	0.00	0.00	1591969.00	0.00	
8071	Proj/8071/Regen .Of Intervertebral Disc	464084.00	592153.00	0.00	1056237.00	0.00	
8072	Proj/8072/Nano Calcium Phosphate	912567.00	0.00	0.00	912567.00	826507.00	
8073	Proj/8073/Develop.Of Cardiopulmonary	700000.00	500000.00	0.00	1200000.00	0.00	
8074	Production Of Novel Nano Indo-Uk Dr.Cp.S	601500.00	601500.00	0.00	1203000.00	0.00	
8075	Dst Inspire Fellowship - Aswathy B S	0.00	250400.00	3200.00	253600.00	0.00	
8076	Icmr - Dr K Sreenivasan	0.00	1203452.00	0.00	1203452.00	0.00	
8077	Home Based Vital Signs - Dr.Niranjan.D.	1777600.00	0.00	1777600.00	3555200.00	0.00	
8078	Proj/8078/An Invitroskin Tissue Eng	0.00	800000.00	0.00	800000.00	0.00	
8079	Dose Ranging Study For Des / Dr.Sabarees	0.00	1375654.00	14331.00	1389985.00	0.00	
8080	Proj/8080/Detection Of Zinc In Epileptic	0.00	5507000.00	0.00	5507000.00	0.00	
8081	Exploring The Potentialof Islet-Dr.Prabh	0.00	260000.00	0.00	260000.00	0.00	
8082	Assessment Of Ceramicconstructs - Franc	0.00	50000.00	30469.00	80469.00	0.00	
8083	In Vitro Osteoarthricitic-Dr.Neethumohan	0.00	600000.00	0.00	600000.00	0.00	

(Amount Rs)

UTILISATION						TOTAL EXPENDITURE	NET BALANCE
CAPITAL EXPENDITURE		REVENUE EXPENDITURE					
OTHERS	TOTAL	SALARIES /WAGES	RENT/ CONSUMABLES	OTHER ADMN EXP	SUB TOTAL		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	467651.00
0.00	0.00	0.00	27024.00	0.00	27024.00	27024.00	774.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	-44861.00
0.00	0.00	102968.00	0.00	0.00	102968.00	102968.00	130338.00
0.00	595972.00	335646.00	567910.00	0.00	903556.00	1499528.00	594189.00
0.00	0.00	95139.00	228867.00	6171.00	330177.00	330177.00	113091.00
0.00	0.00	139530.00	59584.00	53591.00	252705.00	252705.00	557512.00
0.00	0.00	355572.00	3900422.00	81273.00	4337267.00	4337267.00	2169553.00
0.00	0.00	236900.00	56080.00	152377.00	445357.00	445357.00	-100971.00
0.00	0.00	44000.00	0.00	12369.00	56369.00	56369.00	0.00
0.00	88756.00	76660.00	75628.00	393.00	152681.00	241437.00	228339.00
0.00	0.00	153600.00	0.00	12850.00	166450.00	166450.00	4725.00
0.00	0.00	156710.00	225156.00	41386.00	423252.00	423252.00	-252322.00
0.00	1107473.00	317800.00	463567.00	274771.00	1056138.00	2163611.00	-225560.00
0.00	0.00	230400.00	89092.00	58594.00	378086.00	378086.00	676796.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	213728.00
0.00	2833.00	343637.00	107110.00	80555.00	531302.00	534135.00	323029.00
0.00	12661.00	172800.00	299510.00	6240.00	478550.00	491211.00	1498463.00
0.00	241209.00	245000.00	236206.00	1000.00	482206.00	723415.00	-178895.00
0.00	739045.00	63019.00	90346.00	24697.00	178062.00	917107.00	217207.00
0.00	0.00	0.00	11514.00	128600.00	140114.00	140114.00	6740.00
0.00	8536.00	1189282.00	278475.00	116370.00	1584127.00	1592663.00	1157561.00
0.00	0.00	0.00	32268.00	8823.00	41091.00	41091.00	1425.00
0.00	0.00	810323.00	419138.00	30705.00	1260166.00	1260166.00	331803.00
0.00	0.00	193000.00	289358.00	81995.00	564353.00	564353.00	491884.00
0.00	826507.00	124320.00	38602.00	34854.00	197776.00	1024283.00	-111716.00
0.00	0.00	663128.00	91422.00	15127.00	769677.00	769677.00	430323.00
0.00	0.00	26200.00	22719.00	878172.00	927091.00	927091.00	275909.00
0.00	0.00	239100.00	0.00	11185.00	250285.00	250285.00	3315.00
0.00	0.00	309784.00	230440.00	0.00	540224.00	540224.00	663228.00
0.00	0.00	246866.00	136800.00	1821520.00	2205186.00	2205186.00	1350014.00
0.00	0.00	344167.00	180031.00	1900.00	526098.00	526098.00	273902.00
0.00	0.00	57530.00	34874.00	311308.00	403712.00	403712.00	986273.00
0.00	0.00	115200.00	59338.00	0.00	174538.00	174538.00	5332462.00
0.00	0.00	38400.00	0.00	26177.00	64577.00	64577.00	195423.00
0.00	0.00	0.00	64096.00	0.00	64096.00	64096.00	16373.00
0.00	0.00	0.00	26233.00	0.00	26233.00	26233.00	573767.00

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS

Project Code	Name Of Grantee/Principal Investigator	FUND-WISE BREAK UP			TOTAL	FIXED ASSETS	
		OPENING BALANCE	ADDITIONS TO FUND				
			GRANTS	OTHER RECEIPTS			
8084	Role Of Nmda- Dr.Pradeep Punnakkal- Ram	0.00	1990000.00	0.00	1990000.00	0.00	
8085	Proj/8085/Electrochemically Assisted	0.00	900000.00	0.00	900000.00	0.00	
8086	Proj/8086/Gold Nanorods For Therapy	0.00	2457362.00	0.00	2457362.00	0.00	
8087	Proj/8087/Controlled Delivery	0.00	1600000.00	0.00	1600000.00	0.00	
8088	Cancer Tissue Engineering A 3D - Aravin	0.00	380000.00	0.00	380000.00	0.00	
8089	Do Platelets In Patients -Dr.Anugyabhatt	0.00	750200.00	0.00	750200.00	0.00	
		46070595.59	42174496.00	4665354.00	92910445.59	8187809.00	
	Internal Projects						
6500	Ohf Project Dr. Annie John	0.00	250000.00	0.00	250000.00	0.00	
6501	Ohf Project Dr Kaladhar	0.00	160000.00	0.00	160000.00	0.00	
6502	Ohf Project Dr Sachin J Shenoy	0.00	180000.00	0.00	180000.00	0.00	
6503	Construction Of Tebv	0.00	250000.00	0.00	250000.00	0.00	
7380	Networking Services -Ntc Blding-Arun Ani	0.00	0.00	0.00	0.00	0.00	
7410	Application Of Decellularised - Dr. Biju	0.00	0.00	6795.00	6795.00	0.00	
2622	Ohf- For Innovative Projects	1000000.00	0.00	800000.00	1800000.00	0.00	
2621	Iipc Fund(Industry Institute Partnership - Bmt	260769.00	0.00	0.00	260769.00	0.00	
		1260769.00	840000.00	806795.00	2907564.00	0.00	
		47331364.59	43014496.00	5472149.00	95818009.59	8187809.00	
	Grand Total	**108797894.93**	**87439323.55**	**10522842.00**	**206760060.48**	**15639144.00**	

(Amount Rs)

UTILISATION						TOTAL EXPENDITURE	NET BALANCE
CAPITAL EXPENDITURE		REVENUE EXPENDITURE					
OTHERS	TOTAL	SALARIES /WAGES	RENT/ CONSUMABLES	OTHER ADMN EXP	SUB TOTAL		
0.00	0.00	523051.00	5509.00	500.00	529060.00	529060.00	1460940.00
0.00	0.00	36250.00	0.00	0.00	36250.00	36250.00	863750.00
0.00	0.00	26743.00	0.00	0.00	26743.00	26743.00	2430619.00
0.00	0.00	62857.00	0.00	0.00	62857.00	62857.00	1537143.00
0.00	0.00	93500.00	0.00	2000.00	95500.00	95500.00	284500.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	750200.00
0.00	8187809.00	14164483.00	12505366.00	11508999.00	38178848.00	46366657.00	46543788.59
0.00	0.00	0.00	229450.00	0.00	229450.00	229450.00	20550.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	160000.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	180000.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	250000.00
0.00	0.00	86400.00	0.00	0.00	86400.00	86400.00	-86400.00
0.00	0.00	70178.00	13590.00	0.00	83768.00	83768.00	-76973.00
0.00	0.00	0.00	0.00	840000.00	840000.00	840000.00	960000.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	260769.00
0.00	0.00	156578.00	243040.00	840000.00	1239618.00	1239618.00	1667946.00
0.00	8187809.00	14321061.00	12748406.00	12348999.00	39418466.00	47606275.00	48211734.59
0.00	**15639144.00**	**39746645.00**	**19250971.00**	**39482633.50**	**98689568.50**	**114328712.50**	**226864981.28**

PARTICULARS	2013-14 [Rs.]	2012-13 [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	-	-

PARTICULARS	2013-14 [Rs.]	2012-13 [Rs.]
SCHEDULE 7-CURRENT LIABILITIES AND PROVISIONS		
A. CURRENT LIABILITIES		
1. Acceptances		
2. Sundry Creditors:		
a) For Goods	18168574.00	29198510.00
b) Others	2185662.00	2510647.00
3. Advances Received	70892534.93	61029275.93
4. Interest accured but not due on:	0.00	0.00
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	1003263.95	460198.95
b) Others	24387977.69	25724490.29
6. Other current Liabilities	0.00	0.00
TOTAL(A)	116638012.57	118923122.17
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
Sinking fund contribution O. BAL		
Additional contribution Rs.	0.00	36218249.00
TOTAL(B)	0.00	36218249.00
TOTAL(A+B)	**116638012.57**	**155141371.17**

SCHEDULE 8- FIXED ASSETS	GROSS BLOCK			
PARTICULARS	Cost/valuation as at the beginning of the year (01.04.2013)	Additions during the year 2013-14	Deductions during the year 2013-14	
A. FIXED ASSETS:				
1. LAND:				
a) Freehold	16894605.51	0.00	0.00	
b) Leasehold	0.00	0.00	0.00	
2.BUILDINGS:				
a) On Freehold Land *	43608096.88	3429511.00	0.00	
b) On Leasehold Land	0.00	0.00	0.00	
c) Ownership Flats/Premises	0.00	0.00	0.00	
d) Superstructures on Land not belonging to the entity	124407119.88	0.00	0.00	
3. PLANT MACHINERY & EQUIPMENT	1825295932.05	120150261.00	15165407.00	
4. VEHICLES	7474233.74	0.00	0.00	
5. FURNITURE,FIXTURES	45572060.08	2672269.50	20475.00	
6. OFFICE EQUIPMENT	976203.54	260418.00	0.00	
7. COMPUTER/PERIPHERALS		4852352.00	0.00	
8. ELECTRIC INSTALLATIONS	46459949.67	807143.00	0.00	
9. LIBRARY BOOKS	148148683.57	9991506.03	0.00	
10. TUBEWELLS & W.SUPPLY	174615.00	108300.00	0.00	
11. OTHER FIXED ASSETS				
a)OXYGEN CYLINDERS	234319.42	0.00		
b)AIR CONDITIONERS	25951743.91	20620530.00	0.00	
c)TELEPHONE INSTALLATIONS	2151441.94	0.00	0.00	
d) COLD ROOM INSTALLATION	341700.00	0.00	0.00	
e) WATER COOLERS	62866.50	0.00	0.00	
f) LIFT INSTALLATION	11250942.10	0.00	0.00	
g) KITCHEN EQUIPMENTS	1405978.22	0.00	0.00	
h)CANTEEN EQUIPMENTS	292494.59	65665.52	0.00	
I) PAINTINGS	450215.63	0.00	0.00	
k) LIVESTOCK	0.00	0.00	0.00	
l) GAS PLANT INSTALLATIONS	1171261.09	0.00	0.00	
m) SURGICAL EQUIPMENTS	6833183.05	925838.00	0.00	
Total for the year (Total -A)	2309157646.37	163883794.05	15185882.00	
Total for the previous year	2785719113.89	179594006.01	28455037.53	
Captial Work in Progress (B)	648102175.00	1522634.00	0.00	
Total for the year (A+B)	**2957259821.37**	**165406428.05**	**15185882.00**	

* Depreciation for item2(a) has been provided along with depreciation on 2(d)

	DEPRECIATION			NET BLOCK	
Cost/valuation at the year end (31.03.2014)	Depreciation as at the beginning of the year (01.04.2013)	During the year 2013-14	Total up to the year end (31.03.2014)	As at the end of current year end (31.03.2014)	As at the previous year end (31.03.2013)
16894605.51	0.00	0.00	0.00	16894605.51	16894605.51
0.00	0.00	0.00	0.00	0.00	0.00
47037607.88	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
124407119.88	102823393.98	6862133.38	109685527.36	61759200.40	65191822.78
1930280786.05	1127901490.77	108905764.84	1236807255.61	693473530.44	697394441.28
7474233.74	5467732.08	300975.25	5768707.33	1705526.41	2006501.66
48223854.58	31385358.12	1667759.45	33053117.56	15170737.02	14186701.96
1236621.54	912900.91	32372.06	945272.98	291348.56	63302.63
4852352.00	0.00	4686564.20	4686564.20	165787.80	0.00
47267092.67	24736214.15	2253087.85	26989302.00	20277790.67	21723735.52
158140189.60	128010005.00	18078110.76	146088115.76	12052073.84	20138678.57
282915.00	162946.18	11996.88	174943.06	107971.94	11668.82
	0.00	0.00	0.00	0.00	0.00
234319.42	229445.69	2924.24	232369.93	1949.49	4873.73
46572273.91	20828408.47	2574386.54	23402795.01	23169478.90	5123335.44
2151441.94	1958341.12	19310.08	1977651.20	173790.74	193100.82
341700.00	339943.62	175.64	340119.26	1580.74	1756.38
62866.50	62702.35	16.41	62718.77	147.73	164.15
11250942.10	7462987.95	378795.41	7841783.37	3409158.73	3787954.15
1405978.22	983744.34	42223.39	1025967.73	380010.49	422233.88
358160.11	150187.17	20797.29	170984.47	187175.64	142307.42
450215.63	370466.17	7974.95	378441.12	71774.51	79749.46
0.00	0.00	0.00	0.00	0.00	0.00
1171261.09	981361.93	113939.50	1095301.43	75959.66	189899.16
7759021.05	5167430.61	1036636.18	6204066.79	1554954.26	1665752.44
2457855558.42	1459935060.63	146995944.30	1606931004.93	850924553.49	849222585.74
2936858082.37	1316527893.36	143407167.3	1459935060.63	1476923021.74	1469191220.53
649624809.00	0.00	0.00	0.00	649624809.00	627700436.00
3107480367.42	**1459935060.63**	**146995944.30**	**1606931004.93**	**1500549362.49**	**1476923021.74**

PARTICULARS	2013-14	2012-13
	[Rs.]	[Rs.]
SCHEDULE 9 - INVESTMENTS FROM EARMARKED/ ENDOWMENT FUNDS		
1. In Government Securities	56010278.00	55338266.00
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	480771226.00	402380134.00
Technology Fund	59945101.45	63789849.45
Pension & staff funds	57303443.00	51607458.00
TOTAL	659715439.45	578801098.45
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	276754822.47	245840760.02
b) Loose Tools	9600957.00	7249504.00
c) Stock-in trade	0.00	0.00
Finished Goods	0.00	0.00
Work-in-progress	0.00	0.00
Medicine	10886175.60	10134136.95
2. Sundry Debtors:	0.00	0.00
a) Debts Outstanding for a period exceeding six months	43512301.00	0.00
b) Others	47017491.00	84769513.00
3. Cash balances in hand(including cheques/drafts and imprest)	1260190.55	1516100.38

PARTICULARS	2013-14 [Rs.]	2012-13 [Rs.]
4. Bank Balances:	0.00	0.00
a) With Scheduled Banks:	0.00	0.00
-On Current Account	1.15	1.15
-On Deposit Accounts(L.C. margin & Commitment deposit)	465798461.00	606222520.00
-On Savings Accounts	143279526.91	200958017.89
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)	998109926.68	1156690553.39
B.LOANS, ADVANCES AND OTHER ASSETS		
1. Loans:		
a) Staff	11665604.98	13412435.00
b) Other Entities engaged in activities/objectives similar to that of the Entity	0.00	0.00
c) Other(specify)	0.00	
2. Advances and other amounts recoverable in cash or in kind or for value to be received:	0.00	
a) On Capital Account	187130920.09	207587142.09
b) Prepayments	26243882.37	28430822.37
c) Others	0.00	
3. Income Accured:	0.00	
a) On Investments from Earmarked/endowment Funds	61289041.00	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)	0.00	
4. Claims Receivable	0.00	
From Govt of India on Plan Funds	0	0.00
TOTAL(B)	286329448.44	249430399.46
TOTAL(A+B)	**1284439375.12**	**1406120952.85**

PARTICULARS	2013-14 [Rs.]	2012-13 [Rs.]
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
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	789117753.67	0.00
Less concession to poor Patients	0.00	482909990.20
From Projects	60583.00	2069177.00
Testing & Facility charges received	4466405.00	3861284.00
TOTAL	793644741.67	488840451.20
SCHEDULE 13- GRANTS/SUBSIDIES		
(Irrevocable Grants & Subsidies Received)		
1. Central Government	814805000.00	195919478.00
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	814805000.00	195919478.00
SCHEDULE 14-FEES/SUBSCRIPTIONS		
1. Entrance Fees	1244450.00	1182820.00
2. Annual Fees/ Subscriptions	3882605.00	4898710.00
3. Seminar/Program Fees	0.00	0.00
4. Consultancy Fees	0.00	0.00
5. Examination Fees and others	1181850.00	829334.00
TOTAL	**6308905.00**	**6910864.00**

PARTICULARS	2013-14 [Rs.]	2012-13 [Rs.]
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
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	42172843.00	23334973.00
On Technology Fund	1322655.00	632432.00
TOTAL	43495498.00	23967405.00
TRANSFERRED TO EARMARKED/ENDOWMENT FUNDS		
SCHEDULE 16- INCOME FROM ROYALITY, PUBLICATION ETC		
1) Income from Royalty	184392.00	272560.00
2) Income from Publications	0.00	0.00
3)Others(Specify)	0.00	
TOTAL	184392.00	272560.00
SCHEDULE 17- INTEREST EARNED		
1) On Term Deposit		
a) With Scheduled Banks	64828659.00	85126926.00
b) With non-scheduled banks	0.00	0.0
c) With Institutions	0.00	0.0
d) Others	0.00	0.0
2) On Savings Account	0.00	0.0
a) With Scheduled Banks	7280679.18	7126890.53
b) With non-scheduled banks	0.00	0.00
c) Post Office Savings Account	0.00	0.00
d) Others(accrued)	61289041.00	0.00
3) On Loans	0.00	
a) Employees/Staff	696015.00	1072626.00
b) Others	0.00	0.00
4) Interest on Debtors and other Receivables		
TOTAL	**134094394.18**	**93326442.53**

PARTICULARS	2013-14 [Rs.]	2012-13 [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	0.00	12936323.00
2. Rent	1985379.00	1440694.00
3. Fees for Miscellaneous Services	0.00	0.00
4. Miscellaneous Income (income from Projects)	35700.00	30000.00
Other Income	16215524.72	3994924.30
Prior period income	7479068.00	0.00
TOTAL	25715671.72	18401941.30
SCHEDULE 20-ESTABLISHMENT EXPENSES		
a) Salaries and Wages	683397690.80	618001550.80
b) Allowances and Bonus	7131266.00	6445173.00
c) Contribution to Provident Fund	0.00	0.00
d) Contribution to other fund(specify)	0.00	0.00
e) Staff Welfare Expenses	16757699.00	17462765.00
f) Expenses on Employee's Retirement and Terminal Benefits	131762746.00	145236432.00
g) Others(Specify) PG Training & Accademic payments	109267020.00	98540922.00
TOTAL	948316421.80	885686842.80
SCHEDULES 21- ADMINISTRATIVE EXPENSES		
a) Purchases	496076071.90	480192369.16
b) Concession to Poor patients/Labour and processing expenses	161868756.00	0.00
c) Cartage and Carriage Inwards	417255.00	191251.00
d) Electricity and power	43011039.00	39941254.00
e) Water charges	2762159.00	4120348.00
f) Insurance	397130.00	357677.00
g) Repairs and maintenance	35878809.00	32502290.00
h) Excise duty	0.00	0.00
i) Rent,Rates and Taxes	523314.00	397999.00
j) Vehicles Running and Maintenance	772203.00	820394.00
k) Postage,Telephone and Communication Charges	2511238.00	2363220.00
l) Printing and Stationary	2002472.00	3970103.00

PARTICULARS	2013-14	2012-13
	[Rs.]	[Rs.]
m) Travelling and Conveyence Expenses	2294461.30	2574410.00
n) Expenses on Seminar/Workshop	892533.00	2066560.00
o) Subscription Expenses	51312.00	142944.00
p) Expenses on Fees	0.00	0.00
q) Auditors Renumeration	31460.00	11236.00
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	6015783.00	6860963.00
z) Others(specify)	28063409.20	31337566.00
TOTAL	**783569405.40**	**607850584.16**
SCHEDULE 23-INTEREST		
a) On Fixed Loans		
b) Bank Charges)	174730.00	189686.00
c) Others(specify)	0.00	0.00
TOTAL	**174730.00**	**189686.00**

Sd/-
FINANCIAL ADVISOR

Sd/-
DIRECTOR

RECEIPTS & PAYMENTS ACCOUNTS FOR THE

	RECEIPTS	2013-14	2012-13	
		Rs.	Rs.	
I	Opening Balances			
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	
II	Grant Received			
	From Government of India			
	Under Plan - Capital scheme	95893000.00	873300000.00	
	Under Plan Salary/General scheme	785780000.00		
	Unde Plan scheme -NCMMR/Nurses Training	2081086.00	111821.00	
	Non-Plan scheme	29025000.00	36810000.00	
III	Receipts against Earmarked Funds			
	a) Earmarked funds	8658772.00	156147319.05	
	b) Own funds			
IV	Interest Received			
	a) On Bank deposits	77219302.18	84785002.53	
	b) Loans Advances etc	7067.00	191121.00	
V	Receipts from services			
	Receipts from Patient services	644511931.67	586396123.20	
	Other receipts including Royalty	15669651.42	18222209.60	
VI	Other receipts			
	Grant received for Projects	92398427.05	104756412.87	
	Refund of Deposits(LC Margin)			
	Other receipts	269922324.40	323429688.46	
	Total	**2226217448.14**	**2388560578.87**	
	*Closing balance of Bank include grant amount received from DST for setting up of NCMMR, Thiruvananthapuram			

Sd/-
FINANCIAL ADVISOR

E PERIOD FROM 01-04-2013 TO 31-03-2014

		Payments	2013-14	2012-13
			Rs.	Rs.
	I	Expenses	735973226.53	696666872.90
		a) Establishment expenses		
		b) Administrative Expenses	361920372.00	333858605.00
		For Purchases	60321668.00	63630558.00
		Other expenses		
	II	Payments made against funds for various Projects As Per schedule	87473605.00	82076154.00
	III	Investments & Deposits made		
		a) Out of Earmarked funds	69108383.00	211033369.00
		b) Out of own funds		
	IV	Expenditure on Fixed Assets & Capital work -in- progress	217386218.00	231366164.00
		a) Purchase of Fixed Assets		
		b)Capital work-in-progress		
	V	Refund of Loans	66431.00	151164.00
	VI	Finance Charges (Bank charges)		
	VII	Other Payments	545879357.00	564726805.55
		To Funds/Deposit- refunds		
	VIII	Closing Balance	1260190.55	1516100.38
		a) Cash in hand		
		b) Bank Balances	1.15	1.15
		I) In current Account		
		ii) In Deposit Account	146827995.91	203534784.89
		iii) Savings Account *	2226217448.14	2388560578.87
		Total		

Sd/-
DIRECTOR

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES & TECHNOLOGY, THIRUVANANTHAPURAM

SCHEDULES FORMING PART OF ACCOUNTS AS AT 31-03-2014
SCHEDULE 24- SIGNIFICANT ACCOUNTING POLICIES

SCHEDULE 24 & 25 SHOULD APPEARS AS PER LAST ANNUAL REPORT

1. ACCOUNTING CONVENTION

Financial Statements are prepared on the basis of historical cost convention and on accrual method of accounting except in the accounts not directly connected with the functioning of the Institute including Staff Benevolent Fund, Pension,etc.

2. INVENTORY VALUATION

Stores and spares including machinery spares are valued at cost.

3. INVESTMENTS

Investments 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.

5. DEPRECIATION

Depreciation is provided on reducing balance method at the rates specified by the Income Tax Act 1961. 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-Capital is 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 6th Pay Commission report) 12% of the salary is transferred to the Pension Fund.

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 is to be transferred to a Fund for meeting unexpected requirements for Fixed assets subject to a maximum of Rs. 50 Crores.

11. TECHNOLOGY DEVELOPMENT FUND

Receipts against technology developed by the Institute are transferred to the above fund and interest earned is utilized for meeting additional expenses on Improvement of technologies already developed.

12. OVERHEAD SCHEME

Overhead Funds scheme for Innovative Projects has been introduced from the year 2012-13. An amount of upto Rs.10 lakhs can be transferred to this account every year and utilised for innovative projects.

Sd/-
Financial Adviser

Sd/-
Director

SCHEDULE 25-CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS

1. CONTINGENT LIABILITIES

Rs. In lakhs

	2013-14	2012-13
Claims against the Institute not acknowledged as debts	1.11	NIL
Bank Guarantee given by Institute	35.53	18.83
Letters of credit opened on behalf of Institute	18.89	373.06
Disputed demands on Income tax etc	NIL	NIL
In respect of claims from parties for non- execution of orders	NI	NIL

2. UNEXPIRED CAPITAL COMMITMENTS

Rs. In lakhs

	2013-14	2012-13
Estimated value of orders remaining to be executed on Capital Account including Construction under vision 2020	6486	1811.70
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

	2013-14	2012-13
5.1 Value of Imports		
Capital Goods	551.49	3273.24
Stores Spare & Consumables	118.73	101.86
5.2 Expenditure in foreign currency Travel Expenses USD	NIL	50
5.3 Earnings Value of Experts:	NIL	NIL

6. Income received in previous year amounting to Rs.74.79 lacs under Institute Ethics Committee has been treated as prior period income of the Institute. Current year Income balance net of expenditure is treated as income of the Institute.

7. Refund received from Income Tax Department for previous Assessment years amounting to Rs.74.18 lacs has been treated as sundry income of the year 2013-14.

8. Claims for Audit fees by C&AG has not been provided pending decision of the competent Authority. Provision for the current year could not be made for want of details. Arrear will be released accordingly.

9. Grants received for Salary and General Expenses has been treated as Non-Plan grants as suggested by C&AG Auditors and approved by Competent Authority of the Institute.

10. Accrued Interest on Investment amounting Rs.612.89 lakhs (previous year NIL) has been provided in the current year accounts.

11. As suggested by C&AG Auditors the concession to poor patients has been separately shown as expenses under Administrative Expenses (Sch.21) from the year 2013-14.

12. In order to release the pension dues as per the CCS pension rules, an additional amount of Rs.505.69 lakhs has been expended over and above the sanctioned 12% Institute contribution (amounting to Rs. 345.82 lacs) to the Pension Fund.

13. As per comments of C&AG auditors, the undercharging of depreciation for the previous year amounting to Rs.17.71lakhs has been charged along with depreciation for the current year.

14. Emergency Reserve Fund & Technology Development Fund

    During the year, an an amount of Rs.192.28 lacs (previous year Rs. 595.53 lakhs) and Rs.14.76lakhs (previous year Rs. 1.94 lakhs) has been transferred to Emergency Reserve Fund & Technology Development Fund respectively. During the year Rs.13.81lakhs has been spent from Technology Development Fund.

15. Overhead Fund Scheme

    During the year an amount of Rs.8 lakhs (previous year Rs. 10 Lakhs) has been transferred to the Fund from the Overhead Charges collected from External Projects.

16. National Centre for Molecular Materials Research, Thiruvananthapuram

T he Bank Balance as on 31.03.2014 is Rs 35.48 lacs (previous year Rs.25.76 lacs). Interest earned during the year is Rs.1.27 lacs (PY Rs. 0.77lacs). Expenditure incurred on behalf of NCMMR for the year is Rs. 14.06 Lacs (previous year NIL). This has been accounted separately and annexed to the Balance Sheet.

17. Corresponding figures for previous years have been regrouped, wherever necessary.

    Schedules 1 to 25 annexed, form an integral part of the Balance Sheet as at 31-03-2014, and Income & Expenditure Account for the year ended on that date.

Sd/-
Financial Advisor

Sd/-
Director

PROVIDENT FUND ACCOUNT FOR THE YEAR ENDED 31-03-2014

Particulars	2013-14	2012-13
	[Rupees]	[Rupees]
LIABILITIES		
MEMBERS BALANCE	250305574.00	260422346.00
MEMBERS CREDITS (FOR MARCH)	0.00	0.00
BALANCE DUE TO MEMBERS NOT IN SERVICE		
Under EPF scheme	7696523.00	7696523.00
,, GPF ,,	532055.00	532055.00
PENSION FUND DUES	51168169.00	51168169.00
RESERVES&SURPLUS-INTEREST	158755931.00	1714228.39
TOTAL	468458252.00	321533321.39
ASSETS		
INVESTMENT AT COST	337051449.00	291383991.00
DUES TO PF ACCOUNT		
FROM INSTITUTE	0.00	0.00
FROM PF COMMISSIONER	8403467.00	8403467.00
INTEREST ACCRUED NOT DUE	110826497.00	1000280.00
BALANCE WITH BANKS		
SBT -GPF A/C	12176839.00	20745583.39
TOTAL	**468458252.00**	**321533321.39**

Sd/-
Financial Advisor

Sd/-
Director

NATIONAL CENTRE FOR MOLECULAR MATERIALS RESEARCH
BALANCE SHEET AS ON 31-03-2014

Particulars		2013-14	2012-13
		[Rupees]	[Rupees]
LIABILITIES			
CAPITAL FUND			
Opening Balance	2576767.00		2500000.00
Add: Grant received	2250000.00		76767.00
Less: Excess of Expendiure over income	1278298.00	3548469.00	
TOTAL		3548469.00	2576767.00
ASSETS			
BANK BALANCE		3548469.00	2576767.00
(Union Bank of India Account No.541502010002675)			
TOTAL		**3548469.00**	**2576767.00**

Sd/-
Financial Advisor

Sd/-
Director

AUDIT REPORT

Separate Audit Report of the Comptroller and Auditor General of India on the Accounts of Sree Chitra Tirunal Institute of Medical Sciences and Technology (SCTIMST), Thiruvananthapuram for the year ended 31 March 2014

i) We have audited the Balance Sheet of Sree Chitra Tirunal Institute of Medical Sciences and Technology (SCTIMST), Thiruvananthapuram as at 31 March 2014, the Income and Expenditure Account and the Receipts and Payments Account for the year ended on that date under Section 19(2) of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971 read with section 18(2) of the SCTIMST Act, 198O. 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.

ii) This Separate Audit Report contains the comments of this office 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 and Regulations (Propriety and Regularity) and efficiency-cum-performance aspects, etc., if any, are reported through Inspection Reports/CAG's Audit Reports separately.

iii) 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 envaluating the overall presentation of financial statements. We believe that our audit provides a reasonable basis for our opinion.

iv) 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 and Expenditure Account and Receipts and Payments 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) Income & Expenditure Account

CAG has raised claim for the audit fee amounting to Rs. 12.52 lakh for the period up to March 2013 which was neither remitted nor provided for in the accounts. This resulted in understatement of expenditure as well as current liabilities.

(B) General

B.1 Accounting Policy No.1 (Schedule 24)

As per the significant accounting policies (Schedule 24) of SCTIMST, financial statements are prepared on the accrual method of accounting. However it was observed that the institute had recognized income such as income from projects, testing charges, facility utilization charges, fees, subscriptions, royalty etc. on cash basis. Since the institute did not compute the amount receivable, monetary impact of such items could not be quantified in Audit.

8.2 Grant in aid

The grant of Rs. 91.07 crore was received and utilized during the current year viz. 2013-14.

(C) Management letter

Deficiencies which have not been included in the Separate 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 and Expenditure Account and Receipts and Payments 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 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 of Medical Sciences and Technology, Thiruvananthapuram as at 31st March 2014, and

b. In so far as it relates to income and Expenditure Account of the deficit for the year ended on that date.

For and on behalf of C & AG of India

Principal Director of Audit

Scientific Departments

Place: New Delhi
Date:

ANNEXURE TO SEPARATE AUDIT REPORT

1. 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 and action taken by SCTIMST on the outstanding paragraphs was not furnished to Audit.

2. Adequacy of internal Control

Internal Control in purchase

Letters of credit (L/c) applications have to be routed through Accounts Division. Similar procedure has to be followed for sight draft payments also. The L/c margin and commitment deposit with the bank was to the extent of Rs.46.58 crore (Schedule-11) and it is more than 50 per cent of 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, the list of purchase orders, the funds committed there against aggregating to Rs.46.58 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, therefore vouch for the amount of Rs. 46.58 crore held in L/c margin and commitment deposits against the foreign, import purchase orders placed. The discrepancy was pointed out during last year also remedial action was taken despite assurance last year.

3. System of physical verification of assets

Out of 42 divisions/ departments, physical verification of assets for the year 2012-14 was conducted in 29 divisions. Stock verification was conducted in 45 divisions of BMT wing for the year 2011-13. On verification of report, some discrepancies are found which are yet to be resolved. The stock verification for the year 2013-14 at BMT wing was not conducted.

3.1 Asset Registers

On test check, Audit noticed that addition during 2013-14 against Electrical Installation and Tube well and Water supply in the Fixed Asset Schedule (8) was shown as Rs. 807143 and Rs.108300 respectively, where as in the fixed asset register maintained by the Institute, it was shown as Rs.9858.63 and Rs.0. The difference was not reconciled.

4. System of physical verification of inventories

The physical verification of inventories for the period 2010-11 to 2013-14 is yet to be carried out in Hospital and BMT wings.

5. Regularity of paymentof statutory dues

No irregularity was observed pertaining to payment of statutory dues in SCTIMST.

Dy Director

Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum

Reply to Separate Audit Report on the Accounts for the year 2013-14

Para No. and Comments of C & AG	Reply of the Institute
Income and Expenditure Account. CAG has raised claim for the audit fee amounting to Rs.12.52 lakh for the period up to March 2013 which was neither remitted nor provided for in the accounts. This resulted in understatement of expenditure as well as current laibilites.	All pending claims have been remitted to C&AG on 30.07.2014.
(A) General **B 1 Accounting Policy No.1 (Schedule 24)** As per the significant accounting 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 etc., on cash basis. Since the institute did not compute the amount receivable, monetary impact of such items could not be quantified in Audit.	The Institute maintains a policy of receiving testing charges along with the receipt of the samples for testing. Fees and subscriptions are collected on due dates. Income from facility utilization charges/ income from projects are accounted as and when the grants are received. Ascertaining the income earned by companies to which technology transfer has been done, (within the date of finalization of accounts of the Institute) in order to assess the non-payment of royalty, is beyond the control of the Institute.
B.2 Grant in aid - The grant of Rs.91.07 crore was received and utilized during the current year viz. 2013~14.	Noted.