Annual Report
2008-09

Sree Chitra Tirunal Institute for Medical Sciences & Technology

Trivandrum - 695 011, Kerala, India

Annual Report

2008-2009

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY

TRIVANDRUM - 695 011
KERALA, INDIA

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ORIGINS

The origins of the Institute reach back to 1973 when the Royal family of Travancore gifted a multi-storied building for the people and the Government of Kerala resolved to develop the gift as the Sree Chitra Tirunal Medical Center for medical specialties.

Sri. P.N. Haksar inaugurated the Medical Center in 1976 and the growth of a Biomedical Engineering and Technology Wing followed quickly at the Satelmond Palace, Poojappura, 11 kilometers away from the hospital campus.

The concept and achievement of uniting technology and medical sciences within a single institutional framework was regarded sufficiently important by the Government of India to declare it as an *Institute of National Importance* by an Act of Parliament in 1980.

The objectives of the Institute as laid down in the Act are

1. promotion of biomedical engineering and technology
2. demonstration of high standards of patient care and
3. development of post-graduate training programs of the highest quality in advanced medical specialties and biomedical engineering and technology.

INSTITUTE BODY

Prof. R. Chidambaram
Principal Scientific Advisor to the Govt. of India, 318, Vigyan Bhavan Annexe
Maulana Azad Road, New Delhi - 110 011
President

Dr. T. Ramasami
Secretary to Govt. of India, Department of Science & Technology
Technology Bhavan New Mehrauli Road, New Delhi - 110 016

Dr. R.K. Srivastava
Director General of Health Services, Nirman Bhavan, New Delhi - 110 001

Shri. Thennala Balakrishna Pillai
Member of Parliament (Rajya Sabha), Ambadi, Yamuna Nagar, Karakulam
Thiruvananthapuram

Shri. P.C. Thomas
Member of Parliament (Lok Sabha), 67, Kumaranasan Nagar
Kadavanthra, Eranakulam, Kerala

Shri. K. P. Pandian
Joint Secretary and Financial Adviser to the Government of India, Department of Science and Technology, Technology Bhavan , New Mehrauli Road, New Delhi - 110 016

Secretary to the Govt. of India
Department of Education, Ministry of Human Resource Development, New Delhi

Secretary to the Govt. of India
Ministry of Health & Family Welfare, Nirman Bhavan, New Delhi - 110 001

Dr. E.P. Yeshodharan
Exec-Vice President, State Council for Science, Technology & Environment, Govt. of Kerala &
Ex-Officio Secretary to Govt. of Kerala, Sasthra Bhavan,Thiruvananthapuram

Dr. Vishwas Mehta IAS
Principal Secretary to the Govt. of Kerala
Department of Health & Family Welfare, Secretariat, Thiruvananthapuram - 695 001

Dr. M.K. Ramachandran Nair
Vice Chancellor, University of Kerala, Thiruvananthapuram

Dr. Baldev Raj
Director, Indira Gandhi Centre for Atomic Research (IGCAR)
Kalpakkam 603 102, Tamil Nadu

Prof. Ashok Misra
Director, Indian Institute of Technology Bombay, Powai, MUMBAI – 400 076

Dr. K. A. Dinshaw
Director, Tata Memorial Hospital & Cancer Research Institute, Parel, Mumbai – 400012

Dr. Jairup Singh
Vice Chancellor, Guru Nanak Dev University, AMRITSAR – 143 005

Prof. P. Balaram
Director, Indian Institute of Science, BANGALORE – 560 012

Prof. Bakhtaver S. Mahajan
Homi Bhabha Centre for Science Education , Tata Institute of Fundamental Research
V.N. Purav Marg, Mankhurd , Mumbai - 400088

Prof. Jayaprakash Muliyil
Principal, Christian Medical College & Hospital, Thorapadi P.O.
Vellore – 632002, TAMIL NADU

Prof. Dayanand Dongaonkar
Secretary General, Association of Indian Universities, AIU House
16 Com. Indrajit Gupta Marg, NEW DELHI – 110002

Prof. K. Mohandas
Director, Sree Chitra Tirunal Institute for Medical Sciences and Technology
Thiruvananthapuram- 695011

Dr. G. S. Bhuvaneshwar
Head, Biomedical Technology Wing, SCTIMST, Thiruvananthapuram - 695 012

GOVERNING BODY

Dr. R. Chidambaram
Principal Scientific Advisor to the Govt. of India, 318, Vigyan Bhavan Annexe
Maulana Azad Road, New Delhi - 110 011
President

Dr. T. Ramasami
Secretary to Govt. of India, Dept. of Science & Technology, Technology Bhavan
New Mehrauli Road, New Delhi - 110 016

Dr. R.K. Srivastava
Director General of Health Services, Nirman Bhavan, New Delhi - 110 001

Dr. Yashodharan
Exec-Vice President, State Council for Science, Technology & Environment
Govt. of Kerala and Secretary to Govt. of Kerala, Sasthra Bhavan, Thiruvananthapuram

Dr. K. A. Dinshaw
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Mumbai – 400 012

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Director, Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam 603 102, Tamil Nadu

Dr. K. Mohandas
Director, Sree Chitra Tirunal Institute for Medical Sciences and Technology
Thiruvananthapuram - 695 011

Dr. G. S. Bhuvaneshwar
Head, Biomedical Technology Wing, Sree Chitra Tirunal Institute for
Medical Sciences and Technology, Poojappura, Thiruvananthapuram - 695 012

Dr.R. Sankar Kumar
Professor of CVTS, Sree Chitra Tirunal Institute for Medical Sciences and Technology
Thiruvananthapuram- 695 011

OVERVIEW

The Institute completed another year - a year enriched by notable achievements in technology development, health care delivery and on the academic front; and public acclaim was showered on the Institute for its innovations towards achieving affordable healthcare.

Technology development activities progressed at a steady pace with two technologies - glass ionomer cement and caries dissolving agent - transferred for commercial production. A MoU was signed with the Industry for further development, scale up and subsequent technology transfer of radiolucent disposable ECG electrodes even as two other products-Hemoconcentrator and a nanohybrid radioopaque composite reached the market. The new model of Heart Valve and the oral insulin delivery system are poised to enter clinical trials while the Left Ventricular Assist Device - a collaborative R&D programme with VSSC, made satisfactory progress. The quality management system was reassessed by COFRAC, France and was re accredited for a further period of five year. Efforts to implement quality system in Design Control (ISO13485), Technical Services (ISO 9000), Laboratory Animal Management (AAALAC) and pre-clinical safety studies of devices (GLP) are expected to be completed by the first half of the 2010. On the IPR front, the Institute currently holds 82 product and process patents, 13 design patents and has filed another 44 patent applications.

Hospital services recorded further growth in the number of both inpatients and outpatients. With continuous augmentation of infrastructure, streamlining of operations and improvement in the quality of care, it became possible to reduce hospital stay, morbidity and mortality, while enhancing the quantum of services and procedures in all the specialties. New clinics for backache and peripheral endovascular interventions were started. A sleep disorder clinic commenced functioning as a prelude to the establishment of a unique Comprehensive Sleep Disorder center. The comprehensive epilepsy care programme crossed another milestone by successfully performing the 1000th epilepsy surgery. By enhancing the quantum of free and subsidized care to patients belonging to the poor socio-economic sections, the Institute maintained its societal commitments.

The Achutha Menon Centre for Health Science Studies (AMCHSS), the public health initiative of the Institute, continued its research and training activities

with vigor and commitment. The Centre was involved in several public health interventions and has also expanded its national and international collaboration in these spheres. Realizing that the Center's courses and curricula serves as models for other academic institutions, they were made available in the public domain.

Institute, in collaboration with IIT-Madras and the Christian Medical College Vellore, launched two unique Joint Degree Programmes (IIT-M & SCIMST) in an attempt to fill major lacunae in health care delivery system and health care technology development. All the other existing degree programmes and certificate courses continued to maintain their high standards.

Clinical and basic science research into the mechanisms of angiogenesis, endothelial abnormalities, cellular responses to hypoxia and cardiac hypertrophy, role of lipoprotein (a) in atherosclerosis, oxidative stress in women with epilepsy and fetal malformations and anticancer activities of certain plant derived anthroquinones progressed apace. The Institute also took part in a number of international multicentric trials and Phase III studies after meticulous evaluation and approval by the Institute Ethics Committee.

With notable achievements in technology development, healthcare delivery and academic performance for nearly three decades, and with a vision and plans for further progress and development, the Institute is poised to scale newer heights in the decades ahead.

HIGHLIGHTS OF THE YEAR

- The Institute won the EMPI-Indian Express Gold Trophy 2008 in the category of "Innovating for delivery of affordable Healthcare technologies for the nation".
- A collaborative project with Kerala Livestock Development Board (KLDB) funded by the Department of Biotechnology, Government of India on 'Development of de-cellularised animal tissue for cardiovascular applications' commenced.
- COFRAC of France extended the accreditation of the Institute from 1st July 2008 to 30th June 2013.
- An agreement was signed between the Institute and Dr. Toms International, Calicut on the technology transfer of Caries removal agent technology.
- Technology transfer agreement was signed with Anabond Stedman Pharma Research Ltd., Chennai in May 2008 to transfer the technology of Glass Ionomer Cement.
- MoU signed with M/s Lakshmi Technologies Pvt. Ltd, Coimbatore for the further development, scale up and subsequent Technology Transfer of the Disposable ECG electrodes under development at the Institute.
- Basic Healthcare Products Pvt. Ltd, Chandigarh – an industrial partner of the Institute - received the license from DCGI, India for manufacturing bone graft products in India. This is the first manufacturing facility to receive license for manufacturing bioceramic implants in India.
- The Department of Neurology completed the 1000th epilepsy surgery in January 2009.
- 3 new Clinics - Interventional backache clinic and Peripheral Endovascular & interventional clinic (Department of Imaging Sciences and Interventional Radiology) and for Sleep Disorders (Department of Neurology) started.
- A Memorandum of Understanding (MoU) was signed between the Institute and the Graduate School of International Health Development, Nagasaki University, Japan for hosting Nagasaki University Masters Course Students.
- A Reference Manual for Primary Health Care Institutions in Kerala prepared by the Achutha Menon Centre for Health Science Studies of the Institute was presented to the Govt. of Kerala.
- M.Tech (Clinical Engineering) and Ph.D (Biomedical Devices & Technology) – Joint Degree Programmes with IIT-Madras and Christian Medical College, Vellore launched.

BIOMEDICAL TECHNOLOGY DEVELOPMENT

During the year 2008-09, the Biomedical Technology Wing continued to consolidate on the investments made during the earlier two years. Research projects made steady progress with a few of them reaching advanced stages with high promise of success. The availability of extra space with the addition of two floors has enabled further growth for the new initiatives in Tissue engineering and targeted device development.

HIGHLIGHTS OF PRODUCT DEVELOPMENT & COLLABORATION

The year witnessed market launch of two products by our industrial partners based on our technologies -- ***Restofill N FLo*** by Anabond Stedman Pharma Research Ltd., Chennai and the ***Hemoconcentrator*** by SIDD Lifesciences, Chennai. Two technology transfer agreements were signed during the year - the first for the Glass Ionomer Cements with Anabond Stedman Pharma Research Ltd., Chennai and the chemo-mechanical caries dissolving agent (Chitrasolv) to M/s. Dr. Toms Laboratories, Kozhikkode. A MOU was executed with M/s Lakshmi Technologies Pvt Ltd, Coimbatore for the further development, scale up and subsequent technology transfer of the radiolucent disposable ECG electrodes. The new model of the Chitra Heart valve is poised to enter the clinical evaluation stage early next year. The centrifugal blood-pump, the LVAD (joint project with VSSC) and the oral insulin delivery systems made substantial progress during the year.

HIGHLIGHTS OF QUALITY MANAGEMENT SYSTEMS AND TESTING SERVICES

Following the successful reassessment audit carried out in March 2008 by Comité Français D'Accréditation (COFRAC) of France, the accreditation has been extended for another 5 years till July 2013. The three Quality circles formed for effective implementation in the areas of -- (a) Design Control (ISO 13485) (b) Technical Services (ISO 9000) and (c) Laboratory-animal management (AAALAC) made steady progress. Pre-audits are expected to be carried out in the second falf of 2009, with final accreditation during 2010. The initiative on the implementation of GLP based quality system for preclinical safety studies of devices made further progress with three industry sponsored studies being carried out under this program. A project for the **Development of Guidelines for Testing and Evaluation of Medical Devices** supported by the National GLP Compliance Monitoring Authority, Dept. of Science and Technology, New Delhi has been initiated. The aim of this project is develop test guideline which can be adopted by the National GLP compliance monitoring authority for certification of laboratories involved in preclinical safety testing of medical devices.

PRODUCT DEVELOPMENT, TECHNOLOGY TRANSFER & INDUSTRIAL LINKAGES

Commercialisation

Launch of Restofill N Flo

Anabond Stedman Pharma Research Ltd., Chennai launched a new product ***Restofill N FLo*** based on our technology. This is a nanohybrid flow-able light cure radiopaque composite which has good handling properties and flowability, outstanding polishability, good strength and can be used for Class I, III, IV and V restorations.

Products / packaging - of Restofill N FLo

Hemoconcentrator

Following the technology transfer to M/s SIDD Lifesciences Pvt Ltd, Chennai and the completion of clinical trials, about 250 devices have been supplied for clinical use during the year. Further market development is in progress.

NEW TECHNOLOGY TRANSFERS

Glass Ionomer Cement

An agreement was signed on 12th May 2008 between Anabond Stedman Pharma Research, Chennai and SCTIMST to transfer the glass ionomer technology developed in the Dental Products Lab. Mr. Vijayakumar, Director, ASPR and Prof. Mohandas, Director, SCTIMST signed the agreement. The product is meant for use in luting, restorative and core build up dental applications. Two scientists from industry (ASPR) were trained in all aspects of polyacid synthesis and flouro-alumino silicate glass preparation as part of technology transfer. Further activities to complete the technology transfer process are in progress.

Chemo mechanical Caries Dissolving Agent

An agreement was signed for the transfer of technology for the chemo-mechanical caries dissolving agent "Chitrasolv", developed in the Dental Products lab to M/s. Dr. Toms Laboratories, Kozhikkode on 17th December 2008. This was an industry funded programme. Clinical evaluation of the product is to be undertaken by the Govt. Dental College, Kozhikkode. Technology transfer documents were prepared and handed over to the industry.

ECG electrodes

A MOU was signed with M/s Lakshmi Technologies Pvt Ltd, Coimbatore on 16th April 2008 for the further development, scale up and subsequent technology transfer of the radiolucent disposable ECG electrode developed jointly by the Instrumentation Lab and Polymer processing division.

ARTIFICIAL ORGANS

Devices Testing Laboratory

Development of Improved Tilting Disc Heart Valve : The improved tilting disc heart valve is expected to reduce thrombotic potential, ensure MRI compatibility with improve hemodynamic performance. Major part of the preclinical evaluation has been completed and the product has been found to be safe and functionally superior to the current model of the TTK-Chitra valve. The documentation for ethics committee clearance and application to the DCGI for the clinical evaluation are ongoing now. The product is expected to reach clinical trials during 2009.

Development of Coronary Stent Systems : Various test systems required for the evaluation of coronary stents have been installed and validated. The design validation using finite element analysis and other analytical studies has been completed. A titanium nitride coating process to minimise the elution of metallic ions to the surrounding tissues and there by minimizing the restenosis potential of the stent has been evaluated. Studies on the use of curcumin complexes as a potential drug for using in the drug eluting model of the device has shown very good promise. The final prototyping and preclinical evaluation are in progress now.

Vascular Graft: The project (executed in collaboration with Division of Polymer Processing) aims at imparting a thrombo-resistant flouro polymer coating on the fabric along with closure of the graft pores using hydrogel. The process standardisation and preclinical in vitro evaluations are progressing now. Animal evaluation is expected to start soon.

MODELLING & PROTOTYPING LAB

Centrifugal Blood pump for cardio-pulmonary bypass: Final product validation and vendor development activities continued during the year jointly with SIDD Life Sciences Pvt Ltd., Chennai. Mould corrections were carried out to rectify problems with some of the components. In-vitro evaluation was carried out to qualify them for next phase. Vendor development for the drive magnets and blood flow meter is in progress. Technology Development Board of India, who are funding this phase of the development, carried out two reviews of the project.

LVAD: This joint development project for a Left Ventricular Assist Device with Vikram Sarabhai Space Centre, Trivandrum made steady progress. Subsequent to CPCSEA approval for ex-vivo evaluation, three experiments of LVAD were conducted on swine model. Joint review of the project is under way before moving on to the next phase of extended animal evaluation.

In-vitro evaluation with Bovine blood in progress

Centrifugal blood Pump

Membrane Oxygenator: Following user complaints of low oxygenation, a series of in vitro performance evaluations were carried out to study the problem and understand the under-performance of the manufactured device. The studies helped identify the causes and suitable corrections have been initiated. With the implementation of the corrections, the device will undergo a final series of performance validation during 2009. SIDD Life Sciences Pvt Ltd., Chennai is the industrial partner.

BIOMATERIAL AND BIOLOGICAL PRODUCTS

Bioceramics

Clinical evaluation of bioactive composite (Chitra-HABG) along with the concentrated Autologous Platelet System (CAPS kit Model IMCAPS 101 supplied by IndusMedica, LLC, Salt Lake City, USA) in the treatment of periodontal defects was initiated jointly with Prof.

Ex-vivo evaluation of SCTIMST-VSSC LVAD is in progress

K.Nandakumar, Principal and Head of the Dept. of Periodontics, Azeezia College of Dental Sciences and Research, Kollam.

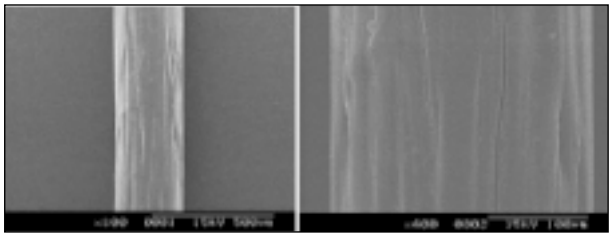
BIOSURFACE TECHNOLOGY

Oral Insulin Delivery: USV Ltd., Mumbai, the industry partner has successfully scaled-up the formulation to the required industrial level. The shelf life of the formulation from these batches has been validated and has been found to be stable for up to 12 months. Pre-clincal safety evaluation of the formulation is in progress.

Silverised Chitosan Wound Dressing : Pre-clinical safety evaluation consisting of cytotoxicity, intracutaneous irritation and sensitisation tests have been completed. The technology is now ready for clinical trials. An Indian patent is being filed.

Bioresorbable Chitin Sutures: Development of Chitin based sutures made good progress during the year with standardisation of the process for the purification of the base biopolymer and its modification to improve strength and pliability. Process scaling and further development is currently in progress.

Porous Chitosan sponges and Micro particles as Surgical Haemostat: The industrial project supported by India Sea Foods



SEM micrograph of monofilament fibres of 0.3mm dia

progressed well. Procedure for preparing the purified starting materials was standardised. Procedure for preparing porous microparticles from a water soluble polysaccharide was also optimised. The particles are free flowing and having an average particle size of 100 micron and are non-cytotoxic. Platelet consumption and dynamic whole blood clotting tests demonstrated their efficacy.

DENTAL PRODUCTS

Development of an Intrauterine Device: The collaborative project with HLL Lifecare Ltd., Trivandrum entered its 3rd year and made good progress. Prototypes were developed for the silicone core and membrane material in the lab, whereas the T frame was finalised by the industry. The core matrix passed the direct contact test and test on extracts for cytotoxicity, while the membrane material is currently being tested. Minor dimensional modifications were made to the mould to suit clinical requirements. Long term migration studies of the drug into simulated uterine fluid are in progress. Chromatographic studies of both test and control materials showed 15-20 micrograms of drug eluting into the fluid per day which is along expected lines. The studies are continuing and the project is expected to be completed on schedule this year.

Organically modified ceramic based dental composite : The small animal experiments for the organically modified ceramic dental composites were completed successfully during the year. CPCSEA approval was recently obtained for conducting large animal studies, and it is expected to commence soon.

LABORATORY ANIMAL SCIENCES

Development of the eco-friendly paper pulp based small animal bedding material initiated with the support of a paper-pulp manufacturing unit in Kerala made good progress. A large user trial was initiated together with validation of the paper pulp in terms of trace-element analysis for heavy-metals, pesticides and bacterial contamination. This project is expected to be completed this year.

POLYMER DIVISION

Dispensable and Biodegradable Bone Cement: development of dispensable and biodegradable HT-poly propylene fumarate bone cement has been continued under the DST project. Shelf life of the two component formulation of the bone cement has been studied and found satisfactory. The setting characteristics of the stored bone cement are within the acceptable limit as per the standard ISO 5833/1-1999 E. The long-term performance of bone growth and remodelling was studied with the implantation of candidate bone cement in femoral bone in rabbit animal model for 96 weeks. The histopathological investigation of bone - bone cement has revealed extensive new bone formation around the implant with mature bone with Haversian canal inside the material. Numerous areas of matured bone having material fragments embedded in the bone have been observed. This suggests the osteo-conductivity and inductivity of the candidate bone cement. There is no evidence of chronic inflammation. The fragmented material is biocompatible. The osteoconductivity and inductivity of the candidate bone cement have also

been confirmed with micro-CT. The studies revealed that the present candidate bone cement is a most promising injectable material for bone growth and remodelling in orthopaedic applications.

THROMBOSIS RESEARCH UNIT

Fibrin Glue: GMP Facility upgradation work for the scale up of Fibrin Glue & Factor VIII got underway and is expected to be ready by the second quarter of 2009. Ongoing scale up activity includes continuous flow centrifugation of pooled plasma to collect higher volumes of cryoprecipitate and thrombin purification from cryo-poor plasma using fast-flow ion exchange column chromatography to meet the target production.

Anti-snake venom from chicken egg: Preclinical evaluation of anti snake venom has been carried out in rabbit models using a new batch of venom. Subcutaneous injections with native venom were given to mimic snake bite and the intravenous administration of anti-venom was done after 2h to 4 h of envenomation. The purified anti venom was found to neutralize the toxic effects of venom with good survival rate of rabbits and reversal of haemorrhagic effects as evaluated by coagulation assays. Further safety and efficacy evaluation is in progress with the aim of initiating clinical trials during 2009.

DIAGNOSTICS AND INSTRUMENTATION

Instrumentation Lab

Development of Disposable ECG electrodes: An important step towards commercialisation of technology for disposable ECG electrodes was taken with the signing of a MOU for technology proving. The process of fabrication is being established at the site of the industrial partner. The first batch of electrodes will soon be subjected to in-vitro testing as well as human volunteer and clinical trials.

Development of Portable Medical Electrical Safety Analyser: the project is being carried out in collaboration with CDAC, Thiruvananthapuram. The aim is to design and develop a portable electrical safety analyser for use in hospitals for periodic electrical safety testing of medical equipments. The design of this tester is based on a recent international standard IEC 62353 (2007). Design, fabrication and testing of the first prototype were completed during the year. Further work is being carried out to improve the prototype and make it suitable for use in hospitals. Attempts are also underway to identify a suitable industrial partner for commercialization.

Development of instrumentation for Bio-impedance application: During this year, significant modifications were carried out using microcontrollers and other circuit improvements to address power supply and signal detection issues. Multi-frequency real time impedance measurements from 40 kHz to 400 kHz were incorporated. These updated versions helped in getting high quality data. The next step of packaging these circuits and subjecting them to thorough volunteer and clinical evaluation is in progress.

Development of stimulus delivery software for fMRI investigations: The software for stimulus delivery was designed to deliver visual, auditory and cognitive stimuli and coded using VC++ platform and the data received from the response boxes and other events were time stamped and recorded in a log file. The libraries for various standard clinical paradigms were developed and the system is under evaluation in the Department of IS & IR.

LABORATORY FOR POLYMER ANALYSIS

C-reactive Measurement: Functionalized gold nanoparticles capable of selectively picking up C-Reactive protein from serum/plasma were developed in the laboratory. The method is sensitive, cost effective and devoid of biologically derived components such as antibodies. The methodology could be used as a novel technique for the estimation of CRP. Further development work is ongoing.

Toxicology

The development of an In vitro pyrogen test kit for the evaluation of pyrogenicity using human whole blood is at an advanced stage. An ELISA based method, it will be suitable for evaluating wide spectrum of products and also detect non-endotoxin pyrogens, such as pyrogens of any chemical or biological nature

TECHNOLOGY TRANSFER & PROJECT COORDINATION

Technology Business Division

Interactions with medical device industries and academic institutions, both within and outside the country, continued to increase in the areas of medical device evaluations, collaborative research and development. The Technology Business Division played an active part in building up these relationships and partnerships. The main focus of the division is on (a) Technology transfer and related activities (b) Industry sponsored and collaborative research and (c) Customer Service for testing.

While two new technology transfer agreements were signed during the year (as reported earlier), continued support was extended to earlier licensees to set up their production facilities and commercialize the products at the earliest. Confidentiality and Non Disclosure agreements were screened by the division before signing them with the external organizations availing Institute's medical device evaluation services.

Review meetings were held with industry for industry sponsored projects regularly to ensure that project milestones were met. Review meetings were also held with technology licensees. The division organized the periodic internal research conclave RESCON in June 2008, November 2008 and March 2009 to review the research projects and programmes of the various laboratories. A meeting of the newly constituted Technology Development Committee of the Institute was also organized on 17th and 18th October at BMT Wing.

QUALITY MANAGEMENT SYSTEMS, TESTING & TECHNICAL SERVICES

Quality Systems

With the completion of 5 years in July 2008 from the initial assessment date, Comite' Francais D'Accreditation (COFRAC) of France carried out a reassessment in March 2008. During this audit, the scope of accreditation was expanded with the addition of 3 new tests. The final approval received in June 2008 extended the accreditation for another 5 years till July 2013. The next surveillance audit is planned for July 2009.

The programme for the extension of Quality Management to all divisions of the BMT Wing progressed steadily. The three Quality circles (a) Design Control on ISO 13485 (b) Technical Services on ISO 9000 and (c) Laboratory-animal management on AAALAC guidelines met regularly to discuss the various issues in implementation and development of suitable procedures. The certification of these systems can be expected to be completed during 2010.

Calibration

The Calibration Cell is responsible for equipment calibration, maintaining traceability in measurements & reference material requirements, as well as co-ordinating inter laboratory comparison studies. During the last year the Cell carried out 280 calibrations. Of these, 225 were directly related to the testing services under the scope of COFRAC accreditation. The accreditation of the calibration cell by the National Accreditation Board for Testing and Calibration Laboratories (NABL), New Delhi is in progress.

In-house Reference Materials (RM) for various biological evaluations are prepared regularly and maintained in the Cell. A TDF project has been completed for validating commercially pure titanium (CP Ti) as reference material in bone implantation studies.

Quality Cell

Activities of Quality Cell include the implementation, maintenance and improvement of management systems to assure that the facilities, equipment, personnel, methods, practices, records and its control are in conformance with the requirements of the standards. The major activities carried out during the year were:-

a. Coordination of the surveillance audit by COFRAC, France during March 2008 resulting in renewal for five more years up to 2013.

b. Coordination of Quality Circle activities. The highlights of these were:-

Quality Circle for Technical Services:

- Energy utilization survey and reduction in power consumption.
- Road map for IT infrastructure up gradation
- Indenting of membrane-based water treatment plant.
- Work Procedure for preventive maintenance shutdown of substation

Quality Circle for Laboratory Animal Sciences:

- Breeding policies for various strains
- Guidelines for Parasitological monitoring
- Autopsy procedures for all deaths
- Individually ventilated caging and proposal on Macro and Micro Environmental set up
- Haematology analysis in Annual Health monitoring

Quality Circle for Design Control

For the implementation of ISO13485:2003

- Identified 22 mandatory procedures
- Reviewed 15 procedures

Training: The following training programmes were organised by Quality Cell

- ISO/IEC 17025:2005 Quality Management System & Internal Auditor Training for twenty personnel were conducted on 21st, 22nd & 23rd April 2008
- Training for Project Management & Application of Risk Management to Medical Devices was conducted on 9th August,2008
- "Enhancing Personal Effectiveness" Training for 24 personnel were conducted on 29th& 30th September 2008
- "Improving personnel & Team Effectiveness" Training for 25 personnel were conducted on 13th& 14th February,2009

Management review

- Management Review Committee meeting for the year 2008 was held on 5th January 2009.
- Three Technical Management Committee meetings were held on 16th May 2008, 19th September 2008 & 16th January 2009
- Internal Audits were carried out during (i) May 19th to 28th of 2008 and (ii)November 17th to 26th of 2008. Two GLP studies were also audited during year.

Document initiated/revised: (i) System Procedures: 3 Nos; (ii) Work Procedures: 201 Nos (iii) Quality related forms: 4 Nos

TESTING SERVICES

Customer Service Cell- Testing & Evaluation Activity

The Customer Service Cell (CSC) is the nodal point for all the testing and evaluation services for medical devices and biomaterials offered by the institute. The cell continuously interacts with medical device industries, research institutions, and academia. It makes available to external customers, the necessary information and counselling for proper selection of tests as well as reasonable access to the laboratories. The year saw an increase in the number of enquiries for availing biocompatibility testing and analytical facilities and the customer base expanded with about ten new industrial customers. However, there was a decrease in the actual number of test materials received from external customers for testing while there was a substantial increase in the number of materials from internal customers.

Description	External			Internal		
	2006-07	2007-08	2008-09	2006-07	2007-08	2008-09
Work orders	381	465	400	233	299	388
No. of test materials handled	1385	1728	1380	802	813	1627
Income (Rs)	11,01957	23,52,881	18,87,300	8,70,950	18,73,869	20,22,000

Study based device evaluation services

The Institute also offers study based programs for functional and safety evaluation of devices and biomaterials for product qualification. Some of the study based programs in great demand are the bio-functional evaluation of coronary stents in porcine model and accelerated ageing studies for determination of shelf life of different devices. The CSC coordinated the requests from various customers for these study based services. The year saw study budgets amounting to about Rs 38 lakhs being committed by industry. Most of the study based programs follow a GLP system as understood by us even though the system to certify us as GLP certified laboratory is still not in place.

SUMMARY OF TESTING SERVICES OFFERED BY VARIOUS LABORATORIES

Bioceramics : Two tests are offered by the Lab for the internal and external customers - X-Ray Powder Diffraction and Scanning Electron Microscopy with EDS analysis.

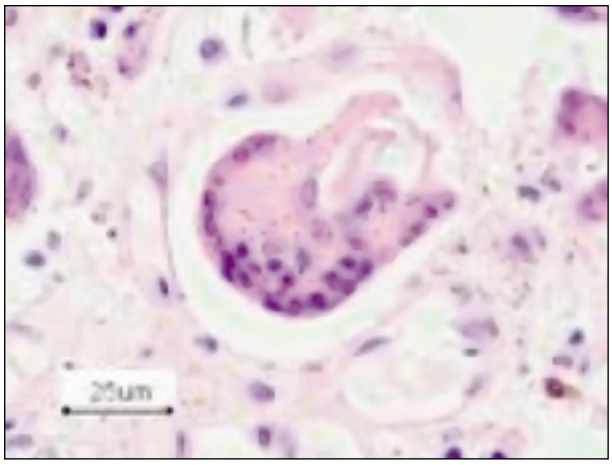
Dental Products: Testing facility was extended to internal and external customers alike on a chargeable basis. The number of samples tested were Micro CT (112), FT- Raman Spectrometer (205), UTM (546), FT-IR spectrometer (57).

Devices Testing: Five accelerated ageing studies on various medical devices were completed and four new studies taken up during the year. The laboratory also supported the testing activities of the BMT Wing by providing service on sample preparation, cleaning, packaging and sterilisation of the materials from customers.

Histopathology laboratory: this is a unique facility with capability to undertake a wide range of specialized techniques for evaluation of the biocompatibility of various materials and devices. The laboratory is well equipped for evaluating hard un-decalcified tissues, with and without materials. This year, the laboratory introduced the evaluation of biocompatibility of materials in bone. It received a record number of samples for evaluation of biocompatibility for evaluation in pre-clinical studies from both industry and research groups. The laboratory also carried out histopathological studies on compatibility of polymer and polymer composite materials in bone and tissue engineered materials in soft tissues and hard tissues and oral toxicity study of nano-particles in rats.

In vivo Models & Testing: Three major device evaluation studies were carried out under GLP system of quality assurance under implementation. They consisted of 2 Sirolimus eluting coronary stent systems sponsored by an Indian industry. The third is a novel drug eluting stent developed by a university. The stents are evaluated in a porcine coronary model for its

Vascular stents in situ- histology, stereomicroscopy and scanning electron microscopy



Material engulfed by foreign body giant cell

safety and efficacy. While two have been completed, the third is on-going.

Microbiology: The division offers routine sterility testing as per United States Pharmacopoeia and the accredited Ames' Test (Salmonella typhimurium reverse mutation Assay) as per ISO 10993. The division also offers services for routine Microbiological monitoring of controlled environments in various labs and water used in the campus for animal drinking and other areas. Support was extended for antimicrobial activity and bacterial adhesion studies of materials being developed by other laboratories. Other tests conducted include spore viability and culture and sensitivity. The different tests conducted during the year were:-

Modelling and Prototyping Lab: ETO sterilisation services were extended to the Hospital wing and BMT Wing regularly. With the shutting down of the PANBIT irradiation facility for refurbishing, the volume of services increased substantially during the year.

Name of test	Number of requests	Number of samples
Sterility test (USP 31/ NF 28)	38	68
Invitro Bacterial Reverse Mutation (AMES) assay	3	3
Spore viability test	6	8
Microbiological monitoring of air	38	85
Bacteriological analysis of water	25	52
Anti microbial activity testing	4	5
Bacterial adhesion studies	3	5
Staining & Culture	12	26
Minimum inhibitory concentration	2	2
Duration of effective antimicrobial activity	2	2
Bacterial penetration study	1	2

Polymer Processing: Tests offered are mechanical properties determination in the tension and compression mode, impact properties and dynamic mechanical analysis. The mixing and extrusion processing facility is extended to the customers.

Thrombosis Research Unit: Tests for detection of platelet activation using flow cytometry methods were validated which include estimations of P-selectin and CD41 expressions and micro particle generation. Tests have application in blood compatibility evaluation and clinical diagnosis. Accreditation for all three tests on platelet activation and a group of complement activation tests were granted by COFRAC. Proficiency program of Royal College of Pathology of Australia for haematology and haemostasis tests have been used efficiently to control the quality of testing. A new haematology analyzer for veterinary samples has been procured, validated and test service is offered routinely.

Tissue culture laboratory: Implementation and maintenance of Quality system in tissue culture lab was continued to meet requirements as per ISO 17025. Continuous procurement, storage, revival and maintenance of cells ensured efficient functioning of the entire system. The laboratory carried out cytotoxicity and cytocompatiblility testing of materials received from customers from industry as well as external and in-house research groups. Cytotoxicity testing was evaluated for 110 samples by direct contact, test on extract and indirect contact method as per ISO 10993-5, 1999. Cell material evaluation included cell adhesion, neutral red assay and MTT assay which accounted for a total of 25 test samples. Interlaboratory comparison for in vitro cytotoxicity test was initiated with NAMSA, USA.

Tissue engineering and Regeneration Technologies: Contact angle analysis facility was accessed by many labs in the campus and a few researchers from outside.

Toxicology: As in the previous years, the division extended its testing services to various external and internal customers covering a wide range of tests conforming to ISO 10993, USP and ASTM standards. A GLP study for the Evaluation of the haemostatic efficiency of a hemostatic dressing in albino rabbits were completed. Other

studies carried out were Calvarial ans segmental implants in rats, intraperitoneal implantation in rats and hemostatic potential in rabbits.

Transmission Electron Microscopy laboratory: Services offered are evaluation of tissue and inorganic (micro- and nano- particles) samples including the evaluation of ultrastructural interaction of the tissue response to materials.

TECHNICAL SERVICES

The service units of the BMT Wing continued to extend their high quality support for the maintenance of the different activities, especially meeting the requirements of the quality system.

Devices Testing: The division continued to support the information management activities of the BMT Wing. The implementation of an Enterprise Resource Planning and Management Information System (ERPMIS) is in the final stages. The campus network BMTLAN is being further upgraded to meet the growing demands of the expansion, new hostel, etc.

Engineering Services: The division prrovided routine and emergency electrical, plumbing, PANBIT, telecommunication, incinerator and air conditioning maintenance service. The division carried out the infrastructure establishment for Polymer & Toxicology block floor expansion activities in the various segments. Supervision and coordination of the construction of the new Canteen, Engineering and Biology blocks are being carried out. The Hostel block was taken over and fitted with necessary furniture and other fittings and made ready for occupations by students in January 2009.

IPR & Technical Co-Ordination: Patents application filing and maintenance in consultation with the institute's patent attorney are the major responsibilities. The cell coordinates the visits by a large number of college student groups from various technical colleges in South India. During the year, 9 New Patent applications were filed and 10 of the older ones were granted / sealed. The status of patents held by the institute and those filed and pending as on 31 March 2009 is:

Patents held (sealed)	=	82 Nos.
Patents filed and pending	=	44 Nos.
Designs held (sealed)	=	13 Nos.

Division of Laboratory-Animal Science is responsible for the breeding, care and management of small animals and ensures consistent supply of quality animals for both testing and research. This requires housing, husbandry, and maintenance of micro as well as macro environment and documentation of small laboratory animals according to CPCSEA and ISO 10993 Part- 2 standards. Assistance is provided to researchers for orbital bleeding of rodents, harvesting tissues from animals, etc. The division extends support for the timely conduct of Institutional Animal Ethics Committee (IAEC meetings) covering documentation, communication with scientists and with CPCSEA for major issues in connection with all animal experimentation of the Institute. Training in Care and Management of Experimental animals is regularly conducted for MSc/PhD/ BVSc students, and for staff joining in various projects.

Precision Fabrication Facility: A number of moulds and dies were fabricated for moulding various components and test samples; jigs and fixtures were fabricated to support the testing in various labs. Some of the important designing and fabrication jobs carried out were:-

1. Precision machining of components for the centrifugal blood pump like top pivots, bottom bearing, pump casings and impellers

2. Machining of fixture for different divisions like --- edge trimming fixture for heart valve disc, burst strength testing fixture for vascular grafts, biaxial stretching fixture, Titanium Pin microhardness testing fixture, pin on wheel fixture, bio reactor fibre assembly fixture, centrifugal blood pump assembly fixture, vascular graft heat exchanger fixture, coaxial electro spinning fixture, etc.
3. Machining of various components like modified dental pulp oximeter sensor holder for Hospital wing, standard 1 gram mass for balance verification, venturimeters, modified blood pump bottom and top components; sheet mould (250 x 250 mm x 4mm thick) Heart valve wear tester components, 4 sets of perfusion chamber and cover plates, two sets of compliance chamber for bio reactor setup and others.
4. Completed the cutting of supplied 6 Sq.ft Polycarbonate sheet into micro slides for Hospital wing and the machining of various moulds like a spherical mould for bioceramics and 4 cavity moulds for IUD inner core for Dental Products lab.

BIOMATERIALS RESEARCH AND DEVELOPMENT

Bioceramics

The Lab is continuing with the design and development of bioceramics and related materials. New initiatives in technology development are

1. Micro and nano porous bioceramic substrates having capacity to carry drugs and biologics for the treatment of refractory osteomyelitis and osteonecrosis.
2. Bone filler cements containing calcium sulphate and calcium phosphate, which are superior in resorption characteristics and having the capacity for drug delivery.
3. Coating of hydroxyapatite layers on to titanium implant surface using Pulsed Laser Deposition technique, so as to increase the integration with bone.
4. Silica-based biosensors for the detection of markers in blood for diagnostic applications.
5. Magnetic nanoparticles for radiological and therapeutic applications
6. A new programme for the preparation of dental porcelains.

Biosurface Technology

Facility for nano/microparticles based biomaterials for Advanced Drug Delivery Systems (FADDS)

Department of Science and Technology approved the project for the development of a facility for nano/micro particles based advanced drug delivery systems. The program of the facility would consist of three components:- 1) Extension of the current expertise in nanoparticle development, physico-chemical characterization and in vivo-in vitro correlation. 2) specific applications of these nanoparticles towards nanoparticles loaded with growth factors, hormones or drugs for therapeutic applications like promoting angiogenesis, treating osteoporosis, type 2 diabetes, growth factor loaded wound healing sponges for treating burns, etc. and 3) basic exploratory research component where monolayer self assembly and molecular imprinting will be studied for specific adsorption of molecules, drug targeting or sensing. Staff recruitment and the purchase of major equipment are almost complete.

Histone antibody labeled nanoparticles: for removal of circulating chromatin fragments

It is reported that apoptotic chromatin particles, irrespective of the source i.e. somatic normal or cancerous cells, when added to somatic cells in culture are

readily ingested by and gets integrated into the host cell chromosomes. This event triggers the development of rapid genomic instability leading to oncogenic transformation in the recipients. Thus, it follows that if such fragmented chromatin particles from apoptotic cells can be prevented from reaching other cells it could curb pathological conditions, including malignant transformation. The objective of this study was to develop histone-antibody labelled nanoparticles which can be possibly used for the removal of the circulating chromatin. The results from in vivo studies showed it to be a promising and less invasive system for the removal of circulating chromatin. Single and multiple administrations of histone antibody nanoparticles were done in vivo on BALB/c mice to compare the efficacy of the dosage effect. Multiple dose treatment was found to be more effective than single dose.

Dental Products

FT-Raman studies on unfilled dental resins cured using a new photoinitiator: This project was carried out as part of the sabbatical undertaken by Prof. Vaidyanathan and Prof. (Mrs) Jayalaxmi Vaidyanathan, New Jersey School of Medicine and Dentistry, NY, USA during the year. A new photoinitiator TPO which cures when exposed to light of 383 nm was used to cure unfilled BIS-GMA resins diluted with TEGDMA. Exposure times were varied from 0 to 60 sec. Concentration of TPO varied from 0.1% to 0.5%. Storage periods varied from 0, 1 hr, 24 hr, 48 hrs and 1 week. Percentage monomer conversion was found out in all cases by recording the FT- Raman spectra of all samples. Efficiency of this novel photo-initiator was compared with that of conventional photoinitiator camphorquinone.

Polymer Scaffold development for small diameter vascular graft: Biodegradable porous polycaprolactone scaffolds prepared in the lab underwent degradation studies for nearly a year. The tubular scaffolds (4 mm dia) were stored in two different media of varying pH at 37oC and gravimetric loss, molecular weight loss, and loss in mechanical properties were monitored at regular intervals. Burst strength and retention strength were also monitored. The samples were supplied to TRU where they were subjected to fibrin coating and seeded with endothelial cells. The scaffolds (bare) also cleared cytotoxicity and sensitization studies. Scaffolds were prepared using porogens of different molecular weight and effect on changes in porosity and pore interconnectivity were measured. Animal experiments will commence soon.

Devices Testing Lab

Bioreactor Development : The division initiated programmes for the development of bioreactors meant for providing suitable microenvironment for cell culture and cell differentiation for tissue engineering applications. Three programmes (in collaboration with the divisions of Thrombosis Research, Tissue culture and Tissue Engineering & Regenerative Technologies) for cartilage tissue, liver cells and vascular tissue engineering applications have been taken up. The systems are in the specification development and design stage now.

Biological Tissue Development : A new programme was initiated by the Division of In vivo Models and Testing for the development of functionally characterised biological tissue for medical applications, in collaboration with the Kerala State Live Stock Development Board (KLDB). The division is supporting the programme by way of carrying out mechanical characterisation and application development.

Instrumentation and the Devices testing labs continued to support the clinical department of Imaging Sciences and Interventional Radiology in the standardization of event related fMRI technique for developing spike triggered fMRI . This programme focuses on the activation of specific brain areas by providing cognitive or motor stimuli in synchrony with the MRI scan.

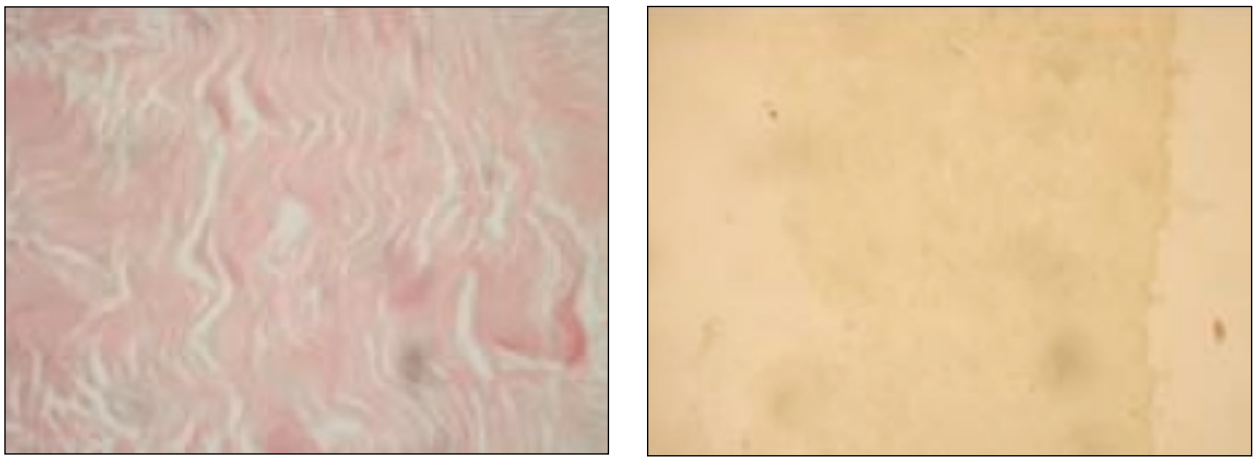
In-vivo Models and Testing

De-cellularised animal tissue: Work continued on the novel technique for non-detergent based decellularisation of animal tissue. A DBT project was sanctioned to develop implants such as bovine jugular vein and bovine pericardium for cardiovascular application. As a part of this project, the collaborator Kerala Live-stock Development Board's facilities are being upgraded to produce animal tissue of international quality with support being provided for implementation of suitable quality management systems.

Polymer Analysis Lab

The DRDO funded project entitled "Development of thermo responsive copolymers as sensing elements for C-reactive proteins", was completed. Several polymeric formulations, water soluble as well as thermoresposive, capable of recognizing and binding clinically relevant CRP were designed and developed under this project. A new technique for the measurement of CRP in blood could be formulated from the data emerged from the project. In the DBT funded programme (Designing molecularly imprinted polymers as substrates for glucose), a novel approach to visualize the binding of glucose to the surface of glucose specific polymer was developed. Further studies are in progress. In another DBT funded programme, strategies were developed to anchor biomolecules to the surface of thermoresponsive polymers to enhance cell adhesion.

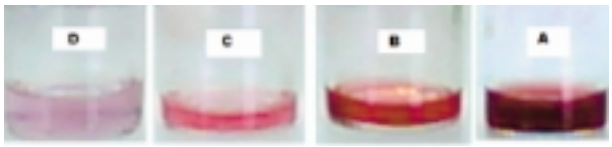
Good progress was made in the development of microcapsules using the concept of Layer by Layer (LbL) approach for delivering drugs at specified targets. This concept was also used to modify the surfaces of devices such as intra ocular lens to improve certain features. Super paramagnetic iron oxide nanoparticles have potential application in the field of drug delivery due to their biodegradable nature, bio-compatibility and the super paramagnetic effect on MRI contrast. Several attempts have been made



Decellularised Bovine pericardium showing intact collagen bundle (H&E, Movats Pentachrome-200X)

to use magnetic nano particles (MNPs) for drug delivery while retaining their inherent magnetic and imaging properties. Loading of adequate quantity of hydrophobic drug such as pacilitaxel into MNPs is one of the challenges for targeted drug delivery. Assembling cyclodextrins onto the surface of MNPs could be another approach for loading of drugs into MNPs. Further studies in employing modified MNPs as a targeted drug delivery vehicle is in progress.

The group has synthesised gold nanoparticles (GNPs) with appropriate ligands to sense clinically relevant molecules such CRP and cholesterol. GNPs showed distinctive colour change when they bind onto the target analytes reflecting the feasibility of developing novel analytical platforms for clinical diagnosis.



Sensing of CRP with a visually observable colour change (A-GNP, B-Modified GNP, and C- CRP specific Ligand conjugated GNP and D- CRP bound GNP).

Polymer Division

Functionally active myocardial patch implant – Under this DBT project, blood compatibility of the newly prepared scaffold hydrogel materials was investigated as described in ISO 10993-4. Studies on cardiac cardio-myocytes cell response to the newly prepared scaffold hydrogel materials were carried out to evaluate its growth and proliferation. The growth which was appreciable is attributed to the formation of synergistic hydrophilic-hydrophobic surface by surface reorganisation. Further work on this promising material is in progress.

Biodegradable molecularly reinforced polymeric nano composite bone fixation devices- Under DST-BMBF project, experimental dynamic compression bone plates were prepared by reinforcing the biodegradable poly(propylene fumarate) with hydroxyapatite microscale particles. Physico chemical and mechanical properties and biodegradation and biomechanical stability were optimized to obtain a cured composite. The structure-property was assessed with reference to biodegradation, and bio-mechanics. The change in storage modulus and bulk morphology under dynamic biomechanical stress in simulated physiological conditions has greater influence on biomechanical stability, interfacial stability and functional performance of an implant. Based on the performance of the experimental bone fixation devices, the candidate PPF/HAP-BMT nanocomposite was selected for further development of clinical bone fixation devices.

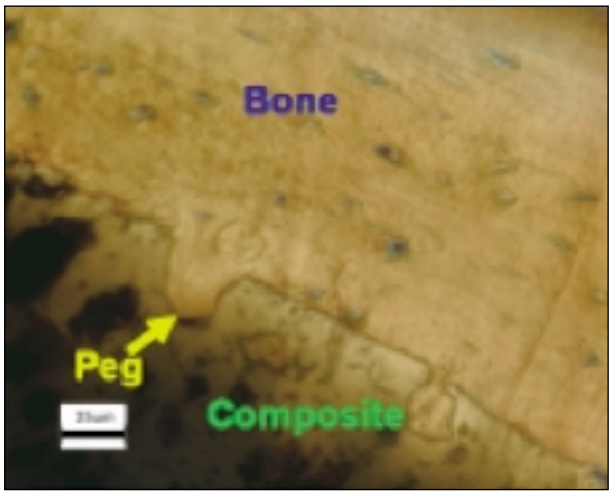
Radiopaque polymers for biomedical applications :- Radiopaque polyurethanes were prepared with various diisocyanates and chain extenders. New chain extender bishydroxyethyl ether of iodinated Bisphenol A has been prepared and characterized for the synthesis of radiopaque polyurethanes. Further work is in progress.

Polymer Processing Lab

Development of bone graft substitutes for spinal fusion surgery

This is a DST funded project aimed to develop bone graft substitutes for spinal fusion surgery. In this project a new radiographically visible composite material was formulated using bioactive glass and polybutylene terephthalate. Composite produced was evaluated for its physico-chemical and biological properties. Modulus and toughness of the composite was comparable to bone and the material could be easily shaped using a scalpel in the theatre if required. The composite exhibited good

mechanical properties suitable for bone replacement and cleared all biological tests according to guidelines of ISO10993 standard. The composite when implanted in rabbit femur exhibited excellent bone bonding capability. The bone was bonded to the composite material wherever bioactive glass was exposed and strongly attached with the composite with processes resembling pegs (see figure below).



Novel microporous polymeric membranes for medical applications

This is a collaborative project with Rubber Technology Centre, Indian Institute of Technology, Kharagpur. The objective of the project is to develop a micro porous membrane from compatible blends of thermoplastic polyurethane (TPU) and poly dimethyl siloxane rubber (PDMS), which can be developed further for use as a substitute for human dura mater and as a non-biodegradable scaffolds in tissue engineering. The blended material showed good biocompatibility in cyto-toxicity studies, good property retention even after in vitro hydrolytic and oxidative degradation with minimal immunological response after short term intramuscular implantation.

Development of Degradable Composites as Bone Substitutes

The aim of the project is to develop appropriate degradable compositions based on poly-caprolactone (PCL) with hydroxyapatite (HAP) and bioglass (BG) as bone substitutes. Poly-caprolactone with hydroxyapatite and bioglass composites formulated by appropriate melt mixing followed by compression/ injection moulding. The compositions are being evaluated for their mechanical and biological properties.

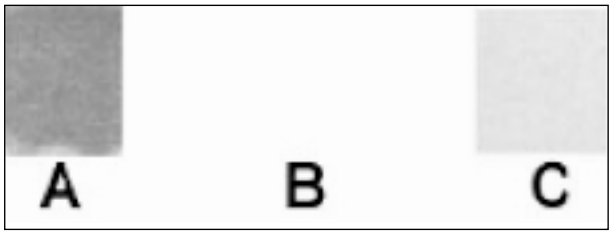
Combination Products of Polymer-Ceramic Nanocomposites with Cells and Growth Factors for Bone Tissue Engineering Applications

The aim of this DBT funded project is to develop innovative nano-structured polymer composite materials and surfaces with tailored properties and to explore the interaction mechanisms at nanoscale between the biological systems and nanostructures. It is also envisaged to design nanostructured systems that could interact in a predictable and controllable way with biological systems and developing hierarchial structures with spatially presented biological cues from bioresorbable electrospun nanofibers that could lead to the development of ideal scaffolds for tissue engineering applications. Synthesis and characterization of poly(ε-caprolactone) (PCL) and its blends were carried out. Composites of PCL and its blends with nanohydroxyapatite were also prepared and characterised.

Synthesis and Characterization of Radiopaque Polyurethanes for Medical Applications

Polyurethanes (PU) are used in the fabrication of many medical devices. New X-ray opaque polyurethane materials can have broad

applications. Radiopacity is a desirable property of many diagnostic devices such as catheters and the conventional method to introduce this property in medical devices is by incorporating heavy metals salts such as Barium sulphate in the polymer matrix. A number of radiopque polyurethanes were synthesized by incorporation of iodinated chain extenders and were characterized by various techniques including GPC, TGA, DMA, proton NMR, ^{13}C NMR and cell culture cytotoxicity. These radiopaque polyurethanes are thermoplastic elastomers with a glass transition temperature (Tg) around -30°C. They exhibited good mechanical properties and were non-cytotoxic.



X-ray images of discs of 1 mm thickness: Radiopaque PU (A), Conventional PU (B) and Aluminium (C)

Development and evaluation of surface modified, hydrogel coated medium and large diameter vascular graft

This project aimed to modify commercially available porous polyester vascular graft by giving two coatings: (1) a fluoropolymer coating that would reduce material thrombogenicity and (2) a biodegradable hydrogel coating that would minimize/prevent the blood leakage through pores. The fluoropolymer used for reducing thrombogenicity was polyvinylidine fluoride (PVDF) and the hydrogel used was the reaction product of oxidized alginate dialdehyde and gelatin. The project is funded by DBT, and is being carried out with the participation of industry. A set-up for dip coating of PVDF onto vascular graft has been fabricated. A number of hydrogel formulations having different solution viscosities and gelation times were developed for spray coating on the external surface of the graft.

TISSUE ENGINEERING AND BIOLOGICAL RESEARCH

Histopathology laboratory

Mechanisms of Immune cell mediated regulation of fibrosis around silicone implant: an in-vitro and in vivo investigative study: An in vitro and in vivo investigation of cell-material interactions between silicone, and macrophages and fibroblasts with reference to material degradation. The study investigates in vitro and in vivo, the role of cells, cytokines and signalling molecules in the persistence of excessive fibrosis around tissue expanders leading to clinical failure.

Microbiology Laboratory

The research focus of the Division continues to be the "Delineating mechanisms of biofilm formation in urinary catheters: characterization of the role of E.coli secretory proteins and influence of environmental signals". The dynamics of biofilm formation on urinary catheters under nutrient limiting conditions and drugs like aminoglycosides and nitrofurans are being carried out. A second DBT funded project on "Tissue engineered hybrid artificial lung model for testing pollutants and drugs" is presently ongoing. Various scaffolds were synthesised and analysed for its ability to support the different lung cell types in culture. Two scaffolds were selected for its ability to support lung cell adhesion and proliferation in culture. These supports are being investigated for its ability in supporting maintenance of alveolar specific characters in culture.

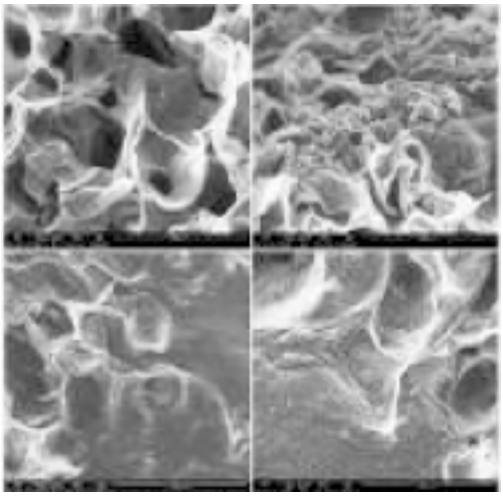


Fig: These are environmental scanning electron microscopic images of Scaffold II A- Bare scaffold. B-D Day 9 of lung cell culture on the scaffold.

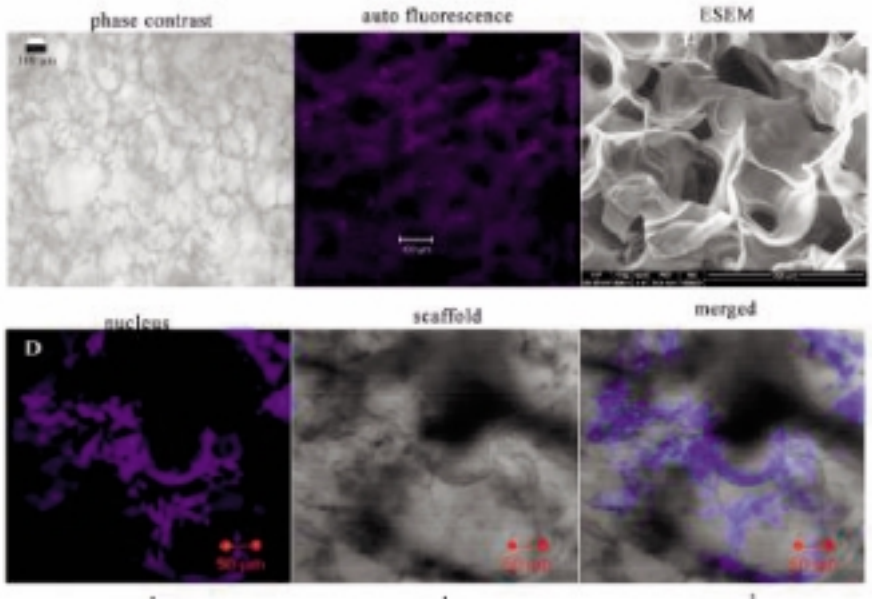


Fig 2: One of the most successful scaffolds, which can be used for hybrid artificial lung tissue construct. Row 1 shows the figure shows the phase contrast and ESEM (Environmental scanning electron microscopic) pictures of the scaffold. In row 2, the distribution of the alveolar cells on the scaffold is visualised by confocal microscopy. The cell nucleus is stained with Hoechst and overlaid on the scaffold image showing distribution of cells on the margins of the pore.

Molecular Medicine Lab

The major focuses in neurobiology research are to elucidate the pathways involved in neurotransmitter release because of its primary role in brain function. Besides, many of the nervous system disorders are associated with impairment of neurotransmitter pathways. The focus was on a synaptic vesicle protein called synaptotagmin, an essential protein in the neurotransmitter pathway, for its expression during hyper-activation of neurons. It was identified for the first time, that the level of synaptotagmin undergoes activity dependent regulation through RNA-protein interaction. This protein showed a sequence specific recognition to its own mRNA and down-regulated the translation efficiency of the RNA molecule. These results provided new insights on how the neurotransmitter release is regulated without affecting the gene transcription levels. During conditions like stress these alternate pathways are induced to down-regulate the neurotransmission and thus prevent over excitation of neurons as well as neuronal death. This work has important implications in medicine and biology. Other research work includes looking at the role of synaptic proteins in neuronal connections after an axonal injury. To enhance the cellular growth as well as repair, it is essential to have a series of growth factors available at a reasonable cost. Development of a series of recombinant growth factors like TGF alpha, VEGF, NGF and BGF is another program that is ongoing. These growth factors have essential role in tissue repair. The evaluation of the stability of these growth factors in various scaffolds for enhancing the tissue repair process is in progress.

In addition to the above, another area of interest is in understanding the evolution of highly

conserved protein domains. Identifying fossilized sequences are critical for accurate determination of the time of divergence between species. The C2 domain is calcium-binding domain is present in a variety of proteins and in some, this domain shows high conservation in many species. A 36 amino acid stretch was identified, that has been conserved from insects to human. The duplicated genes from the parental gene also showed a strong conservation in sequence. These conserved sequences can be used to estimate the timing of genome evolution.

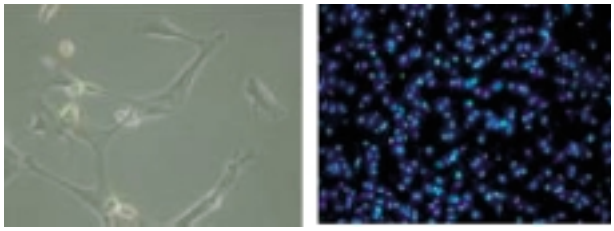
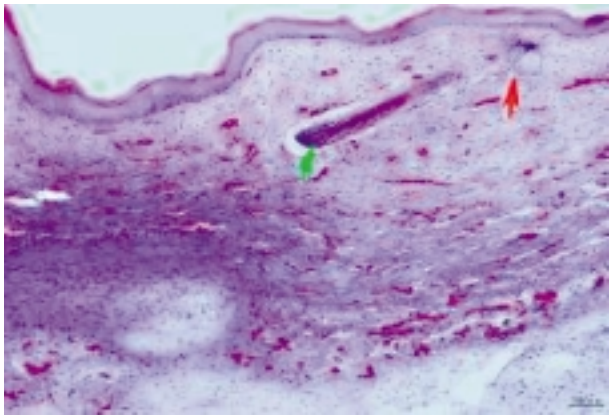


Figure: A. Astrocyte culture.
B. Astrocytes stained with Hoechst 33342

Thrombosis Research Unit

Vascular tissue engineering: DBT funded project with multiple objectives of biodegradable scaffold development, development of bioreactor and construction of vascular tissue has progressed well. The tubular hybrid scaffolds prepared using biodegradable polycaprolactone and biomimetic fibrin composite were seeded with endothelial cells (EC) under static and dynamic conditions and results were compared. Dynamic seeding and culture of EC was successful within 10 days to obtain stabilized monolayer aligned along the direction of flow. Nitric oxide release and good blood compatibility are demonstrated which proves the normal function of EC grown under dynamic conditions. Results have potential application in construction of vascular tissue.

Fibrin Sheet for Wound Healing: The primary objective of the study was to incorporate hyaluronic acid (HA) to fibrin sheet (FS) to improve the water retention at the wound bed and improve bio-resorption of components in fibrin. Histomorphological study of the FS-HA treated wound was done by histological analysis. Most significant observation of this experiment was sporadic formation of hair follicles and sebaceous glands at repaired injury site (Fig 1).



Excessive granulation tissue with abundant neo capillaries was characteristically present in HA-FS treated wound site with differentiated hair follicle (green arrow) and sebaceous glands (red arrow).

Fibrin Sheet for Drug Delivery: A study was conducted to identify differential dose-dependent effect of curcumin on smooth muscle cells (SMC) and endothelial cells (EC) on proliferation, apoptosis and cell cycle. Curcumin was loaded on fibrin sheet and achieved controlled release into culture medium. It is shown that higher doses of released curcumin affects proliferation and induce apoptosis but a specific low dose that is released from fibrin is found to have no adverse effect on EC. On the contrary, this dose was found to affect proliferation of SMC, induced apoptosis and arrested cell cycle. The study indicated that if the release of curcumin can be controlled it will have

variable effect on different cell types and thus can have selective therapeutic applications.

Identification of Adult Stem Cells in Peripheral Blood for Regenerative Medicine: Nestin positive neuronal progenitors were estimated in the mononuclear fraction of circulating blood collected from Parkinson's disease patients using flow cytometric analysis. Results indicated that there is similar percentage of neuronal progenitors in normal population and in the patients. Terminal differentiation of nestin positive cells into neurons under standardized culture conditions was confirmed by expression of MAP-2 whereas partially differentiated cells were identified by expression of Tubulin-3. Undifferentiated neuronal progenitors from circulating blood may be a good cell source for neuronal regeneration.

Identification of Circulating $P63^{+ve}$ keratinocyte progenitors and its differentiation into keratinocytes for potential application in skin tissue engineering was carried out. Compositions of culture matrix and medium were standardized to attain proliferation of $P63^{+ve}$ population with expression of CD34 antigen. Differentiation of progenitors into keratinocyte was proved by immunochemical staining and analysis. It is proposed that human circulating blood can be a source of keratinocyte progenitors for skin tissue engineering. Further work is in progress.

Tissue Culture Laboratory

Tissue culture laboratory is involved in research activities for developing new cytotoxicity test methods, stem cell culture and in vitro tissue biology and engineering. A new test was initiated for evaluation of dental materials based on dentine barrier method. An artificial in vitro tooth model was designed and being evaluated for the developing test protocol. One of the major projects of tissue culture lab is development of in vitro corneal cell sheets for ocular surface regeneration. A modified cell culture surface was developed based on a modified thromoresponsive polymer synthesized here. This material favours flexibility in immobilization of biomolecules on to the backbone of the copolymer. It was characterized by Differential Scanning Calorimetry (DSC), Fourier Transform Infra Red Spectroscopy (FTIR), Environmental Scanning Electron Microscopy (ESEM) and water

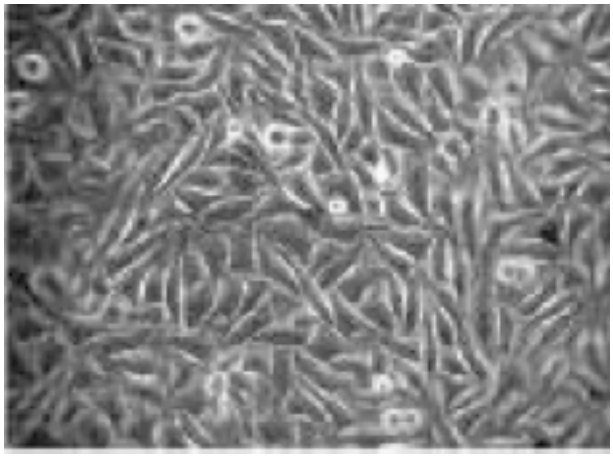
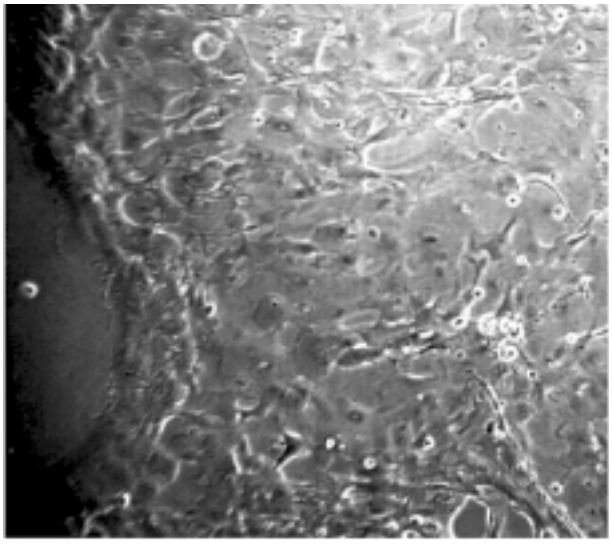


Fig: L929 cell adhesion on coated surface

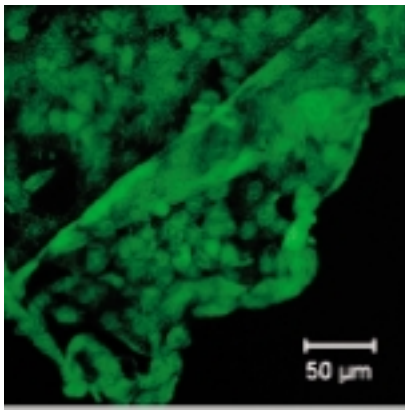


Cells from rabbit limbal explant on coated surface after 10 days in culture

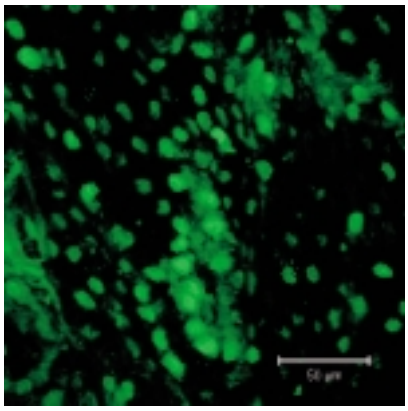
contact angle measurements. This modified polymer was grafted on cell culture plates and characterized for cell culture studies and tissue engineering applications.

Conditions were optimized for growing limbal stem cells without the use of xenogenic feeder layers like mouse 3T3 fibroblasts. The laboratory-generated thermoresponsive culture surface was successfully used to generate bioengineered corneal cell sheets. Retrieved corneal cell sheet were viable and expressed stem cells as well as tissue specific characteristics. Vital staining using FDA showed viable cells in the cell sheet. Immuno-fluoresence staining for stem cell markers p63 and ABCG2 revealed the presence of limbal stem cells.

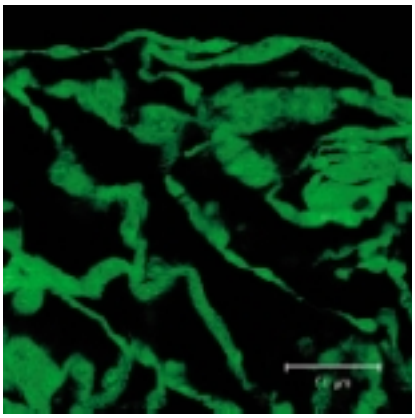
The retrieved corneal tissue construct also expressed required tissue specific differentiated characters by the expression of cytokeratin 3/12. The construct was also positive for intact epithelial feature evidenced by the tight junction protein ZO-1. Actin cytoskeletal distribution gave cortical staining pattern indicating the intact tissue architecture due to the presence of preserved extracellular matrix.



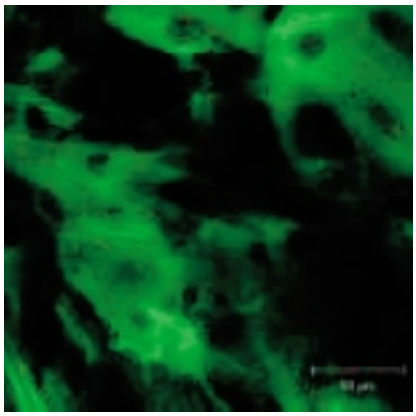
Corneal cell sheet showing viability (green) after FDA staining



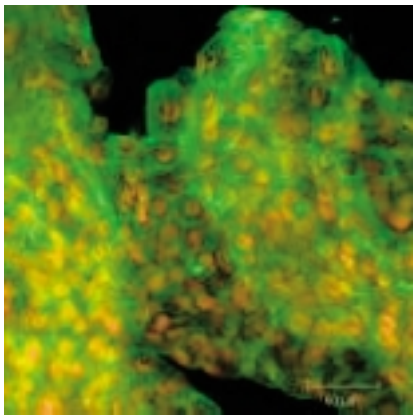
Corneal cell sheet positive for p63 (green) expression characteristic for limbal stem cells



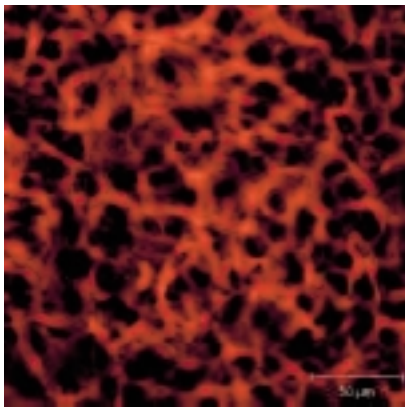
Corneal cell sheet expressing the stem cell marker ABCG2 (green).



Differentiated corneal character in corneal cell sheet by expression of cytokeratin 3/12 marker (green)



Epithelial characteristic of corneal cell sheet. Intact tight junction (green) around cell. Nucleus shown as red.



Actin microfilaments (red) demonstrating cortical staining pattern in cell sheet

Limbal Stem Cell Deficiency (LSCD) was created in rabbit models for evaluation of bioengineered corneal cell sheet construct. Transplantation experiments were successfully completed in LSCD rabbits with limbal cell sheet. Animal experiments are undergoing for accurate evaluation of ocular surface regeneration using cell sheet transplantation.

Tissue culture lab initiated the development of Bioartificial Liver (BAL) with initial studies on developing the culture system and bioreactor. The cytotoxicity, cell adhesion and proliferation of the components of bioreactor were evaluated using L929 fibroblast cells. The BAL components and the material processing procedures were standardized. Rat bone marrow mescenchymal stem cells (MSC) were isolated for standardization of conditions for differentiating to hepatocytes. Mescenchymal stem cells were differentiated to hepatocyte lineage and further studies are going on to obtain fully functional hepatocytes.

Division of Tissue Engineering and Regeneration Technologies (DTERT)

A major focus of work in the division is the development of novel scaffold materials for tissue engineering of different tissue types. Development of different fabrication methods for scaffolding technologies like freeze drying, gas foaming, electrospinning etc. are ongoing. Materials produced are shared with other labs within campus and collaborating labs elsewhere in the country. Another area of development cover **Biopolymer Composites for medical applications :** Several biopolymer injectable, fast setting and biodegradable gels were prepared. The gels were noncytotoxic and some of the gels were useful for encapsulation of living cells; others could be modified to form scaffolds within which cells could be seeded and grown. Mesenchymal stem cells of different origins could also be grown and differentiated to adult cell types on these scaffolds.

1. Joint Indo-US programme on Stem Cells & Tissue Engineering

A Joint Indo-US Centre on Stem Cell and tissue engineering of cardiovascular tissues, funded by the *Indo-US Forum*, continued its activities with visits by Professors Buddy Ratner and Alan Hoffman from Univerisity of Washington, Seattle, and Prof Kip Hauch and Mr Steve Woodard from the Georgia Tech and Emory Centre for the Engineering of Living Tissues, Atlanta during the year.

Professor Hoffman delivered informative lectures on "controlled drug delivery systems", "design and selection of polymer compositions for implants and medical devices", "Tissue engineering scaffolds, and intracellular drug delivery" and "Polymer surface structure and properties and protein adsorption on polymer surfaces". Professor Buddy Ratner, P.I of the programme in the U.S.A discussed the research output generated at the Institute and by the other partners of the programme. Future directions and activities were also discussed. A one day meeting - "A Day with Stalwarts" was held on 27th January 2009, with lectures in the area of Biomaterials, Tissue engineering and Stem Cells by Prof Ratner and other eminent scientists from India.

The reciprocal visits under the programme were by Dr. Prabha D. Nair, Ms Lynda V Thomas and Dr Neethu Mohan to the Georgia Tech and University of Washington and Mr Shinsmon Jose from MAHE to the Unversity of Washington for the collaborative research activities in the period 2008-2009.

"A Day with Stalwarts" meeting on January 27th 2009. Director Prof Mohandas giving his inaugural address. Seated on the dias- Dr. Prabha D. Nair, Prof B.D. Ratner and Head BMT wing, Dr. G.S.Bhuvaneshwar.

The main work addressed under the joint programme was to seed smooth muscle cells on biomaterial scaffolds made at SCTIMST and attempts to study the growth of blood vessels in the dynamic conditions of the bioreactor at GTEC. The application of mechanical strain to tubular biomaterial-collagen containing cell constructs and collagen only with cells constructs was achieved using a bioreactor system as shown in Fig.1. Studies indicated that the collagen - biomaterial construct fares much better than the collagen only construct with elastin fiber formation appearing at an early time point. More work is how ever required to substantiate this aspect and work will be continued at SCTIMST.

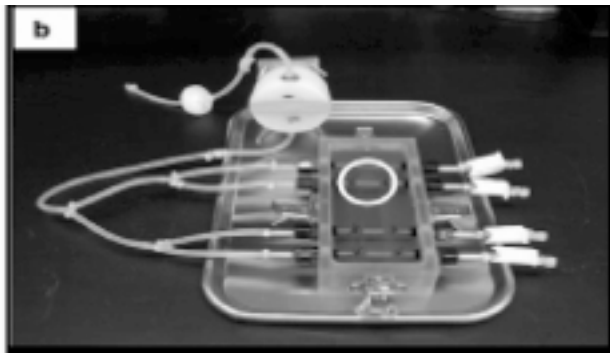


Fig 1 : Biomaterial-collagen constructs subjected to mechanical strain on a bioreactor

Work was also carried out on differentiation of human Embryonic Stem cells to cardiomyocytes by two different protocols and comparison of the differentiated cells from both protocols by Immunocytochemistry. Some of the scaffolds were found suitable for growing ESCs and formation of embryoid bodies. The study further made an effort to look into the aspects of tissue engineering and therapy in Guinea Pig. The study also pointed to the chances of induction of arrhythmia on implantation of heterogeneous population of differentiated cells into the infarct. The studies are part of the efforts to develop a cardiac patch and a blood vessel substitute at the collaborating labs.

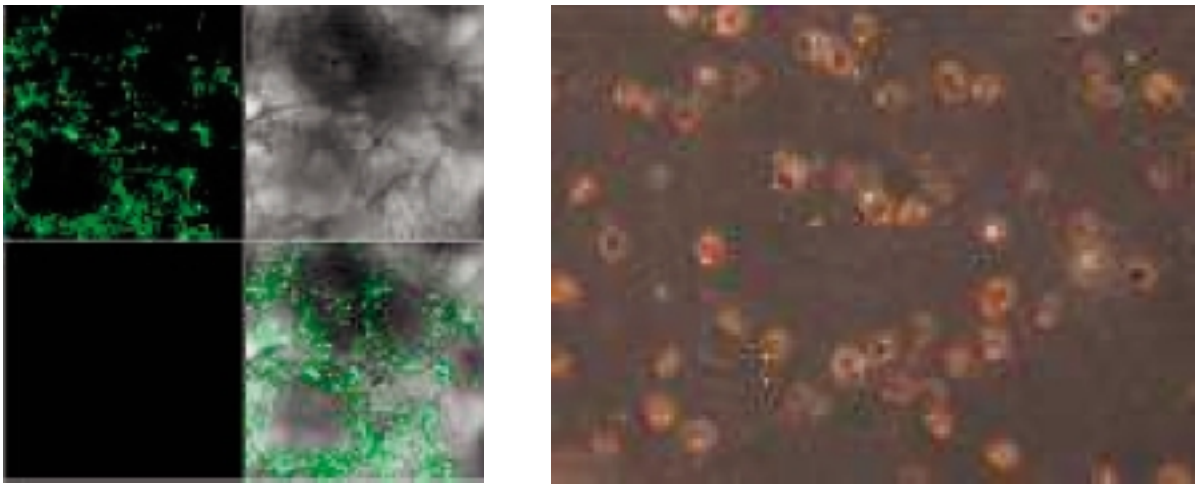
DBT sponsored project on Islet Immuno Isolation with XenoTransplantation and Stem Cell Regeneration to Islets as Strategies for Treatment of Diabetes

The aims of this project are to develop multiple strategies for treatment of diabetes without immunosuppression, viz., 1) Immunoisolation - that allows for allo/xeno transplantation and 2) Stem cell differentiation toward pancreas regeneration

An imporant achievement is the fabrication of IPN macrocapsules with selective permeability and the development of several functional islet specific scaffolds. IPN encapsulated porcine islets were xenotransplanted in experimental diabetic rats to reverse the glycemic status without immunosuppression for periods upto 3 months. IPN encapsulated human fetal islets and islets regenerated from MSC of different origins also showed similar efficacy in diabetic mice without immunosuppression. Umbilical cord stem cells could be seeded on some scaffolds and differentiated to islet cells. Differentaition of adipose stem cells to islet cells in angiogenic models are being attempted.

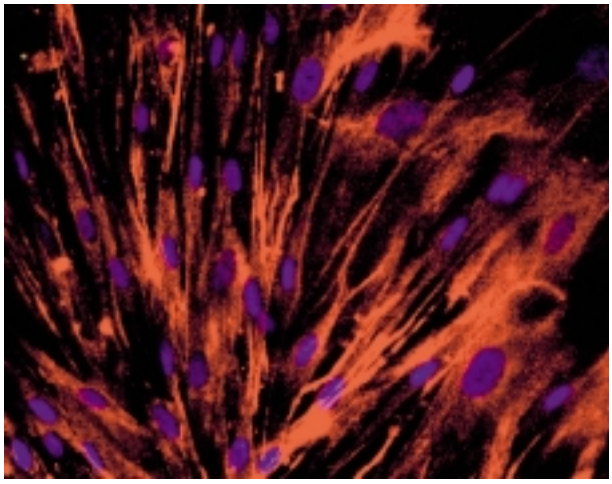
"Programme support on Tissue Engineering" under the Centres for Excellence and Innovation programme of DBT

Development of new polymeric biomaterial gels and scaffolds and polymer bioglass composites, bioreactor development for cartilage tissue engineering in collaboration with the Division of Artificial Internal Organs were the main activities initiated under this programme. Another initiatiave was the setting up a facility for electrospinning materials in micro and nano structures. Differentiation of umbilical cord and bone marrow mesenchymal stem cells into chondrocytes using biomechanical forces in a bioreactor, development of animal implant models for cartilage tissue engineering and implantation of cell seeded scaffolds for cartilage tissue engineering were the other studies addressed. Implantation of chondrocyte-seeded scaffolds was observed to regenerate new cartilage tissue "denovo". Further studies are in progress.

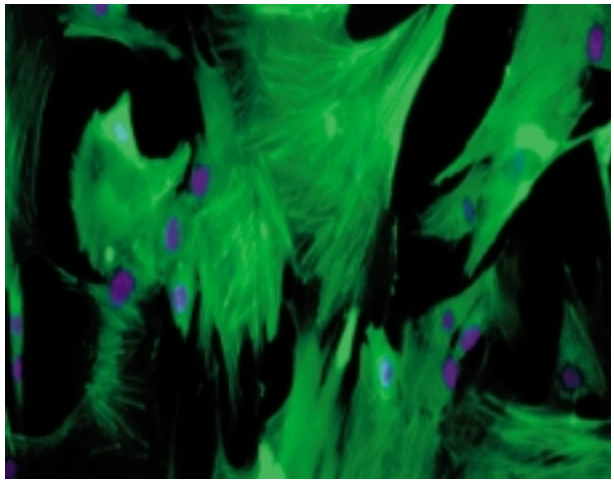


(a) (b)

Mesenchymal stem cells seeded on a scaffold – green (a) and differentiated to islet cells red stained with dithiazone (b)



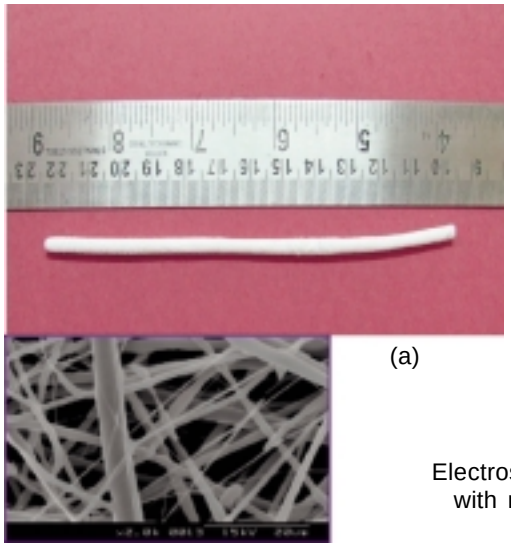
Rabbit bone marrow MSC



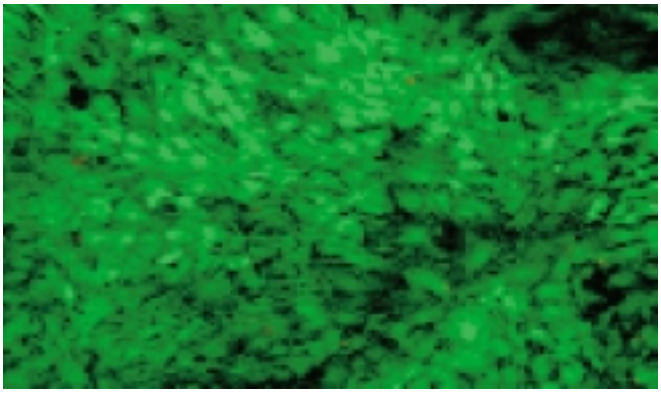
Umbilical cord stem cells stained for F actin

A fully biodegradable and in situ gel was synthesised and characterised for delivery of chondrocytes and stem cells in defect sites. Bioglass was synthesised via novel routes and found to be noncytotoxic. Polymer- bioglass composites were also found to be noncytotoxic. Further studies are ongoing. An electrospinning facilty was set up at DTERT and several materials made in nanofibrous and microporous structures. An electrospun tube from polycaprolactone was found to have favourable mechanical properties and suitable for growing vascular cells.

In an ongoing DBT funded program on **lung tissue engineering** which is a collaborative effort with the Department of Microbiology, several biomaterials were prepared and characterised for physicochemical properties and ability to support the coculture of alveolar epithelial and fibroblast cells. A hyaluron hybrid graft and another biopolymer hybrid copolymer were identified as better biomaterials for the coculture studies.. A new project on epithelial cell mesenchymal interactions and the role of angiogenesis was also sanctioned by DBT in collaboration with the Department of Microbiology, BMT Wing.



(a)



(b)

Electrospun polycaprolactone showing nanofibrous morphology with micropores within.(a) Rat smooth muscle cells growing profusely on the electrospun structures (b)

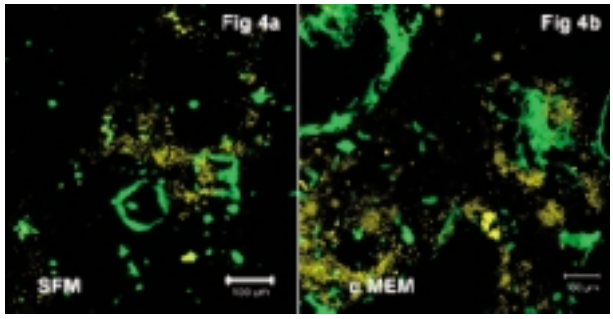
Toxicology

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

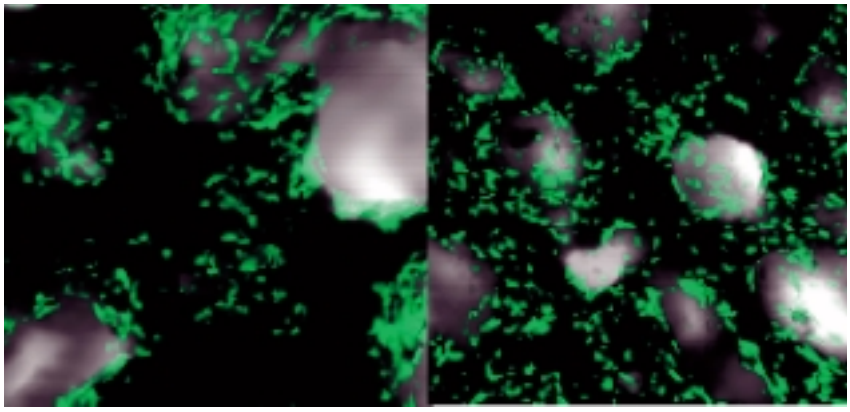
New technique introduced in laboratory during this year are (1) the method for calverial defects, segmental defects and bone cartilage (knee joint) implantation (2) Immunotoxicological studies using T and B lymphocyte proliferation assay; (3) Isolation of DNA and identification of DNA damage from whole blood and tissues using HPLC method; (4_ In vitro human lymphocyte culture for chromosomal studies and micronucleus studies.

Transmission electron microscopy laboratory

Bone Tissue Engineering is the main focus of research. Stem Cell research on bone marrow-derived mesenchymal stem cells and their differentiation into the cells of the bone lineage have also been successfully attempted on these bioactive ceramics fabricating them into "living bone constructs" (biological substitutes) intended for the enhanced repair of large bone defects. Adipose tissue derived mesenchymal stem cells and their differentiation into the cells of bone and cartilage lineage is the new area of research initiated.



ALP activity (yellow granules – ELF 97) as a marker for osteogenic differentiation of the human bone marrow derived mesenchymal stem cells (green – FITC-Actin) grown over ceramic maintained in both bovine serum and serum free medium for 14 days.



Viable Rabbit adipose derived stem cells (acridine orange) grown over ceramic scaffold.(HASi & β-TCP)

PATENTS GRANTED

- "A Single Solution Bonding Agent (Ssba) And A Process For The Preparation There Of" Pat No:221689 / Application No: (443/Che/2003) Dtd:02 Jun, 2003. Inventors: V. Kalliyanakrishnan & P. P. Lizzymol.
- "An Osteoconductive Composite Material". Pat No:222314 / Application No: (805/Che/2003) Dtd:06 Oct, 2003. Inventors: P. Ramesh & Harikrishnavarma.
- "A Process For The Preparation Of A Biopolymer Matrix". Pat No:214429 / Application No: (921/Mas/2002) Dtd:11 Dec, 2001. Inventor: Prabha D. Nair.
- "Anti-snake Venom Immunoglobulins Obtained From Chicken Egg Yolk." Pat No: 223121 / Application No: (185/Mas/2002) Dtd:18 Mar, 2002. Inventor: Lissy K. Krishnan.
- "A Modified Ceramic Resin For Use In Dental Applications And A Process For The Preparation Thereof." Pat No:219733 / Application No: (483/Che/2003) Dtd:12 Jun, 2003. Inventor: P. P. Lizzymol.
- "A Monomer Pyromellitic Dianhydride Glycerol Dimethacrylate (Pmgdm)". Pat No: 214329 / Application No: (391/Mas/2003) Dtd: 09 May, 2003. Inventors: V. Kalliyanakrishnan & P. P. Lizzymol.
- "A Process Preparing Modified Biocompativle Sponge," Pat No:212859 / Application No: (1296/Mas/1997) Dtd:16 Jun, 1997. Inventors: Prabha D. Nair.
- "An Immunoadsorbent Matrix Based On Modified Poly Vinyl Alcohol Microspheres"; Pat No. 222703 / Application No: 224/Mas/1999; Dtd:24 Feb.,1999. Inventors: Sharma C.p., Hari P.r., & Paul Willi.
- "Apatitic Bone Cement Composite With Bioactive Glass"; Application No: (306/Mas/2000); Dtd: 24.apr,.2000. Inventors: Manoj Komath & Harikrishna Varma P.R.
- "Dual Cure Resin Cement (Dcrc) For Orthodontic, Endo-dontic And Veneering Applications In Dentistry", Application No: (695/Che/06); Dtd: 17 Apr., 2006. Inventors: V. Kalliyanakrishnan & P. P. Lizzymol.

HEALTH SCIENCE STUDIES

The Achutha Menon Centre for Health Science Studies (AMCHSS) completed 11 years of its activities in training, research and consultancy in health science studies. The 13th batch of MPH students joined in January 2009. The Centre has become a trail blazer and trend setter for public health education in the country. When the AMCHSS started offering the first Master of Public Health (MPH) program in India there was no job position earmarked for the MPH graduates. However, all the graduates of our MPH program could find excellent positions, over 90% within India. Only a small proportion of our graduates (< 10%) migrated overseas.

Over 10 institutions in India started MPH program after the successful experience of SCTIMST, including Jawaharlal Nehru University, New Delhi, National Institute of Epidemiology (ICMR), Chennai, Post Graduate Institute for Medical Education and Research, Chandigarh and Tata Institute of Social Sciences, Mumbai. SCTIMST could provide technical and faculty support to many of the new public health initiatives in India and in the neighboring countries such as Nepal, Myanmar and Bangladesh.

Major challenges for establishing public health education institutions in India are recruitment and retention of quality faculty and creating career paths for public health graduates at state and national level similar to that exists in a few states such as Tamil Nadu and Gujarat. While all efforts should be made to develop quality faculty it will be worthwhile to experiment usefulness of information technology to share faculty from India and abroad by several public health institutions. Under the European Commission supported project 'partnership for better health' our institution is exploring the possibility of establishing a videoconferencing facility that will enable lectures offered by faculty to be utilized by a large number of students from several institutions simultaneously within and outside the country.

The Diploma in Public Health (DPH) program that we started recently is a good initiative to strengthen public health capacity within the government system. All the candidates are selected from among the state government doctors with at least three years of experience. All of them go back to the government and most of them are promoted to higher positions in the public health system of the government. This input has been reported to be extremely useful to enhance the public health capacity in the state of Gujarat.

A few short courses relevant to the field of public health were conducted in the reporting year. Enrolment of PhD program continued as in previous years.

The Centre has been consistently trying to improve the quality of the MPH program. In the reporting year we have uploaded the revised MPH curriculum in our institute website. There was increasing demand for our curriculum by the new institutions that started an MPH program.

A memorandum of Understanding (MOU) was signed with the Graduate School of International Health Development, Nagasaki University, Japan. In addition under the project entitled "Building Capacity for Tobacco Cessation in India and Indonesia" supported by the Fogarty International Centre of the National Institutes of Health, USA, the institute signed MOUs with three partner medical colleges in Kerala and plan to sign MOUs with two medical colleges in the state of Karnataka with an objective of building a network of tobacco researchers. Many other major research projects are also going on at the Centre in collaboration with many partners within the country and outside.

RESEARCH PROJECTS

Completed Projects

Promoting women's health through strengthening capacity of public health professionals and community based participatory interventions in health by women's groups

The project had three components 1) Strengthening capacity of public health professionals for women's health: Two short courses on Making Pregnancy Safer with national and international participants from Government and non-government organizations were held. 2) Presentations focused on gender dimensions of contemporary public health issues were included in the National Conference on Emerging Public Health Issues organized by the AMCHSS, SCTIMST; the WGEKN (Women and Gender Equity Knowledge Network) report on gender as a social determinant of health was published and distributed to all the participants of the conference. A special invited lecture by Prof Gita Sen of the Indian Institute of Management, Bangalore on 'Gender as a social determinant of health' was held. 3) Empowerment of women for community based participatory interventions in health: Women health volunteers of five Grama Panchayats were trained to map their environments, health issues and to identify priority areas for health action. Geo-coded maps for the entire block Panchayat were also prepared with the support of the community health volunteers. This project was funded by the Government of India Women's Component Plan for Sree Chitra Tirunal Institute for Medical Sciences and Technology.

Ongoing Projects

Athiyannur Sree Chitra Action (ASA)

This is the ongoing initiative of SCTIMST in collaboration with Athiyannur Block Panchayat. We have extended the initiative to all the Grama-Panchayats (GPs) in the block. The resultant database would be helpful for the community in their planning process and at AMCHSS we use this database for training MPH scholars. With the support of Centre for Earth Science Studies (CESS), Trivandrum, a computer based information portal for the area with Geographic Information System (GIS) maps has been developed for Venganur Panchayat, which would be handed over to the Panchayat soon.

The second phase of ASA initiative has got partial funding from the Women Component Project (WCP) of the Government of India, so we have launched a massive women empowerment

program in the community. Selected women volunteers have been trained on health care matters, and as part of their hands on experience, they have collected socio-demographic details and global positioning system (GPS) parameters of 29785 households in the area (7103 households from Athiyannur GP, 8412 from Kottukal GP, 5077 from Kanjiramkulam GP and 2877 from Vizhinjam GP).

ASA specialty clinics

Cardiology clinics were conducted on all fourth Saturdays in the designated clinic at Community Health Center (CHC) Vizhinjam. A total of 293 patients (156 new and 136 review cases) referred by the local practitioners had availed the services of our cardiologists at the clinic and of them 58 patients were advised to come to SCTIMST for further check up. Neurology clinics were conducted on every second month on the second Saturday starting from January. A total of six Neurology clinics were conducted and 55 patients (32 new and 23 review cases) referred by the local practitioners availed services of our Neurologists at the clinic. Of them thirteen patients were advised to come to SCTIMST for further check ups. Considering the recent lackadaisical approach of the Panchayat authorities, ASA coordinators from the collaborating departments viz. cardiology, neurology and AMCHSS are having second thoughts about the method of conducting these clinics. Detailed analysis is being planned to find the opportunity cost versus the benefits that the community might accrue.

Building Capacity for Tobacco Cessation in India and Indonesia

This is a collaborative project between Achutha Menon Center for Health Science Studies of SCTIMST, Gadjah Mada University of Indonesia, and the University of Arizona USA. The overall objective of this project is to strengthen capacity for cessation training and research in India and Indonesia. The specific objectives of the project are to incorporate tobacco education into undergraduate medical education in selected medical colleges in Kerala and Karnataka. Three medical colleges have been identified as partner medical colleges in Kerala: The Academy of Medical Sciences, Pariyaram Kannur, Amrita Institute of Medical Sciences Kochi and the Government Medical College Alappuzha. Memorandum of understanding was signed between the SCTIMST and the above three medical colleges. Fifteen modules are being developed for pre-testing and implementing in different departments of the above medical colleges. In addition to implementing the modules a student and faculty survey will be conducted in these medical colleges to assess the impact of the tobacco education. A community and work site will be selected by each of the above medical colleges for tobacco control activities. In the second year of the project two medical colleges will be selected as partner medical colleges in Karnataka state. Initial visits have been made to Bangalore Medical College and Kasturba Medical College at Mangalore.

Capacity building for Safe Motherhood Programs

This is a collaborative initiative between Society for Education, Welfare and Action - Rural (SEWA Rural), Jhagadia; Centre for Study of Ethics and Rights, Mumbai (CSER, Mumbai) and the Achutha Menon Centre for Health Science Studies. The purpose of this initiative is to develop evidence based models for Safe Motherhood and Newborn care in India. Sewa Rural, Jhagadia has been engaged in an effort to develop a 'Family

Centred Safe Motherhood and Newborn Care Project' during the past three years. The whole programme has the backup of a fully functional base hospital with 100 beds providing comprehensive emergency obstetric and neonatal care for this community and others as well. CSER, Mumbai has been involved in facilitating the development of a strong ongoing monitoring and evaluation plan for the whole project. Role of AMCHSS in this initiative is to examine existing evidence in order to develop publishable material for advocacy through joint publications with SEWA Rural and CSER, and also jointly identifying problems that require further research within the community. Two faculty members from AMCHSS will be engaged with the development of various papers collaboratively with the two other organisations. In addition, at least one student from the second year MPH programme have taken up studies using the data from SEWA Rural through a competitive scheme of identifying best proposals on safe motherhood and new born care, giving an outline of the work of SEWA. It is anticipated that some of the additional outputs will be developed through this effort of MPH graduates working under the guidance of the two identified members of the faculty.

Community Interventions for Health

This pilot project was awarded by the Oxford Health Alliance, UK. Three other sites that got this award are Mexico, China, and the United Kingdom. The objective of the project is to find out the feasibility of community based interventions to reduce the three major risk factors of chronic non-communicable diseases namely tobacco use, unhealthy diet and physical inactivity. Two community development blocks are selected, in Trivandrum district: one an intervention site and the other a control site. A delayed intervention will be provided in the control community in the third year of the project. School, work site, hospital and community are the four groups of people where tailor made interventions will be provided. Baseline data will be collected in both the intervention and the control sites. After the intervention a repeat survey will be conducted in both the intervention and the control sites. The anticipated outcome is a reduction in the risk factors in the intervention site compared to the control site. Such community based interventions to control non-communicable diseases are rare in developing country settings. If the pilot project is successful this could be implemented in many countries where non-communicable chronic diseases are emerging in epidemic proportions.

Ethical considerations in health policy: Case study of political decentralization in Kerala

The study is aimed to examine the rationale for decentralizing health care during the first phase of decentralization in Kerala State during 1996-2001 and understand the ethical dilemmas that were identified and resolved, if resolved, as part of the decision making process. A cross sectional inquiry using qualitative methods of data collection was undertaken. Thirteen key stakeholders who were involved in the decentralization process in Kerala during 1996-2001 were interviewed. The interviews were conducted between November 2007 - January 2008 and the analysis completed between January 2008- October 2008. Analysis using an ethical framework identified the synergistic benefits and limitations. Decentralizing the health sector gave the LSGs an opportunity to address the equity gaps within communities in terms of infrastructure for health, water supply and sanitation. Yet, the most marginalized of communities, the schedule tribe populations, did

not benefit as much from this process because decentralization did not create the conditions to challenge the existing power structures within the society. The strong push to decentralize from the political forces often referred to as the 'Big Bang Approach' lead to ignoring issues relating to economies of scale, particularly in initiatives such as containment of epidemics. These would benefit from expertise available only at the state or district for planning cost-effective interventions. Decentralization has the potential to achieve significant gains in the health sector. But there are two caveats to be kept in mind - one is that decentralization will not solve all problems in the health sector, there are issues that will require a centralized approach and those should be identified at the policy level. The second is that there are tradeoffs between equity, efficiency and accountability goals in health policy that any planning process should identify before the stage of execution. If this is not done, the benefits of the policy decisions could be derailed.

Impact of the 2004 Indian Ocean Tsunami on People in Affected Regions of India and Sri Lanka: A Longitudinal Study of Mental and Social Health Outcomes and Recovery of Individuals, Families, and Communities

This two-country, three-region population study, in Kerala and Tamil Nadu states of India and Batticaloa in Sri Lanka, has reached its third and last phase of its implementation. In the second round of survey in this year, detailed psycho-social aspects of a randomly selected sample of 2107 subjects (1718 adults and 389 adolescents) in the area were collected. Around 10% of this sample was resurveyed by another group of data collectors to ensure quality in data collection process. The project had been reviewed by international teams of experts twice this financial year, during September 27-28, 2008 at the Mahidol University, Bangkok and during November 12-15, 2008 at SCTIMST. Sri Lankan colleagues could not complete the surveys as planned because of the insurgency issues, and the National Institute of Epidemiology at Chennai could not do so because of some unexpected logistic issues. Taking account of these realities, it was decided to defer the decision on the third round of follow up survey till we finish the analysis the second round of data, weighing out the need and feasibility.

As part of the project implementation, we have selected 18 local youths from the affected area, given proper training and entrusted with data collection as a hands on exercise. We have been conducting regular monthly training for them in community counseling with the help of a psychiatrist attached to the district mental health program. Our field office at Alappad functions as a meeting point for these community counselors and some informal counseling services are being offered at the centre. The field office is being visited by academicians and public health students from within and outside the country as an example of community led initiatives in psycho-social health.

Non-Communicable Disease Risk Factor Survey under the Integrated Disease Surveillance Project

This project is funded and coordinated by Indian council of medical Research (ICMR). The overall objective of this project is to conduct a survey of the risk factors of non-communicable diseases in all the states of India in a phased manner. The actual survey will be conducted in each state by an implementing agency identified by the state government. Five regional centers are already identified by the ICMR to provide

technical support to the states for conducting the survey and to ensure quality of the survey. AMCHSS has been identified as one of the regional centers and will have to provide technical support to five states namely Kerala, Karnataka, Lakshadweep, Daman and Diu during the project period of three years. During the first phase of the project, during last year, technical support was provided to the survey agency in Kerala (The clinical epidemiology unit of Medical College, Trivandrum). As a data quality check, 250 households surveyed by the state agency was resurveyed to check data quality. Analysis is being completed for the report.

Partnership for Better Health

The objective of this project is to strengthen public health capacity of two Asian public health institutions namely the Achutha Menon Centre for Health Science Studies (AMCHSS) of SCTIMST in India and the Bangladesh Rural Advancement Committee (BRAC) School of public Health in Bangladesh. Three institutions in Europe are partnering with this initiative: the London School of Hygiene and Tropical Medicine (LSHTM) UK, The Karolinska Institute Sweden and the University of Amsterdam, The Netherlands. Two faculty members from the BRAC School of public health and one from AMCHSS will be sent for PhD training in European Schools. Two faculty members from the BRAC school have already joined for the PhD program. The faculty from AMCHSS is expected to join shortly. Faculty from the European institutions will teach selected course modules of the MPH program at both the BRAC School and AMCHSS. Videoconferencing facilities will be used for such teaching so that both the Asian Schools will benefit from the teaching that will take place in one school. Books and journals will be purchased for both the Asian Schools. Senior faculty members of the two Asian Schools will be trained in pedagogy in LSHTM.

Prevalence of Type 2 diabetes in a rural Community in Alappuzha District, Kerala: Identification of the Contributing Economic and Socio-cultural Factors

The study starts with the assumption, which is well accepted in the current thinking in public health, that lifestyles are important determinants of non-communicable diseases. The goal of the study is to explore 'one step behind' lifestyle modifications, and examine the economic and socio-cultural determinants of life style modifications, which in turn lead to an increase in frequency of non-communicable diseases, specifically type 2 diabetes, in a selected rural community. The main objective of the study is to examine the economic and socio-cultural determinants of life style modifications in a selected rural community in Alappuzha district. This is a qualitative study to facilitate the identification of the community perceptions of life style changes that have happened over the last 15 years in the study area, which consists of two wards in Venmony Panchayat, Alappuzha district, Kerala. An in-depth interview guideline was used to interview the selected informants within the community. In all, 16-32 key informants were interviewed for the qualitative study. This represented and adequate range of sex, socio-economic status, and the influence of migration of any household member to the countries in the Middle East. The interviews have been translated and transcribed into English and analysis using a method of inductive coding will be undertaken.

Stakeholders' perceptions of Institutional Review Boards (IRBs) in India

The mechanisms for oversight of research in India seem to be rather weak, in spite of the

existence of the Indian Council of Medical Research (ICMR) guidelines for undertaking biomedical research. It is possible that not all institutions undertaking biomedical research involving human subjects have IRBs and /or that there are IRBs but they are not effective. In developed countries researchers have often tended to view the IRB as being antagonistic to the research process and sometimes IRB members may not be able to resolve conflict of interest issues. The purpose of the study is to examine the inadequacies involved in using the IRBs as an oversight mechanism for biomedical and other health research involving human subjects in India and suggest changes and/or improvements if there is a felt need for it.

Qualitative research methods using four focus group discussions (FGDs) among potential participants and in-depth interviews with key stakeholders from six institutions, including researchers, IRB members and other experts were done. The analysis of the FGDs has been completed and an abstract of the paper has been presented at the National Bioethics Conference in December 2007. The in-depth interviews have been transcribed and the analysis completed. A second presentation based on this analysis was jointly presented at the International Conference on Urology and Transplantation, Karachi in September 2008. Papers based on these two presentations are being developed it is expected to be completed by June 2009.

Master of Public Health (MPH) Programme

Due to the increasing demand for MPH program the academic committee of the institute has decided to increase the number of MPH student intake from 15 to 25 from 2010 onwards. Out of the 15 students of the 2007 batch, 14 completed the course in December 2008.

Nine public health students from the Harvard School of Public Health, under the leadership of Dr Richard A Cash, spent 4 weeks as part of their winter-session program. During their stay from 5th to 26th of January 2009, AMCHSS organized one Kerala Seminar, created opportunities for them to interact with our students, and coordinated their field visits in Kerala and Tamil Nadu.

Three academicians from the Boston University School of Public Health (BUSPH) namely Dr Robert Schadt, Educational Technology Manager, Office of Teaching, Learning, & Technology, Dr James Wolffe, Associate Professor, International Health, and Dr Jennifer Beard, faculty, International Health visited AMCHSS on 16th January 2009 and interacted with our faculty members and students. Dr Jennifer Beard gave a writing workshop for our junior batch of students.

Four Months WHO Fellowship Training Programme on "Community based interventions for cardiovascular diseases" was started on 5th January 2009. The program will end on 2nd May 2009. List of WHO fellows is given below.

1. Ms. Anney Thomas from Port Blair, Andamans
2. Dr. Basab Gupta, New Delhi

A team of academicians from Germany and Turkey visited the centre and provided lectures to the MPH and DPH students on Epidemiology, burden of diseases and information technology. Another team of nursing faculty from the state of Maharashtra visited our institute which was organized by the state institute of health and family welfare, Government of Kerala Feb 12, 2008.

PATIENT CARE

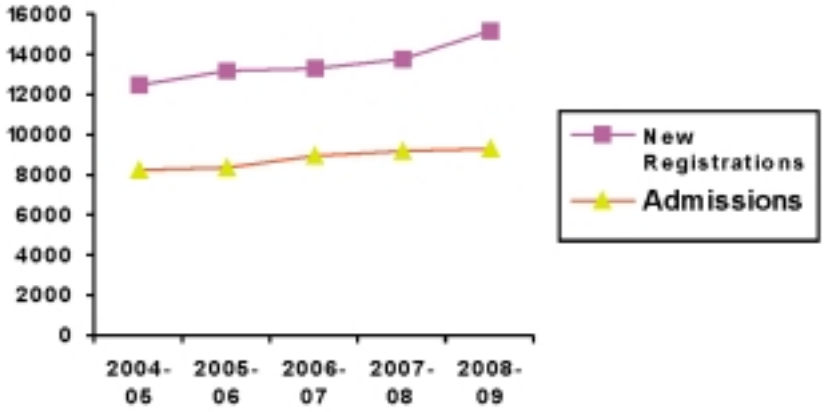
During the year 2008-09, the hospital statistics showed an increasing trend with regard to the patients getting registered in the hospital, patients coming for follow up, and admissions. A comparative analysis of the statistics for the last five years was done (Chart 1-6). It is also noted that bed occupancy rate increased by more than 5% during the year where as average length of stay is reduced to 7 from 8 in the previous year. The bed turn over remained static at 40 patients. The analysis of the statistics reflects the fact that the quantum of the services is increasing every year. The services were managed by reducing the length of stay and optimum utilization of available beds. This was achieved with out any increase of bed strength or resources like manpower. The hospital also provided free treatment and subsidized treatment for a greater number of patients and thereby helping the needy patients belonging to the poor socio economic status. This activity reemphasizes the social commitment of the Institute.

The infrastructures of the various sections of the hospital were strengthened for efficient management of hospital services.

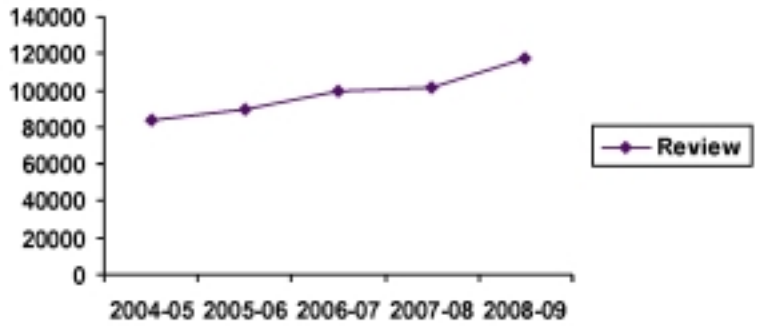
- A new state of the art Central Air Conditioning plant is in the process of installation.
- A state of the art DSA lab for the Dept. of Imaging Sciences & Intervention Radiology is getting installed.
- Provision of Intermediate Intensive Care Units to the Dept. of Cardio Vascular & Thoracic Surgery and Neuro Surgery.
- The old lifts in the hospital were replaced by new ones.
- There was a revamping of the fire extinguishing system to ensure fire safety.
- The laundry was renovated to provide more space for the functioning of linen service and a new 50 Kg washing machine was installed in the laundry.
- Hot food cabinets were provided to all wards and ICUs for improving the dietary services.
- Televisions for viewing educational and entertainment programmes by patients was made available to all wards, OPDs and waiting areas of the hospital.
- A proposal to upgrade the electrical substation incorporating Building Management System is in the final stage of implementation.
- A state of the art plasma sterilizer was installed in the Dept. CSSD for the quality improvement of the sterile supply to the hospital.

The Institute provided credit facility to the retired defense personnel and their dependants through the ECHS scheme. The armed forces are also in the process of empanelling the Institute for providing treatment to the serving defense personnel. The infection control and biomedical waste management activities were strengthened during the year by providing improved infrastructure and periodic surveillance mechanisms. The Telemedicine facility provided 157 Tele consultations during the year. The hospitals who availed the services included Govt. Medical College Calicut, Taluk Hospital (TH) Neyyattinkara, TH Mavelikkara, TH Quilandy, Block Panchayat Primary Health Centre (BPHC) Vettom, BPHC, Valavannur, Community Health Centre (CHC), Thanur, TH, Tirur etc. The Institute participated in the Village Resource Programme (VRC) of ISRO during the year and faculty from the Institute delivered lectures to the public for increasing the health awareness of people. Education programmes of interventional radiological procedures from SRMC, Chennai were transmitted live to Doctors of Dept. of IS & IR of the Institute by the Telemedicine facility.

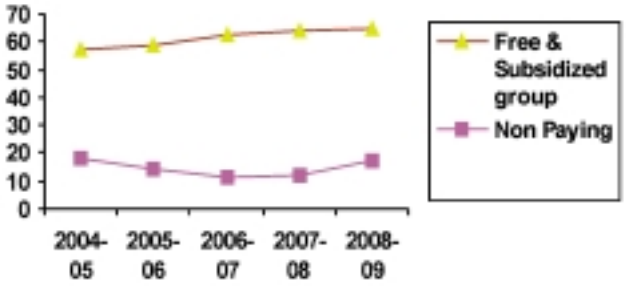
New Registration & Admission (Chart 1)



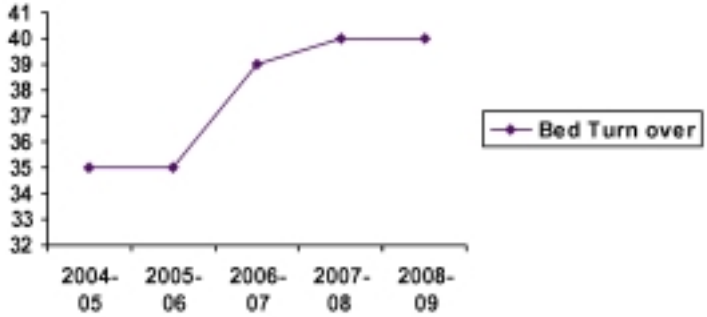
Follow Up (Chart 2)



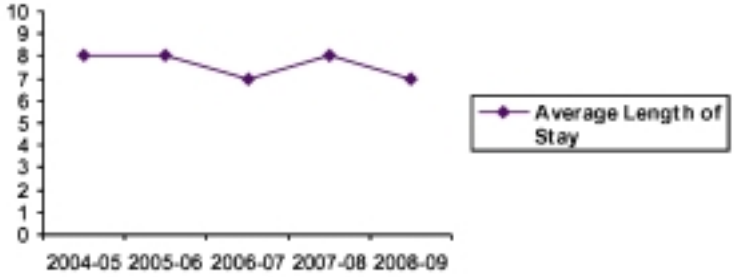
Free & Subsidized Treatment (Chart 3)



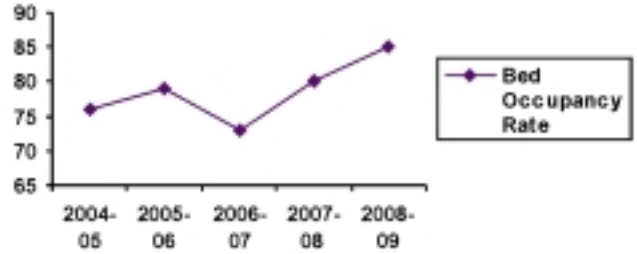
Bed Turn Over (Chart 4)



Average Length of Stay (Chart 5)



Bed Occupancy Rate (Chart 6)



Medical Records

Medical records department continued to have vital role in maintenance of quality patient care, assisting academic, research activities and sharing responsibility in efficient management of services. Considerable increase in New registration, admission, repeat cases, bed turn over, bed occupancy rate and number of operations recorded. The death rate has declined to 2.15% from 2,32% of previous year and average length of stay to 7 days from 8 days. As a measure of space management program 12,000 records were pruned, 25000 less active records were screened and shifted to AMC record storage facility. Movement of records has been made fully computerized.

IMPORTANT STATISTICS

Sanctioned bed	- 239
Bed occupancy	- 85%
New registration	- 15189
Repeat cases	- 117305
Admissions	- 9300
Discharges	- 9297
Deaths	- 200
Death rate	- 2.15 %
Average length of stay	- 7 days
Bed turn over	- 40 patients
Paying cases	- 87.64 %
Non paying cases	- 12.36%
Financial assistance certificate issued	- 3368
Treatment / attendance certificates issued	- 2905
Medical records supplied for academic/Research purpose	- 9319
Medical records retrieved for correspondence	- 2831
Medical records retrieved for patients review	- 117305

Anesthesiology

Anesthesia support given during this year for

Cardio-vascular & thoracic surgery	1900 cases
Neurosurgery	1200 cases
Neuro & cardiac radiological procedures	700 cases

New Initiative during the year (Major capital equipments)

1. Aestiva S/5 Anesthesia Machine
2. ICU Ventilators
3. Video Laryngoscope
4. Various Intubating scopes
5. TEE & Vivid I ultrasound

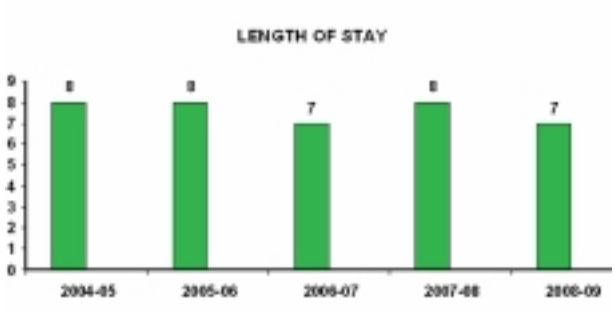
Biochemistry

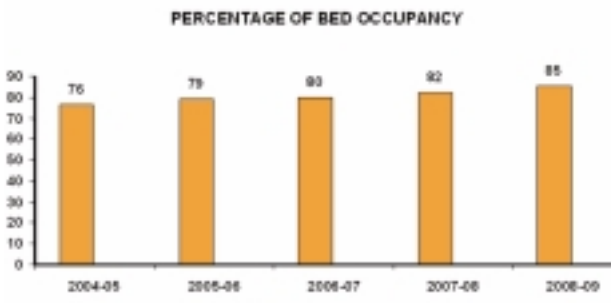
The department of Biochemistry comprises mainly of two wings: a) Central Clinical Laboratory (CCL) where patients samples are analyzed round the clock for hematology, clinical pathology and biochemistry parameters and b) research laboratories where externally funded research programme and Ph.D programme are undertaken. During the year the department had nine Ph.D students.

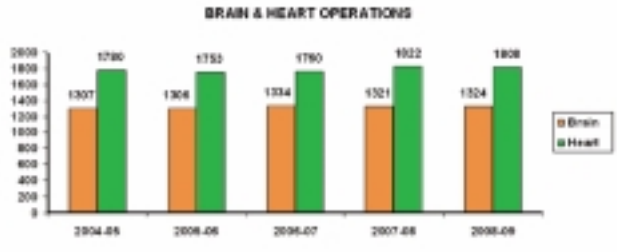
The central Clinical laboratory performed a total of 6, 43, 680 tests during the year in biochemistry, haematology and clinical pathology as detailed below:

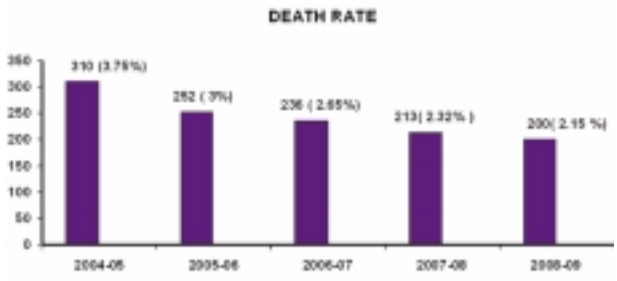
Biochemistry	2, 63,951
Hematology	1,54,720
Coagulation parameters	60,605
Blood gas and electrolytes	31,734
Miscellaneous	1,32,670


REGISTRATIONS AND ADMISSIONS
Registration
Admissions
12445
8252
13212
8394
13288
8885
13814
9172
15189
9368
2004-05
2005-06
2006-07
2007-08
2008-09

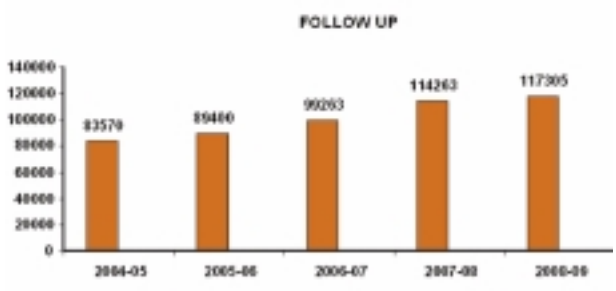

LENGTH OF STAY
8
8
7
8
7
2004-05
2005-06
2006-07
2007-08
2008-09

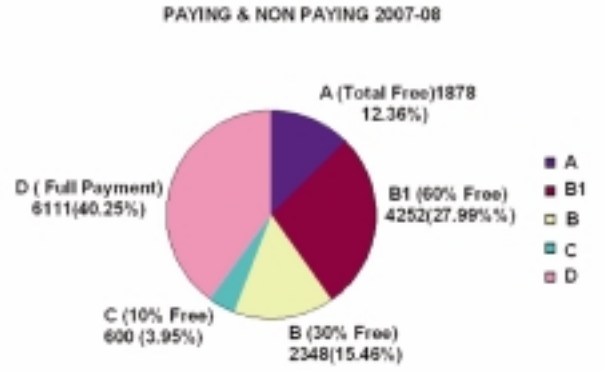

PERCENTAGE OF BED OCCUPANCY
76
79
80
82
85
2004-05
2005-06
2006-07
2007-08
2008-09

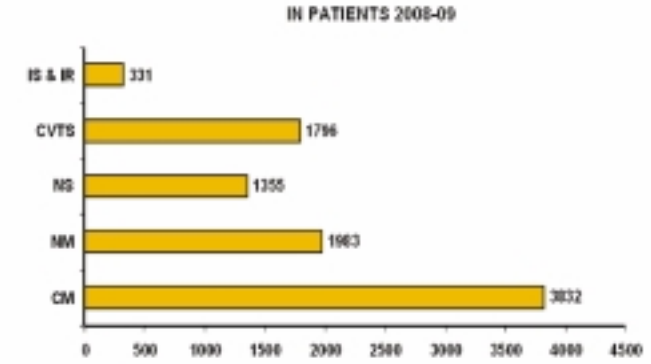

BRAIN & HEART OPERATIONS
1307
1780
1306
1753
1334
1790
1321
1822
1324
1808
Brain
Heart

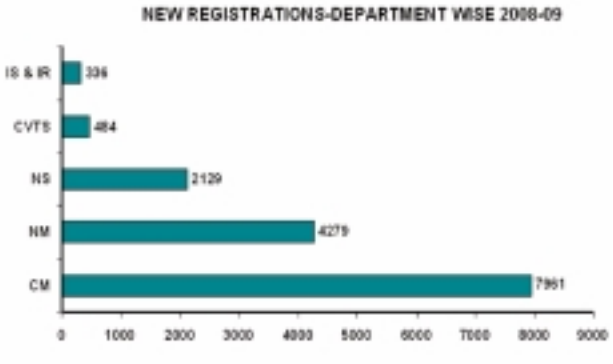

DEATH RATE
310 (3.75%)
252 (3%)
236 (2.65%)
213(2.32%)
200(2.15 %)
2004-05
2005-06
2006-07
2007-08
2008-09


LABORATORY INVESTIGATIONS
651658
783841
733044
773868
893357
2004-05
2005-06
2006-07
2007-08
2008-09


FOLLOW UP
140000
120000
100000
80000
60000
40000
20000
0
83570
89400
99263
114263
117305
2004-05
2005-06
2006-07
2007-08
2008-09


PAYING & NON PAYING 2007-08
A (Total Free)1878
12.36%)
B1 (60% Free)
4252(27.99%%)
B (30% Free)
2348(15.46%)
C (10% Free)
600 (3.95%)
D (Full Payment)
6111(40.25%)
A
B1
B
C
D


IN PATIENTS 2008-09
IS & IR
331
CVTS
1796
NS
1355
NM
1903
CM
3832
0
500
1000
1500
2000
2500
3000
3500
4000
4500


NEW REGISTRATIONS-DEPARTMENT WISE 2008-09
IS & IR
336
CVTS
484
NS
2129
NM
4279
CM
7951
0
1000
2000
3000
4000
5000
6000
7000
8000
9000

Blood Transfusion Services

Division of Blood Transfusion Services provides round the clock blood support meeting patient requirements. Efficient blood inventory management is achieved through 100% blood component separation, adoption of established transfusion policies like MSBOS and Type& Screen for optimal use of collected blood, periodical blood utilization review by HTC etc. The Division also regularly undertakes capacity building training programmes for doctors from DHS, measures for enhancing voluntary blood donation through mobile blood camps and as an extended service, continued blood support to out side patients.

New initiatives

- Leucoreduced cellular blood component was introduced as a special product with minimal residual donor leucocytes with definite indications to prevent repeated febrile non haemolytic transfusion reactions, HLA alloimmunisation and CMV transmission using extraction technology.
- Red cell screening cells I,II,III were introduced for antibody screening of all patients requiring transfusion.
- As per NACO's requirement the Division has evaluated and provided QC parameters for formulating guidelines for antisera anti A1 and anti H reactivity for Indian reference standards.
- Introduced on-line computerised blood requisition format.
- Repeat regular donors are provided with an ID card and it is found that this motivates others to donate.
- Information, counseling and advice to donors on test reactivity and reference to concerned physician is providing early medical intervention for them and also leads to investigations for their family members.
- Persons who come to donate but rejected on counseling due to high risk behaviour are advised to report to ICTC for testing and follow up

Special programs

- Blood Bank participated in the mega blood donation camp conducted at Chandrasekharan Nair stadium on April 7th April 2008 as part of observance of World Health Day.
- World Blood Donor Day (June 14th) was celebrated by felicitating 50 repeat regular voluntary blood donors by issuing ID cards at SCTIMST. Dr Mohandas, Director inaugurated the function and handed over the ID cards, Mr Balagopal C, MD, Terumo Penpol gave key note address, Dr Rita Cross Joint Director KSACS gave special address and released the poster on donor motivation, Sri K Lalith Prasad, CEO, TCS Technopark and Sri Retnakar Rao P, Project Director & President SBF VSSC felicitated the function. Dr PV Sulochana gave a talk on "Health benefits of regular blood donation" after the inaugural function. Dr Jaisy Mathai welcomed the gathering and Dr S Sathyabhama gave vote of thanks.
- Observed National Blood Donation Day by holding mobile collection camp in the mass blood donation programme organized by KSACS on 30th September 2008.
- Blood Bank & ISBTI (K) jointly organized a workshop on "Total Blood Security for Trivandrum District" on 23/08/08 at SCTIMST. Dr Mohandas, Director SCTIMST inaugurated the program which was attended by Blood Bank Medical Officers of various hospitals, Clinicians, NGO's and Public Health Consultants. On this occasion five presentations were delivered by experts in the area viz. "Blood Security is the Key"

(Mr. C Balagopal MD TerumoPenpol Ltd.), "Voluntary Blood Donation" (Dr Usha Titus IAS, Project Director KSACS), "How prepared are we to face a disaster" (Mr Rajan Medhekar IPS, ADGP, Kerala Fire Force), "Blood security as a public health issue" (Dr V Raman Kutty, Professor, AMC), and "Expanding role of Blood Centres" (Dr Jaisy Mathai)

- Regular participation in EQAs program of CMC Vellore for Immunohaematology and Transfusion transmissible infection screening
- Evaluation of screening kits for KSACs
- Preparation of 2nd version of SOP Manual
- Continuing the study on 'Demographic risk factors associated with undetected hypertension in Blood donors' which has shown the need for dissemination of information for early health seeking and life style modification
- The study on Standardisation of rbc units for Hb content based transfusion policy is being continued for evaluating no.of rbc units needed to achieve target Hb.

Status of ongoing/routine activities

- Regular participation in EQAs program of CMC Vellore for Immunohaematology and Transfusion transmissible infection screening
- Evaluation of screening kits for KSACs
- Preparation of 2nd version of SOP Manual
- Continuing the study on 'Demographic risk factors associated with undetected hypertension in Blood donors' which has shown the need for dissemination of information for early health seeking and life style modification
- The study on Standardisation of rbc units for Hb content based transfusion policy is being continued for evaluating no.of rbc units needed to achieve target Hb.

Cardiology

During 08-09, there was a significant increase in the outpatient attendance and 7961 new patients registered in Cardiology Dept. 3832 patients were treated as inpatients. There was an all-round increase in outpatient related investigation including ECG, exercise stress tests, 2D echo Doppler studies, Holter, HUT tests & trans esophageal echo studies. The Dept. of Cardiology organized an advanced Pediatric Intervention Work shop on 9th & 10th Jan, 2008 , with Dr. Saqueel A Qureshi, Consultant in pediatric Cardiology, Guy's Hospital, as the Course director. Several difficult to manage cardiac lesions were treated by interventional techniques during the workshop.

Invasive and Interventional Procedures during *2008-2009*

	2008-09
DIAGNOSTIC	
Coronary Angiography	1514
Cardiac Catheterization	221
EPS	37
INTERVENTIONAL	
PTCA	589
ASD DEVICE CLOSURE	155
BAS	17
BAV	2
PTMC	191
PDA COIL CLOSURE	19
PDA DEVICE CLOSURE	105
VSD, CoA	1 each
PPI	163
ICD	7
EPS + RFA	137
TOTAL PROCEDURES	3287

Cardio Vascular and Thoracic Surgery

The department organized and conducted a live workshop on high intensity focused ultrasound for atrial fibrillation ablation on 3rd and 4th October 2008. The procedures were conducted by Dr.K. Vibhu Keshethry a well renowned cardiac surgeon from USA. Cardiac surgeons and trainees of the State attended the program. 3 cases were operated before an interactive audience who evinced keen interest in the various techniques demonstrated by the surgeon. The Department had conducted a CME on Bioprosthetic valves and Mitral valve Repair procedures in 19th October 2004. Dr.Kausnal Pandey, the eminent cardiac surgeon from P D Hinduja Hospital, Bombay, delivered the key note lecture. A good number of cardiologists and cardiac surgeons of Trivandrum attended the program. The homograft value bank program, which got underway the previous year, progressed with an increased number of harvests that met the required sterility standards as per microbiological surveillance. Efforts are on to procure the cryo preservation system so as to preserve the harvested valve for implantation on appropriate patients. M.Ch Vascular Surgery Program (CVTS), which was started last year, got two more candidates this year. The Department celebrated August 6th 2008 as "Vascular day" by arranging a public awareness program, Vascular quiz for Surgery post graduates and continuing Medical Education program for practicing doctors and surgeons.

In the year 2008-2009, *1782* Cardio Vascular and Thoracic operations were performed, of this *1410* were open-heart procedure. The details are furnished below.

Adult Cardiac Operations

Open Heart - 946

These include
1. Coronary artery bypass surgery
1. Valve replacement surgery
2. Ascending aortic aneurysm
3. Adult congenital heart disease, etc. etc.

Closed Heart - 295

These include
1. Vascular Surgery
2. Lung surgery
3. Beating heart surgeries
4. Coarctation surgery, etc. etc.

Congenital Heart Surgeries

Open Heart: 464

These include all simple and complicated cardiac surgeries of infants and children.

Closed Heart: 77

These include PDA ligation, Coarctation of aortic repair, BDG etc. etc.

Computer Division

Routine activities included Graphical User Interface based Software development, Installation, Web Site updates, Tender Processing, Training for students, Hardware and Software maintenance of all the user programs, including the PACS client maintenance. The Division was involved in maintaining 12 higher end servers with a remarkable uptime of 99.9995% and around 774 computer hardware devices including Servers , PCs, Thin Clients, Printers ,Routers, Wireless Access Points and Switches.

Major Activities

New Software Developed in the Division

- Salary, Pension, Arrears -6th pay implementation - New GUI based program was developed & successfully implemented for new Salary , Pension Processing and arrear calculation and developed screens for staff to view.

- Computer Service Request Entry - New GUI based program was developed and implemented for online service request entry through 'SCTNET' and 'Intranet' for timely monitoring of repairs/updates.
- Wireless Access for internet - Access points were installed in Block 1, Block 2 and Block 3 and Library for providing internet access to students with authentication.
- Pensioner's Portal - Web based program was made for accessing pension, income tax and related data through internet for Pensioners.
- E-Learning - Detailed web based program was implemented for online class room sessions for MPH & DPH programme including online test series with access through internet and authentication.
- Biometric Attendance Marking System - Software program interface was developed for interfacing new Biometric Attendance Marking unit with the Institute Employee Biodata and made user friendly programs for printing identity cards to all employees ,students and pensioners.

New Proposals

- Storage - System study completed for scanning and storing old Patient Charts for archiving in Medical Records Department.

Division of Clinical Engineering

As in previous years, the activities of the Clinical Engineering Division included installation of new equipments, and maintenance of equipment and utilities, keeping maximum uptime.

This year the Engineering Department was involved in the installation of a large number of most modern, sophisticated hi-tech equipments in various departments of the hospital complex. Completion of more than 50% of installation work for the new imported 200 X 2 Hi-tech AC Plants and the biplane flat panel detector Catheterization lab system for Interventional Radiology, commencement of Site preparation for a new Cardiology catheterization lab and modernization work of electrical substation were the new project achievements. Purchase procedures for two new lifts, one for the nurses' hostel and another one in the AMC building have been completed. Modernization work on three lifts (one in Nurses' hostel and two in the faculty hostel) has already been commenced. Tender processing for the installation of a new Liquid Oxygen plant is fast progressing.

Imaging Sciences & Interventional Radiology

Department of Imaging Sciences & Interventional Radiology (old name Dept. of Radiology) is providing Diagnostic Imaging and Interventional Radiology services in Neuro and Vascular diseases and also of other systems. Department runs it's Interventional Radiology OPD and has started specialty clinic in Peripheral Endovascular and Interventional Backache clinic. Department has inpatient admission facility and intensive care management. Department provides imaging facilities such as CT, MRI and Ultrasound to the Institute's OP patients and inpatients. This is the only department in our Institute, which provides imaging services to all patients referred from any where on OPD basis. Interventions are done for difficult cases of intracranial aneurysms, cerebral AVMs, cerebral dural fistulas, Vein of Galen aneurysms, spinal AVMs; abdominal aortic aneurysms etc. are referred to our department from across the country. Department provides excellent state of the art imaging services with currently available latest technologies in MRI,

Helical CT and colour Doppler. Portable colour Doppler, CR system and PACS are the other advanced techniques available in the department. PACS is linked with HIS. CT Angio, 3D CT, Virtual Endoscopy, Virtual Angioscopy,

Vascular Doppler, Transcranial Doppler and MRI of Epilepsy, Stroke, Brain Tumours and Spine are routinely done.

Investigation Procedure Done

(From April 1, 2008 to March 31, 2009)

DIAGNOSTIC PROCEDURES

No.	Procedures	No. of Cases
1	Plain X-rays	38,030
2	MRI Scans	4,011
3	CT Scans	4,222
4	US Scans	3,136

INVASIVE DIAGNOSTIC PROCEDURES

No.	Procedures	No. of Cases
1	Peripheral Angio & Aortogram	73
2	4 Vessel Angiogram	423
3	Spinal Angiogram	27
4	Renal Angiogram	5
5	Bronchial Angiogram	1
7	Fluoroscopy	6
8	Barium swallow	6
9	EVLT	1
10	Barium meal	1
11	IV DSA	1
12	Fenestration	1
13	WADA test	1
14	IVC gram & filter	2
15	Check angiogram	3
	Total	551

INTERVENTIONAL PROCEDURES

No	Interventional Procedures	Total (No.of cases/ Procedures done)
1	AVM (glue & onyx)	29
2	ICA coiling	5
3	CCF coiling	11
4	Thrombolysis/ stenting	14
5	Acom /Pcom aneurysm coiling	2
6	Liver pseudo aneurysm	1
7	Uterine Artery Embolisation	15
8	Balloon occlusion test	1
9	Vertebroplasty	9
10	CFA occlusion	1
11	Renal stenosis	12
12	CIA / SFA stenosis	22
13	Bilateral EIA/CFA stenosis	3
14	JNA PVA	5
15	SAM stenosis	1
16	Carotid body tumor - PVA	6
17	Heamangioma Embolization	1
18	EVLT (Laser)	1
19	Aneurysm Coiling	10
20	Esophageal dilatation	3
21	Bronchial artery Embolisation/stent	13
22	DAVF (glue/ onyx/alcohol)	14
23	Spinal AVM (Onyx) PVA	2
24	Chemo embolisation	4
25	VOG coiling	2
26	Endovascular laser treatment	3
27	Liver heamangioma	1
28	Hepatic artery embolisation	1
29	Orbital / vertebral heamangioma	3
30	Other AVM's	6
31	CCA	2
32	Other interventional procedures	36
	Total	239

INTERVENTIONAL RADIOLOGY SERVICES:

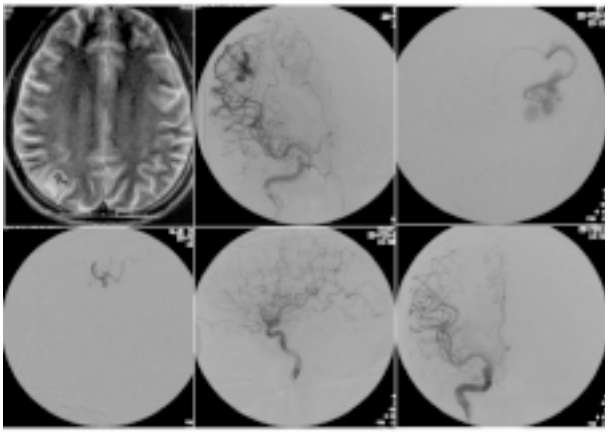
OP Registrations	-	286
IP Admissions	-	311
Interventional Radiology Procedures	-	239

A total of 239 Interventional Radiological procedures were done. Three hundred and eleven patients were admitted under interventional radiology.

New Initiative During the Year

Two new clinics have been started under the department of Imaging Sciences and Interventional Radiology OPD on 14th May 2008.

1. Interventional backache clinic
2. Peripheral Endovascular and interventional clinic (including varicose vein)



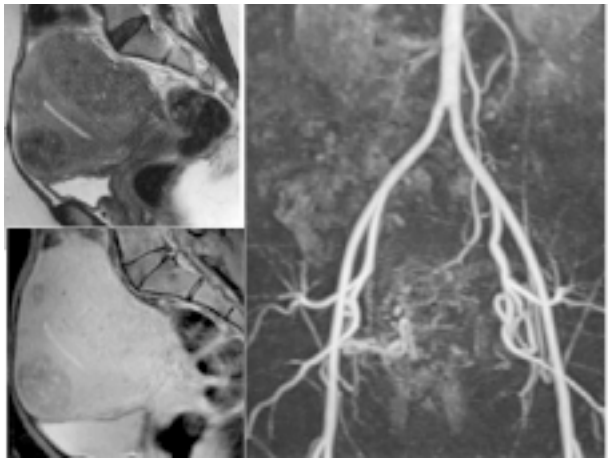
40-year male with history with seizures. O/E: Had no focal deficits.
MRI scan with T2 WI shows small AVM nidus in right parietal lobe; Diagnostic angiogram shows the small AVM nidus with venous pouches; Selective feeder injection shows the angioarchitechture of nidus; Glue cast in feeder; Total obliteration of AVM nidus after glue injection

Relevance

This is a minimally invasive procedure that does not involve any direct surgical procedure. The AVM nidus was obliterated with the help of glue injected superselectively in the vascular feeder.

Uterine Artery Embolisation for 42-year female with history of menorrhagia

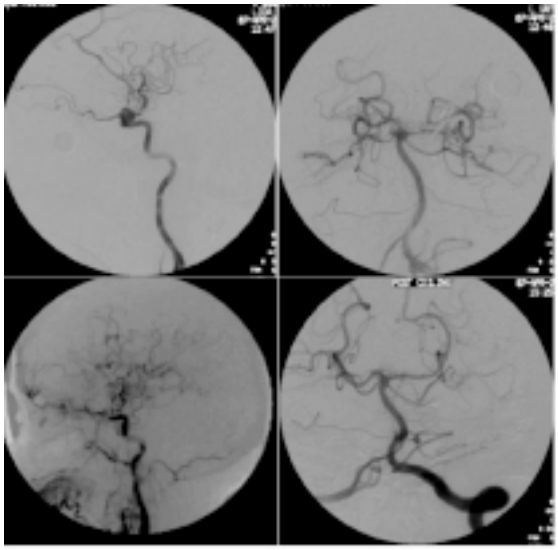
since 1 year MRI images T2 WI ; CE T1 WI; CE PELVIC MRA



Uterine Artery Embolisation for 42-year female with history of menorrhagia since 1 year Digital substraction Images: Right uterine artery pre and post embolisation, Left uterine artery pre and post embolisation. Post embolisation total obliteration of blush

Relevance

A significant proportion of females have to undergo hysterectomy for uterine fibroids. If the



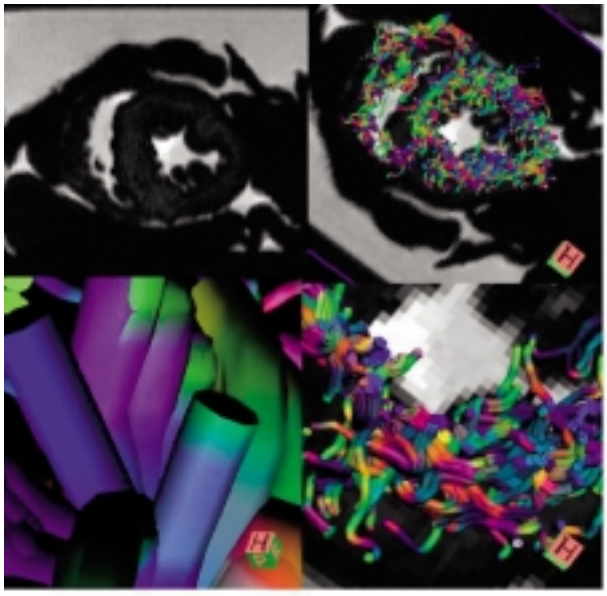
Coil Embolisation of multiple intra cranial aneurysms in 45-year female with acute SAH
Right carotico-opthalmic & superior cerebellar artery aneurysm. Total obliteration of aneurysms post coiling

.

patients are middle aged this procedure is also accompanied with the oopherectomy as well. This leads to preponement of the menopausal symptoms and its accompanied problems. Uterine artery Embolisation for these fibroids is a boon to these patients that does not involve surgical procedure and its side effects.

Relevance

Intracranial Bleed due to rupture of the aneurysms is a known entity that causes significant morbidity and / or mortality. Although the treatment can be done surgically as well, the advantages of minimally invasive endovascular treatment are obvious. The added advantage is of being able to tackle multiple aneurysms at the same sitting as was done in this patient.



Diffusion Weighted MRI with fibre tracking performed with the 1.5 T clinical MRI scanner available in DISIR:

Clockwise from top left: Ex-vivo Diffusion Weighted MR Image of the Pig heart; Fibre tracking of the myocardial muscle in the right as well as the left ventricle; Serial closeups of the same fibres to show further details of the myocardial fibres.

Relevance

The establishment of the structural basis of any disease pathology is a dream for any scientist working in the field of life sciences. However, the present investigation of choice still remains in the form of histopathological examination of the organ in question (here it's the heart). Again the cutting of the heart tissue will lead to some insight about the microscopic appearance. But, the second and third order arrangement of the fibres is still an enigma. MRI due to its currently available technology can depict the path of the muscle fibres with the use of its Diffusion Weighted imaging and fibre tracking. It uses the diffusion properties of the muscle bundle in the heart. This technology can be used to interrogate the incompletely explained structural changes in diseases like hypertrophic cardiomyopathy and others.

Microbiology

There has been an overall increase of 25% in the diagnostic investigations of the department noticeable especially in screening samples for Hepatitis B, Hepatitis C, HIV and Thyroid function tests. A New Diagnostic test called Genprobe test for detection of Ribosomal RNA of Mycobacteriun tuberculosis has been introduced. Detection of Procalcitonin a precursor marker of Calcitonin has also been initiated which would help in distinguishing between a relevant bacterial infection and viral infection as it rises to significant levels early in any invasive bacterial infection.

Neurology

Epilepsy Programme

The R. Madhavan Nayar Center for Comprehensive Epilepsy Care saw an increase in number of outpatient attendance, video-EEG admissions and the number of EEGs performed.

For the first time since the program began, 100 epilepsy surgeries were performed in one calendar year. The number of intracranial EEGs also increased by 40%. More number of extratemporal surgeries were performed. Two out-patient clinics run on Wednesdays and Fridays. The rural outreach epilepsy clinics in the first and third Sundays of every month also functions smoothly. Two to three epilepsy surgeries are carried out every week. All aspects of epilepsy care are provided, including psychosocial counseling and occupational therapy.

The Cognition & Behavioural Neurology Section, Department of Neurology section provides clinical services to patients with cognitive problems and dementia. It also provides advise & technical support to the Alzheimer's & Related Disorders Society of India (ARDSI), a voluntary organization which helps dementia patients and carers. The section also carries out clinical & basic science research in the field of Dementia, Cognition and Behaviour. An Epilepsy Camp and awareness program was conducted on 24/08/08 at Mannarkkadu Nursing Home, Mannarkkad, Palakkad. 68 patients with epilepsy were examined and counseled.

The National Epilepsy Day was celebrated on November 19, 2008 by conducting a "Painting competition for children with epilepsy". 30 children participated in the event. They were awarded Rs 1000/-, 750/- and Rs 500/- respectively for First, Second and Third Prizes. An epilepsy camp and awareness program was conducted by R.Madhavan Nayar Centre for Comprehensive Epilepsy Care, SCTIMST in association with Health Oriented Project Establishment (HOPE) in Kanhangad on 8/02/2009. Eighty eight patients with epilepsy were examined. A public epilepsy awareness program and interactive question answer section was also conducted during the program.

New initiatives

1. Transcranial magnetic stimulation for functional localization
2. Sleep disorder program with polysomnography
3. EEG-Functional MRI
4. Computerised Perimetry

DESIGNATED ACTIVITIES

Total number of Surgeries	= 95
Temporal	= 69
Extra temporal	= 21
Callosotomy	= 0
Hemispherectomy	= 5
2. VNS Implantation	= 11
3. Invasive Monitoring	= 9
1. Cortical Stimulation & Mapping (CSMP)	= 6
2. Electrocorticography	= 87
3. Epilepsy Clinic attendance	= 5287 cases
4. Sleep Disorder Clinic attendance	= 76 cases
5. Polysomnography (PSG)	= 28 cases
6. Ward Admissions	= 851cases
7. VEEG Admissions	= 728 cases
8. SEEG	= 4388 cases
9. Outreach Clinic Attendance	= 1364 cases
10. Group Sessions	= 2304
11. Occupational Therapy Services	= 403

Movement Disorder

The movement disorder section initiated 3 new collaborative (international and national) and 2 in-house research projects during the year. The centre completed participation in 4 major international clinical trials and began 2 new trials during this period. The Research programmes and collaborative programmes of the Movement disorder section are given below:

1. Experimental therapeutics with Transcranial Magnetic Stimulation in collaboration with University of Pierre and Marie Curie, Paris
2. Developing Motion Sensors and Optical Tracking Devices for clinical and research applications in the analysis of movement disorders.
3. LRRK2 mutation as a cause of Parkinson's disease in a South Indian cohort in collaboration with the Rajiv Gandhi centre for Biotechnology, Kerala.
4. Multimodality MRI in atypical parkinsonism in collaboration with the department of Radiology, SCTIMST
5. Synaptic plasticity in early Parkinson's disease: a TMS study
6. Cranial Ultrasonography and SWI- based differential diagnosis of atypical parkinsonian disorders

Analysis of neuroprogenitor cells in the peripheral blood mononuclear fraction of Parkinson's disease patients in collaboration with Thrombosis Research Unit, BMT wing. A new research collaboration was initiated between the centre and the Hospital Salpetriere, Paris to develop therapeutic protocols for movement disorders using repetitive Transcranial Magnetic Stimulation. Another new collaborative Program was started between SCT and Indira Gandhi Centre for Atomic Research for developing Motion Sensors and Optical Tracking Devices for clinical and research applications in the analysis of movement disorders.

DESIGNATED ACTIVITIES

Movement disorder clinic attendance	=	1192
Botulinum toxin clinic attendance	=	111
Deep Brain stimulation surgeries	=	09
Radiofrequency lesioning surgeries	=	04
DBS programming sessions	=	67
International clinical trials	=	6

Neuromuscular Division

In-house Projects

Collaborative project with Neurology dept KS Hegde Medical Academy, Mangalore.

The prevalence of Campylobacter jejuni infection associated with Guillain Barre Syndrome. Collaborative Nodal center for National Polio Surveillance programme for Acute flaccid Paralysis under the aegis of WHO.

A clinico electrophysiological, pathological and outcome study of CIDP

Standardisation of temperature measurements in the EMG lab

Standardisation of F wave parameters in nerve conduction studies

Family and genetic studies in Myotonic dystrophy patients : Autonomic function studies in Diabetic neuropathy patients . Mortality studies in the neuro medical ICU

Multiple sclerosis - clinico radiological corelative study

ACTIVITIES

Neuro Muscular Clinic	592
Nerve Conduction study	1102
VEP	186
BAER	**8**
Needle EMG	285
Muscle biopsies	64
Nerve biopsies	24
Skin biopsies	12
Genetic DNA studies	7

THERAPEUTIC PROCEDURES

Medical	
Large volume Plasma Exchange	166
Small volume Plasma Exchange	62
Surgical	
Thymectomy	17

Stroke

New initiatives

1. Establishment of Neurosonology lab: In addition to Transcranial Doppler studies steps are underway to bring Extracranial vascular studies and Transcranial tissue imaging with a new Ultrasound machine.
2. Develop Institutional protocols for management of acute ischemic and Hemorrhagic strokes and Cerebral Venous thrombosis
3. Started weekly teaching/demonstration sessions for stroke patients and caregivers in post stroke rehabilitation and Nutrition.

Designated Activities

1. Stroke outpatient clinic: In addition to the routine services, coordinating speech, physio and occupational therapy and weekly teaching/demonstration sessions in post stroke rehabilitation and Nutrition for patients and caregivers.

   Stroke clinic attendance: 2384 in the last year
2. Comprehensive stroke care: Various designated activities have been made routine [acute stroke care (intensive care facility and thrombolytic therapy), Intermediate stroke care and continued care including adequate monitoring of treatment and rehabilitation]
3. Patient management conference: routine multidisciplinary meeting once in two weeks to make final decision on management of difficult cases.

   Transcranial Doppler studies: 150 in the last one-year.

Completed studies

1. Long-term complications of oral anti-coagulation after cardiac valve replacement
2. Acute Stroke - Awareness, Attitude and Practice among general practitioners in Kerala

Ongoing studies

1. Cervical arterial dissection: clinical, radiological features and long term outcome-retrospective study
2. Benefit of combined treatment with Transcranial Magnetic stimulation in addition to routine Physiotherapy in post stroke functional outcome - Prospective study.

Studies planned for the current year

Incidence of asymptomatic intra cranial carotid disease in patients with CAD - Ultrasound based study

Kerala Registry Of Epilepsy And Pregnancy (KREP) & International Rolandic Epilepsy Linkage And Neurodevelopment

In the current year, the total registrations under the KREP had reached 1500. There were 172 registrations in the year 2008-9. Out of total 172 registrations, 58 patients were given pre-conceptional counselling,while others were registered after conception. As per the protocol, all pregnant women with epilepsy were screened for fetal malformations in the 16-18 weeks of pregnancy. We carried out extensive evaluation (including echocardiography and ultra-sonography) for 200 newborn and infants born to women with epilepsy during the current year. Around 81 Developmental assessment and 45 Neuropsychological Evaluation were performed during the year and House visits to prevent drop outs covered around 102 families.

Cognition & Behavioural Neurology Section

The section provides clinical services to patients with cognitive problems and dementia. It also provides advise & technical support to the Alzheimer's & Related Disorders Society of India (ARDSI), a voluntary organization which helps dementia patients and carers. The section also carries out clinical & basic science research in the field of Dementia, Cognition and Behaviour. In addition to the ongoing research programs a new National Institute of Health (NIH) USA, funded multi-centric Indo-US collaborative project, the Kerala-Einstein study, commenced in mid-year 2008. A new National longitudinal DST supported project of studying cognition in aging older adults was also initiated under the stewardship of CBNS.

STATUS OF ONGOING/ROUTINE ACTIVITIES

Speech Evaluation	-	1098
Speech therapy	-	604
Audio Evaluation	-	305
Neuropsychological Testing	-	616
IQ Assessments	-	145
Counselling Sessions	-	257
Memory & Neurobehavioural Clinic Attendance	-	240
New Patients with Dementia	-	55

Neurosurgery

The department of neurosurgery continued to maintain high standards in patient care and academic pursuits as in previous years. Thrust was given to subspecialty oriented development and the major areas of operative focus were microvascular surgery, surgery of the skull base, endoscopic surgery, epilepsy and movement disorder surgery. Emphasis was given to minimally invasive procedures with the aid of neuro-navigation equipment. Spinal instrumentation surgery was developed as a new subpeciality and spinal instrumentation surgeries are now being done routinely. A total of 1326 cases were operated with an overall mortality figure less than 2.5%, results which are comparable with the best centres of the world. Outpatient: There has been a steady increase in our patient load and our drainage area now extends to neighbouring states as well. The faculty and the students maintained the high standards and our institute was well represented in all major national and international conferences symposiums & seminars. Four candidates successfully completed their MCh training and four new residents joined the department.

Day to day activities of the department include OPD and the operation theatre functioning five days a week. The weekend is the academic day wherein regular Neuroradiology meetings are held followed by grand rounds and case discussion or seminars. There has been a significant change in trend in management of pituitary tumors with most of them being operated by endoscopic approach. The total number of cases operated during the year 2008-09 was and their distribution is as follows.

Aneurysms	124
AVM	15
Cavernomas	12
Cerebello-pontine angle schwannomas	62
Meningiomas	148
Gliomas	179
Epilepsy	116
Endoscopic surgery	34
Sellar suprasellar (excluding meningioma)	85
Movement disorder	14
Spine	159
Others	378
Total	1326

New Initiatives

One of the major acquisitions in the last year was the purchase of an intraoperative neuro-physiological monitoring system. Availability of this facility has helped in reducing the extent of operative morbidity significantly. Two new state of the art microscopes : with the addition of these two new microscopes all our four operation theatres are now equipped with high end microscopes. A new step down 5 bedded ICU was set up in the neurosurgery ward. This new ICU will help to improve the nursing care of neurosurgery patients in the ward who require extra attention than other routine patients

Pathology

During the year (April 2007 to March 2008), the division has performed histopathological analysis in 1650 surgical specimens in patients undergoing surgical treatment for neuro and cardiac diseases. Intra-operative tissue diagnosis (frozen section) was performed in 456 patients. Enzyme histochemical and immunohistochemical studies were performed in 62muscle biopsies. Immunopathological investigations were performed in 2450 cases. Apart from the service oriented diagnostic work, the department also conducted fortnightly teaching programmes (case demonstration, CPC and seminars) for the postgraduate students in neurology and neuro-surgery. The division also undertook training programmes for postgraduate students in Pathology from Medical College, Trivandrum, Kottayam and AIMS Kochi.

Dr. S.Sandhyamani, Professor of Pathology attended the National Seminar on "Career in Science for Women, Challenges and Opportunities" organized by the Kerala State Council for Science, Technology and Environment (KSCSTE) on the occasion of **International Women's Day** as a nominee of the Institute .

Physiotherapy

The physical rehabilitation work of the section was aimed at critical care in ICU s and achieving early functional ability for patients with active and passive physiotherapy. In addition, out patients and in patients were given physiotherapy with good results by using modern electrotherapeutic

equipment such as External PhrenicNerve Stimulator, Functional Electrical Stimulator, Sonopuls,etc.. and research activities are ongoing in this area.

PATIENT'S TREATED BY PHYSIOTHERAPY DURING *2008-2009*

Cardiac Surgery	-	6688
Neuromedical	-	4120
Nerosurgery	-	2910
Paediatriccardiacsurgery	-	4588
Out-patients	-	1830

The unit also contributed to teaching and training of observership trainee physiotherapists and post basic nursing students in physiotherapy and rehabilitation.

CLINICAL RESEARCH

Biochemistry

Immobilization of Galectin-1 in active form

Galectin-1 is the most prominent and ubiquitous human tissue lectin. Resident on vascular endothelium and smooth muscle cells, these molecules are supposed to be crucial in lymphocyte anchoring, metastasis and immune complex deposition on vessel walls. For the first time, this laboratory has been successful in immobilizing this lectin with its activity unaffected, so that the above phenomena can be studied more realistically.

Serum anti-α-galactoside antibody (anti-Gal) sugar specifically binds to lipoprotein (a) [Lp (a)] to form immune complex.

Implicated in atherosclerosis, aneurysm and stroke, Lp (a) remains enigmatic in its mechanism of pathogenesis. By ultra centrifugation, Western blot and ELISA, we have demonstrated that serum anti-gal can form immune complex with Lp(a) through recognition of the unique O-linked oligosaccharide of the lipoprotein. Since these immune complexes are prone to uptake by macrophages and smooth muscle cells, they could be the crucial link in Lp(a)-mediated atherogenesis and other vascular damages.

Oxidative Stress in Women with Epilepsy and fetal malformation (Completed research project jointly with Dept. of Neurology)

The extent of oxidative stress and antioxidant status of different groups of women with epilepsy (WWE) and pregnancy using anti-epileptic drugs (AEDs) were compared with respective controls. Results demonstrated that WWE exposed to AEDs, especially polytherapy, as well as WWE with history of fetal malformations or abortions had higher oxidative stress and reduced antioxidant activity compared to respective controls. Thus AEDs interfere with the capacity to handle oxidative stress, particularly during pregnancy and thereby leads to teratogenicity and thus opens a possible opportunity to modify oxidative stress by the administration of antioxidants during pregnancy.

Oxidation potential of Lipoprotein (a)

Aimed at identifying the mechanism of potential atherogenic effects of Lp (a), its susceptibility to in vitro oxidation was carried out and compared to that of LDL. Oxidation kinetics measured as formation of conjugated dienes (CDs), a marker of lipid per oxidation, demonstrated that Lp (a) also undergoes oxidative modification similar to LDL, and suggests the possibility that oxidative

modification can enhance immune/inflammatory response and atherogenicity of Lp (a).

Dysfunctional high-density lipoprotein (HDL) and atherogenesis (Ph.D programme/CSIR)

Although HDL possesses many features that contribute to protection from atherosclerosis, this lipoprotein may be modified in certain individuals or circumstances to become pro-atherogenic. Inhibiting formation of defective HDL would be expected to improve its function and provide cardiac protection. A study was initiated for identification of the prevalence of dysfunctional HDL in subjects with metabolic syndrome, its physico-chemical characterization and elucidation of its functional consequences.

Nitric oxide and matrix metalloproteinase induction in cancer cells

A project is ongoing to identify the molecular pathways through which nitric oxide activates various MMPs and also to elucidate the mechanism of MMP gene induction in human colon cancer cells. Various MMPs are regulated by exogenous nitric oxide treatment in culture condition. The two gelatinases (MMP2 and MMP9) significantly increases with SNAP (nitric oxide donor) treatment for a period of 4h. There is a significant increase in the migration of colon cancer cells treated with nitric oxide donor compared to the control cells. The involvement of cGMP was also analyzed with ODQ, a cGMP inhibitor and the result was further confirmed with ELISA.

Anti-cancer activities of emodin and aloe emodin

The above two plant derived anthraquinones inhibited the proliferation of cancer cell lines in a dose dependent manner. Flow cytometric analysis of the drug treated cells showed a cell cycle arrest at the G2/M phase which provided a possible mechanistic explanation for the growth inhibitory effect of aloe emodin. Alterations in mitochondrial membrane potential and the annexin positivity were evident in aloe emodin induced apoptosis. DNA fragmentation is one of the characteristic features of late apoptotic cells, which is also found positive in treated cells. Aloe emodin's effect against colon cancer cell migration was investigated and non toxic levels of aloe emodin could efficiently suppress the TPA-induced migration. Moreover, endothelial cell proliferation and migration, two major steps involved in angiogenesis were also inhibited by aloe emodin.

Cellular and Molecular Cardiology

Research on the cardiac response to injurious and protective agents remains the focus of the Division. The major areas of research were: isolation, expansion and application of stem cells; and cellular response to hypoxia and hypertrophy-stimulating factors. The studies are supported by externally-funded research projects. Two projects were completed during the year in focus. There are four ongoing projects

A porcine model to evaluate efficacy of cardiac stem cells in myocardial ischemia

There is a growing body of evidence that resident stem cells in the adult heart can be isolated and used to repopulate the infarcted myocardium raising the hope for enhancing cardiac performance and treating ischemic heart disease. However, several issues concerning the dosage, route of delivery and appropriate time for cell transplantation therapy remain to be clarified. To identify ideal conditions for these, an attempt was made to develop a porcine model, in collaboration with the Division of In Vivo Models and Testing at

Biomedical Technology Wing of the Institute. Techniques were standardized for isolation of cKit-positive cells from surgically-excised right atria of pigs and intra coronary administration of cardiosphere-derived cells to the same animals in which myocardial infarction was produced. Myocardial infarction was produced by embolization of apical branches of left anterior descending coronary artery distal to second diagonal branch with thrombin loaded alginate beads. Coronary occlusion was documented by angiography and evidence of ischemia was noted in electrocardiogram. Assessments of left ventricular function both prior to and post administration of homologous stem cells was made by measuring ejection fraction and fractional shortening, using echocardiography. Indices of left ventricular contractility such as dp/dt max, contractility index and pressure-time index were measured after left ventricular catheterization.

Phase bright cells were also isolated from right ventricular biopsies obtained using flexible myocardial biopsy forceps (Bioptome). This model is useful for translational research in the field of adult cardiac stem cell therapy for myocardial ischemia. This project was supported by the Department of Biotechnology and completed in 2009.

'Cardoguard Tablet-delineation of molecular mechanism of action and its efficacy in the regression of ventricular hypertrophy'

Scientific evaluation of Ayurvedic preparations is necessary for its effective use. Hence a study was carried out in collaboration with Nagarjuna Herbal Concentrates Ltd. to evaluate the efficacy of Cardoguard, an antihypertensive formulation of the Company. The drug was found to be effective in the reduction of blood pressure in Spontaneously Hypertensive rats. Ex vivo studies also demonstrated that the drug induced endothelium-dependent relaxation of pre-constricted aortae. Vasorelaxation by Cardoguard was found to be mediated by its antioxidant capacity associated with its calcium antagonistic action, thereby enhancing endothelium-dependent relaxing factor availability. Studies in Spontaneously hypertensive rats have shown that the drug is effective in the prevention of cardiac remodeling consequent to pressure overload. The inference is based on evaluation of cardiac output and histological examination of the left ventricular myocardium. Toxicity studies have confirmed the safety of the drug. The study was completed in 2008 and was supported by the Department of Science and Technology under the Drugs and Pharmaceutical Research Programme.

Determination of genetic component in hypertension and cardiac hypertrophy

The study is carried out in collaboration with the Department of Cardiology. The primary aim of this study is to identify the genetic and environmental factors involved in the development of hypertension and cardiac complications in the local population. Evaluation of the demographic details of the patients registered in the Cardiology Department of the Institute showed that cardiovascular disorders have a familial tendency. In most cases, hypertension was detected only after the development of cardiac ailments, suggesting the need for screening the healthy population for prevalence of hypertension. Among the healthy individuals screened, 5.1% were hypertensive. The mean age at detection of hypertension was 35.44±7.69 years. The mean age at detection of hypertension in the patients with cardiac ailments was significantly higher (≈50 years) indicating the

possibility that hypertension remained undetected and untreated for about 15 years. Prompt detection and treatment of hypertension can possibly prevent the development of cardiac complications. The large proportion of hypertensives with LVH also indicates the need to identify susceptible individuals using predictive markers. Study is in progress to identify polymorphic markers and their functional significance. The work is supported by Kerala State Environment, Science and Technology Council.

Co-ordinated regulation of the cardiac fibroblast cell cycle and the resistance of these cells to apoptosis

The ability to proliferate in response to mitogenic stimulation, retained throughout adult life, and the resistance to apoptosis are central to the role of cardiac fibroblasts in myocardial remodeling post injury. Surprisingly, however, the mechanisms that govern cell cycle progression and apoptosis resistance in these cells remain unclear. Against this backdrop, ongoing investigations in this laboratory address the co-ordinated regulation of the cardiac fibroblast cell cycle and the resistance of these cells to apoptosis under hypoxic conditions. A protective role for NFkB, the stress-related transcription factor, in the resistance of hypoxic cardiac fibroblasts to apoptosis was demonstrated. Further, it was shown that regulation of cIAP2 expression by NF-kB may, at least in part, mediate the pro-survival role of NF-kB during hypoxia.

It was shown earlier in this laboratory that hypoxia delays $G_1 \rightarrow S$ transition of the cardiac fibroblast cell cycle by a mechanism involving p38 MAPK-dependent induction of p27. As a sequel to these observations, investigations were initiated to evaluate the role of the retinoblastoma gene product, p21 and p27, p38 and p42/44 MAPK, NFkB and the anti-apoptotic cIAP2 and Bcl-2 in modulating cell cycle events and conferring survival advantage upon cardiac fibroblasts under hypoxic conditions. The work is supported by the Department of Biotechnology and Life Science Research Board.

Hypoxic cardiac fibroblasts as a source of factors that compromise the viability of cardiac myocytes: implications in ischemia/reperfusion injury- Studies carried out in collaboration with the NIH, USA, showed that hypoxic fibroblast-derived factors significantly enhance the susceptibility of cardiac myocytes to reactive oxygen species (ROS)-induced mitochondrial permeability transition (MPT), determined by high precision confocal line-scan imaging following controlled, photo excitation-induced ROS production within individual mitochondria. Further, these factors were found to induce apoptosis in cardiac myocytes. The findings point to a novel paracrine mechanism that could exacerbate ischemia-reperfusion injury to cardiomyocytes.

Enhancement of angiogenesis by eNOS-modified endothelial progenitor cells

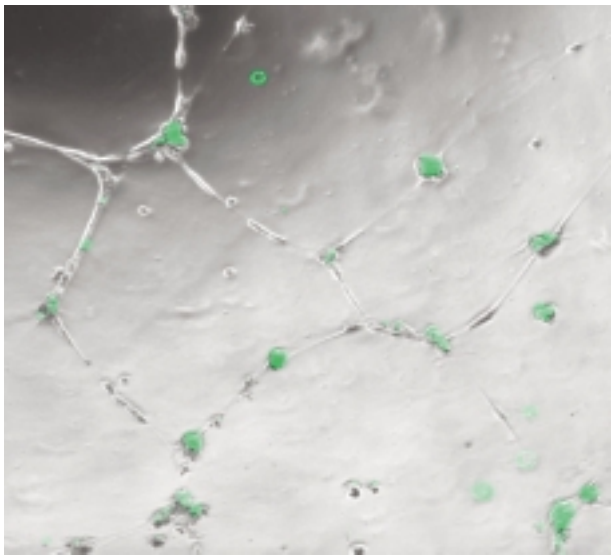
Circulating endothelial progenitor cells (EPCs) constitute a powerful cellular substrate for neovascularization in ischemic tissues. However the therapeutic potential of ex-vivo expanded EPCs for angiogenesis is limited due to their quantitative and qualitative impairment in certain pathologies including coronary artery disease (CAD). In an earlier study, it was shown that cardiovascular risk factor score and the number of stenosing coronary arteries are important determinants of the formation of functional EPCs in culture. Hence strategies to address this shortfall became a necessity. Given an important role of endothelial nitric oxide synthase (eNOS) in the

regulation of EPC migration, the effects of eNOS gene transfer on ex vivo expanded EPCs from patients with CAD was evaluated. Peripheral blood mononuclear cells were isolated, differentiated into EPCs and then transfected with mammalian expression vector pcDNA3.1-eNOS containing the full-length human eNOS gene using lipofectamine. eNOS activity and mRNA expression was significantly increased after transfection. In vitro functional studies showed that in comparison to the untransfected EPCs, eNOS-modified EPCs showed a greater presence of endothelial-like spindle-shaped cells and increased incorporation into tube-like structures on the matrigel. (Fig) Histological (CD31-positive cells) (Fig) and angiographic analysis in rabbit models of hind limb ischemia showed an enhanced formation of collateral vessels and arteriogenesis in the animals treated with eNOS-transfected EPCs as compared to those treated with untransfected EPCs or saline. Therefore, modification of human EPCs by eNOS gene transfection strategy leads to a significant improvement in their angiogenic properties in vitro and in vivo and possibly may have therapeutic potential to enhance the process of therapeutic angiogenesis in patients with CAD. This research project is supported by a DBT post-doctoral fellowship.

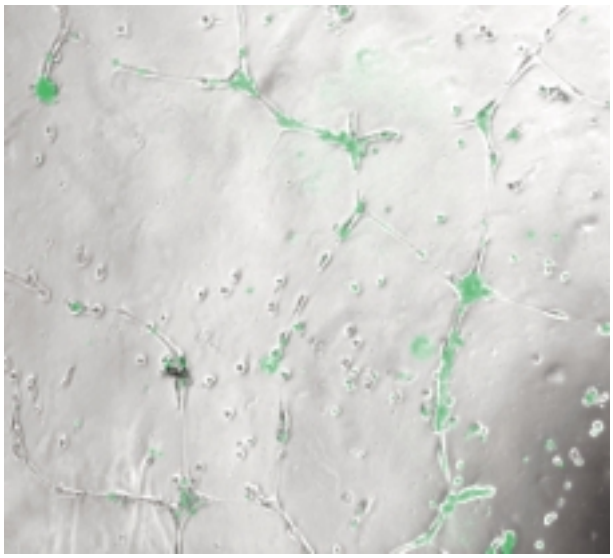
Important visitors/trainees- Dr. Oloyo Ahmed Kolade from Nigeria, a recipient of INSA-JRD- TATA MEMORIAL Fellowship carried out part of his work in the Division between September and November 2008. The topic of research was, "Evaluation of the role of androgens in the onset and severity of salt-induced hypertension in male Sprague Dawley rats." Dr Ahmed carried out ex-vivo studies to examine the effect of orchidectomy on vascular relaxation of Sprague-Dawley rats fed a high salt diet. The studies were carried out in aortic rings isolated from rat. Variation in isometric force in response to different stimuli was recorded. Vascular relaxation responses to cAMP and K^+ channel activation was influenced by orchidectomy in male Sprague Dawley rats fed a high salt diet.

Coculture of GFP-labeled EPCs or eNOS-EPCs and mature endothelial cells in in vitro matrigel assay

EPCs-HUVECs

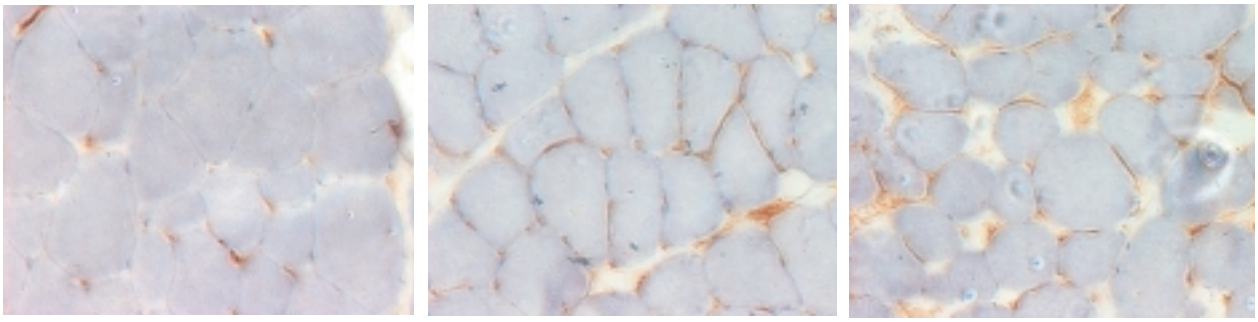


eNOS-EPCs-HUVECs



CD31 staining of limb tissues in hind limb ischemia rabbit models transplanted with eNOS-EPCs in vivo

saline-treated tissues | EPCs-treated tissues | eNOS-EPCs-treated tissues



Neurology

Extramural funding

1. An international, randomized, double-blind, two parallel group study comparing terutroban 30 mg o.d. versus aspirin 100 mg o.d. administered orally for a 3-year mean duration (event driven trial). Phase III trial: PERFORM Study (Prevention of cerebrovascular and cardiovascular Events of ischaemic origin with teRutroban in patients with a history of ischaemic stroke or tRansient ischaeMic attack)

Intramural funding

Incidence, Types, Risk Factors, and Outcome of Stroke in a Developing Country. The Trivandrum Stroke Registry - Sapna E. Sridharan, J. P. Unnikrishnan, Sajith Sukumaran, P. N. Sylaja, S. Dinesh Nayak, P. Sankara Sarma, and Kurupath Radhakrishnan: Stroke. 2009, Published online before print February 19, 2009, doi:10.1161/ STROKEAHA.108.531293

Neurosurgery

Ongoing research projects

- Multicentric multinational randomised controlled surgical trial in intracerebral haemorrhage (STICH II), sponsored by stroke association and medical research council, University of New Castle, UK. Status: ongoing Principal International Investigator: Mr.Mendlow, Professor of Neurosurgery, Regional Neurosciences Centre, New Castle Upon Tyne, UK
- Open label dose confirmation study of Interstitial 131 I-ch TNT-i/B MAb(Cotara) for treatment of Glioblastoma Multiforme(GBM) at first relapse. Principal International Investigator: Sunil Patel, Associate Professor of Neurosurgery, University of South Carolina Sponsors: Peregrine pharmaceuticals, USA Status: ongoing
- Multinational clinical study to evaluate "Efficacy & Safety of AP 12009 in adult patients with recurrent or refractory anaplastic astrocytoma (WHO Grade 3) as compared to standared treatment with temozolamide or BCNU: A randomized, actively controlled, open label clinical phase III study, AP 12009-G005" Status: will start in Q 3, 2008, after ethics committee approval. Sponsors: Anti Sense Pharma, GmbH, Regensburg, Germany
- Phase III confirmatory randomised evaluation of convection enhanced delivery of IL 13-PE38QQR compared to standard of care with

survival endpoint in glioblastoma multiforme patients at first recurrence. Status : will start in Q4 2008 after IEC approval. Sponsors : Neopharm, Inc, 101 Waukegan Road, Suite 970, Lake Bluff, IL , USA

Pathology

Mycobacterial research

During the year, 3 major lipid antigens of Mycobacterium tuberculosis bacilli were isolated and characterized. These include cord factor (Trehalose 6,6' dimycolate), lipoarabinomannan and sulpatides. With these antigens immunoassays such as ELISA were standardized for the diagnosis of tuberculous meningitis, tuberculous pleural effusion, tuberculous lymphadenitis. These assays are extremely useful in culture negative patients with tuberculosis. The role of cord factor in invitro chemotaxis of neutrophils from patients with pulmonary tuberculosis and tuberculous meningitis were evaluated. As an extension of this study, a research project has been recently submitted to DBT for funding. Four recombinant mycobacterial antigens - Esat-6, HspX, Tb8.4 and PlcA were isolated and characterized. A cocktail containing these four recombinant mycobacterial antigens were applied in a immunoassay and it was found to be extremely useful in the serodaignosis of pulmonary tuberculosis. With these recombinant mycobacterial antigens we could distinguish patients with latent tuberculosis from those with BCG vaccinated individuals. This observation has great epidemiological application as well as in tuberculosis control programmes. A specific immunohistochemical techniques have been introduced to detect mycobacterial antigens in tuberculous lesions. Nested PCR test is standardized for the diagnosis of tuberculous pleural disease and this assay could distinguish tuberculous pleural effusion from those patients with malignant pleural effusion.

Immunological studies in Myasthenia Gravis

In this study an attempt have made to isolate the tumor specific antigen in patients with myasthenia gravis with thymoma and also to correlate the antigenic similarities between skeletal muscle antigens and tumor specific antigen in patients with myasthenia gravis. Immunoassay to estimate the circulating antigen in the sera of patients with myasthenia gravis is useful not only in the diagnosis but also in the prognosis of the disease. As an extension of this the department is initiating one more project to study the Immunological markers that play a role in patients with myaethsnic syndromes undergoing plasma exchange to the Department of Science and Technology State council, Kerala state. (B) Immunocytochemical method for the demonstration of mycobacterial antigens in cerebrospinal fluid specimens for the rapid laboratory diagnosis of tuberculous meningitis. This was attempted in the cytospin smears of cerebrospinal fluid. This direct immuno-cytochemical method is simple, rapid reproducible and can be used an adjunct in the early laboratory diagnosis of tuberculous meningitis particularly in patients in whom bacteriological methods did not yield positive results for M tuberculosis in cerebrospinal fluid specimens.

MAJOR EQUIPMENTS PURCHASED DURING THE YEAR

Brabender Plastograph
RT-PCR
Transmission Electron Microscope, Hitachi 7650A - 120 Kv
Grinder and Polisher, ECOMET 3000
AFM under the COE program of DBT
ITC under the COE program of DBT
Automated Coagulation Analyser Amax Destiny Plus
Anaesthesia Work Station
Continuous Auto Transfusion System
Enterprise 3000 Electric Profiling Bed for Hospital use (ICU Beds)
Allura Xper FD10 Single Plane Cardiovascular System
Micro Ultra Centrifuge
Impulse 80 C-Arm DSA System
Vitek 2 Bacterial Identification and Antibiotic Susceptibility Testing System
Dataquest Acquistion & Analysis System
Polygraphs
IE 33 Intelligent Echocardiography Ultrasound System
Sugita Multipurpose Headframe
Heart Lung Machine
CS 300 Datascope Intra Airotic Baloon Pump
Leica DM 2500 Microscope
LCD Monitor-Sharp
Cascade Intra Operative Monitoring System
Chromophare Double Combination Ceiling Light wth Provision for Mountable
Chromophare Double Combination Ceiling Light wth Provision for centrally Mountable Camera
Baylis RF Pain Management System
Labsystem PRO Bard EP Recording System
Hemodynamic Recorder for Cathlab
Fluuromax- 4 Spectroflurometer
Sterrad Nx- Plasma Sterilization System
Sterilizer Plasma Based US FDA Approved Capacity
Leica ASP 300S Automated Vacuum Tissue Processor
Intra Vascular Ultrasound Machine (Volcano S5)
ICU Ventilator Servo-i

ACADEMIC ACTIVITIES

Division of Academic Affairs

Admission of students and evaluation of students registered for various programmes are the primary responsibilities entrusted to the division. The division co-ordinates the work of standing Academic Committee of the Institute.

Programmes on offer - 2009

Post-doctoral	*PhD./Master's*	*Diploma*
1. DM Cardiology	14. PhD	16. Cardiac Nursing
2. DM Neurology	15. Master of Public Health (MPH)	17. Neuro Nursing
3. DM Neuroimaging and Interventional Neuroradiology		18. Blood Banking Technology
4. DM Cardio Thoracic & Vascular Anaesthesia		19. Cardiac Laboratory Technology
5. DM NeuroAnaesthesia		20. Neuro Technology
6. MCh Cardiovascular & Thoracic Surgery		21. Operation Theatre Technology
7. MCh Vascular surgery		22. Advanced Medical Imaging Technology
8. MCh Neuro Surgery (after M.S)		
9. MCh Neuro Surgery (after MBBS and 1 year Residency in General Surgery)		23. Clinical Perfusion
10. Certificate course in Cardiovascular & Neuro Surgical Anaesthesia		24. Medical Records
11. Certificate course in Cardiovascular & Neuro Radiology		
12. Certificate course in Vascular Surgery		
13. Post DM / MCh Fellowship		

Students Enrolment

The student strength for DM/MCh degree, Post-doctoral certificate courses and Post DM/ MCh Fellowships during the year was 78. The Master of Public Health degree programme has 30 scholars. The Institute has, as of now, 68 students for the PhD programme, 61 scholars for the various Nursing and Technology related Diploma Programmes. The off-campus courses at the National Institute of Epidemiology have an enrolment of 27 students for the Master of Applied Epidemiology programme and 15 students for the Master of Public Health.

A. List of Post-doctoral students

DM (Cardiology)

Rajesh Muralidharan.P
Krishna Kumar. M
K.J. Prem Kumar
Saurabh Kumar Gupta
Ali Shafeeq (Sponsored)
P Shyam Sundar Reddy
Randeep Singla
Bhavesh Harivadan
S Venkateshwaran
Ainchwar Rohan Vijay
Ajeet Arulkumar S J
Mahesh Kumar S
Dinesh Chowdhary
Amit Kumar Chaurasia

DM (Neurology)

Abhijit Das
Pranav D Shinde
Neeraj N Baheti
Malini Gopinath
Gopal Krishna Dash
Mahesh Pundlik Kate
Wattamwar Pandurang
Doshi Suyog Ashok
G Srinivas
Haseeb Hassan
Anis Jukkarwala
Davis Manuel A

DM (Cardiothoracic Anaesthesiology)

Aveek Jayant
Murali Krishna T
Divya Amol Chandran

DM (Neuro Anesthesiology)

Suparna B
Nilai Chatterjee
Gopala Krishna K N

DM (Neuroimaging and Interventional Neuroradiology)

Jitender Saini
Jolapara Milan Babulal
Amit Aslam Khan
Keerthiraj B
Somenath Chatterjee
Swati Chinchure
Pranjal Phukan

M Ch (Cardiovascular & Thoracic Surgery)

Thomas Mathew
Saurabh Jaiswal
Kirun Gopal
Ajoy Menon (Sponsored)
Balasubramonian K R
Brijesh P K
Mahesh Wadhwani

Sabarinath Menon

Rajesh Jose

Reji Chandran

Madkaiker Ashish Narayan

MCh (Neurosurgery)

Jinendra Kumar.R

Bimal.G

Rahul Jain

Nilesh Jain

Sachin Sampat Baldawa

Mukesh Pandey

Amit Sadashiv Dhakoji

Mradul Kumar Sharma

Sathia Prabhu A

Manish Ganesh Pai

Rajneesh Misra

Navneet Kumar Singh

MCh (Neurosurgery) (5 year)

Jayanand Sudhir. B

M Ch (Vascular Surgery)

Shivananda S

Srujal N Sha

Vikram Patra

PDCC (Anaesthesiology)

Reshmi Liza Jose

Sushanda Panda

Meenakshi Vitthal Patil

Dinesh Kumar U S

PDCC (Radiology)

Banuprakash S

Deepak K S

Post DM / MCh Fellowships

Ragesh P

Haridasan V

Shiva kumar R

Atma Ram

Atampreet Singh

Vikas V

B. List of PhD / Master's Programme students

PhD Students

Vandana Shankar

Arun.B

Sumith.R.Panicker

Manitha.B.Nair

Sailesh Mohan

Anie.Y

Sumi.S.

Josna Joseph

A.Edwin Sam

A.S.PradeepKumar

Sajeesh.S

Viji Mary Varghese

Manickam. P

Godwin.S.K.

Anu Paul

Aghila Rani.K.G.

Manna Jose

Sangeetha Mohan

Sreeja Purushothaman

Suboj Babykutty

Priya.P.S.

Deepa.D

Sudhakar.M.

Anu.S.Nair
Anu Mol Jose
Dawlee. S
P.R.Uma Sankar
Lynda Velutheril
Manju. S
Ragaseema.V.M
Malini . S. Pillai
Devi. R.R
Rajesh. P
Vinod V
Joe Vargheese
Viola B Morris
Beena G Mohan
Unnikrishnan S
Priya A Nair
Kiran S
Sreerekha P R
Anwar Azad P
Vrinda S Kumar
Shelma R
Shabeesh Balan
Geetha M
Fayaz R K
Remya N S
Rojan Jose
Rajeev.N.S
Ajeesh M
Soumyarani V S
Sonia T A
Vidhya Raj
Renjith P Nair
Sheena Mathew
Anu Anna Abraham
Smita K A
Kalaivani V
Sabarinath P S
Francis Boniface Fernandez
Aswathy P M
Jairani P S
Arjun G Namboodiri
Neena Aloysius
Padmakrishnan C J
Linda Philip
Sheeja Lizo Easo

Master of Public Health 2 year Programme

2009 Admission - Ist year students

Dr. Aarthy. R
Dr. Sourabh Saxena
Dr. N.S. Viswanath
Dr. Dileep Kumar
Dr. Santhosh Kumar. N
Dr.. Dhruba Jyoti Borah
Dr. Aravind Kumar .M
Dr. Bhagya Lakshmi. N
Dr. Uma . V. Shankar
Dr. Sony Shah
Dr. Sangamithra. K
Dr. Anshul Avijit
Dr. Praveen .P. A
Dr. Sagar. T
Dr. Sathish. T

2008 Admission 2nd year students

Dr. Madhu. U
Dr. Das Sanjay Sujitranjan
Dr. Amritha Geevarghese

Dr. Indrani Sharma

Dr. Ujjwala Gupta

Ms. Gayatri Bholanath Giri

Dr. Chiranjeev Bhattacharya

Dr. Subhasis Bhandari

Dr. Tumge Loyi

Dr. Jagan Kumar. B

Ms. J. Radha

Dr. Bency Joseph

Dr. Mohammed Asheel

Dr. Pinaki Sharma

Dr. Anitha

Diploma in Public Health programme 1 year

Dr. Bipin Kumar Singh

Dr. Shardool Upadhyaya

Dr. Chakreshwar Chobisa

Dr. Ashwinbhai Kalubhai Taviad

Dr. GhanashyambanBadridan Gadhvi

Dr. Divyesh Bhailalbhai Patel

Dr. Ghanshyam Mehta

Dr. Paresh Kumar Jagadishchandra Joshi

Dr. Direndra Kumar Mehta

Dr. Arun Kumar Singh

Dr. Shah Piyushkumar Yashwantlal

Two off-campus prgrammes of two-year duration are offered at the National Institute of Applied Epidemiology, Chennai (NIE) which is under the Indian Council of Medical Research (ICMR)

1. Master of Applied Epidemiology
2. Master of Public Health (Health Services, Development and Research)

Joint Programme by IIT Madras / CMC Vellore / SCTIMST - Trivandrum

The three institutions - IIT Madras, CMC Vellore and SCTIMST Trivandrum, each having a set of unique strengths and facilities, had joined together in starting two Programmes - 'M.Tech in Clinical Engineering' and 'Ph.D in Bio-medical devices and technology' to address the issue of capacity building for reducing India's dependence on imports of medical devices. A unique feature of these courses is the clinical attachment with a maximum exposure to the clinical environment. This ensures that, at the end of the course the students will be able to interact effectively with the clinicians and other medical and paramedical staff in the hospital resulting in the identification of unmet 'clinical needs'. This is also expected to trigger further research leading to development of innovative indigenous healthcare technology. The first batch of students has registered in July 2008.

MS / Ph.D Bio-engineering courses at CMC Vellore

This off campus programme of the Institute, post-graduate Bioengineering programme, emphasizes the R&D needs of health care in India to be developed. There are three students admitted for the programme.

C. List of Diploma students - Cardiac Nursing

Joby John

Mariamma Philip

Sunitha S.S

Sindhu Susan Isac

Lekshmi R.P

Salini S.

Ancil John

Rakhi Rajendran
Aswathi A.K
Usha Devi A.
Arya P.
Divya G.
Yalmika V.S
Manikanda Prasad
Shine Mary L.V

Neuro Nursing

Asha Gopi G.S
Bindu Lekha V.
Krishnasankar
Anil Gopalakrishnan
Harish T.K
Viji V. Fernandez
Bijitha L.B
Amritha C.K
Jummy Varghese
Mahesh Sharmila
Dhivya Raju

Technology related Programme

Shammy S.
Meera Sundaram C.S
Jishnu K. Namboothiri
Princy V.
Leskshmi C.
Rejith R.S
Amit Krishnan
Aruna S.S
Renjini N.
Varghese Mathew
Santhosh S.
Sameer
Sooryajith
Abhilash T.R
Sujesh S.
Priya Rani R.
Neethu G.P
Nisha Gopi G.S
Ruknudheen N.
Sreelakshmi K.
Sandhya R.
Darsana S.G
Radhika Devi
Sandhya K.S
Shinjitha P.
Akhil B.S
Shitha Basheer J.
Fasalurahiman V.P
Sreerag M. Nair
Subin K.
Muhammed Labeez K.
Rijesh S.R
Vidya Vijay G.
Rubiya Irshad
Sandhya C.K

Degrees awarded

Name of Candidates	*Degree*	*Speciality*
Ganesh Divakar	MCh	Neurosurgery
Naren Nayak	MCh	Neurosurgery
Vikas V.	MCh	Neurosurgery
Vishal Jain	MCh	Neurosurgery
Varghese T. Panicker	MCh	Cardiac surgery
Sanjay Gandhi	MCh	Cardiac surgery
Vivek Babu B.	MCh	Cardiac surgery
Arul Dominic Furtado	MCh	Cardiac surgery

Ajith Cherian	DM	Neurology
Atma Ram	DM	Neurology
Deepak Guptha	DM	Neurology
Chandra Mohan Singh	DM	Neurology
Atampreet Singh	DM	Neurology
Shivakumar R.	DM	Neurology
Ragesh P.	DM	Cardiology
Shanmuga Sundaram R.	DM	Cardiology
S V K R Krishna	DM	Cardiology
Haridasan V.	DM	Cardiology
Arvinda H.R	DM	Neuroradiology
A.L Periakaruppan	DM	Neuroradiology
Sriganesh K.	DM	Neuroanaesthesia

Post Doctoral Certificates awarded

Name of Candidates	*Speciality*
Nikhil S. Bhoomkar	Anaesthesiology
Sivakumar R.	Anaesthesiology
Mallikarjun Rao D T V S	Anaesthesiology
Ajay Aravind	Anaesthesiology
John George	Anaesthesiology
Mahadevaswamy S	Radiology
Wangju Sumnyan	Radiology
Utham B. George	Radiology
Rajesh Anto	Vascular Surgery

Post DM/MCh Fellowships

Name of Candidates	*Specialty*
Sumantha Shekhar Padhi	Cardiology
Sanjay G.	Cardiology
Dilip M.	Neurosurgery
Rajesh Shankar Iyer	Neurology
Chandrasekhar R.	Neurology
Mini S.	Neurology

Diploma awarded

Name of Candidates	*Specialty*
Fatima Mehmood Ahmed	Cardiac Laboratory Technology
Gigin Nath G.	Cardiac Laboratory Technology
Sajith V.S	Cardiac Laboratory Technology
Praveen Kumar A.	Medical Imaging Technology
Shijil Joseph	Medical Imaging Technology
Ranjith C.	Medical Imaging Technology
Suma B.	Medical Records Science
Remya L.T	Medical Records Science
Anjumol P.S	Blood Banking Technology
Lakshni Rajaclosy	Blood Banking Technology
Shanu P.S	Clinical Perfusion
Don Sebastin	Clinical Perfusion

Short-term training/observership upto period of six months

Candidates sponsored by the Government / Autonomous institutions/ Health sector organizations, approved Medical /Dental / Nursing colleges, paramedical Institutions and Government / Defence services are provided short term training. This training / observership is arranged in consultation with the respective department / discipline and the time and period of training is decided by the Academic Division in

consultation with the head of the department/ division. Around 600 observers from 75 institutions all over the country spent varying periods from two weeks to six months in different department of the Institute.

Library

Library, BMT Wing: The library has a collection of 10178 books and 5498 back volumes of journals. During the current year, 235 books were added and 61 journals and "Materials for Medical devices Database" were subscribed. The collection includes 2215 standards specifications and 275 patent specifications. Being part of DST-CSIR Consortia, our library has access to full text of journals and standards, in addition to those we subscribe. The library has accounts with Patents Information System, Nagpur, NISCAIR, DELNET and STN-Easy for the easy retrieval of information.

The information management system and library automation is based on the UNESCO software, CDS/ISIS and bar coding has been implemented. The library information and the CD-ROM collection are available to both the wings through intranet. As a part of support to the Quality Systems, the library updates all relevant national and international standards and maintains an archival cell for storing and retrieval of documents related to Quality Systems. During this year 50 standards specifications were added to the collection of the library.

Status of Collection :

Books - Total	23918
Books - Added during 2008-09	802
Back Volumes - Total	19843
Back Volumes - Added during 2008-09	124
Periodicals Subscribed	164

Our library starts accessing ejournals through "DST-CSIR EJournals Consortia".

Nursing Education

The speciality nursing programes continue to attract registered nurses as evidenced by the number of applicants for the two programes - Diploma in Cardiovascular and Thoracic Nursing, and Diploma in Neuro nursing. Presently 163 cardiac nurses and 112 neuro nurses are working in many parts of the world adding name and fame to this Institute. The Senior Lecturer in Nursing offered additional support to the in-service education of the Institute, as well as continuing nursing education activities of the University of Kerala and other Government Institutions. The 2007 batch students of the 2-year Diploma Programes in Speciality Nursing have graduated in December 2008. There were six graduates in the Diploma Programe in Cardiovascular and Thoracic Nursing and six graduates in the Diploma Programe in Neuro Nursing. Currently twenty-six students (Sixteen in CVT Nursing and ten in Neuro nursing) are undergoing these programes.

EXTERNALLY FUNDED RESEARCH PROJECTS

BIOMEDICAL TECHNOLOGY WING-INDUSTRY SPONSORED PROJECTS

ONGOING PROJECTS

Title	*Principal Investigator*	*Funding Agency*
Microparticles based Hemostatic chitosan material	Dr. Chandra P.Sharma	India Sea Food Ltd. Cochin
Development of drug releasing intrauterine system	Dr. V.Kalliyana Krishnan	HLL Lifecare Ltd., Trivandrum
Pilot level production of Bioactive Composite Granules for Dental Application	Dr. H.K.Varma	DORTHOM Medi Dents Pvt Ltd., Coimbatore
Testing and Optimization of Bioactive Ceramic Products (Production QC Work)	Dr. H.K.Varma	Basic Healthcare Products Pvt. Ltd, Chandigarh (Technology Transfer Project)

COMPLETED PROJECTS

Title	*Principal Investigator*	*Funding Agency*
Development of a chemo-mechanical caries dissolving agent	Dr. V.Kalliyana Krishnan	Dr.Toms Laboratories Ltd., Calicut
Shelf life and marginal leakage study of single solution bonding system	Dr. V.Kalliyana Krishnan	Anabond-Stedman Pharma Research Ltd., Chennai

BIOMEDICAL TECHNOLOGY WING

EXTERNAL FUNDED PROJECTS

NEWLY INITIATED

Title	*Principal Investigator*	*Funding Agency*
Development of technologies for isolating tissue-engineering-scaffolds from mammalian organs and tissues	Dr. T.V.Anilkumar	DBT
Novel ceramic collagen composites for bone regeneration	Dr. Annie John (Indian side)Dr. Michael Gelinsky (German side)	DST-DAAD Project Based Personnel Exchange Programme(PPP)
Facility for micro/nanoparticles based biomaterials for Advanced Drug Delivery Systems (FADDS)	Dr. Chandra P. Sharma	DST
Development of Radiopaque Nanocomposites for dental applications	Dr. V.Kalliyana Krishnan	DST
Development of decellularised animal tissue for cardio vascular application	Dr. S.R.Krishnamanohar	DBT
Epithelial -mesenchymal interactions in Tissue engineered hybrid artificial lung - role of angiogenic factors	Dr A.Maya Nandkumar	DBT

ONGOING PROJECTS

Title	*Principal Investigator*	*Funding Agency*
Ethical and Procedural Issues in the use of medical devices in India	Dr. Anoopkumar Thekkuveettil, Dr. Girish R Menon and Richard Cash	National Institute of Health, USA
Bone Tissue Engineering using adipose stromal cells on 3D porous bioactive ceramic scaffolds	Dr. Annie John	DBT (ANCETE)
Cell based tissue engineered fabrication of osteochondral grafts	Dr. Annie John	DBT (ANCETE)
Bioconjugation of nanomaterials and their applications in cancer therapy	Dr. Annie John- Co – investigator (Collaboration with University of Kerala)	DBT, (Nanoscience & Nanotechnology Task Force)

Title	*Principal Investigator*	*Funding Agency*
Combination product of polymer-ceramic nano composite with cells and growth factors for Bone Tissue Engineering applications	Dr. Annie John - Co – investigator	DBT (Nanoscience & Nanotechnology Task Force)
Differentiation of foetal liver progenitor cells and fabrication of a prototype for bioartificial liver	Dr. T.V.Kumary	DBT (ANCETE)
Tissue Engineered Small Diameter Vascular Graft (TEVG): Fabrication & Evaluation	Dr. Lissy K.Krishnan	DBT
Tissue Engineered small diameter vascular graft: Fabrication and Evaluation	Dr. Lissy K.Krishnan	DBT
Delineating mechanism of biofilm formation in urinary catheters: characterisation of role of *E.coli* secretory proteins and influence of environmental signals	Dr. A. Maya Nandkumar	Kerala State council for Science Engineering technology & environment
Tissue engineered hybrid artificial lung model for testing pollutants and drugs	Dr. A. Maya Nandkumar	DBT
Evaluation of molecular toxicity of newly developed materials intended for biomedical application	Dr. P.V.Mohanan	Indian Council of Medical Research (ICMR), New Delhi
Development of an improved Tilting Disc Heart Valve Prosthesis	C.V. Muraleedharan	PATSER
Development of coronary stent system	Muraleedharan C.V.	NMITLI, CSIR, GOI
Commercialisation of Centrifugal blood pump for extracorporeal applications	D.S. Nagesh	TDB
Development of Left Ventricular Assist Devices (LVAD) VSSC-SCTIMST joint project	D.S. Nagesh	VSSC, Trivandrum
Development of a Portable Medical Electrical Safety Analyser*	Dr. Niranjan D.Khambete	Department of Information Technology
Development of Medical Investigation Camera for Endoscopy*	Dr. Niranjan D.Khambete	Department of Information Technology
Implanted neutral interface and control schemes for artificial hand control **	Dr. Niranjan D.Khambete	DBT

Title	*Principal Investigator*	*Funding Agency*
Assessment of Electrical Impedance Spectroscopy as a Technique for Early Detection of Cervical Cancer in Developing Countries: A pilot Study***	Dr. Niranjan D.Khambete	Women's Cancer Initiative, Mumbai
A Joint Indo-US Centre on Stem cells and Tissue engineering	Dr. Prabha D. Nair	IUSSTF, Indo-US forum
Programme support on Tissue Engineering under the Centres for Excellence and Innovation program of DBT	Dr. Prabha D. Nair-Team Leader	DBT
* *In collaboration with CDAC, Trivandrum* ** *In collaboration with CMC, Vellore* *** *In collaboration with Tata Memorial Hospital, Mumbai, and The University of Sheffield, UK*		
Tissue Engineering of Cartilage using biomimetic scaffolds under dynamic conditions	Dr. Prabha D. Nair	DBT
Novel microporous polymeric membranes for medical applications	Dr. P.Ramesh	DBT
Combination Products of Polymer-Ceramic Nanocomposites with Cells and Growth Factors for Bone Tissue Engineering Applications	Dr. P.Ramesh	DBT
Synthesis and Characterization of Radiopaque Polyurethanes for Medical Applications	Dr. Roy Joseph	KSCSTE, Govt. Kerala
Development and evaluation of surface modified, hydrogel coated medium and large diameter vascular graft	Dr. Roy Joseph	DBT
Effect of action substitution on the structure and biocompatibility of ionomer glasses and glass ceramics	Dr. A Sabareeswaran - Co-Investigator:	UKIERI-DST Science and Technology Award 2008
Evaluation of the pro and anti inflammatory profile of cells onto bio- material surface	Dr. Sharma CP in collaboration with Prof. Dr. Herald Renz, Department of Clinical	Indo-German (DST-DAAD) Project based Personnel exchange Programme.

Title	*Principal Investigator*	*Funding Agency*
	Chemistry and Molecular Diagnostics-Central Laboratory, Philipps-University, Marburg, Germany.	
Oral Insulin Delivery	Dr. Sharma CP	CSIR under NMITLI New Delhi
Designing molecularly imprinted polymers as substrates for glucose	Dr. K. Sreenivasan	DBT

COMPLETED PROJECTS

Title	*Principal Investigator*	*Funding Agency*
Bone regeneration in Large Segmental defects using tissue engineered new generation bioceramic scaffold	Dr. Annie John	DRDO
Bone regeneration in a diabetes-induced rat model	Dr. Annie John	DST
Ultra structural study of the interface between bone and bioactive ceramics – a pre-clinical evaluation	Dr. Annie John	KSTEC
Resorption and Remodeling of Novel Bioceramics	Dr. Annie John (Indian side) & dr. Michael gelinsky (German side)	DST-DAAD Joint Research Project (Indo-German)
Differential expression of rat brain RNA during seizure development	Dr. Anoopkumar Thekkuveettil	Department of Science and Technology
Process optimisiation and development of dispensable and biodegradable polymeric bone cement for minimally invasive treatment of bone diseases	Dr. M.Jayabalan	DST
Development and studies on novel biodegradable polymeric materials as functionally active cardiac implant	Dr. M.Jayabalan	DBT
Development of molecularly reinforced biodegradable nanocomposite materials as internal orthopedic fixation devices	Dr. M.Jayabalan	DST-BMBF
Bioengineered cornea for ocular surface regeneration	Dr. T.V. Kumary	DBT

Title	*Principal Investigator*	*Funding Agency*
Development of improved tilting disc heart valve	Mr. Muraleedharan C.V.	PATSER, DSIR, GOI
Islet Immuno Isolation with XenoTransplantation and Stem Cell Regeneration to Islets as Strategies for Treatment of Diabetes	Dr. Prabha D. Nair	DBT, Govt. of India
Development of bioactive bone graft substitutes for spinal fusion surgery	Dr. Roy Joseph	DST
Langmuir Blodgett Film Deposition: Blood Compatibility	Dr. Sharma CP	DST
Development of thermo responsive copolymers as sensing elements for C-reactive proteins	Dr. K. Sreenivasan	DRDO
Biomimetic Processing of inorganic – organic composites for biomedical applications	Dr. H.K.Varma	DST (INDO –Japanese S&T Cooperation Joint Project)

SCTIMST TECHNOLOGY DEVELOPMENT FUNDED PROJECTS

NEWLY INITIATED PROJECTS

Title	*Principal Investigator*	*Duration*
Toxicity evaluation of glass ionomer cements (P-6018)	Dr. V. Kalliyana Krishnan	One year
Pre clinical/efficacy studies of bioengineered cell sheet for ocular surface regeneration	Dr. T.V. Kumary	One year
Development of Degradable Composites as Bone Substitutes	Dr. P. Ramesh	One year

ONGOING PROJECTS

Title	*Principal Investigator*	*Duration*
Scale-up and Small-scale Production of Fibrinogen Concentrate, Thrombin and Factor VIII for Clinical Use	Dr. Lissy K Krishnan	One year
Scale up production and process standardization of Chitra Polyurethane potting compound	Mr. D.S.Nagesh	One Year
Calcium Sulphate Based Bone Filler Cements for Drug Delivery Applications	Dr. Manoj Komath (Co-PI : Dr.H.K.Varma)	One year
Development of Instrumentation for Bio-impedance applications	Dr. Niranjan D. Khambete	One year
Development of an In vitro pyrogen test kit: Evaluation of pyrogenicity using human whole blood	Dr. P.V. Mohanan	One year
Estimation of the in vitro release kinetics of drug eluting stents	Dr. K. Sreenivasan	One Year

COMPLETED PROJECTS

Title	*Principal Investigator*	*Duration*
Feasibility study on the use of Commercially pure Titanium as reference material for bone implantation tests	Ms. Leena Joseph	One year
Disposable latex covers for ultra sound probes	Dr. P.Ramesh	One Year
Development of Silverised Chitosan Wound Dressing	Dr. Sharma CP	One year

SHORT TERM STUDENT PROJECTS - M.TECH / M.Sc

Title	*Name of student/* Intitution/Course	*Supervisor*
Preliminary studies on development of resin modified glass ionomer cements	Mr.Sabarish MSc (Applied Chemistry), Calicut University, MSc Project Work, June 2008	Dr.V.Kalliyana Krishnan
Feasibility study for the use of computational fluid dynamics techniques for replacing steady flow testing of artificial heart valves	Arun Kumar ND / CUSAT, Cochin / M. Tech	Shri Muraleedharan CV
A method for the analysis of prosthetic heart valve sound for correlating the valve pathology and valve sound	Meryl Cherian / MIT, Manipal / M. Tech	Shri Muraleedharan CV
Identification & characterization of interfacial failure modes of titanium nitride (TiN) & diamond like carbon (DLC) coatings	Aiswarya Raj RK / VIT, Vellore/ M. Tech	Shri Muraleedharan CV
Functional characterisation of silastic sensor for ICP Measurement	Asha ND / Anna university / M. Tech	Shri Muraleedharan CV
Modeling Membrane Oxygenator using SIMULINK	Ms. KiruthikaM.Tech Biomedical engg. Vellore Institute of Technology	Shri D.S.Nagesh
CFD study of Centrifugal Bloodpump	Mr. Ramith R M.Tech Structural Engg., Cochin University of Science and Technology	Shri D.S.Nagesh
Synthesis, Characterization and Mechanical Properties of Hydroxyapatite	Sanoj Reginold N.M.Sc. Materials Science,Kannur University	Dr. H.K. Varma

HOSPITAL WING

Externally funded research projects

Title	*Principal Investigator*	*Funding Agency*
Adult human resident cardiac stem cells and endothelial progenitor cells-detection of optimum conditions for their therapeutic use	Prof. C.C. Kartha	Funding Agency – Department of Biotechnology
A phase III, double-blind, placebo-controlled study to determine the efficacy and safety of a low (50 mg/day) and high (100 mg/day) dose of the study drug xxxx as add-on therapy, in patients with idiopathic Parkinson's disease with motor fluctuations, treated with a stable dose of levodopa and who may be receiving concomitant treatment with stable doses of dopamine agonist and/or an anticholinergic.	Dr.Asha Kishore	Clinirx Research Private Ltd.
A multicenter, randomized, double blind, parallel-group placebo and pramipexole controlled study to assess efficacy and safety of the study drug xxxx monotherapy in the treatment of patients with early stage Parkinson's disease (with Extension Phase for 31 weeks)	Dr.Asha Kishore	Quintiles Research India Pvt Ltd
Safety and Efficacy of the study drug xxxx in the Treatment of Patients with Psychosis Associated with Parkinson's disease	Dr.Asha Kishore	Quintiles Research India Pvt Ltd
A Multicentre, Randomized, Double-blind, Placebo and Entacapone-controlled, Parallel Group Study of the Efficacy, Safety and Tolerability of the study drug xxxx in Levodopa treated Parkinson's disease Patients with Motor Fluctuations	Dr.Asha Kishore	Quintiles Research India Pvt Ltd
A phase III double-blind, placebo-controlled, 18-month extension study to investigate the long-term efficacy and safety of a low (50mg/day) and high (100mg/day) dose of the study drug xxxx, as add-on therapy, in	Dr.Asha Kishore	Clinirx Research Pvt Ltd

Title	*Principal Investigator*	*Funding Agency*
patients with idiopathic Parkinson's disease with motor fluctuations, treated with a stable dose of levodopa and who may be receiving concomitant treatment with stable doses of dopamine agonist and / or an anticholinergic		
A Multicenter, Double-Blind, Randomized, Placebo-Controlled, Single Treatment Cycle, Parallel Evaluation of the Safety, Efficacy and Immunogenicity of Two Formulations of the study drug xxxx, followed by a Blinded Active Treatment Extension of up to Two Additional Treatment Cycles in patients with Cervical Dystonia.	Dr.Asha Kishore	Allergan Pharmaceutical Development Centre India Pvt Ltd
Collaborating With The Center Of Excellence In Magnetic Resonance Imaging For Biomedical Research Detroit, USA on Susceptibility Weighted Imaging (SWI)	Bejoy Thomas & Kesavadas	The Center Of Excellence In Magnetic Resonance Imaging-USA
Multimodality Neuroimaging in pre-surgical work up of patients with temporal lobe epilepsy (TLE)	Dr. Kesavadas	Kerala State Council for Science, Technology and Environment
'*Cardoguard* Tablet-delineation of molecular mechanism of action and its efficacy in the regression of ventricular hypertrophy'	Dr. R.Renuka Nair	Department of Science & Technology
Determination of genetic component in hypertension and cardiac hypertrophy'	Dr.R.Renuka Nair	Kerala State Council for Science Technology and Environment
"Modulation of energy metabolism in prevention of cardiac remodeling: Stimulation of peroxisome proliferator-activated alpha receptor"	Dr. R Renuka Nair	Life Sciences Research Board/DRDO, New Delhi
"Survival mechanisms in cardiac fibroblasts"	Dr. K Shivakumar	Life Sciences Research Board/DRDO, New Delhi
"Molecular basis of delayed G1-S transition in hypoxic cardiac fibroblasts"	Dr. K Shivakumar	Department of Biotechnology, New Delhi
Demonstration of *Mycobacterium tuberculosis* by an in-situ hybridization and immunocytochemical method in the CSF-cytospin smears for the diagnosis of tuberculous meningitis	Dr.V V Radhakrishnan	Department of Science and Technology- New Delhi; duration

Intramural Funding

Title	*Principal Investigator*	*Funding Agency*
LRRK2 mutation as a cause of Parkinson's disease in a South Indian cohort	Dr.Asha Kishore	Collaboration with the Rajiv Gandhi centre for Biotechnology, Kerala
Multimodality MRI in atypical parkinsonism	Dr.Asha Kishore	Technology Development Funds, SCTIMST
Cranial Ultrasonography and SWI- based differential diagnosis of atypical parkinsonian disorders	Dr. Asha Kishore	Technology Development funds, SCTIMST
"Characterization of brain tumors using advanced MR imaging techniques."	Prof. A.K. Gupta	Indo - Italian Collaborative project approved
Brain MRI studies of motor and behavioral function in health and disease, with particular emphasis on stroke"	Prof. A.K. Gupta	Indo - Italian Collaborative project
Development of Computerized Indian Neuropsychological Battery for Evaluation of Cognitive Impairment	Dr. Mathuranath	
"Pharmacogenetic study for evaluating the teratogenic effects of anti epileptic drugs"	Dr.Sanjeev V.Thomas	Department of Biotechnology, Government of India
"Oxidative stress and its relationship to fetal malformations in women with epilepsy	Dr.Sanjeev V. Thomas	Kerala State Council for Science, Technology and Environment, Pattom, Trivandrum
International Rolandic Epilepsy Linkage and Neuro Development	Dr. Sanjeev V Thomas	NIH, USA, RO1 Project

Extramural Funding

Title	*Principal Investigator*	*Funding Agency*
Kerala-Einstein Study: Risk factors for cognitive decline	Dr. Mathuranath	National Institute of Health (NIH)
Setting up a Brain-mapping unit & a neurogenetic laboratory	Dr. Mathuranath	Expansion Grants State Council for Science Technology and Environment

SCIENTIFIC PUBLICATIONS

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2. Ajay VS, Prabhakaran D, Jeemon P, Thankappan KR, Mohan V, Ramakrishnan L, Joshi P, Ahmed FU, Mohan BVM, Chaturvedi R, Mukherjee R, Reddy KS. Prevalence and determinants of diabetes mellitus in the Indian industrial population. *Diabetic Medicine* 2008; 25:1187-1194

3. Aghila Rani K G, Jayakumar K, Srinivas G, Nair RR, Kartha CC; Isolation of ckit-positive cardiosphere-forming cells from human atrial biopsy. Asian Cardiovasc Thorac Ann 2008; 16:50-56.

4. Annamma George; Ethical Guidelines for Research in Speech, Language and Hearing. In: Get the Acts Together. Monograph of the Indian Speech and Hearing Association, 2009:1-18.

5. Annamma George; The National Trust Act. In: Get the Acts Together. Monograph of the Indian Speech and Hearing Association, 2009:19-27.

6. Anumon V D, Roy Joseph, Muraleedharan C V; Preparation and Characterization of Ethylene Co-Vinyl Acetate Based Drug Delivery System for Cardiovascular Applications. International conference on Advances in Polymer Technology, 2008 (APT '08) held on September 25-27, 2008; Kochi. p.76.

7. Anie Y, Sumi S, Latha M, Mundayoor S, Radhakrishnan V.V; Diagnostic approaches in Pleural tuberculosis. Diagnostic Microbiology and Infectious Diseases 2008; 59:389-394

8. Anu Paul, Chacko BK, Geetha, M and Appukuttan. P.S. Multiple Specificity of Human Serum Dextran-Binding Immunoglobulin: a (1 6)- and (1 3)-linked Glucose and a (1 3)-linked Galactose in Natural Glycoconjugates are Recognized.Immunological Investigations (A Journal of Molecular and Cellular Immunology), Volume 38 Issue 2, 153-158, 2009.

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11. Asha S. Mathew, Soumya Colombus, Kalliyana Krishnan V, Lissy K.Krishnan. Dynamic endothelial cell seeding in the lumen of biodegradable poly(caprolactone) scaffolds for vascular tissue engineering. Ist International Conference in Nano Bio 2009; Amrita Institute of Medical Sciences & Technology, Cochin, February 17-20, 2009.

12. Ariya Saraswathy, Rosemary MJ and Kalliyana Krishnan.V .Study on progression of atherosclerotic plaque using FT-Raman spectroscopy. Proceedings of the Kerala Science Congress, 530-531, Kollam, January 28-31, 2009.

13. Arun Torris, KalliyanaKrishnan.V. Micro computed tomography: A new tool for biomaterial characterization Proceedings of the Kerala Science Congress, 560-562, Kollam, January 28-31, 2009.

14. A Singh, C Kesavadas, M Radhakrishnan, K Santosh, MD Nair, G Menon, VV Radhakrishnan Primary Diffuse lepto-meningeal gliomatosis, J Neuroradiology, 36 (1). 52-56;2009

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diagnostic evaluation of patients with intractable epilepsy. Epilepsia Published Online: Mar 12 2009 DOI: 10.1111/j.1528-1167.2008.01882.x

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BOOKS / CHAPTERS IN BOOKS

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HONOURS, AWARDS AND RECOGNITIONS

Dr. Anil Kumar PR was awarded the DST-IIPA gold medal for securing the First Position among the participants in the 12 weeks DST sponsored program, 8th foundation training program for scientists and technologists, organized by Indian Institute of Public Administration, New Delhi.

Dr. Biji Bahulyean won the best paper award in the annual conference of the Kerala chapter of the Neurological society of India for his paper titled Hemispherotomy and Hemispherectomy for intractable epilepsy due to unihemispheric pathology: surgical techniques and outcome.

Dr. Chandra P. Sharma was awarded FBSE (Fellow, Biomaterial Science and Engineering) by International Union of Societies for Biomaterial Science and Engineering (IUS-BSE) during the World Biomaterials Congress 2008 held on May 28th at Amsterdam.

Ms. S,Dawlee, got Young Scientist Award of Kerala State Council for Science Technology & Environment at 21st Kerala Science Congress, 2009

Ms. Manitha B. Nair successfully completed the "Young Scientist's Refereeing Programme in the year 2008" for the journal Biomaterials and is duly recognized as a "Qualified reviewer of the Journal Biomaterials"

Ms. PP Saramma, Senior lecturer in nursing received the Best Scientific Paper Award during 12th Annual National Conference of Nursing Research Society of India (NRSI) at Manipal.

Dr.Sailaja GS got the Gold Medal Award from Society for Polymer Science India, Trivandrum Chapter for presentation of best paper based on her PhD thesis in 2009. The award comprise of a gold medal and the citation.

Dr. Sanjeev V. Thomas got Vimla Virmani award by the National Academy of Medical Sciences, New Delhi for his work on economic and psychosocial burden of epilepsy in India.

Dr. Suresh Nair was appointed a member of The International Liaison and Advisory Panel of the editorial board of "NEUROSURGERY" the leading international journal on neurosurgery.

Dr K R Thankappan, Professor and Head, AMCHSS became a member of the international advisory board for the graduate school of international health development, Nagasaki University, Japan.

Ms.Viji Mary Vargheese received Split site Commonwealth Fellowship award to do part of her Ph.D at University of Nottingham, UK.

Fellowship /Awards

Best Poster award at the National Epilepsy Conference, New Delhi for the paper Role of advanced MRI protocols for detection and evaluation of lesion extent of cortical dysplasia in patients with epilepsy C. Kesavadas, B.Thomas, Kapilamoorthy TR, Gupta AK, N Bodhey.

Best paper award at the Indian Society of Vascular & Interventional Radiology (ISVIR) - 2008, Mumbai for the paper Clinical and Radiological profile in posterior circulation dissections presented by Amit Aslam Khan.

Dr. Bejoy Thomas Certificate of Merit Award for the paper, 'Video-EEG and MRI comparison in Classic Epilepsy Syndromes' presented by, Asst. Professor at Radiological Society of North America (RSNA) annual Congress at Chicago, November 30 to December 5, 2008.

Sachin.J.Shenoy, Tilak Prasad, Sabareeswaran A, Nithya Joseph, Anil Kumar PR, Sreenivasan.K, Umashankar.PR, Kumary.TV -Best Poster award for the paper. "A Rabbit Model of Limbal Stem Cell Deficiency for Evaluation of Ocular Surface regeneration" at the National Symposium on Animal Models in Biomedical Research: Ethical & Welfare Issues, February 25-26, 2009, held at - Central Drug Research Institute (CDRI), Lucknow, UP - In collaboration with - Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), National Institute of Animal welfare (NIAW), Ministry of Environment & Forests, Government of India and Laboratory Animal Science Association of India (LASAI).

Students/Reserch Fellow

Dr. Rajesh Muralidharan, resident cardiology - Best Paper Award -CSI Kerala Chapter Summer meeting Thiruvalla 2008: Long-term follow-up of bare metal coronary stent implantations - 10 year follow-up.

Ms. Savneet Kaur -International Travel Award by the Department of Science and Technology, India, for poster presentation at the 2008 Meeting of International Society for Heart Research, 'Cell to Bedside' at Cincinnati, Ohio from 17-20th June, 2008

Best paper award at the Indian Society of Neuro Radiology (ISNR) - 2008, Lucknow for the paper Clinical and Radiological profile in anterior circulation dissections presented by Amit Aslam Khan.

VISITORS

Aditya Nair, 8th grade, Sollon Middle School, USA visiting the Epilepsy Programme for one month from 13.06.08.

Chandrima Mukherjee, Neuropsychologist from Care Hospital, Hyderabad visiting the Epilepsy Program as an observer from 17.02.09 to 03.03.09.

Eric James Maina, Medical doctor from Kenyan Visiting in the Neuro physiology as an observer for 3 months from 02.06.08 to 30.08.08

Hunnur Manoj, MD, DM, DNB (Neurology), Mumbai, visiting the Epilepsy Program as an observer for one month from 15.07.08 to 15.08.08.

Jane Grande-Allen, PhD, Associate Professor, Department of Bioengineering, Rice University, Houston, Texas, USA

Jinith Raj J, M,Sc in Medical Biochemistry ,student from School of Health Science, Calicut University. M.Sc. project "Susceptibility of Lipoprotein(a) to in vitro oxidative stress: a comparison with low- density lipoprotein"

Shahna Valsan, Department of Biotechnology and Microbiology, Kannur University, Kannur. M.Sc. project: Antiproliferative and antimetastatic action of aloe emodin on colon cancer cells: a cell line based study (March- September 2008).

Padma Krishnan CJ of Department of Biotechnology and Microbiology, Kannur University, Kannur. M.Sc. project : Nitric oxide induced migration of colon cancer: an in vitro study (March- September 2008).

Veena R of School of Biotechnology, Chemical & Biomedical Engineering VIT University, Vellore . M.Sc project: Cytotoxic effect of a synthetic lignan on human cervical cancer cell line, SiHa: involvement of autophagy (December- March 2009)

Nandini RJ, Department of Microbial Biotechnology, SBGE, Bharathair University, Coimbatore. M.Sc. project : Antiproliferative and antimetastatic effect of nimbolide on colon cancer cells: an in vitro study (January- March, 2009).

Raji SR, Department of Microbial Biotechnology, SBGE, Bharathair University, Coimbatore. M..Sc. project: Regulation of matrix metalloproteinases by exogenous nitric oxide via cGMP in colon cancer cells (January- March, 2009).

Sabine Meunier, Neurophysiologist from the University of Pierre and Marie Curie, France, visited the program and trained the research staff in new research protocols using Transcranial magnetic stimulation in August 2008.

A team of 10 scientists headed by Dr. Jayakumar from the Indira Gandhi centre for atomic research visited the movement disorder section of Neurology Department section to set up a collaborative research project

Professor of Neurology and Coordinator Integrative Medicine. Keck School of Medicine, University of Southern California

Poornima Shah, Neurophysiologist, Jaslok Hospital visiting the Epilepsy Program as an observer for three months from April 2008.

Vinod Puri, Professor of Neurology, GB Pant Hospital, New Delhi visiting the Epilepsy Program as an observer for one month from 01.06.08 to 30.06.08.

Suvasini Sharma, Senior Resident, DM Pediatric, Department of Pediatrics, AIIMS, New Delhi visiting the Epilepsy Program as an observer for one month from 15.06.08 to 15.07.08.

Syam, Neurologist, Taluk Hospital, Paravoor visiting the Epilepsy Program as an observer for two months from 02.07.08.

K. Mishra, Professor, University of Southern California School of Medicine, California visited the Neurology department on 29.09.08 and 30.09.08.

T. Sateesh Kumar, DM (Neurology) post graduate from King GeorgeHospital visiting the Epilepsy Program as an observer for one month from 01.11.2008 to 29.11.2008.

K. Ganesan, DM (Neurology) postgraduate from Madras Medical College, Chennai visiting the Epilepsy Program as an observer for 16 days from 16.12.2008 to 31.12.2008.

Priyarenjini.S, Neurologist from Royal Hallamshire Hospital, United Kingdom visiting the Epilepsy Program as an observer from 05.01.09 to 31.01.09.

Naveen Sankhyan, Pediatric Neurology resident from AIIMS Hospital, Delhi visiting the Epilepsy Program as an observer from 02.02.09 to 28.02.09

Pradeep P. Nair, Assistant Professor (Adhoc), Department of Neurology, SGPGIMS, Lucknow visiting the Epilepsy Program as an observer from 15.02.09 to 28.02.09.

M. Radha, DM (Neurology) postgraduate from Madras Medical College, Chennai visiting the Epilepsy Program as an observer for 16 days from 16.12.2008 to 31.12.2008.

Priyarenjini.S, Neurologist from Royal Hallamshire Hospital, United Kingdom visiting the Epilepsy Program as an observer from 05.01.09 to 31.01.09.

T.K.Vaidyanathan, Professor, New Jersey School of Medicine andDentistry, USA spent 6 months in our lab on sabbatical (Oct 08- March 2009) as Emeritus Professor.

Jayalakshmi Vaidyanathan, Professor, New Jersey School of Medicine and Dentistry, USA spent three and a half months in our lab on sabbatical (Dec 15, 2008- March 31, 2009) as Emeritus Professor.

B.D. Ratner, A.S. Hoffman, Kip Hauch from the University of Washington, Seattle visited DTERT and SCTIMST as part of the Joint Indo-US centre on stem cells and tissue engineering program and delivered lectures. Mr Steve Woodard from Georgia Institute of Technology also visited DTERT under the same program.

Naseem Thielgaard from the Danish Institute of Technology visited DTERT as part of Scout India program from the Danish Government.

VISITS ABROAD OF FACULTY MEMBERS

Dr. A. K. Gupta has attended the 8th Asia Pacific Congress of Cardiovascular and Intervention Radiology (APCCVIR) Kualalampur on June 9th to June12th 2008, and presented two invited talks - Alternative Route of CCF embolization and Evaluation of Lower limb veins.

Dr. A. K. Gupta has attended the Antisense Investigators meet of "Glioma Trial" on June 12 -14, 2008 at Vienna, Austria.

Dr. A. K. Gupta has attended the Live International Neuroradiology, Neurosurgery course PARIS, June 17-19, 2008.

Dr. M.Jayabalan visited Universtiy of Duisburg, Essen, Germany during 07.5.2008 - 05.6.2008 under DST-BMBF Programme.

Dr. R. S. Jayasree attended the IDEA Sequence Development programme during June 16 to 20 and The Image Calculation programme during June 23 to 26 at Cary, North Carolina, USA

Dr. T V Kumary visited Division of Division of Ophthalmology and Visual Sciences Queen's Medical Centre , University of Nottingham, November, 2008.

Dr. T V Kumary visited Division of Stem Cell Biology, Institute of Human Genetics International Centre for Life , Newcastle University, Newcastle upon Tyne, United Kingdom. , November, 2008.

Dr. T. R. Kapilamoorthy attended Radiological Society of North America (RSNA)-2008, November 29 to December 4, Chicago

Dr. C. Kesavadas visited the Institute of Neurology, University College, London as the Biotechnology Overseas Associateship Awardee, 2008 for research in EEG correlated Functional MRI for a period of 3 months from April to June 2008.

Dr. C. Kesavadas also attended European Society of Pediatric Radiology, Edinburgh, June 2008 and presented the paper Susceptibility weighted imaging (SWI) in the work up of patients with pediatric epilepsy

Dr. C. Kesavadas attended Biotechnology Overseas Associateship Award, 2008 for research in EEG correlated Functional MRI at the Institute of Neurology, University College, London (April to June 2008)

Dr. Lissy K.Krishnan attended 4-day course on "Advances in Tissue Engineering" conducted at Rice University, Houston, USA during Aug 16-19, 2008.

Dr. Lissy K.Krishnan visited Bioengineering departments of Rice University Houston, USA, for two weeks and had interactions with various bioengineering groups.

Dr. P.V. Mohanan participated as an Observer during the International GLP Inspection held at M/s F. Hoffmann-La Roche Ltd. Pharmaceutical Division, Basel, conducted by Swiss Agency for Therapeutic Products, under Swissmedic GLP Authority, Switzerland during 04-05 December, 2008 AND at Institute Pasteur de Lille, France, conducted by French Health Agency for Safety of Health Products, France during 08-12 December, 2008.

Dr.Narendra.K.Bodhey, Associate Prof. attended the European Society of Radiology Meeting held at Austria, Vienna from 6-10th March, 2009

Dr. Prabha D. Nair visited the Georgia Tech, U.S.A, and University of Washington Seattle, U.S.A as part of the research collaborative activity of the Joint Indo-US Centre on Stem Cells and tissue engineering. April 2008.

Dr. Prabha D. Nair visited Department of endocrinology, Odense University Denmark during June 6-8, 2008 and delivered a lecture on Biomaterial Scaffolds and designs for Stem cells and Tissue engineering.

Dr.Sathyanarayana Pathro, Adhoc consultant attended the European Society of Radiology Meeting held at Austria, Vienna from 6-10th March, 2009

Visit abroad of students

Ms. Anumol Jose, Ph.D. student obtained Commonwealth split site fellowship for 1year to carryout research on spinal cord injury models at University of Glasgow, UK. The program started on Sept 25, 2008 and will end on Sept 22, 2009.

Ms. Lynda V. Thomas visited the Georgia Tech, U.S.A, as part of the research collaborative activity of the Joint Indo-US Centre on Stem Cells and tissue engineering. October 2008 to November 2008

Ms. Neethu Mohan visited the Georgia Tech, U.S.A, as part of the research collaborative activity of the Joint Indo-US Centre on Stem Cells and tissue engineering. October 2008 to November 2008.

Ms. Viji Mary Varghese, Ph.D Student worked on the proteomic and genomic aspects of limbal stem cells under the guidance of Prof. H.S. Dua, Corneal surgeon and Expert in limbal stem cell deficiency at University of Nottingham, UK.

FUNCTIONS, WORKSHOPS AND CONFERENCES

Committee on papers laid on the table (Loksabha) visited SCTIMST

Release of Reference Manual for Primary Health care Institutions in Kerala by Smt P K Sreemathi Teacher Hon. Minister for Health and Social Welfare, Govt. of Kerala

Launch of the Joint Degree Programme-M.Tech.(Clinical Engineering) andPh.D (Biomedical Devices and Technology). Dr.T Ramasami, Secretary, DST, inaugurationg the function

Dr. Kalyanakrishnan receiving the EMPI-Indian Express “Indian Innovation Award” won by the Institute

Dr. K. Mohandas, Director,SCTIMST inaugurating the Workshop on Total Blood Security for Trivandrum District.

Minister for Food,Civil Supplies & Animal Husbandry Shri. C. Divakaran, Launching of the project joint venture of SCTIMST & KLD board-Development of decellularised animal tissue for cardio vascular application 19-8-08

Institute Day Celebrations

INTERNATIONAL CONFERENCES ATTENDED BY FACULTY

Name of the participant/ Speaker	*Name of the Conference*	*Date & Venue*	*Title of the paper/ participants status*
Dr. Annie John	8th World Biomaterials Congress (WBC) 2008	Amsterdam, Netherlands, May 28 - June 1, 2008	Poster Presentation : In vivo regeneration and repair of segmental defects in goats using a combination product of cells and indigenous porous triphasic ceramic
Ms.Annamma George	Investigators meeting	Kualalumpur, Malaysia, 24-26th June 2008	Participant
Ms.Annamma George	Investigators meeting	Dubai, UAE, 13-14th January 2009	Participant
Dr. Asha Kishore	12th International Congress on Parkinson's disease and Movement Disorders	Chicago June 2008	"Progression of Parkinson's disease after long-term electrical stimulation of the subthalamic nucleus"
Dr. Asha Kishore	SriLankan Neurology Association.	Srilanka November 22-23, 2008.	Invited Faculty Lecture on "Genes and Parkinson's Disease" "Long term outcomes of Deep Brain Stimulation in Parkinson's Disease"
Dr. Biju Soman	Training Program of Public Health Teachers	Boston University, USA from May 23 to June 17, 2008	Participant
Dr. Biju Soman	Symposium South East Asia Public Health Education Institutes Network (SEAPHEIN)	Bangkok during August 20-22, 2008.	"Public Health Technologies: An essential tool for public health professionals to address climate challenges"

Name of the participant/ Speaker	*Name of the Conference*	*Date & Venue*	*Title of the paper/ participants status*
Dr. Biju Soman	Pacific Rim Global Health Project meeting and the SRNT Asia Pacific Conference	Bangkok, Thailand during October 25-30, 2008	Participant
Dr. A. K. Gupta	8th Asia Pacific Congress of Cardio vascular and Intervention Radiology (APCCVIR)	Kualalampur on June 9th to June12th 2008	Invited Talk "Alternative Route of CCF embolization and Evaluation of Lower limb veins"
Dr. A. K. Gupta	European Congress of Radiology	Vienna, Austria. March 6-10, 2009	Vertebroplasty with or without embolisation in vertebral Haemangiomas
Dr. A. K. Gupta	Antisense Investigators meet of Glioma Trial	Vienna, Austria June 12 -14, 2008	Paticipant
Dr. A. K. Gupta	Live International Neuroradiology, Neurosurgery course	PARIS June 17 - 19, 2008	Participant
Dr. Jayakumar.K	87th Annual Conference of American Association of Thoracic surgeons & Annual conference of European Society of Cardio Vascular Surgeons	Santiago, Lisbon April 2008	Participant
Dr. Jayabalan M	International Conference on Medical Materials, Devices and Regenerative Medicine and Workshop (MMDRM-2008)	Kathmandu, Nepal November 23- 25, 2008	"Biodegradable hydrogel as endoluminal paving matrial for cardiac applications"
Dr. Jayabalan M	14th International Symposium on Biomedical Science and Technology (BIOMED 2008	Mugla,Turkey May 3-7, 2008	Invited talk " Biosynthetic injectable materials for cardiac applications"

Name of the participant/ Speaker	*Name of the Conference*	*Date & Venue*	*Title of the paper/ participants status*
Dr. R. S. Jayasree	IDEA Sequence Development programme & The Image Calculation programme	North Carolina, USA June 16 to 26	Participant
Dr. Kapilamoorthy	Radiological Society of North America (RSNA)	Chicago November 29 to December 4, 2008	Participant
Dr. Kesavadas.C	European Society of Paediatric Radiology	Edinburgh June 2008	"Susceptibility weighted imaging (SWI) in the work up of patients with pediatric epilepsy"-Invited Talk
Dr. Kesavadas.C	8th Annual Neuroradiology and Functional Neuroanatomy Course Institute of Neurology, University College, London	London 31 March to 3 April 2008	Participant
Dr. Kesavadas.C	Endovascular Forum 2008- British Society of Interventional Radiology and Vascular Society	Stratford, UK 20-21 June	Endovascular Forum 2008
Dr.Mala Ramanathan	Conference on Emerging Issues in Bioethics and Clinical Ethics Workshop, Centre for Biomedical Ethics and Culture(CBEC), SIUT, Karachi	Karachi, Pakistan October 25-26, 2008	"Multiple Vulnerabilities and the Ethics of Surrogate Motherhood in India". & "Ethical Review of Research proposals in a multispecialty and multidisciplinary setting - a case study in India"
Dr.Mathuranath PS	Investigators meeting	Kualalumpur, Malaysia 24-26th June 2008	Participant
Dr. Narendra K Bodhey	European Society of Radiology Meeting	Austria, Vienna from 6-10th March, 2009	Participant

Name of the participant/ Speaker	*Name of the Conference*	*Date & Venue*	*Title of the paper/ participants status*
Dr. Prabha D Nair	8th World Biomaterials Congress (WBC) 2008	Rai Conference Centre, Amsterdam, Netherlands May 28 - June 1, 2008	A Novel Biological-hybrid copolymer scaffold with Enhanced properties for Vascular Tissue Engineering Role of Scaffold Composition in Regulating the Chondrogenic Phenotype During Invitro Tissue Regeneration Poster : A Biohybrid Scaffold Towards Stem Cells Generated Tissue Engineered Pancreas
Mr.Paul W	8th World Biomaterials Congress (WBC) 2008	Rai Conference Centre, Amsterdam, Netherlands May 28 - June 1, 2008	Poster: Fatty Acid Conjugated Calcium Phosphate Nano particles for Protein Delivery
Ms.Radhakumary C	WBC 2008	Netherlands May 28 - June 1, 2008	Poly(vinyl acetate) Modified Chitosan Microspheres for Controlled Drug Delivery
Ms. Rekha MR	8th World Biomaterials Congress (WBC) 2008	Rai Conference Centre, Amsterdam, Netherlands May 28 - June 1, 2008	Poster: Noval pH sensitive Thiolated Chitosan Micro-particles: Ivitro Evaluation as Oral Insulin Delivery System
Ms.Rekha MR	3rdIndo-Australian Conference BITE & RM 2009	Sydney, Australia January 21- 23, 2009	"Pullulan based vectors for liver targeted gene delivery: blood compatibility and transfection efficiency"

Name of the participant/ Speaker	*Name of the Conference*	*Date & Venue*	*Title of the paper/ participants status*
Dr.Sajith Sukumaran	Investigators meeting	Dubai, UAE, 13-14th January 2009	Participant
Dr. Sanjeev V. Thomas	American Epilepsy Society Meeting	Seattle, USA, Dec 2008	"Oxidative stress in women with epilepsy" "No familial tendancy for congenital alformations in offsprings of women with epilepsy"
Dr. P S Sarma	Pacific Rim Global Health Project meeting and the SRNT Asia Pacific Conference	Bangkok, Thailand October 25-30, 2008	Participant
Dr. Sharma CP	8th World Biomaterials Congress (WBC) 2008	Rai Conference Centre, Amsterdam, Netherlands May 28 - June 1, 2008	Chaired a Symposium on "Oral Insulin Delivery" & Poster presentation
Dr. Sharma CP	3rdIndo-Australian Conference BITE & RM 2009	Sydney, Australia January 21- 23, 2009	"Polymeric nanoparticles towards oral insulin delivery: blood compatibility concerns"
Dr. Sharma CP	International Conference on Medical Materials, Devices and Regenerative Medicine and Workshop (MMDRM-2008)	Kathmandu, Nepal November 23- 25, 2008	Talk- Blood compatibility of materials
Dr. S Nair	6th International Congress on Meningiomas and Cerebral Venous System	Boston Sept 3-6, 2008	Invited speaker- "Approaches for large petroclival meningiomas"
Dr.S Nair	Grand rounds lecture - Ohio State University Medical Centre, Columbus	18th Sept 2008 Columbus	Grand rounds lecture
Dr.S.Nair	5th International Congress of the World Federation of Skull	Vancouver September 2008	Invited faculty- Chaired a session & presented 10 papers

Name of the participant/ Speaker	*Name of the Conference*	*Date & Venue*	*Title of the paper/ participants status*
	Base Societies and 19th Annual Meeting of the North American Skull Base Society		
Dr. G. Srinivas	International PSE symposium on natural Products and Cancer	Naples, Italy 22-26, September, 2008	"Molecular mechanism of plumbagin action: an update on its anti-tumor function"
Dr. G. Srinivas	Ehrlich II- 2 nd World conference on Magic Bullets, organized by German Association of Pharmaceutical Scientists	Nurenberg, Germany 4-6 October, 2008	"Plumbagin: A candidate for targeted anticancer therapy"
Dr. K. R. Thankappan	World Health Day Symposium organized by the Monash University	Melbourne, Australia April 7, 2008 at	"Hypertension control by trained volunteers in a rural community in India"
Dr. K. R. Thankappan	UK National Smoking Cessation Conference	Birmingham 30 June to 01 July, 2008	"Smoking by Tuberculosis Patients in Kerala, India: Proactive Cessation Efforts are urgently needed"
Dr. K. R. Thankappan	Project meeting on "Building Capacity for Tobacco Cessation in India and Indonesia"	Yogyakarta, Indonesia during July 20-27, 2008.	Participant
Dr. K. R. Thankappan	Governing Council meeting of the International Society of Behavioral Medicine	Tokyo, Japan on August 26, 2008	"Change in awareness, treatment and control of hypertension: Results from a community based intervention program in Kumarakom, Kerala, India"
Dr. K. R. Thankappan	Pedagogic training	The London School of Hygiene and Tropical Medicine, September 22-27, 2008	Participant

Name of the participant/ Speaker	*Name of the Conference*	*Date & Venue*	*Title of the paper/ participants status*
Dr. K. R. Thankappan	Project meeting Pacific Rim Global Health	Bangkok, Thailand, October 25-30, 2008	"Tobacco Use Patterns, Disease Burden and Control Initiatives in India"
Dr. K. R. Thankappan	China Medical Board and the Bill and Melinda Gates Foundation	Hanoi Vietnam November 4-5, 2008	"Education for Global Health Leadership"
Dr. K. R. Thankappan	40th Asia Pacific Academic Consortium for Public Health Conference	Kuala Lumpur November 7-9, 2008	"Challenges for public health education in low and middle income countries in the Asia Pacific Region"
Dr. K. R. Thankappan	International seminar entitled "Changing Diabetes Barometer" Oxford Health Alliance, International Diabetes Federation and Novo Nordisk	Oxford, UK on December 8-9, 2008	Participant
Dr. K. R. Thankappan	Nagasaki University International Advisory Board Meeting	Nagasaki University Feb 4-6, 2009	"Health at Low cost - The Kerala model"
Dr.Umashankar P	3rdIndo-Australian Conference BITE & RM 2009	Sydney, Australia January 21- 23, 2009	"A porcine orthotopic implantation model to evaluate mechanical heart valve"
Dr.Varma HK-	International Conference on Medical Materials, Devices and Regenerative Medicine and Workshop (MMDRM-2008)	Kathmandu, Nepal November 23- 25, 2008	"Bioceramic Scaffolds For Bone Tissue Engineering"

CONFERENCES ATTENDED BY STUDENTS-INTERNATIONAL CONFERENCES

Name of the participant/ Speaker	*Name of the Conference*	*Date & Venue*	*Title of the paper/ participants status*
Priya PS	International PSE symposium on natural Products and Cancer, organized by Phytochemical Society, Europe	Naples, Italy, during 22-26, September, 2008	Participant
Ashwathy MS	WBC 2008	Rai Conference Centre, Amsterdam, Netherlands May 28 - June 1, 2008	Poster Presentation Participant
Arun U	WBC 2008	Rai Conference Centre, Amsterdam, Netherlands May 28 - June 1, 2008	Poster Presentation Participant
Kaladhar K.	WBC 2008	Rai Conference Centre, Amsterdam, Netherlands May 28 - June 1, 2008	Poster Presentation Participant
Lynda V Thomas	WBC 2008	Rai Conference Centre, Amsterdam, Netherlands May 28 - June 1, 2008	Poster Presentation Participant
Manju S	International Conference on Medical Materials, Devices and Regenerative Medicine and Workshop (MMDRM-2008)	Kathmandu, Nepal November 23-25, 2008	Poster Presentation Participant
Manitha B Nair	MMDRM-2008	Kathmandu, Nepal November 23-25, 2008	Participant
Morris VB	WBC 2008	Rai Conference Centre, Amsterdam, Netherlands May 28 - June 1, 2008	Participant Poster Presentation

Name of the participant/ Speaker	*Name of the Conference*	*Date & Venue*	*Title of the paper/ participants status*
Neethu Mohan	WBC 2008	Rai Conference Centre, Amsterdam, Netherlands May 28 - June 1, 2008	Participant Poster Presentation
Subojkutty	International PSE symposium on natural Products and Cancer, organized by Phytochemical Society, Europe	Naples, Italy, during 22-26, September, 2008	Participant Poster Presentation
Sudhakar M	WBC 2008	Rai Conference Centre, Amsterdam, Netherlands May 28 - June 1, 2008	Participant Poster Presentation
Vidya Raj	MMDRM 2008	Kathmandu, Nepal November 23-25, 2008	Participant
Viola B Morris	MMDRM 2008	Kathmandu, Nepal November 23-25, 2008	Participant

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   Dean & HOD, Cardiology, SCTIMST
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   Molecular Cardiology, SCTIMST
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   Professor of Anaesthesiology, SCTIMST
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   Secretary to the Government of Kerala
   Health & Family Welfare
   Thiruvananthapuram
4. Shri. K.N. S Nair
   Head, Engineering Maintenance Division
   VSSC (Retd)
   "Deepti", Kazhakuttan, Thiruvananthapuram
5. Financial Advisor
   SCTIMST, Thiruvananthapuram
6. A member to be co-opted by the
   Director as and when necessary

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   New Delhi - 110016
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   Joint Secretary to Govt. of India &
   Financial Advisor
   Department of Science & Technology
   New Delhi - 110 016

4. Dr. G.S. Bhuvaneshwar
Head, BMT wing, SCTIMST

5. Financial Advisor (Ex-Officio Convenor)
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SCTIMST, Thiruvananthapuram

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Head, BMT Wing, SCTIMST, Poojappura
Thiruvananthapuram

3. Prof. Jayaprakash Muliyil
Professor & Head of Community Medicine
Christian Medical College, Vellore

4. Nominee of the Secretary
Department of Science & Technology
Govt. of India, New Delhi - 110 016

5. A Senior Professor of SCTIMST

6. An External Expert nominated by the President of the Institute

Junior Staff Selection Committee

1. Dr. S.J. Douglas Linsby
Medical Superintendent, SCTIMST
Thiruvananthapuram

2. Dr. G. S. Bhuvaneshwar
Head, BMT Wing, SCTIMST, Poojappura
Thiruvananthapuram

3. Shri. P. B. Sourabhan
Deputy Director (Admn)
SCTIMST, Thiruvananthapuram

4. Mrs. Vijayamma Harikrishnan
Nursing Superintendent
SCTIMST, Thiruvananthapuram

5. Dr. Kalliyana Krishnan V
Scientist 'G', BMT Wing

6. Representative of Academic Wing of the Institute nominated by the Director of the Institute

Ethics Committee

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Government of Kerala, R.G. 286, Thriveni
Ulloor, Thiruvananthapuram - 695 011

3. Smt. J. Lalithambika IAS
"Abhilash" Golf Links Road
Kowdiar, Thiruvananthapuram-695043

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Co ordinator, CSER (Centre for Studies in Ethics and Rights)
Candelar, 4th Floor
26 St. John Baptist Road
Bandra West, Mumbai 400050, India

8. Dr. S.N. Pal
Director (Engineering)
HSCC (India) limited
E-6 (A), Sector -1
NOIDA (U.P)-201301

9. Dr. K. Mohandas
Director
SCTIMST, Thiruvananthapuram

10. Dr. G. S. Bhuvaneshwar
Head, BMT Wing, SCTIMST
Poojappura, Thiruvananthapuram

11. Dr.Anoop Kumar T.
(Member Secretary IEC)
Scientist 'E', Molecular Medicine
SCITMST, BMT Wing, Poojappura
Thiruvananthapuram-12

12. Dr. Girish Menon
Additional Professor of Neurosurgery
SCTIMST, Trivandrum

Technology Development Committee

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2. Dr. G. S. Bhuvaneshwar
Head, BMT Wing, SCTIMST
Poojappura, Thiruvananthapuram

3. Dr. K. Balasubramanian
Director, Nonferrous Materials
Technology Development Centre
Hyderabad

4. Dr. M. Radhakrishna Pillai
Director
Rajiv Gandhi Centre for Biotechnology
Trivandrum

5. Dr. K.G.Rajendran
Vice President, USV Ltd., Mumbai

6. Prof. R. Krishnakumar
Department of Engineering Design
I.I.T. Madras

7. Dr. S. Radhakrishnan
Scientist - G
Polymer Science & Engineering
National Chemical Laboratory, Pune

8. Dr. Baldev Raj, (Institute Body)
Director
Indira Gandhi Centre for Atomic Research
(IGCAR), Kalpakkam

9. Dr. K. Radhakrishnan
Professor of Neurology, SCTIMST

10. Dr. K. Jayakumar
Professor of Cardio Vascular &
Thoracic Surgery, SCTIMST

11. Dr. Kalliyana Krishnan V.
Scientist 'G', BMT Wing
SCTIMST

DEPARTMENTS AND PERSONNEL

Prof. K. Mohandas, MD,FRCA
Director

Academic Division

Dr. Jagan Mohan Thanrakan
Dean

Dr. A.V. George, MA, BEd, PhD
Registrar

Sundar Jayasingh, MA, MBA, DLL
Deputy Registrar

Library

S. Jayachandra Das, BSc, MLISc
Librarian-cum-Information Officer

T. Sudha, M.A, MLISc.
Librarian-cum-Documentation Officer - A

Nursing Education

P. P. Saramma, BSc, MN
Lecturer in Nursing

Public Relations

T.V. Hemalatha, MA, MPhil, LLB, PGDJ
Public Relations Officer

Achutha Menon Centre for Health Science Studies

Dr. K R. Thankappan, MD, MPH
Professor and Head

Dr. V Raman Kutty, MD, MPH
Professor

Dr. P Sankara Sarma, PhD
Additional Professor

Dr. Mala Ramanathan, PhD, MA
Additional Professor

Dr. K Srinivasan
Associate Professor

Dr. Biju Soman, MD, DPH
Assistant Professor

Dr. Manju R Nair MBBS MPH
Scientist C

Honorary Professor
Dr. T K Sundari Ravindran, PhD

Visiting Faculty

Dr. Richard A Cash
Harvard School of Public Health, USA

Dr. Jane Heyworth
Sub dean, Health Sciences
School of Population Studies
University of Western Australia
Perth Australia.

Administration

Dr. K. Mohandas, MD,FRCA
Director

C.S. Sreepriya, MA, LL.B, PGDHM, PGDT, PGDJ, DCA.
Executive Secretary to the Director-Cum-Ethics Committee Coordinator

S.Pramod, B A
Secretary to Director

P.B. Sourabhan, MA, LLB, PGDMM, DCA
Deputy Director (Administration)

S. Chandrasekharan Nair, IA & AS(Retd)
Financial Advisor & Chief Accounts Officer
(Till 30/10/2008)
(P.Radha Devi IA &AS
(On Deputation from 1/11/2008)

S. Sasikumar, MA (PA), BGL, LLB, PGDIR, PGDIRPM
Administrative Officer Gr I

P.V. Chandrasekharan BSc, SAS *(Till 13/09/2008)*
Internal Audit Officer
(P.S.Anandam MSc.
(Deputation from 15/09/2008)

Selvarajkumar BSc.
Administartive Officer Gr II

C. Gopinathan, BSc, LLB, SAS
Chief Accounts Officer (from 9/12/08)

A. Santhakumari, MCom
Accounts Officer Gr I

C.R. Mohandas, BCom
Accounts Officer Gr II

R. Sreekumar, BSc. PGDMM, MBA (MM)
Purchase Officer Gr I

M. Sudhakara Sharma, BA
Stores & Purchase Officer Gr II

V.Sukumaram, Bcom. *(Till 31/1/2009)*
Stores & Purchase Officer Gr II
(Helen Joseph, BSc.,PGDFM
(From 01/02/2009)

B. S. Anil Kumar, BA
Security Officer

K. Prasanna Kumar B.Com, DEE
Security Officer

Hemant Kumar R.P
Asst. Security Officer- A

S. Venkitachalam Iyer, BCom
Pool Officer

Construction Wing

Thomas Philip
Construction Engineer (On Contract)

G. Gopinatha Kurup
Junior Engineer (Civil)

BIOMEDICAL TECHNOLOGY WING

Dr. G. S. Bhuvaneshwar, MS, PhD
Head, BMT Wing

Artificial Organs

Dr. G. S. Bhuvaneshwar, M.S., Ph.D.
Leader, DAO & Head, BMT Wing

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

Mr. D. S. Nagesh, M.Tech.
Engineer F & Scientist In Charge,
Modelling & Prototyping lab

Mr. V. Vinod Kumar, M.Tech.
Engineer C

Mr. Sujesh Sreedharan, ME
Engineer C

Mr. V. Arun Anirudhan, B.Tech.
Engineer B (on Study Leave)

Mr. M. K. Sajithlal, B.Tech.
Engineer B

Mr. G. Renjith, B.Tech.
Engineer B

Bioceramics and SEM Laboratory

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

Dr. Manoj Komath, PhD
Scientist D

Mr. R. Sreekumar, BSc
Junior Scientific Officer

Mr. S. Vijayan, MSc
Junior Scientific Officer

Biosurface Technology Division

Dr. Chandra P. Sharma, MTech, MS, DSc, MEBE, F.B.S.E
Senior Scientist G & Associate Head

Dr. M. R. Rekha, PhD
Scientist C

Calibration Cell

Mr. C. V. Muraleedharan, MTech
Engineer F & Scientist In Charge

Mrs. Leena Joseph, BTech
Engineer C

Dental Products Laboratory

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

Dr. P. P. Lizymol, PhD
Scientist C

Division of In-vivo Models and Testing

Dr. P. R. Umashankar, MVSc
Scientist D & Scientist In Charge

Dr. Sachin J. Shenoy, MVSc
Scientist C

Division of Laboratory Animal Science

Dr. A. C. Fernandez, PhD
Scientist F & Scientist In Charge

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

Engineering Services

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

Mr. K Rajan, Dip. Electrical Engg.
Junior Engineer(Instrumentation)-A

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

Implant Biology

Dr. Mira Mohanty, MD (Pathology)
Scientist G, Head, Division of Implant Biology & SIC Histopathology Laboratory

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

Dr. Annie John, PhD
Scientist E & SIC Transmission Electron Microscopy Lab

Dr. A. Sabareeswaran, MVSc
Scientist C

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

Instrumentation Laboratory

Dr. Niranjan D. Khambete, MTech, PhD
Engineer E & Scientist In Charge

Division of Microbiology

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

Laboratory for Confocal Microscopy and Experimental Pathology

Dr. T. V. Anil Kumar, PhD
Scientist D & Scientist in charge

Molecular Medicine Laboratory

Dr. Anoopkumar Thekkuveettil, PhD
Scientist E & Scientist In Charge

Polymer Analysis

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

Mr. P. R. Hari, BSc, AIE
Junior Scientific Officer

Polymer Division

Dr. M. Jayabalan, MSc, BEd, PhD, PGDIPRL
Scientist F & Scientist In Charge

Polymer Processing Laboratory

Dr. Roy Joseph, M.Tech., Ph.D.
Scientist E & joint in-charge

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

Mr. M. C. Sunny, B.Sc., AIC.
Jr. Scientific Officer

Precision Fabrication Facility

Mr. V. Ramesh Babu, M.Tech
Engineer E & Scientist In Charge

Quality Cell

Mr. D. S. Nagesh, M.Tech
Quality Manager

Dr. P. Ramesh, PhD
Scientist E

Technology Business Division

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

Technical Co-ordination Cell

Mr. D. Ranjit, BE
Scientist F & Scientist In Charge

Technology Proving Facility

Dr. G. S. Bhuvaneshwar, MS, PhD
Head, BMT Wing

Mr. D. S. Nagesh, M. Tech
Engineer F

Tissue Engineering and Regenerative Technologies

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

Thrombosis Research Unit

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

Dr. Anugya Bhatt, MSc, PhD
Scientist C

Toxicology

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

HOSPITAL WING

Dr. S.J. Douglas Linsby, MBBS, MS
Medical Superintendent (01.07.2004 – till date)

Dr. S.K. Jawahar, MBBS, MHA, DipNB (Health Admn)
Administrative Medical Officer

Ms.Vijayamma Harikrishnan, B Sc (N) (Post –Basic), M.A; PGDHHM
Nursing Superintendent

Ms.Sudhamaniamma, MSc(N), PGDHRM
Deputy Nursing Superintendent

Anaesthesiology

Dr. K.Mohandas, MD, FRCA
Professor & Director of the Institute

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

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

Dr. Thomas Koshy, MD
Additional Professor

Dr. Shrinivas V. Gandhinhaljkar, MD
Additional Professor

Dr. Prasant kumar Dash, MD
Additional Professor

Dr. P.K.Neema, MD
Additional Professor

Dr. S.Manikandan, MD
Associate Professor

Dr. P.K.Sinha, MD
Associate Professor

Dr. P.Gayatri, MD, FRCA
Associate Professor

Dr. P.R.Suneel, MD
Associate Professor

Dr. K.P.Unnikrishnan, MD
Associate Professor

Dr.Subrata kumar Singha, M.D
Assistant Professor

Honorary Professor
Dr. Raymond Douglas Latimer, MBBS, FFARCS, MA

Biochemistry

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

Dr.N.Jayakumary Ph.D
Professor

Dr.G.Srinivas Ph.D
Scientific C

Blood Transfusion Services

Dr. Jaisy Mathai, MBBS, DCP
Scientist F and Head

Dr. P.V. Sulochana, MBBS
Scientist G

Dr. S. Sathyabhama, MBBS
Scientist F

Cardiology

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

Dr. Thomas Titus, MD, DM
Professor

Dr. V. K. Ajithkumar, MD, DM
Professor

Dr. S. Sivasankaran, MD, DM, DIP NB
Additional Professor

Dr. K M. Krishnamoorthy, MD, DM
Associate Professor

Dr. S. Harikrishnan, MD, DM
Associate Professor

Dr. Santhoshkumar Dora, MD, DM
Assistant Professor

Dr. Krishnakumar Nair
Assistant Professor

Dr. Narayanan Namboodri
Assistant Professor

Dr Harikrishna MS
Assistant Professor

Dr. Bijulal
Assistant Professor

Cardiovascular & Thoracic Surgery

Dr. K. Jayakumar, MS, MCh
Professor and Head

Dr. R. Sankar Kumar, MS, MCh
Professor

Dr. K.G. Shyam Krishnan MS, MCh
Professor

Dr. M. Unnikrishnan, MS, MCh
Professor

Dr. S.R. Krishna Manohar, MS, MCh
Professor

Dr. Manoranjan Misra, MS, MCh
Assistant Professor

Dr. Baiju S. Dharan, MS, MCh
Assistant Professor

Cellular and Molecular Cardiology

Dr. C.C. Kartha, MD, FNASc, FASc, FAMS, FIACS
Professor Senior Grade & Head

Dr. Renuka Nair, PhD, MNAMS, MNASc
Scientist- G

Dr. K. Shivakumar, PhD
Scientist-F

Computer Division

G. Geetha, MTech (Computer Science)
Scientist 'F'

Mr. Suresh Kumar
Scientist 'B'

Division of Clinical Engineering

K.Vijayakumar. B.Sc; B.Sc(Engg); PGDHHA
Engineer G and Head

Koruthu P Varughese. B. Sc(Engg); PGDEDT; PGDCA; MBA
Engineer G

G.Mohanlal. B.Sc(Engg); MBA
Engineer F

B.Madhusoodanan Pillai. B.Sc(Engg); PGDCA, MBA
Scientist Engineer F

N.Sivanandan
J.E. (Electrical)

Medical Records

Shri. N.G. Thampi BSc, BMRSc, MA
Senior Medical Records officer & Head

Shri P J Varghese
Asst. Medical Records officer

Microbiology

Smt. Molly Antony, MSc, DMV
Scientist F

Dr. Muralidhar K. Katti, M. Sc, PhD, FISCD
Associate Professor

Neurology

Dr. K. Radhakrishnan, MD, DM, FAMS
Professor Senior Grade& Head

Dr. MD. Nair, MD, DM
Professor

Dr. C. Sarada, MD, DM
Additional Professor

Dr. Sanjeev V.Thomas, MD, DM
Additional Professor

Dr. Asha Kishore, MD, DM
Additional Professor

Dr. P.A. Suresh, MD, DM
Additional Professor (On leave)

Dr. Abraham Kuruvilla, MD, DNB, DABN (Cl/N Ph)
Associate Professor

Dr. P.S. Mathuranath, DM
Associate Professor

Dr. Ashalatha R., MD, DM
Assistant Professor

Dr. C. Rathore,M.D ,D.M
Assistant Professor

Neurosurgery

Dr. S. Suresh Nair, MCh Neurosurgery
Professor& Head of the Department

Dr. Ravi Mohan Rao, MS, MCh,
Dip NB Neurosurgery
Associate Professor

Dr. R. Girish Menon, MCh, DipNB Neurosurgery
Associate Professor

Dr. Rajesh B. J., MS, MCh Neurosurgery
Assistant Professor

Dr. Mathew Abraham, MS, FRCS,
MCh Neurosurgery
Assistant Professor

Dr. H.V. Easwer, MCh Neurosurgery
Assistant Professor

Dr. K. Krishna Kumar MS, MCh
Assistant Professor

CV Gopalakrishnan MS, MCh
Assistant Professor

Pathology

Dr. V.V. Radhakrishnan, MD
Professor Senior Grade & Head

Dr. S. Sandhyamani, MD, FAMS
Professor

Dr. Annamma Mathai, PhD
Scientist C

Imaging Science and Interventional Radiology

Dr. A.K.Gupta, MD, PDCC
Professor& Head

Dr. T.R.Kapilamoorthy, DMRD, MD
Additional Professor

Dr. C.Kesavadas, DMRD, MD
Additional Professor

Dr. Bejoy Thomas, MD, DNB
Associate Professor

Dr. Narendra.K.Bodhey, MD, DNB
Associate Professor

Dr. Hima S Pendharkar, MD, DM
Assistant Professor

Dr. R. S. Jayasree
Scientist 'C'

Statement of Accounts 2008-2009

Contents

Balance Sheet As At 31-3- 2009

(Amount Rs.)

	Schedules	Current Year Rs. Ps.	Previous Year Rs. Ps.
CORPUS/CAPITAL FUND AND LIABILITIES			
CAPITAL FUND	1	2526268149.96	2189133852.41
RESERVES & SURPLUS	2	271488083.70	242356298.90
EARMARKED ENDOWMENT FUNDS	3	225164971.53	203416603.99
SECURED LOANS & BORROWINGS	4	0.00	0.00
CURRENT LIABILITIES & PROVISIONS	7	122270153.62	51190540.29
TOTAL		**3145191358.81**	**2686097295.59**
ASSETS			
FIXED ASSETS	8	1005717447.14	884933862.64
INVESTMENTS FROM EARMARKED ENDOWMENT FUNDS	9	387237833.70	348211737.90
CURRENT ASSETS , LOANS, ADVANCES ETC	11	1752236077.97	1452951695.05
MISCELLANEOUS EXPENDITURE (TO THE EXTENT NOT WRITTEN OFF)		0.00	0.00
TOTAL		**3145191358.81**	**2686097295.59**

Sd/-
Financial Adviser

Sd/-
Director
Sree Chitra Tirunal Institute for
Medical Sciences and Technology
Thiruvananthapuram

Income and Expenditure Account for the year ended 31-3- 2009

(Amount Rs.)

	Schedules	Current Year Rs.	Ps.	Previous Year Rs.	Ps.
INCOME					
Income from Sales / Services	12	283240956.00		267685289.50	
Grants Received from Govt of India(Non Plan)	13	229640277.00		226500000.00	
Fees/Subscription	14	3938512.00		3751850.00	
Income from Investments (Income on Invest from earmarked/endow. Funds transferred to Funds)	15	18375843.80		12576432.00	
Income from Royalty, Publication etc	16	1915736.00		3054865.00	
Interest Earned	17	62650044.89		85376264.56	
Other Income	18	10388477.26		7900321.40	
TOTAL		**610149846.95**		**606845022.46**	
EXPENDITURE					
Establishment Expenses	20	438782799.10		279096444.05	
Other Administrative Expenses	21	364599681.66		316775484.00	
Interest	23	86805.40		80763.40	
Depreciation (Net Total at the year-end-corresponding to Schedule 8)		82609782.25		72963231.61	
TOTAL		**886079068.41**		**668915923.06**	
Balance being Excess Expenditure over Income		275929221.46		62070900.60	
Add: Transfer to Special Reserve Account		32974258.80		27036968.00	
BALANCE BEING DEFICIT CARRIED TO CAPITAL FUND		308903480.26		89107868.60	
SIGNIFICANT ACCOUNTING POLICIES	24				
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25				

Sd/-
Financial Adviser

Director
Sree Chitra Tirunal Institute for
Medical Sciences and Technology
Thiruvananthapuram

SCHEDULES TO CAPITAL FUND AND LIABILITIES

Schedules Forming Part of Balance Sheet as at 31-3- 2009

(Amount Rs.)

		Current Year Rs. Ps.	Previous Year Rs. Ps.
SCHEDULE 1 - CORPUS/CAPITAL FUND:			
Balance as at the beginning of the year	3029403167.02		
Less Depreciation up to the end of the previous year	843328524.80		
Net balance at the beginning of the year		2186074642.22	1629668576.01
Add: Plan Grants received from Government of India Rs 723000000.00			
Less Expr on poor patient's treatment - Rs 112128701.00			
(Total 16.8 2cr less Rs 5.61 cr from WCP =Rs 11.21 cr)	610871299.00		
Add: Grants received from Others for Capital Assets(WCP)	38918424.00		
Add:Women Component Plan(WCP)-Grant received- Rs 95000000.00			
Less Expr on poor women patient's treatment- Rs 56081576.00			
Less Other Revenue Expr on WCP Rs 00.00			
Less Utilised on Capital assets Rs 38918424.00	0.00		
	649789723.00		
Add:Contribution towards Corpus/Capital Fund		649789723.00	649500000.00
Deduct: Balance of net expenditure transferred from the Income and Expenditure Account		308903480.26	89107868.60
		2526960884.96	2190060707.41
Less:Value of Assets Written off during the year		692735.00	926855.00
DeductTransfer to BMT/Add Transfer from CHO			
BALANCE AS AT THE YEAR-END		**2526268149.96**	**2189133852.41**
SCHEDULE 2-RESERVES AND SURPLUS:			
1. Capital Reserve:			
As per last Account			
Addition during the year			
Less:Deduction during the year			
2. Revaluation Reserve:			
As per last Account			
Addition during the year			
Less: Deductions during the year			
3. Special Reserves:			
As per last Account		242356298.90	216048087.90
Addition during the year (Current year transfer+Decrease in provision)		29131784.80	26308211.00
Less: Deductions during the year		0.00	0.00
4. General Reserve:			
As per last Account			
Addition during the year			
Less: Deductions during the year			
TOTAL		**271488083.70**	**242356298.90**

Schedules Forming Part of Balance Sheet as at 31-3- 2009

Code	Name of Guarantee	Fund-wise Break Up			Total
		Opening Balance	Additions To Fund		
			Grants	Other Receipts	
SCHEDULE 3 - EARMARKED / ENDOWMENT FUNDS (CHO)					
5000	PROJ-MISCELLANEOUS	673778.00	1347276.00	0.00	2021054.00
5008	DR.C.KARTHA	-93649.00	97000.00	0.00	3351.00
5018	CSIR PROJECT-DR. P.S. APPUKUTTAN	13450.79	0.00	0.00	13450.79
5027	DST GOVT. OF KERALA-DR. P.S. APPUKUTTAN	26335.53	0.00	0.00	26335.53
5028	DST GOVT. OF KERALA-DR.K RADHAKRISHNAN	11438.00	0.00	0.00	11438.00
5029	DST GOVT. OF KERALA- DR.J.SHANMUGHAM	7113.00	0.00	0.00	7113.00
5031	PHYSIO-ANTHROPOMATIC STUDY-DR.GUPTA	3871.77	0.00	0.00	3871.77
5033	MPH PROGRAMME	101480.00	0.00	0.00	101480.00
5034	INDIAN EPILEPSY ASSN.DR.K. RADHAKRISHNAN	3558.00	0.00	0.00	3558.00
5036	PROJ/DST KERALA/DR.MURALEEDHARAN	4495.00	0.00	0.00	4495.00
5040	PROJ. DR.ASHA VIJAYARAGHAVAN	3495684.70	0.00	0.00	3495684.70
5047	IMPROVEMENT OF VOLUNTARY BLOOD DONAR	16094.90	0.00	0.00	16094.90
5054	ANTIVIRAL AND ANTIFUNGAL STUDIES ON	1418.30	0.00	0.00	1418.30
5055	GRANT/ROCKFELLER FOUNDATION,USA	686120.00	0.00	0.00	686120.00
5065	M.D.PHARMA(DR. ASHA)	398586.50	0.00	0.00	398586.50
5070	PROJ.INDIAN EPILEPSY ASSTN.JAYACHANDRAN	485.30	0.00	0.00	485.30
5077	INDIAN EPILEPSY ASSOCIATION	18111.90	0.00	0.00	18111.90
5078	PROJECT GRANT/DR MALA RAMANATHAN	5810.00	0.00	0.00	5810.00
5080	GRANT/WHO/DR VARATHARAJAN/AMC/PROJECT	11471.30	0.00	0.00	11471.30
5082	T V HEMALATHA/HEALTHAWARENESS PROGRAM	137709.00	0.00	0.00	137709.00
5083	PROJECT/DEPT OF NEUROLOGY	1683.00	0.00	0.00	1683.00
5088	DOUBLE BLIND PLACEBO CONT. PARALLEL	63023.00	0.00	0.00	63023.00
5089	DR.A.K.GUPTA	0.00	300000.00	0.00	300000.00
5091	EURO REG. OF EPILEPSY & PREGNANCY	103087.00	0.00	0.00	103087.00
5092	TIDES FOUNDATION,DR.MALA	115282.00	0.00	0.00	115282.00
5094	KERALA STATE AIDS CONTROL SOCIETY	330010.00	1375434.00	7428.00	1712872.00
5098	RISK FACTORS FOR EPILEPSY-DR.RADHAKRISHNAN	7193.00	0.00	0.00	7193.00
5099	EFFECT OF BLOOD DONATION	1711.00	0.00	0.00	1711.00
5100	AMC/MAC ARTHUR FOUNDATION/02-70546	956153.05	0.00	0.00	956153.05

Capital Expenditure			Utilisation R evenue Expenditure					
Fixed Assets	Others	Total	Salaries Wages	Rent / Consumables	Other Adm Exp	Total	Total expenditure	Net Balance
0.00	0.00	0.00	757487.00	106315.00	142398.00	1006200.00	1006200.00	1014854.00
0.00	0.00	0.00	0.00	0.00	3351.00	3351.00	3351.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13450.79
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26335.53
0.00	0.00	0.00	0.00	0.00	8437.00	8437.00	8437.00	3001.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7113.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3871.77
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	101480.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3558.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4495.00
0.00	59065.00	59065.00	87000.00	0.00	1219501.00	1306501.00	1365566.00	2130118.70
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16094.90
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1418.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	686120.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	398586.50
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	485.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18111.90
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	0.00	11471.30
0.00	0.00	0.00	0.00	0.00	10172.00	10172.00	10172.00	127537.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1683.00
0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	63023.00
0.00	0.00	0.00	0.00	0	300000.00	300000.00	300000.00	0.00
0.00		0.00	0.00	0.00	0.00	0.00	0.00	103087.00
0.00	0.00	0.00	0.00	0.00	115282.00	115282.00	115282.00	0.00
0.00	0.00	0.00	144152.00	675380.00	8391.00	827923.00	827923.00	884949.00
0.00	0.00	0.00	0.00	0.00	2631.00	2631.00	2631.00	4562.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1711.00
0.00	0.00	0.00	16371.00	0.00	893467.00	909838.00	909838.00	46315.05

Schedules Forming Part of Balance Sheet as at 31-3- 2009

Code	Name of Guarantee	Fund-wise Break Up			Total
		Opening Balance	Additions To Fund		
			Grants	Other Receipts	
5103	CLINICAL TRIAL/QUINTAILSPEC/DR.RADHAKRISHNAN	226587.00	0.00	0.00	226587.00
5104	ANTIVIRAL PRINCIPLES/MOLLY ANTONY	13599.00	0.00	0.00	13599.00
5108	EVAL.SUB-TYPES DEMENTIA/DR.MATHURA	15800.50	0.00	0.00	15800.50
5110	TOBACCO CESSATION & RESEARCH / DR.THANKAP	597238.40	2797973.00	3200.00	3398411.40
5111	DIFFUSION WEIGHTED IMAGING/DR.GUPT	-21226.00	0.00	0.00	-21226.00
5112	WHO FELLOWSHIP	281642.00	0.00	0.00	281642.00
5113	STUDIES ON ANTI-VIRAL/MOLLY ANTONY	448.00	0.00	0.00	448.00
5114	IND.PARTICP. IN PUBLIC HEALTH/WORLD	51.00	0.00	0.00	51.00
5119	STAKE HOLDER-PERCEPT/INST.REV BO	211899.73	0.00	0.00	211899.73
5121	REG.OF.PREG IN WOMEN -EPILEPSY	91158.00	0.00	0.00	91158.00
5124	PRO-INFLAMMATORY CYTOKINE/DR. K. SHIVAKUMAR	74618.50	0.00	0.00	74618.50
5125	PIOLOT STUDY/HEMOGRAFT HARVEST	28468.00	0.00	0.00	28468.00
5126	A MULTI NATIONAL, MULTI-CENTER/SIRO	114215.00	1862.00	0.00	116077.00
5127	CARDOGUARD TABLET/DST/DR.RENUKA NAIR	244304.00	0.00	0.00	244304.00
5128	INDENT. OF MACOBACTERIAL/DST/V.V.RADHAKRISHN	224814.00	0.00	0.00	224814.00
5129	STRENGHTENING OF PANCHAYAT RAJ	-13724.75	0.00	13724.75	0.00
5130	TELE-HEALTH & MEDICAL EDUCATION/JAWAHAR	645320.00	470000.00	0.00	1115320.00
5131	OXIDATIVE STRESS IN WOMEN/DR. SANJEEV THOMAS	126562.00		0.00	126562.00
5132	STUDIES ON MATRIX METALLOPROTEINASE	-111891.00	473000.00	0.00	361109.00
5133	COMMUNITY BASED INTERVENTION/WHO	415059.00	0.00	0.00	415059.00
5134	PILOT STUDY/DR.K. RADHAKRISHNAN	5000.00	0.00	0.00	5000.00
5135	A 16-WEEK,DOUBLE BLIND/ASHA KISHORE	1977479.00	0.00	0.00	1977479.00
5136	A16 WEEKDOUBLE BLIND STUDY	713.00	0.00	0.00	713.00
5137	MECHANISM OF ANTICANCER/DAE, BRS	34177.00	0.00	0.00	34177.00
5138	PREVENTION ON NCD'S: TUNING/WHO	98.00	0.00	0.00	98.00
5139	A 24 WEEK, MULTICENTER/DR. MATHURANATH	698983.28	1599980.00	0.00	2298963.28
5140	HARVARD SCHOOL OF PUBLIC HEALTH	109091.00	0.00	57320.26	166411.26
5141	THE TRIVANDRUM STROKE REGISTRY/WHO SEARO	5481.00	0.00	0.00	5481.00
5142	BANKING FOR BETTER HEALTH-MEDISAVE	240383.36	0.00	0.00	240383.36
5143	MODULATION OF HIGH GLUCOSE/STE/KARTHA	26430.00	124402.00	0.00	150832.00
5144	WHO-SEARO/DEV&FIELD TEST/GME	130795.50	0.00	0.00	130795.50
5145	ADULT HUMAN RESIDENT/	37422.00	0.00	80918.00	118340.00
5146	DEVELOPMENT OF SPECT	145606.00	0.00	0.00	145606.00

Capital Expenditure			Utilisation R evenue Expenditure					
Fixed Assets	Others	Total	Salaries Wages	Rent / Consumables	Other Adm Exp	Total	Total expenditure	Net Balance
0.00	0.00	0.00	31919.00	0.00	0.00	31919.00	31919.00	194668.00
0.00	0.00	0.00	0.00	0.00	4721.00	4721.00	4721.00	8878.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15800.50
0.00	0.00	0.00	1038963.00	0.00	1416421.75	2455384.75	2455384.75	943026.65
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-21226.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	281642.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	448.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00
0.00	0.00	0.00	0.00	0.00	9184.00	9184.00	9184.00	202715.73
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91158.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	74618.50
0.00	0.00	0.00	0.00	0.00	4630.00	4630.00	4630.00	23838.00
0.00	0.00	0.00	0.00	0.00	2480.00	2480.00	2480.00	113597.00
0.00	0.00	0.00	3742.00	92369.00	140684.00	236795.00	236795.00	7509.00
0.00	0.00	0.00	0.00	14913.00	13736.00	28649.00	28649.00	196165.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	49467.00	49467.00	72500.00	0.00	18571.00	91071.00	140538.00	974782.00
13484.00	0.00	13484.00	10000.00	0.00	103078.00	113078.00	126562.00	0.00
0.00	47783.00	47783.00	98802.00	80610.00	6935.00	186347.00	234130.00	126979.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	415059.00
0.00	0.00	0.00	5000.00	0.00	0.00	5000.00	5000.00	0.00
0.00	0.00	0.00	0.00	0.00	18502.00	18502.00	18502.00	1958977.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	713.00
0.00	0.00	0.00	10000.00	21416.00	0.00	31416.00	31416.00	2761.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98.00
0.00	377024.00	377024.00	237685.00	0.00	64742.00	302427.00	679451.00	1619512.28
0.00	0.00	0.00	0.00	0.00	69831.00	69831.00	69831.00	96580.26
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5481.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	240383.36
0.00	0.00	0.00	0.00	149886.00	463.00	150349.00	150349.00	483.00
0.00	0.00	0.00	0.00	0.00	5913.00	5913.00	5913.00	124882.50
0.00	0.00	0.00	86290.00	12479.00	2230.00	100999.00	100999.00	17341.00
0.00	0.00	0.00	0.00	0.00	6935.00	6935.00	6935.00	138671.00

Schedules Forming Part of Balance Sheet as at 31-3- 2009

Code	Name of Guarantee	Fund-wise Break Up			Total
		Opening Balance	Additions To Fund		
			Grants	Other Receipts	
5147	FATHERHOOD INITIATIVES	39137.00	0.00	0.00	39137.00
5148	HIV/AIDS/DR.D.VARATHARAJAN	13627.00	0.00	0.00	13627.00
5149	REDUCING DEATH RATE	1539.00	0.00	0.00	1539.00
5150	PROTOCOL 6002-INT 001	1069314.60	111480.00	1800.00	1182594.60
5151	DOSE RANGING STUDY:CGHR	137840.00	0.00	0.00	137840.00
5153	DEV REF. MANUAL FOR	763664.00	0.00	0.00	763664.00
5155	COMM BASED DETECTION	367464.00	0.00	0.00	367464.00
5156	TSUNAMI PROJECT	1936814.50	188337.00	0.00	2125151.50
5158	DETERMINATION OF GENETIC CO(DR.RENUKA NAIR)	-74498.00	358154.00	0.00	283656.00
5159	NCD RISK FACTOR	189185.00	200000.00	0.00	389185.00
5160	BRAIN MAPING & BASIC NEUROGENETIC/ DR.P.S MATHURANATH	970219.00	0.00	0.00	970219.00
5161	DOSE RANGING STUDY:CGHR	2296909.00	319212.00	34188.00	2650309.00
5162	MAINTAINING EVENT REGISTRY	7638.00	0.00	0.00	7638.00
5163	DR.JAYAKUMAR	0.00	0.00	0.00	0.00
5164	FCTC PROVISION/DR. K.R. THANKAPPAN	-5976.25	22715.00	0.00	16738.75
5165	HEALTH SECTOR REFORM	3525.00	0.00	0.00	3525.00
5166	PHARMACOGENETIC STUDY/DR.SANJEEV	-15870.00	0.00	0.00	-15870.00
5167	PROJ/SURVIVAL MECHANISM	137157.00	1330700.00	0.00	1467857.00
5168	PROJ/VERMEER STUDY	1180397.00	412834.00	0.00	1593231.00
5169	SAFETY OF MELPERONE	321849.00	37315.00	0.00	359164.00
5170	DR.ASHA KISHORE	1053008.00	2310473.00	0.00	3363481.00
5171	DOSE CONFIRMATION GLIOBLASTOMA…	-35.00	0.00	0.00	-35.00
5172	C.KESAVADAS	114004.00	104950.00	0.00	218954.00
5173	DR.DINESH NAYAK	85246.00	459059.00	0.00	544305.00
5174	CHANGES IN SLEEP WAKEFULNESS-Dr.Mohanku.	276833.00	0.00	0.00	276833.00
5175	SURGICAL TRAIL IN LOBAR INTRACEREBRAL	23367.24	58926.03	0.00	82293.27
5176	WOMENT COMPONANT PLAN	3173529.00	0.00	0.00	3173529.00
5177	DR.KRISHNAMANOHAR	33015.00	80024.00	0.00	113039.00
5180	DR.KANNAN SRINIVASAN	-7506.00	734956.00	0.00	727450.00
5181	DR.ASHA KISHORE	0.00	209300.00	0.00	209300.00
5182	DR.SANJEEV.V.THOMAS	3372701.00	0.00	69818.00	3442519.00
5183	DR.K.R.THANKAPPAN	5365142.00	7280039.00	0.00	12645181.00

Utilisation								
Capital Expenditure			R evenue Expenditure					
Fixed Assets	Others	Total	Salaries Wages	Rent / Consumables	Other Adm Exp	Total	Total expenditure	Net Balance
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39137.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13627.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1539.00
0.00	25500.00	25500.00	0.00	0.00	160143.00	160143.00	185643.00	996951.60
0.00	0.00	0.00	0.00	0.00	169.00	169.00	169.00	137671.00
0.00	0.00	0.00	0.00	91393.00	8219.00	99612.00	99612.00	664052.00
0.00	0.00	0.00	0.00	0.00	13081.00	13081.00	13081.00	354383.00
0.00	13643.00	13643.00	264051.00	27268.00	442826.00	734145.00	747788.00	1377363.50
0.00	0.00	0.00	0.00	87415.00	737.00	88152.00	88152.00	195504.00
0.00	0.00	0.00	159195.00	0.00	84197.00	243392.00	243392.00	145793.00
0.00	832164.00	832164.00	0.00	122890.00	9509.00	132399.00	964563.00	5656.00
0.00	0.00	0.00	158008.00	0.00	153110.00	311118.00	311118.00	2339191.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7638.00
0.00	0.00	0.00	0.00	0.00	3752.00	3752.00	3752.00	-3752.00
0.00	0.00	0.00	0.00	0.00	8600.00	8600.00	8600.00	8138.75
0.00	0.00	0.00	0.00	0.00	44.00	44.00	44.00	3481.00
0.00	0.00	0.00	106012.00	0.00	8945.00	114957.00	114957.00	-130827.00
0.00	0.00	0.00	180000.00	367393.00	193088.00	740481.00	740481.00	727376.00
0.00	0.00	0.00	24758.00	0.00	95384.00	120142.00	120142.00	1473089.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	359164.00
0.00	0.00	0.00	93994.00	0.00	524021.00	618015.00	618015.00	2745466.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-35.00
0.00	0.00	0.00	51733.00	0.00	46035.00	97768.00	97768.00	121186.00
0.00	14332.00	14332.00	178764.00	0.00	21327.00	200091.00	214423.00	329882.00
0.00	0.00	0.00	86002.00	0.00	82066.00	168068.00	168068.00	108765.00
0.00	0.00	0.00	0.00	0.00	43168.00	43168.00	43168.00	39125.27
0.00	0.00	0.00	0.00	0.00	1395121.75	1395121.75	1395121.75	1778407.25
0.00	0.00	0.00	72000.00	0.00	5141.00	77141.00	77141.00	35898.00
0.00	0.00	0.00	357750.00	0.00	251384.00	609134.00	609134.00	118316.00
0.00	0.00	0.00		0.00	209300.00	209300.00	209300.00	0.00
0.00		0.00	337565.00	0.00	173431.00	510996.00	510996.00	2931523.00
0.00	379500.00	379500.00	1715779.00	0.00	3620816.00	5336595.00	5716095.00	6929086.00

Schedules Forming Part of Balance Sheet as at 31-3- 2009

Code	Name of Guarantee	Fund-wise Break Up			Total
		Opening Balance	Additions To Fund		
			Grants	Other Receipts	
5184	DR.JAWAHAR	1000000.00	0.00	0.00	1000000.00
5185	A MULTICENTRE DOUBLE BLIND..DR.ASHA KISHORE	0.00	146451.00	0.00	146451.00
5186	DR.MALARAMANATHAN	0.00	218322.00	0.00	218322.00
5187	DR.SANJEEV.V.THOMAS	0.00	266903.00	0.00	266903.00
5188	DR.K.RADHAKRISHNAN	0.00	701125.00	0.00	701125.00
5189	DR.HARIKRISHNAN	0.00	755500.00	0.00	755500.00
5190	DR.MALARAMANATHAN	0.00	115282.00	0.00	115282.00
5191	DR.ASHA KISHORE	0.00	1196200.00	0.00	1196200.00
5192	DR.K.R.THANKAPPAN	0.00	886797.00	0.00	886797.00
5193	DR.MALARAMANATHAN	0.00	500000.00	0.00	500000.00
5194	DR.K.R.THANKAPPAN	0.00	3785285.00	0.00	3785285.00
5195	DR.ASHA KISHORE	0.00	10000.00	0.00	10000.00
5196	DR.SHIVKUMAR	0.00	1227000.00	0.00	1227000.00
6054	PROJ/DR RADHAKRISHNAN NEUROLOGY	145667.50	0.00	0.00	145667.50
6055	MOVEMENT/DR. ASHA KISHORE	0.00	0.00	0.00	0.00
6057	PUBLISHING JOURNAL ARTICLE/DR. THANKAPPAN	715802.00	0.00	0.00	715802.00
6058	ATHIYANOOR SCT ACTION/DR.K.R.T	21006.00	0.00	0.00	21006.00
6060	SILVERLINE PUBLICATION/DR.RADHAKRISHNAN	-65114.00	0.00	3000.00	-62114.00
6064	SPEECH THERAPY	0.00	0.00	0.00	0.00
6065	COMPREHENSIVE CENTRE FOR SLEEP DIS ORD.	0.00	31955.00	0.00	31955.00
7101	ADVANCES TO PI	-59223.00	0.00	1960360.00	1901137.00
7102	AMT.PAYABLE TO PROJECT STAFF	8717.00	0.00	43966.00	52683.00
2721	ADVANCE FOR SUPPLIES PROJECT	-64387.00	0.00	25419501.00	25355114.00
1014	NEW PENSON SCHEME	8344821.00	0.00	8920976.00	17265797.00
1075	PATIENT WELFARE FUND	1065175.00	0.00	669898.00	1735073.00
1076	PWF EXPENSES	66775.35	0.00	850.00	67625.35
1080	STAFF BENEVOLENT FUND	2008008.25		3253497.00	5261505.25
1301	EMPLOYEES PENSION FUND	99430316.65		95416048.00	194846364.65
	TOTAL	**149124910.40**	**32646221.03**	**135956493.01**	**317727624.44**

Utilisation								
Capital Expenditure			R evenue Expenditure					
Fixed Assets	Others	Total	Salaries Wages	Rent / Consumables	Other Adm Exp	Total	Total expenditure	Net Balance
0.00	0.00	0.00	0.00	0.00	45464.00	45464.00	45464.00	954536.00
0.00	0.00	0.00	0.00	0.00	5244.00	5244.00	5244.00	141207.00
0.00	0.00	0.00	0.00	0.00	218322.00	218322.00	218322.00	0.00
0.00	0.00	0.00	59161.00	0.00	3810.00	62971.00	62971.00	203932.00
0.00	0.00	0.00	13286.00	0.00	479368.00	492654.00	492654.00	208471.00
0.00	44075.00	44075.00	275571.00	0.00	167907.00	443478.00	487553.00	267947.00
0.00	0.00	0.00	0.00	0.00	19310.00	19310.00	19310.00	95972.00
0.00	0.00	0.00	107284.00	77859.00	0.00	185143.00	185143.00	1011057.00
0.00	326564.00	326564.00	0.00	0.00	159991.00	159991.00	486555.00	400242.00
0.00	33100.00	33100.00	62333.00	0.00	143265.00	205598.00	238698.00	261302.00
0.00	0.00	0.00	24925.00	0.00	90146.00	115071.00	115071.00	3670214.00
0.00	0.00	0.00	0.00	0.00	68.00	68.00	68.00	9932.00
0.00	0.00	0.00	8129.00	0.00	0.00	8129.00	8129.00	1218871.00
0.00	0.00	0.00	32000.00	0.00	0.00	32000.00	32000.00	113667.50
0.00	0.00	0.00	169139.00	0.00	0.00	169139.00	169139.00	-169139.00
0.00	0.00	0.00	211379.00	0.00	10093.00	221472.00	221472.00	494330.00
0.00	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	0.00	-62114.00
0.00	0.00	0.00	174300.00	0.00	0.00	174300.00	174300.00	-174300.00
0.00	0.00	0.00	455846.00	0.00	110.00	455956.00	455956.00	-424001.00
0.00	0.00	0.00	0.00	0.00	1986434.00	1986434.00	1986434.00	-85297.00
0.00	0.00	0.00	0.00	0.00	44001.00	44001.00	44001.00	8682.00
0.00	25419501.00	25419501.00	0.00	0.00	0.00	0.00	25419501.00	-64387.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17265797.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1735073.00
0.00	0.00	0.00	0.00	0.00	66076.00	66076.00	66076.00	1549.35
0.00	0.00	0.00	0.00	0.00	3072152.00	3072152.00	3072152.00	2189353.25
0.00	0.00	0.00	0.00	0.00	119665915.00	119665915.00	119665915.00	75180449.65
13484.00	**27621718.00**	**27635202.00**	**7978875.00**	**1927586.00**	**138323977.50**	**148230438.50**	**175865640.50**	**141861983.94**

Schedules Forming Part of Balance Sheet as at 31-3- 2009

Code	Name of Guarantee	Fund-wise Break Up			Total
		Opening Balance	Additions To Fund		
			Grants	Other Receipts	
SCHEDULE 3 - EARMARKED / ENDOWMENT FUNDS (BMT)					
5000	PROJECT SUSPENSE	794364.00	397632.00	-	1191996.00
5057	DYNAMIC ORTHOPAEDIC PVT LTD, HYDROXY	63412.55	0.00	0.00	63412.55
5089	DETEC & TREAT OF CANCER BY LASER	3959.00	0.00		3959.00
7000	MISCELLENEOUS PROJECT	30944.09	0.00		30944.09
7001	PRO;SAHAJANAND VASCU;DR.AURTHUR	2915047.75	1980001.00		4895048.75
7002	Dr.TOMS LABORATORY, Dr. K.KRISHNAN	-2103.00	72250.00		70147.00
7003	PROJ:D.S.T. DR.P.V. MOHANAN	2537.40	0.00		2537.40
7004	PROJ:ATMRF:DR LISSY KRISHNAN	551.25	0.00		551.25
7005	PROJECT:DYNAMIC ORTHOPAEDICS	13656.00	0.00		13656.00
7006	PROJ: D.S.T. D.S.NAGESH	391217.00	0.00		391217.00
7008	NMITLI, PROJECT C.S.I.R	244304.90	700000.00		944304.90
7009	CHITOSAN BASED WAINED DRESSING	26259.75	0.00		26259.75
7011	DST-FAB: CLINICALLY/SIG:SHAPE OF HEVA	109864.00	194000.00		303864.00
7014	AUROLAB,ARAVIND EYE HOSPITAL	13674.00	0.00		13674.00
7015	TTK.HEALTHCARE.DEVELOPMENT OF VALV	47988.00	0.00		47988.00
7016	INDO-GERMAN COMMITTEE MEETING-DST	106484.00	0.00		106484.00
7017	HINDUSTAN LATEX.EVALU:BLOOD BAG	577746.50	0.00		577746.50
7018	ALL INDIA COUNCIL FOR TECHNI:EDU:SH	48220.00	0.00	131366.00	179586.00
7019	DST.NIRANJAN	69847.00	0.00		69847.00
7020	IFCPAR-DR.JAYAKRISHNAN	188.00	0.00	0.00	188.00
7022	DST-LBFDPSBC-DR.SHARMA	79453.00	0.00		79453.00
7023	DEV: HYDRO-CEPHALUS-HINDUSTAN LATEX	45510.00	0.00		45510.00
7026	DEV.HEART VALVE-DST.MURALEE	22976.00	0.00	811.00	23787.00
7027	STED-DR T V KUMARY-INVITRO	5089.00	0.00		5089.00
7029	DONERG/LIFE SCIENCE BOARD	6876.00	0.00	0.00	6876.00
7030	DST/DR MEERA/QUANTITATIVE	41803.00	0.00	0.00	41803.00
7031	DBT/DR P V MOHAN/DEV INVITROPYRO	80564.00	0.00		80564.00
7032	DST. DR. ANNINE/BONE REGENERATION	29166.00	0.00	0.00	29166.00
7033	BIOFUNCTIONAL EVALUATION DR. UMASANKER	76835.00	0.00		76835.00
7034	DST. DR. NIRMALA RACHEL	14664.00	0.00		14664.00
7035	DST-H.K.VARMA	95433.00	0.00		95433.00

Utilisation								
Capital Expenditure			Revenue Expenditure					
Fixed Assets	Others	Total	Salaries Wages	Rent / Consumables	Other Adm Exp	Total	Total expenditure	Net Balance
-	-	0.00	588897.00		-	588897.00	588897.00	603099.00
		0.00	0.00		27384.00	27384.00	27384.00	36028.55
		0.00	0.00		0.00	0.00	0.00	3959.00
		0.00			0.00	0.00	0.00	30944.09
		0.00	170055.00		870736.00	1040791.00	1040791.00	3854257.75
		0.00	9200.00		37796.00	46996.00	46996.00	23151.00
		0.00				0.00	0.00	2537.40
		0.00			0.00	0.00	0.00	551.25
		0.00			0.00	0.00	0.00	13656.00
		0.00			30305.00	30305.00	30305.00	360912.00
0.00		0.00	32273.00		501566.00	533839.00	533839.00	410465.90
		0.00			5321.00	5321.00	5321.00	20938.75
		0.00			116367.00	116367.00	116367.00	187497.00
		0.00				0.00	0.00	13674.00
		0.00			0.00	0.00	0.00	47988.00
		0.00			100000.00	100000.00	100000.00	6484.00
		0.00	0.00		33512.00	33512.00	33512.00	544234.50
		0.00			17283.00	17283.00	17283.00	162303.00
		0.00			0.00	0.00	0.00	69847.00
		0.00	0.00	0	0.00	0.00	0.00	188.00
		0.00	0.00	0	68.00	68.00	68.00	79385.00
		0.00			0.00	0.00	0.00	45510.00
0.00		0.00	0.00		22976.00	22976.00	22976.00	811.00
		0.00			0.00	0.00	0.00	5089.00
		0.00	0.00		0.00	0.00	0.00	6876.00
		0.00	0.00		41803.00	41803.00	41803.00	0.00
		0.00	0.00		0.00	0.00	0.00	80564.00
		0.00	0.00	0	0.00	0.00	0.00	29166.00
		0.00			4254.00	4254.00	4254.00	72581.00
0.00		0.00	0.00		0.00	0.00	0.00	14664.00
		0.00				0.00	0.00	95433.00

Schedules Forming Part of Balance Sheet as at 31-3- 2009

Code	Name of Guarantee	Fund-wise Break Up			Total
		Opening Balance	Additions To Fund		
			Grants	Other Receipts	
7036	INVITRO HEMO CAMPABILITY/ DR. LISSY	374372.00	0.00		374372.00
7037	INVIVO EVALUATION/ STED/DR. LISSY	6205.00	0.00		6205.00
7039	JNC/ASR/DR. MOHANAN/STUDY OF ACCUTE.....	44684.00	0.00		44684.00
7040	BIOMED/ C.V. MURALEEDHARAN	44000.00	0.00		44000.00
7041	CSIR-GRANT-ASHA S MATHEW,PHD STUDENT	10000.00	446300.00		456300.00
7042	CSIR-GRANT-BERNADETTE K. MADATHIL,PHD	25870.00	0.00		25870.00
7043	CSIR-GRANT-SAILAJA.G.S.SRF	9067.00	0.00		9067.00
7044	LISI NO TRIAL TRIAL MERIND	26842.65	0.00		26842.65
7045	NIRMALA RACHEL, CSIR	25813.00	0.00		25813.00
7046	C.S.I.R. GRANT, MS. SUNITHA	23816.00	0.00		23816.00
7047	U.G.C. GRANT- RESEARCH FELLOW	152454.00	200000.00		352454.00
7048	CSIR GRANT- JOSENA JOSEPH	13974.00	60293.00		74267.00
7049	CSIR GRANT - MARY VARGHESE	67007.00	0.00		67007.00
7051	CSIR GRANT - MANITHA B NAIR	19803.00	213200.00		233003.00
7052	DBT/DR.PRABHA/DEV. OF TEMP - RES - CO-OPLY	264407.75	0.00		264407.75
7053	DR.SREENIVASAN/DEVEL.OF TEMP.RES.CO-OPLY	246827.00	0.00		246827.00
7054	DST-DR.ANOOP-DIFF:EXPR:RAT BRAIN.....	683544.00	0.00		683544.00
7055	CSIR-NMITLI SCHEME-C.V.MURALEEDHARAN	4962076.00	7348000.00		12310076.00
7056	D.S.T.ROYJOSEPH, BONE GRAFT SUB:SPINAL	146471.00	0.00		146471.00
7057	DST - PROJECT.DR.JAYABALAN	338250.00	0.00		338250.00
7059	DBT-DR. PRABHA D NAIR, ISLET IMMUN.....	540224.00	1575000.00		2115224.00
7060	ICMR PROJECT/ SUDHAKAR MUTHALEE	44058.00	707288.00		751346.00
7061	DR. UMASANKAR/PRELIMI:EVALU:BIODEGRADABLE	708178.00	0.00		708178.00
7062	DR. LIZY-SAHAJA:EVA "STENT"INVITRO.....	-43694.00	333045.00		289351.00
7063	DR.P.V.MOHAN, SHAJANAD	153772.00	136654.00		290426.00
7065	DR.T.V.KUMARI, DBT.BIOGENE	184361.00	0.00		184361.00
7066	DR.B.S.GEETHA.PDF,STED	15321.00	0.00		15321.00
7067	DBT.DR.JAYABALAN,DEV:&STUDIES.....	319170.00	430000.00		749170.00
7068	STED.DR.JAYAKRISHNAN.SYNTHESIS.....	111366.00	0.00		111366.00
7069	VSSC - PROJECT. D.S. NAGESH	978257.00	330600.00		1308857.00
7070	CHO PROJECT - 5146 JAYASREE	8128.00	0.00		8128.00
7071	STEC-PROJECT: DR.MAYA NANDKUMAR	44811.00	21123.00		65934.00

Utilisation								
Capital Expenditure			Revenue Expenditure					
Fixed Assets	Others	Total	Salaries Wages	Rent / Consumables	Other Adm Exp	Total	Total expenditure	Net Balance
		0.00	.		36948.00	36948.00	36948.00	337424.00
0.00		0.00				0.00	0.00	6205.00
		0.00	0.00		0.00	0.00	0.00	44684.00
		0.00				0.00	0.00	44000.00
		0.00	257145.00	19356	0.00	276501.00	276501.00	179799.00
		0.00	0.00		0.00	0.00	0.00	25870.00
		0.00	0.00	0	0.00	0.00	0.00	9067.00
		0.00	0.00	0	6231.00	6231.00	6231.00	20611.65
		0.00	0.00	0	11750.00	11750.00	11750.00	14063.00
		0.00	0.00	0	23816.00	23816.00	23816.00	0.00
		0.00	272200.00	0	0.00	272200.00	272200.00	80254.00
		0.00	43632.00	0	2921.00	46553.00	46553.00	27714.00
		0.00	21000.00	0	15151.00	36151.00	36151.00	30856.00
		0.00	193200.00	0	30328.00	223528.00	223528.00	9475.00
		0.00	0.00		493418.00	493418.00	493418.00	-229010.25
		0.00	0.00		24071.00	24071.00	24071.00	222756.00
		0.00	0.00		639110.00	639110.00	639110.00	44434.00
0.00		0.00	286204.00		1678226.00	1964430.00	1964430.00	10345646.00
		0.00	10925.00		25499.00	36424.00	36424.00	110047.00
		0.00	131339.00		190840.00	322179.00	322179.00	16071.00
50000.00		50000.00	86300.00		1869692.00	1955992.00	2005992.00	109232.00
		0.00	609986.00		9560.00	619546.00	619546.00	131800.00
		0.00	0.00		0.00	0.00	0.00	708178.00
		0.00	111642.00		15592.00	127234.00	127234.00	162117.00
		0.00	72600.00		3130.00	75730.00	75730.00	214696.00
		0.00	146225.00		459616.00	605841.00	605841.00	-421480.00
		0.00	0.00		0.00	0.00	0.00	15321.00
		0.00	87697.00		688932.00	776629.00	776629.00	-27459.00
		0.00	45000.00		72396.00	117396.00	117396.00	-6030.00
		0.00	160328.00		789056.00	949384.00	949384.00	359473.00
		0.00	0.00		9000.00	9000.00	9000.00	-872.00
		0.00	0.00		139888.00	139888.00	139888.00	-73954.00

Schedules Forming Part of Balance Sheet as at 31-3- 2009

Code	Name of Guarantee	Fund-wise Break Up			Total
		Opening Balance	Additions To Fund		
			Grants	Other Receipts	
7072	SAHAJANAND MED.TECH. C.V.MURALIDHARAN	76292.00	0.00		76292.00
7073	STUDY PROJECT:DR.P.V.MOHANAN	101153.00	100000.00		201153.00
7074	STUDY PROJECT: CLRI- DR.MOHAN	289303.00	0.00		289303.00
7075	STUDY PROJECT - BIOSYNC SCI	11935.00	0.00		11935.00
7076	ARROW INTERNATIONAL : DR.UMASHANKAR	399773.00	0.00		399773.00
7077	UMHOU SENEMBYU:DR.UMASHANKAR	625414.00	0.00		625414.00
7078	DR.BOBBY.T.EDWIN-STEC PROJECT	99016.00	211300.00		310316.00
7079	DBT- DR.SREENIVASAN	200687.00	523000.00		723687.00
7080	DBT-DR.MAYA- TISSUE ENGINEERING HYBRID	5942.00	954420.00		960362.00
7081	USV LTD. MUMBAI - DR.MOHAN	88349.00	0.00		88349.00
7082	INDO-US JOINT PROJECT	894266.00	1084651.00		1978917.00
7083	ARROW HAEMO DIALYSIS	30882.00	0.00		30882.00
7085	DR.R.V.THAMPAN - CSIR	26381.00	0.00		26381.00
7086	HORMONE RELEASING INTRA DEVICES	230667.00	694951.00		925618.00
7087	CSIR - KALADHAR - BST	3528.00	228775.00		232303.00
7088	FEASIBILITY STUDY	1000000.00	0.00		1000000.00
7089	PROJ/7089/DEV.PORTABLE SAFETY	1291450.00	0.00		1291450.00
7090	PROJ/7090/TISSUE ENGINEERS VASCULAR	129079.00	3647300.00		3776379.00
7091	PROJ/7091/NOVEL MICROPHORES	253085.00	403600.00		656685.00
7092	PROJ/7092/SEA FOOD	42100.00	150000.00		192100.00
7093	PROJ/7093/CSIR GRANT-LPA	77538.00	556273.00		633811.00
7094	PROJ/7094/CSIR GRANT-GIJU	29942.00	0.00		29942.00
7095	PROJ/7095/CSIR GRANT-VIOLA.B.MORRIS	15492.00	213200.00		228692.00
7096	PROJ/7096/CSIR GRANT-DEVI	12574.00	185600.00		198174.00
7097	PROJ/7097/ACCELERATED AGEING	57731.00	564313.00		622044.00
7098	PROJ/7098/EVALN OF NTU DRUG	872680.00	786650.00		1659330.00
7099	PROJ/7099/BCL	184530.00	200000.00		384530.00
7101	PROJ/7101/CSIR/SONIA.T.A	0.00	212663.00		212663.00
7102	PROJ/7102/CSIR/LYNDA THOMAS	0.00	177666.00		177666.00
7103	PROJ/7103/CSIR/VIDYARAJ	0.00	194800.00		194800.00
7104	PROJ/7104/CSIR/RENJITH.P.NAIR	0.00	148995.00		148995.00
7105	PROJ/7105/CSIR/ARJUN NAMBOODIRI	0.00	69921.00		69921.00

Utilisation								
Capital Expenditure			Revenue Expenditure					
Fixed Assets	Others	Total	Salaries Wages	Rent / Consumables	Other Adm Exp	Total	Total expenditure	Net Balance
		0.00	0.00		0.00	0.00	0.00	76292.00
		0.00	75600.00		0.00	75600.00	75600.00	125553.00
		0.00	0.00		0.00	0.00	0.00	289303.00
		0.00	0.00		0.00	0.00	0.00	11935.00
		0.00	0.00		0.00	0.00	0.00	399773.00
		0.00	21700.00		0.00	21700.00	21700.00	603714.00
		0.00	310316.00		0.00	310316.00	310316.00	0.00
0.00		0.00	95733.00		288555.00	384288.00	384288.00	339399.00
0.00	0.00	0.00	110400.00		482714.00	593114.00	593114.00	367248.00
		0.00				0.00	0.00	88349.00
		0.00	14522.00		1229189.00	1243711.00	1243711.00	735206.00
		0.00	0.00		0.00	0.00	0.00	30882.00
		0.00	0.00		0.00	0.00	0.00	26381.00
0.00		0.00	409426.00		102263.00	511689.00	511689.00	413929.00
		0.00	193200.00		0.00	193200.00	193200.00	39103.00
		0.00				0.00	0.00	1000000.00
		0.00			0.00	0.00	0.00	1291450.00
		0.00	551818.00		775382.00	1327200.00	1327200.00	2449179.00
		0.00	40600.00		631357.00	671957.00	671957.00	-15272.00
		0.00	33677.00		7335.00	41012.00	41012.00	151088.00
		0.00	512859.00		0.00	512859.00	512859.00	120952.00
		0.00	0.00			0.00	0.00	29942.00
		0.00	222690.00			222690.00	222690.00	6002.00
		0.00	49413.00		500.00	49913.00	49913.00	148261.00
		0.00			132780.00	132780.00	132780.00	489264.00
		0.00	137090.00		166585.00	303675.00	303675.00	1355655.00
		0.00	51133.00		151344.00	202477.00	202477.00	182053.00
		0.00	192663.00			192663.00	192663.00	20000.00
		0.00	161000.00			161000.00	161000.00	16666.00
		0.00	178164.00		3210.00	181374.00	181374.00	13426.00
		0.00	132940.00		1833.00	134773.00	134773.00	14222.00
		0.00	63361.00			63361.00	63361.00	6560.00

Schedules Forming Part of Balance Sheet as at 31-3- 2009

Code	Name of Guarantee	Fund-wise Break Up			Total
		Opening Balance	Additions To Fund		
			Grants	Other Receipts	
7200	JOINT PROGRAME/M.TECH	0.00	11894794.00		11894794.00
8001	PROJ/8001/PROGRAM SUPPORT &TISSUE	16551590.00	0.00		16551590.00
8002	PROJ/8002/PROGRAM SUPPORT & TISSUE	3160463.00	0.00		3160463.00
8003	PROJ/8003/PROGRAM SUPPORT & TISSUE	1355000.00	0.00		1355000.00
8004	PROJ/8004/PROGRAM SUPPORT & TISSUE	1346367.00	0.00		1346367.00
8005	PROJ/8005/PROGRAM SUPPORT & TISSUE	1567000.00	0.00		1567000.00
8006	PROJ/8006/BIOCONJUGATION NANO MAT.	336000.00	0.00		336000.00
8007	PROJ/8007/PRODUCTS OF POLYMER	2113000.00	0.00		2113000.00
8008	PROJ/8008/CSIR GRANT-PADMAJA.P.NAMBI	8020.00	251848.00		259868.00
8009	PROJ/8009/DBT/DR.T.V.ANILKUMAR/DE…TISSUE	1223400.00	0.00		1223400.00
8010	PROJ/8010/DBT/DR.NIRANJAN/IMPLATED…. CONTROL	2953200.00	0.00		2953200.00
8011	PROJ/8011/NANOFRONT/DR.NIRANJAN/INTRAMAS	139900.00	0.00		139900.00
8012	PROJ/8012/VSSC/DR.NIRANJAN/DESIGN STUDIES	0.00	1755600.00		1755600.00
8013	PROJ/8013/DST/DR.C.P.SHARMA/ FADDS	0.00	36260000.00		36260000.00
8014	PROJ/8014/DBT/DR.ROY JOSEPH/DEV….V.GRAFT	0.00	1625200.00		1625200.00
8015	PROJ/8015/DR.ANOOPKUMAR/PROGRAMME…	0.00	95617.00		95617.00
8016	PROJ/8016/DBT/DR.UMASHANKAR/DEVE….APPLN.	0.00	3271000.00		3271000.00
8017	PROJ/8017/AYUTECH/DR.UMASANKAR	0.00	365300.00		365300.00
8018	PROJ/8018/ICMR/DR.P.V.MOHANAN	0.00	450000.00		450000.00
8019	PROJ/8019/STEC/DR.P.RAMESH	0.00	440000.00		440000.00
	Total	**54309695.59**	**82862823.00**	**132177.00**	**137304695.59**

Utilisation								
Capital Expenditure			Revenue Expenditure					
Fixed Assets	Others	Total	Salaries Wages	Rent / Consumables	Other Adm Exp	Total	Total expenditure	Net Balance
		0.00			1148619.00	1148619.00	1148619.00	10746175.00
930628.00		930628.00	899524.00		573702.00	1473226.00	2403854.00	14147736.00
2432333.00		2432333.00	385366.00		1415770.00	1801136.00	4233469.00	-1073006.00
450000.00		450000.00	243192.00		582156.00	825348.00	1275348.00	79652.00
928965.00		928965.00	45100.00		199480.00	244580.00	1173545.00	172822.00
948880.00		948880.00	183364.00		852926.00	1036290.00	1985170.00	-418170.00
		0.00	174058.00		21118.00	195176.00	195176.00	140824.00
356643.00		356643.00	207252.00		248958.00	456210.00	812853.00	1300147.00
		0.00	235440.00		14716.00	250156.00	250156.00	9712.00
558510.00		558510.00	123813.00		606510.00	730323.00	1288833.00	-65433.00
2689434.00		2689434.00	168360.00		19356.00	187716.00	2877150.00	76050.00
		0.00				0.00	0.00	139900.00
		0.00	136000.00		153665.00	289665.00	289665.00	1465935.00
7993670.00		7993670.00	1103069.00		3540487.00	4643556.00	12637226.00	23622774.00
637825.00		637825.00	161491.00		345974.00	507465.00	1145290.00	479910.00
		0.00	8140.00		5140.00	13280.00	13280.00	82337.00
1657363.00		1657363.00	211461.00		307636.00	519097.00	2176460.00	1094540.00
		0.00				0.00	0.00	365300.00
		0.00	60148.00		22268.00	82416.00	82416.00	367584.00
						0.00	0.00	440000.00
19634251.00	**0.00**	**19634251.00**	**11239931.00**	**19356.00**	**23076070.00**	**34335357.00**	**53969608.00**	**83335087.59**

Schedules Forming Part of Balance Sheet as at 31-3- 2009

		(Amount Rs.) Current Year		Previous Year	
		Rs.	Ps.	Rs.	Ps.
SCHEDULE 7 - CURRENT LIABILITIES AND PROVISIONS					
A. CURRENT LIABILITIES					
1. Acceptances					
2. Sundry Creditors:					
a) For Goods	48612935.00				
b) Others	2752338.00	51365273.00		13968555.00	
3. Advances Received		36985002.93		16495819.00	
4. Interest accured but not due on:					
a) Secured Loans / borrowings					
b) Unsecured Loans / borrowings					
5. Statutory Liabilities:					
a) Overdue					
b) Others		6719141.25		1937809.15	
6. Other current Liabilities		19509884.44		14939979.14	
TOTAL (A)		**114579301.6**		**47342162.29**	
B. PROVISIONS					
1. For Taxation					
2. Gratuity					
3. Superannuation/Pension(New Pension Scheme)					
4. Accumulated Leave Encashment					
5. Trade Warranties/Claims					
6. Others(Specify) Audit fee	3862474.00				
Sinking fund contribution to invest	3828378.00	7690852.00		3848378.00	
TOTAL(B)		**7690852.00**		**3848378.00**	
TOTAL(A+B)		**122270153.62**		**51190540.29**	

SCHEDULES TO ASSETS

Schedules Forming Part of Assets as at 31-3- 2009

`	GROSS BLOCK Cost/valuation as at the beginning of the year	Additions during the year	Deductions during the year
SCHEDULE 8 - FIXED ASSETS			
A. FIXED ASSETS:			
1. LAND:			
a) Freehold	1600169.51	0.00	
b) Leasehold			
2. BUILDINGS:			
a) On Freehold Land	37436928.26		105,000.00
b) On Leasehold Land			
c) Ownership Flats/Premises			
d) Superstructures on Land not belonging to the entity	124907172.50	0.00	
3. PLANT MACHINERY & EQUIPMENT	964254542.64	113872958.75	692,735.00
4. VEHICLES	3539508.74	754283.00	
5. FURNITURE,FIXTURES	30201189.61	5356497.00	
6. OFFICE EQUIPMENT	951977.54	3951.00	
7. COMPUTER/PERIPHERALS	0.00		
8. ELECTRIC INSTALLATIONS	14909913.67	343770.00	
9. LIBRARY BOOKS	104134665.57	11122715.00	
10. TUBEWELLS & W.SUPPLY	174615.00	0.00	
11. OTHER FIXED ASSETS			
a) OXYGEN CYLINDERS	234319.42	0.00	
		0.00	
b) AIR CONDITIONERS	21838713.91	312624.00	
c) TELEPHONE INSTALLATIONS	2057304.94	9950.00	
d) COLD ROOM INSTALLATION	341700.00	0.00	
e) WATER COOLERS	62866.50	0.00	
f) LIFT INSTALLATION	7097889.10	2217053.00	
g) KITCHEN EQUIPMENTS	560470.22	845508.00	
h) CANTEEN EQUIPMENTS	151482.59	0.00	
I) PAINTINGS	382715.63	0.00	
k) LIVESTOCK	31848.00	0.00	
l) GAS PLANT INSTALLATIONS	1159838.09	11423.00	
m) AMC AIR CONDITIONERS	0.00	73500.00	
TOTAL FOR THE YEAR (TOTAL -A)	**1316029831.44**	**134924232.75**	**797735.00**
TOTAL FOR THE PREVIOUS YEAR	1227271544	89685142.00	926855.00
B. CAPITAL WORK IN-PROGRESS	412232556.00	69266869.00	
TOTAL FOR THE YEAR (A+B)	**1728262387.44**	**204191101.75**	**797735.00**

* Depreciation/value for Buildings on lease hold land included.

Cost/valuation at the year end	Depreciation as at the beginning of the year	Depreciation During the year	Total up to the year-end	NET BLOCK As at the Current year-end	As at the previous year-end
1600169.51	0.00	0.00	0.00	1600169.51	1600169.51
37331928.26					
124907172.50	79666349.70	4128637.55	83794987.26	78444113.50	82677751.06
1077434766.39	631031644.34	66960468.31	697992112.65	379442653.74	333222898.30
4293791.74	2635549.28	331648.49	2967197.78	1326593.96	903959.46
35557686.61	21150084.96	2161140.25	23311225.21	12246461.40	9051104.65
955928.54	848719.26	16081.39	864800.65	91127.89	103258.28
0.00					
15253683.67	12480948.18	415910.32	12896858.50	2356825.17	2428965.49
115257380.57	71027792.91	6634438.15	77662231.06	37595149.51	33106872.66
174615.00	149777.45	3725.63	153503.09	21111.91	24837.55
234319.42	210978.07	3501.20	214479.28	19840.14	23341.35
22151337.91	16498549.18	847918.31	17346467.49	4804870.42	5340164.73
2067254.94	1757376.72	46481.73	1803858.46	263396.48	299928.22
341700.00	337961.48	560.78	338522.26	3177.74	3738.52
62866.50	62517.11	52.41	62569.52	296.98	349.39
9314942.10	3529777.76	867774.65	4397552.41	4917389.69	3568111.34
1405978.22	507236.59	134811.24	642047.83	763930.39	53233.63
151482.59	104521.93	7044.10	111566.03	39916.56	46960.66
382715.63	322878.21	8975.61	331853.82	50861.81	59837.42
31848.00	26170.52	851.62	27022.14	4825.86	5677.48
1171261.09	979691.14	28735.49	1008426.63	162834.46	180146.95
73500.00	0.00	11025.00	11025.00	62475.00	
1450156329.19	**843328524.80**	**82609782.25**	**925938307.05**	**524218022.14**	**472701306.64**
1316029831.44	770365293.19	72963231.61	843328524.80	472701303.64	456906251.25
481499425.00	**0.00**	**0.00**	**0.00**	**481499425.00**	**412232556.00**
1931655754.19	**843328524.80**	**82609782.25**	**925938307.05**	**1005717447.14**	**884933862.64**

Schedules Forming Part of Balance Sheet as at 31-3- 2009

				(Amount Rs.) Current Year Rs. Ps.	Previous Year Rs. Ps.
SCHEDULE 9 - INVESTMENTS FROM EARMARKED / ENDOWMENT FUNDS					
1.	In Government Securities			62051451.00	51367034.00
2.	Other approved Securities			5685391.00	5685391.00
3.	Shares				
4.	Debentures and Bonds				
5.	Subsidiaries and Joint Ventures				
6.	Others (to be specified)	(i) Sinking Fund Investments	230762235.00		206883158.00
		(ii) Technology Fund	40725848.70		35473140.90
		(iii) Pension & staff funds	48012908.00	319500991.70	48803014.00
	TOTAL			**387237833.70**	**348211737.90**
SCHEDULE 11 - CURRENT ASSETS,LOANS,ADVANCES ETC					
A. CURRENT ASSETS					
1.	Inventories:				
	a) Stores and Spares		117825583.13	117825583.13	80150825.13
	b) Loose Tools		2905956.00	2905956.00	2497633.00
	c) Stock-in trade				
	Finished Goods				
	Work-in-progress				
	Medicine		6106035.84	6106035.84	8503376.00
2.	Sundry Debtors:				
	a) Debts Outstanding for a period exceeding six months				
	b) Others		45918894.00	45918894.00	19623591.00
3.	Cash balances in hand(including cheques/drafts and imprest)		979541.58	979541.58	895160.13
4.	Bank Balances:				
	a) With Scheduled Banks:				
	- On Current Account		1.15		
	- On Deposit Accounts				
	(L.C. margin & Commitment deposit)		1103000000.00		
	- On Savings Accounts		185689524.74	1288689525.89	1167903639.26

Schedules Forming Part of Balance Sheet as at 31-3- 2009

		(Amount Rs.) Current Year Rs. Ps.	Previous Year Rs. Ps.
	b) With non-Scheduled Banks:		
	- On Current Account		
	- On Deposit Accounts		
	- On Savings Accounts		
5.	Post-Office-Savings Accounts		
	TOTAL(A)	**1462425536.44**	**1279574224.52**
	B. LOANS, ADVANCES AND OTHER ASSETS		
1.	Loans:		
	a) Staff	9696251.00	11197189.00
	b) Other Entities engaged in activities/objectives similar to that of the Entity		
	c) Other(specify)		
2.	Advances and other amounts recoverable in cash or in kind or for value to be received:		
	a) On Capital Account	196253335.00	150223827.00
	b) Prepayments	82944931.53	11040430.53
	c) Others	916024.00	916024.00
3.	Income Accured:		
	a) On Investments from Earmarked/endowment Funds		
	b) On Investments-Others		
	c) On Loans and Advances		
	d) Others		
	(includes income due unrealised Rs)		
4.	Claims Receivable		
	From Govt of India on Plan Funds		
	TOTAL(B)	**289810541.53**	**173377470.53**
	TOTAL(A+B)	**1752236077.97**	**1452951695.05**

Schedules Forming Part of Income & Expenditure for the Period/Year ended 31-3-2009

(Amount Rs.)

				Current Year Rs.	Current Year Ps.	Previous Year Rs.	Previous Year Ps.
SCHEDULE 12 - INCOME FROM SALES/SERVICES							
1.	Income from Sales						
	a) Sale of Finished Goods						
	b) Sale of Raw Material						
	c) Sale of Scraps						
2.	Income from Services						
	a) Labour and processing charges						
	b) Professional/Consultancy Services						
	c) Agency Commission and Brokerage						
	d) Maintenance Services						
	e) Others (Specify)						
	From Hospital Services-Gross Income	Rs.445059148.00					
	Less concession to poor Patients	Rs.168210277.00	276848871.00			264575147.00	
	From Projects		2659779.00			898229.00	
	Testing & Facility charges received		3732306.00			2211913.50	
	TOTAL			**283240956.00**		**267685289.50**	
SCHEDULE 13 - GRANTS / SUBSIDIES							
(Irrevocable Grants & Subsidies Received)							
1.	Central Government			229640277.00		226500000.00	
2.	State Government(s)						
3.	Government Agencies						
4.	Institution/Welfare Bodies						
5.	International Organisations						
6.	Others(Specify)						
	TOTAL			**229640277.00**		**226500000.00**	
SCHEDULE 14 - FEES / SUBSCRIPTIONS							
1.	Entrance Fees			1486320.00		617350.00	
2.	Annual Fees/ Subscriptions			1424600.00		2851000.00	
3.	Seminar/Program Fees			0.00		0	
4.	Consultancy Fees			0.00		0	
5.	Others(Specify) Examination Fees			1027592.00		283500.00	
	TOTAL			**3938512.00**		**3751850.00**	

Schedules Forming Part of Income & Expenditure for the Period/Year ended 31-3- 2009

	Investment from Earmarked Fund				Investment-Others				Total for			
	Current Year		Previous Year		Current Year		Previous Year		Current Year		Previous Year	
	Rs.	Ps.	Rs.	Ps.	Rs.	Ps.	Rs.	Ps.	Rs.	Ps.	Rs.	Ps.
SCHEDULE 15												
INCOME FROM INVESTMENTS												
(Income on Invest from Earmarked/Endowment Funds transferred to Funds)												
1. Interest												
a) On Govt. Securities												
b) Other Bonds/Debentures												
2) Dividends:												
a) On Shares												
b) On Mutual Fund Securities												
3) Rents					1482901.00		693989.00					1482901.00
4) Others(Specify)												
On Sinking Fund	13876337.00		10214130.00		0.00		0					13876337.00
On Technology Fund	3016605.80		1668313.00									3016605.80
TOTAL	**16892942.80**		**11882443.00**		**1482901.00**		**693989.00**					**18375843.00**
TRANSFERRED TO EARMARKED/ ENDOWMENT FUNDS	16892942.80		11882443.00									**16892942.80**

	(Amount Rs.)			
	Current Year		Previous Year	
	Rs.	Ps.	Rs.	Ps.
SCHEDULE 16- INCOME FROM ROYALITY, PUBLICATION ETC				
1) Income from Royalty	1915736.00		3054865.00	
2) Income from Publications				
3) Others(Specify)				
TOTAL	**1915736.00**		**3054865.00**	

Schedules Forming Part of Income & Expenditure for the Period/Year ended 31-3-2009

		(Amount Rs.) Current Year Rs. Ps.	Previous Year Rs. Ps.
SCHEDULE 17 - INTEREST EARNED			
1)	On Term Deposit		
	a) With Scheduled Banks	59416322.87	83810357.05
	b) With non-scheduled banks		
	c) With Institutions		
	d) Others		
2)	On Savings Account		
	a) With Scheduled Banks	1660401.02	472298.51
	b) With non-scheduled banks		
	c) Post Office Savings Account		
	d) Others		
3)	On Loans		
	a) Employees/Staff	1573321.00	1093609.00
	b) Others		
4)	Interest on Debtors and other Receivables		
	TOTAL	**62650044.89**	**85376264.56**
SCHEDULE 18 - OTHER INCOME			
1.	Profit on Sale/disposal of Assets:		
	a) Owned assets		
	b) Assets acquired out of grants, or received free of cost		
2.	Export Incentives realized		
3.	Fees for Miscellaneous Services		
4.	Miscellaneous Income (income from Projects)	8111631.00	5923556.00
	Other Income	2276846.26	1976765.40
	TOTAL	**10388477.26**	**7900321.40**
SCHEDULE 20 - ESTABLISHMENT EXPENSES			
	a) Salaries and Wages	347741972.80	205483261.80
	b) Allowances and Bonus	1211061.50	1321147.00
	c) Contribution to Provident Fund	24282.00	
	d) Contribution to other fund(specify)		
	e) Staff Welfare Expenses	10364926.80	6967300.25
	f) Expenses on Employee's Retirement and Terminal Benefits	28392518.00	20469805.00
	g) Others(Specify) PG Training & Accademic payments	51048038.00	44854930.00
	TOTAL	**438782799.10**	**279096444.05**

Schedules Forming Part of Income & Expenditure for the Period/Year ended 31-3- 2009

		Current Year Rs. Ps.	Previous Year Rs. Ps.
SCHEDULES 21 - ADMINISTRATIVE EXPENSES			
a)	Purchases	272360981.16	237025724.00
b)	Labour and processing expenses	0.00	0.00
c)	Cartage and Carriage Inwards	173553.00	182884.00
d)	Electricity and power	32608545.00	26904136.00
e)	Water charges	3929919.00	1093469.00
f)	Insurance	1124.00	1124.00
g)	Repairs and maintenance	21397829.00	22011852.00
h)	Excise duty	0.00	0.00
i)	Rent,Rates and Taxes	476842.00	559163.00
j)	Vehicles Running and Maintenance	460457.00	335689.00
k)	Postage,Telephone and Communication Charges	2449906.00	2105334.00
l)	Printing and Stationary	2463169.00	1350642.00
m)	Travelling and Conveyence Expenses	1651873.50	689640.00
n)	Expenses on Seminar/Workshop	2531270.00	2016196.00
o)	Subscription Expenses	27810.00	62411.00
p)	Expenses on Fees	0.00	0.00
q)	Auditors Renumeration	11236.00	8427.00
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	4980664.00	5256413.00
z)	Others(specify)	19074503.00	17172380.00
	TOTAL	**364599681.66**	**316775484.00**
SCHEDULE 23 - INTEREST			
a)	On Fixed Loans		
b)	On Other Loans(including Bank Charges)	86805.40	80763.40
c)	Others(specify)		
	TOTAL	**86805.40**	**80763.40**

Schedules Forming Part of Income & Expenditure for the Period/Year ended 31-3- 2009

SCHEDULE 24 - SIGNIFICANT ACCOUNTING POLICIES

ACCOUNTING CONVENTION

Financial Statements are prepared on the basis of historical cost convention unless otherwise stated and on the accrual method of accounting

INVENTORY VALUATION

Stores and spares including machinery spares are valued at cost

INVESTMENTS

Investment including long term investments are carried at cost.

FIXED ASSETS

Fixed assets are stated at cost of acquisition inclusive of inward freight,duties and taxes incidental and direct expenses related to acquisition.

DEPRECIATION

6.1 Depreciation is provided on reducing balance method at the rates specified by the Income Tax Act 1961.

6.2 In respect of additions to/deductions from fixed assets,during the year depreciation is provided for full year.

GOVT GRANTS/SUBSIDIES

9.1 Govt. Grant from Plan fund are treated as additions to Capital fund of Institute.

9.2 Grants in respect of specific fixed assets acquired are shown as deduction from the cost of the related asset.

9.3 Govt.Grants/subsidies are accounted on Grant release order basis.

FOREIGN CURRENCY TRANSACTIONS

Transactions denominated in foreign currency are accounted at exchange rate prevailing at the date of transactions.

RETIREMENT BENEFITS

12.1 An amount equal to one month salary every year is transferred to Pension Fund Account to meet liability on account of Pension payments

12.2 An amount of Rs.4 lakh is transferred every year to above fund for meeting liabilities on account of Gratuity payments.

12.3 Leave encashment eligible at the time of retirement/relieving is accounted on actual payment basis.

PROVIDENT FUND

Liabilities and assets of Provident fund account were seperated from Balance sheet of Institute and shown as seperate statement.

SINKING FUND RESERVE

Five percent of receipts from patient are transferred to a Fund for meeting unexpected requirements for Fixed assets.

DEVELOPMENT FUND TECHNOLOGY

Receipts against technology developed by the Institute are transferred to the above fund for meeting additional expenses on Improvement of technologies already developed. During the year Rs.10.56 lakh was spent from this fund for the purpose.

SCHEDULE 25 - CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS

CONTINGENT LIABILITIES

1.1	Claims against the Institute not acknowledged as debts	Rs. NIL (PY NIL)
1.2	In respect of:	
	Bank Guarantee given by Institute	Rs.21.75 lakh (PY Rs13.01 lakhs)
	Letters of credit opened on behalf of Institute	Rs.943.62 lakh (PY Rs1049.44 lakh)
1.3	Disputed demands on Income tax etc	Nil
1.4	In respect of claims from parties for non-execution of orders	Nil

CAPITAL COMMITMENTS

Estimated value of orders remaining to be executed on Capital Account including Construction under vision 2020	Rs.3984.26 lakh (PY Rs.987.37 lakh)
Lease obligation for rentals for Plant & Machinery	Nil
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.
TAXATION	Provision for Income tax not made since there is no taxable income for Institute under Income tax Act 1961, during the year

FOREIGN CURRENCY TRANSACTIONS:

6.1	Value of Imports	
	Capital Goods	Rs 1812.73 lakh (PY Rs. 676.57 lakh)
	Stores, Spares & Consumables	Rs 318.13 lakh (PY Rs. 271.89 lakh)
6.2	Expenditure in foreign currency	
	Travel Expenses	EURO 300, Pound 500, Aus $ 200 (PY US$ 1150.00)
6.3	Earnings:	
	Value of Exports	Nil
6.4	Remuneration to Auditors	
	As auditors:	
	For Taxation	Rs. 11236 .00 (PY Rs. 8427 .00)

Corresponding figures for previous years have been regrouped, where ever necessary.
Schedules 1 to 25 are annexed to and form integral part of the Balance Sheet as at 31-03-2009, and Income & Expenditure Account for the year ended on that date.

Sd/-
Financial Adviser

Sd/-
Director

Receipts & Payment Accounts for the Period from 01-04-2008 to 31-3-2009

	RECEIPTS	Current Year	Previous Year
I	**Opening Balances**		
	a) Cash In Hand	895160.13	1143745.63
	b) Bank Balances		
	i) In Current Account	1.15	1.15
	ii) In deposit Account		
	iii) Savings Account	137902894.46	74478139.58
II	**Grant Received**		
	From Government of India		
	Under Plan scheme	723000000.00	720100000.00
	Plan recurring	0.00	0.00
	Non-Plan scheme	61430000.00	69700000.00
	Women Comp. Plan	95000000.00	95000000.00
III	**Receipts against Earmarked Funds**		
	a) Earmarked funds	16569813.00	31285551.00
	b) Own funds		
IV	**Interest Received**		
	a) On Bank deposits	59897075.99	85148053.56
	b) Loans Advances etc	356470.00	65546.00
V	**Receipts from services**		
	Receipts from Patient services	341892132.93	323125418.00
	Other receipts including Royalty	24995468.65	15151918.00
VI	**Other receipts**		
	Grant received for Projects	91779313.03	83457403.02
	Refund of Deposits(LC Margin)		
	Other Deposit received	101401797.71	99221353.00
	TOTAL	**1655120127.05**	**1597877128.94**

	PAYMENTS	Current Year	Previous Year
I	**Expenses**		
	a) Establishment expenses	513101014.30	373472602.95
	b) Administrative Expenses		
	For Purchases	368538762.00	315198993.00
	Other expenses	191348387.00	88916030.20
II	**Payments made against funds for various Projects**		
	As Per schedule	48789260.43	46283364.00
III	**Investments & Deposits made**		
	a) Out of Earmarked funds	17078476.00	16100000.00
	b) Out of own funds	15500000.00	333736301.00
IV	**Expenditure on Fixed Assets & Capital work-in- progress**		
	a) Purchase of Fixed Assets	65080453.00	83946767.00
	b) Capital work-in-progress		
V	**Refund of Loans**		
VI	**Finance Charges(Bank charges)**	59675.40	51841.00
VII	**Other Payments**		
	To Funds/Deposit- refunds	248956699.00	201372430.40
VIII	**Closing Balance**		
	a) Cash in hand	979541.58	895160.13
	b) Bank Balances		
	i) In current Account	1.15	1.15
	ii) In Deposit Account		
	iii) Savings Account	185687857.19	137903638.11
	TOTAL	**1655120127.05**	**1597877128.94**

Provident Fund Account for the year ended 31-03-2009

Amount Rs.

	CURRENT YEAR	PREVIOUS YEAR
LIABILITIES		
MEMBERS BALANCE	191150022.00	173972283.00
MEMBERS CREDITS (FOR MARCH 2009)	3532833.00	2424610.00
BALANCE DUE TO MEMBERS NOT IN SERVICE		
Under EPF scheme	6602266.00	6116671.00
,, GPF ,,	532055.00	532055.00
PENSION FUND DUES	40618942.00	37610132.00
RESERVES & SURPLUS-INTEREST	0.00	1756912.39
TOTAL	**242436118.00**	**222412663.39**
ASSETS		
INVESTMENT AT COST	204867803.00	204867803.00
DUES TO PF ACCOUNT		
FROM INSTITUTE	1132833.00	0.00
FROM PF COMMISSIONER	15035709.00	13857796.00
INTEREST ACCRUED NOT DUE	1000280.00	1000280.00
BALANCE WITH BANKS		
SBT -GPF A/C	12371352.39	2686784.39
SBT-CPF A/C	0.00	0.00
INTEREST ACCRUED	8028140.61	
TOTAL	**242436118.00**	**222412663.39**

GPF Trial Balance as on 31-03-2009

GI Code		Current Year	Previous Year
1001	SCTIMST	1132833.00	
1005	Dues from PF Commissioner	15035709.00	
1010	Members Balance		227060933.00
1011	Receipts(for March) not credited to Members		3532833.00
1012	Old Members EPF Account		6602266.00
1013	Old Members GPF Account		532055.00
1015	Dues to Pension Fund		40618942.00
1020	Reserves and surplus		-
1030	Loan Payment	28582133.00	
1040	Interest accrued	8028140.61	
1050	Investments	204867803.00	
1090	Final settlements	7328778.00	
1120	Interest accrued not due	1000280.00	
	Cash at Bank	12371352.39	
	TOTAL	**278347029.00**	**278347029.00**

Separate Audit Report of the Comptroller & Auditor General of India on the Accounts of Sree Chitra Tirunal Institute of Medical Sciences and Technology, (SCTIMST), Thiruvananthapuram for the year ended 31st March 2009

We have audited the attached Balance Sheet of Sree Chitra Tirunal Institute of Medical Sciences and Technology (SCTIMST), Thiruvananthapuram as at 31 March 2009, the Income & Expenditure Account and the Receipts & Payment Account for the year ended on that date under Section 19(2) of the Comptroller & Auditor General's (Duties, Powers &, Conditions of Service) Act, 1971 read with section 18(2) of the SCTIMST Act 52 of 1980. These financial statements include the accounts of bio-medical engineering and technology units/branches of the SCTIMST. These financial statements are the responsibility of the SCIIMST's management. Our responsibility is to express art opinion on these financial statements based on our audit.

2. This Separate Audit Report contains the comments of the Comptroller & Auditor General of India (CAG) on the accounting treatment only with regard to classification, conformity with the best accounting practices, accounting standards and disclosure norms, etc. Audit observations on financial transactions with regard to compliance with the Law, Rules & Regulations (Propriety and Regularity) and efficiency-cum-performance aspects, etc., if any are reported through Inspection Reports/CAG's Audit Reports separately.

3. We have conducted our audit in accordance with auditing standards generally accepted in India. These standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements. An audit includes examining, on a test basis, evidences supporting the amounts and disclosure in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of financial statements. We believe that our audit provides a reasonable basis for our opinion,

4. Based on our audit, we report that:

   i. We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our audit;

ii. The Balance Sheet, Income & Expenditure Account and Receipt & Payment Account dealt with by this report have been drawn up in the format approved by the Government of India, Ministry of Finance.

iii. In our opinion, proper books of accounts and other relevant records have been maintained by the SCTIMST as required under Section 18 (1) of the SCTIMST Act, 1980 in so far as it appears from our examination of such books.

iv. We further report that:

A. Balance Sheet

Liabilities

A.1. Capital Fund Schedule-1 - Rs. 252.63 crore

The opening balance was taken as Rs. 218.61 crore instead of Rs. 218.91 crore resulting in understatement of the fund by Rs. 30 lakh.

A.2. Revision of earmarked/endowment fund: Schedule-3

At the instance of audit, SCTIMST revised schedule-3 to the balance sheet and included transactions amounting to Rs. 9.63 crore. Further, an amount of Rs. (-) 32100 which was erroneously accounted under earmarked funds of the balance sheet was rectified during 2009-10.

B. Income & Expenditure Account

B.1. Revenue recognition:

The accounting policy of the institute stipulated accrual basis of account. Revenue recognition of the institute from various income such as (a) hospital services (b) projects (c) testing charges (d) facility utilisation charges (e) fees/ subscriptions and (f) interest earned, etc., were accounted on cash basis. Similarly, income receivable, income accrued and claims receivable, etc., were not accounted. Monetary impact could not be quantified in audit.

B.2. Depreciation:

The accounting policy of the SCTIMST stipulated that depreciation was provided on reducing balance methods at the rates specified by the Income Tax Act, 1961. It was observed that rates of depreciation charged by the institute were different from the rates prescribed in the IT Act from the assessment year 2003-04. Due to difference in rates applied, the depreciation under expenses account of the income and expenditure account was understated by Rs. 34.84 crore and asset account of the Balance Sheet for the year ending 31 March 2009 was overstated to the same extent.

C. General

C.1. Acturial valuation

SCTIMST did not obtain acturial valuation for ascertaining liability on account of gratuity, pension and leave salary payments.

C.2. Central Autonomous Organisations which receive Plan grants as well as non-Plan grants, should account for expenditure (Capital and Revenue) separately under Plan and Non-plan. The financial statements of SCTIMST were not prepared separately for Plan and Non-Plan category thus making the exhibition of accounts violative of extant instructions.

D. Grants-in -aid

Out of the grants in aid of Rs 10182 crore (Grant of Rs. 87.94 crore and un-spent amount of Rs. 13.88 crore from previous financial year 2007-08) received during the year, the organisation could utilise a sum of Rs.83.15 crore, leaving a balance of Rs. 18.67 crore as unutilised grant as on 31 March 2009.

E. Management letter

Deficiencies which have not been included in the Audit Report have been brought to the notice of the SCTIMST through a Management letter issued separately for remedial / corrective action.

Subject to our observations in the preceding paragraphs, we report that the Balance Sheet and Income and Expenditure Accounts/ Receipts and Payment Account dealt with by this report are in agreement with the books of accounts.

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, and subject to the significant matters stated above and other matters mentioned in Annexure-I to this Audit Report give a true and fair view in conformity with accounting principles generally accepted in India.

a. In so far as it relates to the Balance Sheet, of the state of affairs of the Sree Chitra Tirunal Institute for Medical Sciences & Technology, Thiruvananthapuram as at 31 March 2009 and

b. In so far as it relates to Income & Expenditure Account of the deficit for the year ended on that date

For and on behalf of the C & AG of India

Sd/

New Delhi

Principal Director of Audit (SD)

Date:

Scientific Departments

ANNEXURE-1

1. Adequacy of Internal Audit system

The internal audit division is functioning under an Internal Audit Officer assisted by one Office Superintendent for periodical audit of Hospital wing and BMT wing. Though the purchase orders and works bills above Rs.10 lakh are pre-audited by the internal audit wing, the observations are not converted in a report format and compliance watched. The internal audit team may be strengthened to evaluate the effectiveness of the internal control system and contribute to the ongoing activities.

2. Adequacy of Internal control System

The internal control system was not adequate. Periodical check to ensure sound internal control mechanism in SCTIMST is necessary and action there on needs to be taken by the Department of Science and Technology.

3. System of Physical verification of assets

Physical stock verification for 2007-08 was conducted in 42 departments/ sections of the Hospital wing only. Physical verification for the remaining departments/sections was however not conducted for 2007-08. Though discrepancies were noticed in canteen, details of amount recovered from the canteen contractor were not available. SCTIMST did not furnish the following details / information,

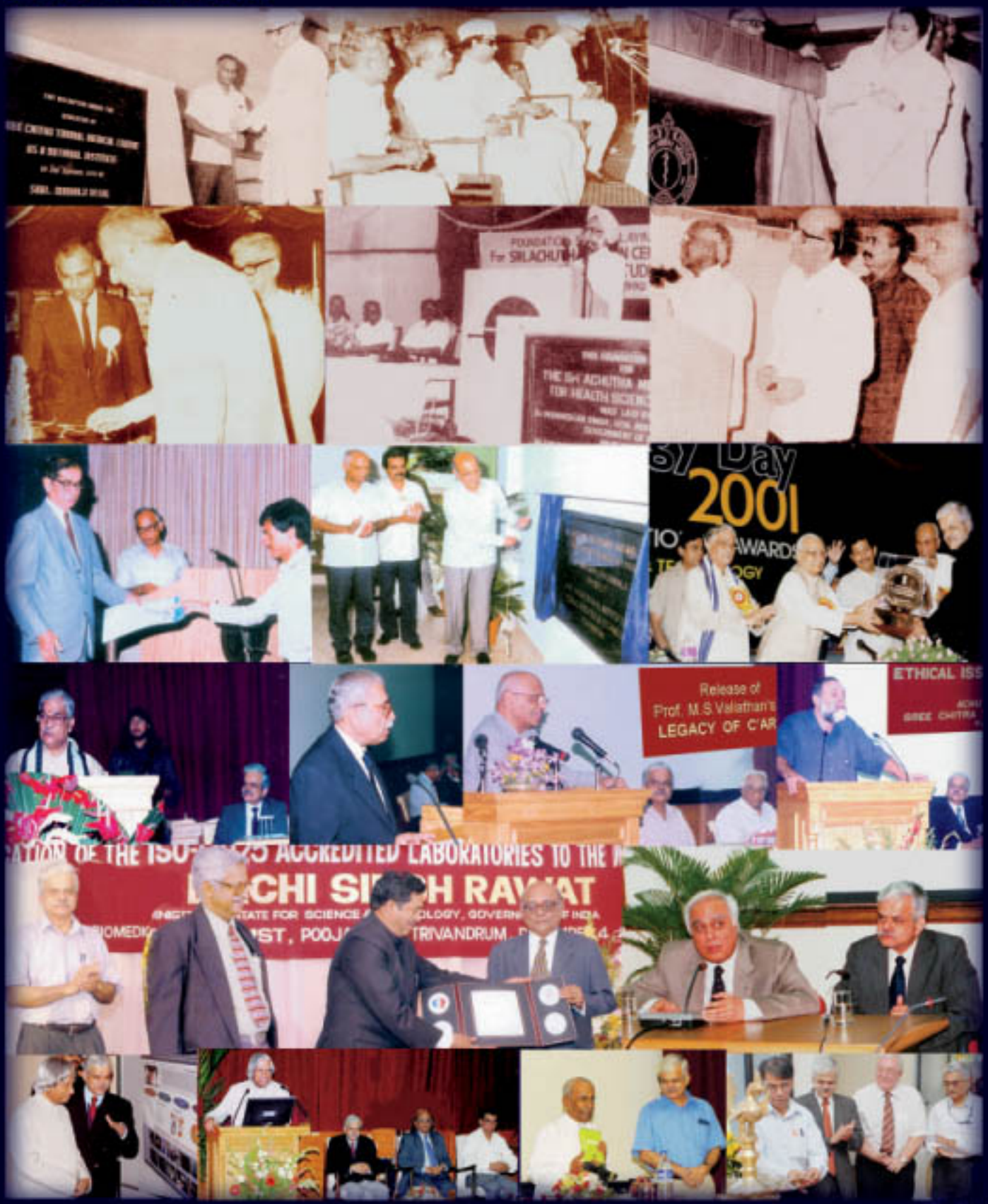
i) Latest physical verification report in connection with the stock of medicines

ii) The latest physical verification report of BMT wing.

Sd/

Deputy Director

Milestones....



Sree Chitra Tirunal Institute for Medical Sciences & Technology

Trivandrum - 695 011, Kerala, India