



Annual Report 1996-97

SREE CHITRA TIRUNAL
INSTITUTE FOR
MEDICAL SCIENCES AND TECHNOLOGY
THIRUVANANTHAPURAM
KERALA, INDIA

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Historical

H I G H L I G H T S O F T H E Y E A R

- The John D. and Catherine T. McArthur Foundation grant for developing the MPH Programme
- A munificent donation from a charitable foundation to set up a comprehensive epilepsy care centre
- Completion of first phase of epidemiological survey of epilepsy covering ten panchayats in Central Kerala
- Establishment of minimally invasive treatment of lumbar disc prolapse with percutaneous laser decompression
- Transfer of technology of ophthalmic sponge and concentric needle electrodes
- Expansion of precision engineering infrastructure
- Sustained effort for Official Language implementation

Historical

THE ORIGINS of the Institute reach back to 1973 when the Royal Family of Travancore gifted a multi-storeyed building for the people and the Government of Kerala resolved to develop the gift as the Sree Chitra Tirunal Medical Centre for medical specialities.

The Medical Centre was inaugurated by Sri. P.N.Haksar in 1976 and the growth of a Biomedical Engineering and Technology Centre followed quickly at the Satelmond Palace, Thiruvananthapuram.

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 Act lays down the objectives of the Institute to be the promotion of biomedical engineering and technology, demonstration of high standards of patient care and the development of post-graduate training programmes of the highest quality in advanced medical specialities and biomedical engineering and technology.

Overview

THE PROGRESS and achievements of the Institute during the year under review stemmed from the new initiatives introduced in the previous year, as well as the vigorous pursuit of the objectives for which the Institute was established.

Two more medical devices technologies - the ophthalmic sponge and the concentric needle electrode- were transferred for commercial production. Clinical evaluation of vascular grafts, hydroxy apatite porous granules and fibrin glue was commenced. The satisfactory progress of the industry sponsored development of membrane oxygenators and the successful completion of the biological evaluation of tribal therapeutic agents(used by tribal practitioners) in collaboration with Regional Research Laboratory, Thiruvananthapuram, have paved the way for further industry sponsorship and inter-institutional collaboration. Special efforts to improve and strengthen the infrastructure for biocompatibility and biofunctional evaluation and for

precision engineering of device prototypes were undertaken to facilitate biomedical technology development programmes during the 9th Five Year Plan period.

In addition to streamlining hospital services through computerisation and administrative reorganisation, the Institute started new diagnostic and therapeutic facilities such as electrophysiological studies and radio frequency ablation of cardiac dysrrhythmias, movement disorder clinic, coil embolisation of intracranial vascular malformations and laser ablation of prolapsed intervertebral discs. The blood transfusion service won the Indian Red Cross Trophy for the Best Blood Bank for the 3rd consecutive year.

The commencement of the MPH Course, the beginning of epidemiological surveys and the organisation of public health seminars marked the successful launch of the Achutha Menon Centre for Health Science Studies.

Evaluation of photodynamic therapy for tumours, role of free

radical scavengers in the prevention of myocardial reperfusion injuries, development of immuno diagnostic systems for tuberculous meningitis and the ongoing research on mucoid vasculopathy and endomyocardial fibrosis constituted some of the

activities in the field of biomedical research.

Rural outreach programmes, training programmes integrating medical sciences and technology and the efforts in the field of public health reflected the Institute's commitment to serve the people and the country. ■

Patient Care

DR. P.R.N.MENON MS

Medical Superintendent

DR. S.K.JAWAHAR M.B.B.S

Administrative Medical Officer

INCREASING NUMBER of patients, the demand for high quality services and the rising cost of health care posed fresh challenges.

OPD services are burdened with the increase in the number of registrations and admissions in all departments. By the co-ordinated efforts of receptionists, security personnel, medical record assistants, medico-social workers and staff nurses, congestion and delay were reduced in the OPD's, thereby providing services at an acceptable level of quality. Provision of computers for registration, medico-social assessment and billing considerably helped improve the situation. There are plans to build a few more examination cubicles in the OPD. Measures were taken to provide sufficient space in the OPD for patients and bystanders by constructing additional waiting areas. Plans were finalised to install a digital calling system in the OPDs.

Sustained efforts were made in the wards with the help of staff nurses and co-workers to maintain cleanliness and to ensure a comfortable stay for the patients. Feedback from patients and bystanders, during the rounds, helped in improving the inpatients services. The hospital charges were revised in line with the escalation in prices of drugs and consumables.

The weekly meeting of ward sisters, Nursing Superintendent and the Medical Superintendent and the periodic interactions with stores, purchase, administration and accounts helped review and improve the quality of patient care in the OPDs and wards.

The hospital management committee met regularly and reviewed issues relevant to patient care. Trainees in the Dietary, sponsored by various hospitals, and hospital management trainees sponsored by universities continued to attend the hospital.

Medico-Social Work

Medico-social workers continued to co-ordinate the registration of new patients and were involved in activities like assessment of income, motivation of blood donors and providing guidance and counselling to patients.

In the Neurology clinics, medico-social workers co-ordinated the evaluation and management of various psychosocial problems of epilepsy patients. They regularly conducted group sessions for epilepsy patients and their family members.

Mr. Jayachandran & Mrs. Usha Kandaswamy, attended various professional conferences & workshops and presented papers.

Medical Records

SRI. P. KRISHNAMOORTHIA PILLAI. MA
Senior Medical Records Officer

Sri. N. G. THAMPI MA, BMRSC
Medical Records Officer

This Division contributed in several ways to the efficient management of the hospital. Statistical data were made available for planning clinical management strategies, research and for publication of papers.

Table:1 Number of charts retrieved.

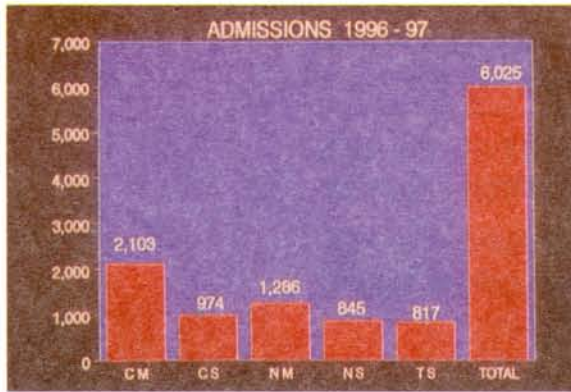
| | |
|---------------------------------|-------|
| 1. Follow up in special clinics | 36395 |
| 2. Correspondence of patients | 11230 |
| 3. Analytical studies | 7204 |
| 4. Pruning of charts | 719 |
| 5. Backlog feeding | 643 |
| 6. Internal audit | 100 |
| 7. Cardiac Surgery Scrutiny | 1352 |

10155 fresh registrations and 6025 admissions were made during the year. Computer terminals were connected to all the wards and ICU. The inpatient chart analysis was carried out by medical records assistants in the Division itself,

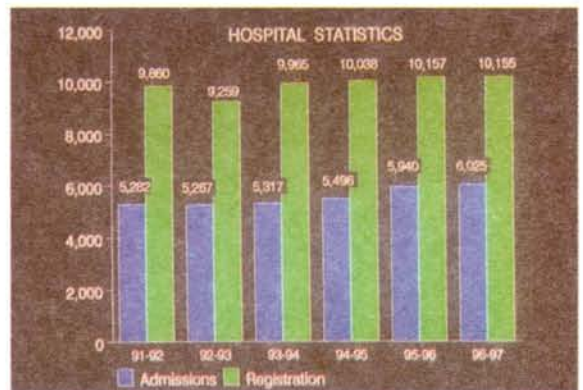
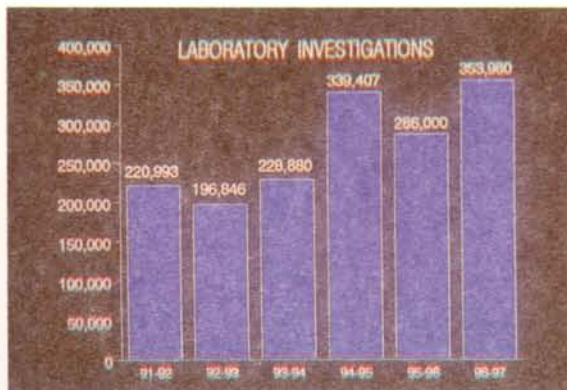
and completion of records was ensured. Copies of the discharge summary were sent to the patient and the referral doctor. There was an increase in referrals from other States, mainly West Bengal and Madhya Pradesh. These patients were given appointment for surgery and other procedures in consultation with heads of department concerned. The Senior Medical Records Officer was authorised to issue certificates to patients for applying for advance, financial assistance from Prime Ministers and Chief Ministers fund and other relevant certificates. The Division was entrusted with giving fresh appointments by post. Detailed monthly statements were regularly placed before the Hospital Management Committee.

Table: 2 Important Statistics

| | |
|--------------------------|--------|
| Sanctioned bed | 200 |
| Cardiac Surgery | 1437 |
| Neurosurgery | 717 |
| New cases | 10155 |
| Repeat cases | 36395 |
| Admissions | 6025 |
| Discharges | 6038 |
| Death | 231 |
| Paying % | 78 |
| Non Paying % | 22 |
| Operative Mortality % | 6 |
| Autopsy rate % | 5 |
| Lab Investigation | 353980 |
| X-ray | 18729 |
| Physiotherapy | 23238 |
| ECG | 16242 |
| Echo | 20643 |
| TMT | 1026 |
| Cath | 531 |
| Coronary angiogram. | 679 |
| Cath and Angio | 91 |
| PTCA | 41 |
| EPS | 45 |
| BMV | 16 |
| PPI | 77 |
| BAV | 27 |
| Ballon dilatation of COA | 1 |
| Stent. | 17 |
| R.F. Ablation. | 3 |
| CT Scan | |
| 2207MRI | 2310 |
| EEG | 1808 |
| VEEG | 69 |
| Aortogram | 269 |
| Cerebral Angiogram | 289 |
| Angioplasty | 50 |
| Embolisation | 68 |
| Perfusion | 819 |



- CS - CARDIAC SURGERY
- CM - CARDIAC MEDICINE
- NM - NEURO MEDICINE
- TS - THORACIC SURGERY
- NS - NEURO SURGERY



Nursing Services

MRS. VIJAYAMMA HARIKRISHNAN RN, RM, BSc (Nursing), M.A
Nursing Superintendent

Mrs. ROSAMMA EDWARDS RN, RM, DNA
Deputy Nursing Superintendent

The nursing services functioned with emphasis on patient care and in-service education. Monthly review meetings of ward sisters and orientation programmes to new staff members contributed to optimal nursing care.

Physiotherapy

MRS. M. MEENAKUMARI,
B.Sc., D.P.T.
Physiotherapist

The number of patients referred for Physiotherapy rose significantly. The department-wise break up was as follows:-

| | |
|------------------------------|---------------|
| Cardiology & Cardiac surgery | 6896 |
| Thoracic surgery | 3796 |
| Neurology | 4651 |
| Neurosurgery | 7853 |
| Grand Total | 23,238 |

Physiotherapy sessions were also conducted for patients following percutaneous laser disc decompression. Teaching and training programmes in physiotherapy and rehabilitation for Post Basic Nursing students of the Institute were carried out regularly in the unit.

Clinical Engineering

MR. K. VIJAYAKUMAR, BSc, BSc (Engg)
Biomedical Engineer

Mr. KORUTHU P VARUGHESE, BSc (Engg), PGDCA
Engineer

Mr. G. Mohanlal. BSc (Engg)
Engineer

Mr. B. MADHUSUDANAN PILLAI, BSc (Engg), PGDCA, MBA
Scientist Engineer

Mrs. DEEPA MATHEWS B.Tech
Engineer (Ad-hoc)

As in previous years, the Division was involved in activities relating to the maintenance of equipments as well as procurement, installation, testing and commissioning of new equipment. Checking and certification of installations in the newly constructed Achutha Menon Centre and an energy audit study were two major jobs completed during the year. The new 300 TR capacity centrifugal air conditioning plant was installed.

Major installations during the year included;

A multichannel electro physiological recorder and a hemodynamic recorder;

A modern operating table and a wall mounting operating light for neuro surgery theatre;

Two portable X-ray machines and two film processors for Radiology Department;

Training for Graduate Engineers, Diploma holders, ITI Certificate holders was imparted as usual.

Computer Division

MRS. G. GEETHA M.TECH (Computer Science)
Systems Manager.

System support involved software development and management for all user departments.

The Division made remarkable progress with the expansion of system environments as follows:-

Hardware Expansion:

- 80586 Server for AMC
- 80586 (15 nos) for AMC
- 80586 Multimedia Units (2 Nos) for AMC
- 80586 (3 Nos) for Computer Division
- 80586 Server for Library
- 80586 Multimedia Units (3 Nos) for CHO & BMT Library
- 80586 Nodes (3 Nos) for Library
- 80586 Nodes (10 Nos) for user departments

Software Expansion:

- Windows NT 4.0
- Microsoft Professional
- Network Solution -Plans for campus networking were finalised.

Biomedical Technology Wing

DR. R. SIVAKUMAR

Head, BMT Wing

In the IX Five year Plan period (1997-2002) the technology development activities based on appropriate scientific knowledge are poised for expansion. The expansion aims at consolidating and improving the quality of the expertise that is required for new innovative developments. The proposed programmes take into account the existing strength and future needs. Close interaction between the medical practitioners and the relevant industries is being emphasised, starting from the project planning stage all the way upto commercialisation. The need for continued R&D for upgradation is being addressed in partnership with the industries.

In the development of biomedical devices and implants, the biomaterials play a critical role in ensuring the desired host -tissue response. The characterization, especially the surface of the material, is essential to understand material-tissue interaction and ensure biocompatibility and biofunctionality. Hence, analytical facilities are being expanded. New precision lathe and milling machine were

added to the workshop to ensure fabrication of precision components, dies, fixtures etc.

In order to address some of the fundamental issues related to the reliability and the performance of devices, cell-culture and microbiology laboratories were set-up. Material - tissue interaction (soft, hard and blood tissues), correlation of toxic effects to the material properties, and device evaluation using appropriate animal models were some of the areas pursued with vigour.

Technology Status:-

The Ophthalmic Sponge technology was transferred to F.D.C. Ltd., Mumbai, a well known pharmaceutical company in the field of Ophthalmology.

The Concentric Needle Electrode project sponsored by DST was completed and commercialisation efforts were progressing.

The clinical trials of hydroxyapatite porous granules for dental applications were on-going. Attempts were on to identify a suitable industry to

develop further applications and commercialisation.

Negotiations with suitable industries were on to further develop the surface modification of polyvinyl chloride (PVC) for blood bag and other applications and Latex for urinary catheters.

The development of membrane oxygenator sponsored by SPIC Science Foundation, Madras, made considerable progress.

Other R&D activities were in various stages of development and are outlined under each group/division.

Division of Academic Affairs

DR. K. G. BALAKRISHNAN MD, DM, FAMS, FACC
Dean (On leave)

SRI.A.V. GEORGE M.A, B.ED, M.PHIL.
Registrar

SRI. SUNDAR JAYASINGH M.A, M.B.A, D.L.L.
Assistant Registrar

The Institute approved the development of the Achutha Menon Centre for Health Science Studies (AMCHSS), the third wing of the Institute, as a Premier School of Public Health

in South Asia and during the year under review, started a Master of Public Health course. With the addition of this course, the Institute is offering 17 programmes.

Figure

PROGRAMMES ON OFFER - 1997

| Post Doctoral Programmes | Ph.D/Master's Programmes | Certificate Programmes | Diploma Programmes |
|---|--|---|--|
| <ol style="list-style-type: none"> 1. DM Cardiology 2. DM Neurology 3. M.Ch Cardiovascular & Thoracic surgery 4. M.Ch Neuro Surgery (after M.S) 5. M.Ch Neurosurgery (after MBBS and 1 year residency in General surgery) 6. Certificate course in Anaesthesia 7. Certificate course in Radiology 8. Certificate course in Vascular surgery | <ol style="list-style-type: none"> 9. Ph.D 10. Master of Public Health | <ol style="list-style-type: none"> 11. Post basic Cardiac Nursing 12. Post basic Neuro Nursing 13. Certificate in Blood Banking Technology | <ol style="list-style-type: none"> 14. Diploma in Cardiac Laboratory Technology 15. Diploma in Neuro Technology 16. Diploma in Operation Theatre Technology 17. Diploma in Advanced Medical Imaging Technology |

Ph.D Programme

Table 3 Candidates who passed the Comprehensive Examination.

| Scholar's name | Research topic | Guide |
|-----------------|--|--|
| Ms.Lakshmi.S | "Phase transfer catalysed surface modification of plasticized poly (vinyl chloride) to prevent plasticizer migration." | Dr.A.Jayakrishnan Scientist Division of polymer Chemistry. |
| Ms. C.V.Sindhu | "Studies on pericardial calcification:prevention via surface modification and drug delivery" | Dr.Thomas Chandy Scientist Bio Surface-Technology. |
| Ms.Preetha Nair | "Developmental differences in the functional response of cardiomyocytes to sub-optimal levels of magnesium" | Dr.Renuka Nair Scientist Division of Cellular Molecular Cardiology |

Post-Doctoral Programmes

The national response to various academic courses remained impressive and the state-wise break up of the applications confirmed the nationwide acceptance of the educational programmes (table.4).

Table:4

| State/Union territories | Number applied |
|-------------------------|----------------|
| Andhra Pradesh | 25 |
| Assam | 2 |
| Bihar | 1 |
| Gujarath | 24 |
| Jammu & Kashmir | 3 |
| Karnataka | 20 |
| Kerala | 173 |
| Madhya pradesh | 3 |
| Maharashtra | 12 |
| New Delhi | 11 |
| Orissa | 2 |
| Punjab | 4 |
| Rajasthan | 4 |
| Tamil Nadu | 35 |
| West Bangal | 8 |
| Uttar Pradesh | 7 |

Table.5 gives the details of the programme wise demand and the number selected and joined.

Table: 5

| Programme | No.applied | No. Selected and join |
|-----------------------|------------|-----------------------|
| DM Cardiology | 157 | 4 |
| DM Neurology | 42 | 4 |
| MCh CVTS | 31 | 3 |
| MCh Neuro Surgery | 38 | 3 |
| PDCC Anaesthesia | 38 | 6 |
| PDCC Radiology | 25 | 2 |
| PDCC Vascular Surgery | 3 | Nil |

Examinations

Except for one failure in the M.Ch NeuroSurgery, all candidates were declared successful in the 1996 DM/MCh examinations (Table-6).

Table: 6

| Name of candidate | Degree | Speciality |
|--------------------------------|--------|--------------|
| Dr. K.LATCHUMANA DHAS | DM | Cardiology |
| Dr. KADER MUNEER.P | DM | " |
| Dr. SUDHA LAKSHMI TRIPURANENI | DM | " |
| Dr. JOSEPH.P.K. | DM | " |
| Dr. THOMAS JOHN | DM | Neurology |
| Dr. GIGY V.KURUTTUKULAM | DM | Neurology |
| Dr. VAIDYA APURV BACHUBHAI | Mch | CVTS |
| Dr. DIBANATH CHAKRABARTY | Mch | NeuroSurgery |
| Dr. DALAL YASHESH VINODCHANDRA | Mch | " |
| Dr. GIRISH MENON.R | Mch | " |

All candidates registered for post doctoral certificate courses completed their training satisfactorily in December 1996. The details are given in Table-7.

Table:7

| Name of candidate | Speciality |
|---------------------------------|----------------------|
| Dr. SUNIL T.PANDYA | PDCC-Anaesthesiology |
| Dr. GOPALAKRISHNAN.R | " |
| Dr. KELKAR SUMEDH RAMCHANDRA | " |
| Dr. PRAMOD.M.G | " |
| Dr. SURESH.C. | " |
| Dr. NIRMALA SOUNDARA RAJAN | " |
| Dr. RAGHAVAN ASHOK | PDCC-Radiology |
| Dr. SREEKUMAR.K.P. | " |
| Dr. VIJAYSINH MOHANSINH THAKORE | Vascular Surgery |

M P H Programme

With the objective of training health personnel to analyse the health situation and devise appropriate policies and programmes in a cost-effective manner, a four semester Master's course in Public Health (MPH) was started in January 1997. Eight candidates were admitted to the programme. The course is multidisciplinary in character and integrates material from and adopt the approaches of social, economic and health sciences.

Diploma / Certificate courses

List of successful candidates for Diploma and Certificate courses is given in Table-8.

Table: 8

| Name of candidate | Speciality |
|-----------------------|-------------------------------------|
| Mr.A.P. ROY | Advanced Medical Imaging Technology |
| Mr.JOHN.K.PHILIP | " |
| Mr.NISHA ZACHARIAH | Operation Theatre Technology |
| Mr.JACOB JOHN | Cardiac Laboratory Technology |
| Mr.RAYMOL KURUVILLA | " |
| Mr.RAJESH M.G | Neuro Technology |
| Mr. GEORGE JOSEPH | " |
| Mr. MANJUSHA KUMARI.V | Blood Banking Technology |
| Mr. CELINE THANKACHAN | " |

Table. 9: List of successful candidates for Post Basic Certificate Programme

| Name of Candidates | Speciality |
|----------------------|---------------|
| Ms. Ambili. A | CVT Nursing |
| Ms. Ancey Jacob | " |
| Ms. Bindu Michael. N | " |
| Ms. Leela Joseph | " |
| Ms. Ligi Manuel | " |
| Ms. Preethy John. K | " |
| Ms. Sabitha Joseph | " |
| Ms. Suja. K.G | " |
| Ms. Usha. G | " |
| Ms. Ambily Bhaskar | Neuro Nursing |
| Ms. Aneena Sebastian | " |
| Ms. Beena. M | " |
| Ms. Jessy Mole. M | " |
| Ms. Resmy Joseph | " |
| Ms. Shinyamol. K | " |
| Ms. Sindhu. T.T | " |
| Ms. Soosan Iype | " |

Short term Training/ Observership

The demand for short-term training/observership in procedures, techniques and management was again on the increase. The Institute was

constrained to put certain restrictions, due to the inordinately high demand in some areas. It was decided to levy fees from those observers/trainees who are sponsored by private organisations within the country.

National Science Day

National Science Day was celebrated in the Institute. Second year students from Trivandrum Medical College and students from Government Vocational Higher Secondary Schools were taken on an educational tour of the Institute to introduce them to the concept of integrating bio medical science with technology for better patient care. Various departments / divisions of the hospital complex, the Biomedical Technology Wing and Achuta Menon Centre for Health Science Studies extended enthusiastic support for the success of the programme.

LIBRARY

MRS. R. PRASANNA KUMARI MA, MLISc
Librarian cum Documentation Officer

MRS. S. JAYAPRABHA BA, BLISc
Librarian cum Documentation Officer Gr II

MR. JAYACHANDRA DAS. BSc, MLISc
Librarian cum Documentation Officer Gr II

During 1996-97, the library continued to consolidate the developments in information technology to improve its services. There was a marked increase in the number of external users who availed the various services of the library like reprographic services, and online information services. Information, communication and networking technologies made considerable impact on the quality and quantity of the services. The INTERNET facility became popular with the medical community of the Institute and a good number of users learning to navigate the cyberspace.

Collection

The library collection consisted of 16,950 books and 14,832 bound journals besides video cassettes, patents, standards, microfilms and compact discs. The library acquired 750 books and subscribed to 318 journals. 50 journals were received as gratis during the year.

Information Services

The library facilities and services continued to be extended to neighbouring institutions. Constant updating of the search keyword profile of the users resulted in the enhancement of the SDI service. The NIC-SCTIMST Biomedical Information Services of the library showed qualitative and quantitative improvement. The library retrieved more than 30,000 references from MEDLINE database during the year in more than 500 searches. The other databases searched during the year were AIDSLINE, Science Citation Index, Excerpta Medica-Neurosciences and Cardio-sciences in CD, BIOSIS, ADONIS full text database and Current Contents database on Diskette on three subjects - Life Sciences, Engineering Computing and technology ; Physical, Chemical and Earth Sciences.

Computer Facility

To face the challenges posed by Information Technology and INTERNET, action was initiated to upgrade the computer facility of the library with a Pentium Pro Server , 3 multimedia nodes and 3 pentium nodes.

Nursing Education

Mrs. P.P. SARAMMA, M.Sc(Nursing)
Instructor in Nursing

The ninth batch of Post Basic Certificate students in Cardiovascular and Thoracic Nursing, and the fifth batch of Neuronursing students successfully completed their programme in December 1996. Currently, twenty students are undergoing training in these two programmes.

Graduate and postgraduate nursing students from institutions within the state and outside were provided clinical experience for varying periods.

Public Relations

Mrs. T. V. HEMALATHA,
M.A, L.L.B, P.G.D.J.
Public Relations Officer

Public relations section was responsible for the publication of News-letters, arranging "Meet the Press" programmes and monitoring the implementation of the official language.

Medical Illustration

Mr. G. LIJIKUMAR
Chief Technician.

High quality projection slides and photographs were prepared for over 80 scientific papers published during the year and for papers presented in national and international conferences.

The computerised slide making machine significantly improved the quality of the multicoloured slides, texts and charts.

Achutha Menon Centre for Health Science Studies

DR. T. N. KRISHNAN PH.D
Honorary Professor (Till 07.09.96)

DR. V. RAMANKUTTY MD, MPHIL, MPH (Harward)
Associate Professor

DR. R. S. VASAN MD, DM, FACC
Associate Professor

DR. P.SANKARA SARMA PHD
Assistant Professor

DR. MALA RAMANATHAN PHD
Assistant Professor

Routine activity included teaching, weekly journal clubs, debates, public-health-related field visits and organisation of workshops and exhibition. The Master's Course in Public Health was launched with eight students.

Research activity related to the public health aspects of rheumatic fever & rheumatic heart diseases, blood pressure, heart failure, and coronary risk factors.

The John D. and Catherine T. Mac Arthur Foundation awarded a grant for \$ 400 000 for establishing the MPH course. \$ 100 000 of this grant is earmarked for developing library facilities and the rest of the amount for overseas visiting faculty, and for training of the Centres' faculty abroad.

Important Visitors to the centre included

Dr Hans Rosling,
Karolinska University, Sweden,

Dr. Harcharan Singh
Former Planning Commission
member,

Dr. Richard Cash
Harvard University,

Dr. K.B. Pathak
IIPS, Bombay and

Dr. Rick Homans
University of North Carolina.
They spoke on topics of
relevance to public health.

The AMC organised a workshop on "Gender and violence" on Feb 22, 1997 jointly with the Centre for Development Studies, Thiruvananthapuram. ■

Departmental Reports

Department of Anaesthesiology

DR. K. MOHANDAS MD

Professor & Director of the Institute.

DR. R.C. RATHOD MD

Professor & Head

DR. (MRS) A. ROUT MD

Additional Professor (on leave)

DR. H.D WAIKER MD

Additional Professor

(till 30.09.96)

DR. (MRS) RUPA SHRINIVAS

MD, Dip NB

Associate Professor

DR. G. SURESH MD

Associate Professor

DR. PIUS K. MANAVALAN MD

Associate Professor (till 5.10.96)

DR. THOMAS.A.KOSHY MD

Assistant Professor.

DR. SHRINIVAS V

GAND HINHLAJKAR MD

Assistant Porfessor

DR. PRASANTA KUMAR DASH

MD

Assistant Professor

(from 30.04.96)

Dr. RAGHUNATH SREEDHAR

NALGIRKAR MD

Assistant Professor

(from 30.05.96)

Dr.V.K. SATHYAJITH MD, Dip.NB

Consultant (Ad-hoc)

Dr. RATAN GUPTA MD, Dip.NB

Consultant (Ad-hoc)

Dr.C.SURESH MD

Consultant (Ad-hoc)

Dr. M.G. PRAMOD MD

Consultant (Ad-hoc)

Sri GANAPATHY POTTI

Scientific Assistant

Candidates for Post Doctoral Certificate Course

Dr. Sujatha.P

Dr. Deepali Aravind Dalal

Dr. Jami Sridhar

Dr. C.Ganesan

Dr. Nagaraja Gowda

Dr. Jayashree S. Kore

Table: 10.

Anaesthesia support given during the year (1996-97)

| Procedures | Number |
|---|--------|
| Open heart surgery | 657 |
| Thoracic, Vascular & closed heart surgery | 602 |
| Neurosurgery | 697 |

Anaesthetic services were also provided for investigational and interventional radiological and cardiac procedures.

Postgraduate students in Anaesthesiology from the Medical College at Trivandrum, Calicut, Goa and Belgaum underwent short term training/ observation in the department.

Anaesthesiologists from Bhopal, Baroda and Munnar spent short periods in the department as observers. ■

Division of Biochemistry

DR. K. SUBRAMONIA IYER, Ph.D
Professor

DR. P. S. APPUKUTTAN, Ph.D
Additional Professor

DR. N. JAYAKUMARI, Ph.D
Associate Professor

SMT. SHANTA A. GEORGE, M.Sc
Scientist

DR. P. L. JAISON, Ph.D
Research Associate (Till November 1996)

SMT. K. I. ANNAMMA, B.Sc.
Scientific Assistant

SRI. B. SASIKUMAR, M.Sc
Scientific Assistant

The Central Clinical Laboratory functioned round the clock providing investigations in clinical chemistry, hematology and clinical pathology. The total number of procedures touched 3.54 lakhs which was 23% higher than that of the previous year. With a view to providing effective support for the care and management of epileptics, assays were introduced for anticonvulsant drugs like phenytoin, phenobarbital, carbamazepine and valproic acid. Estimation of neuraminic acid was started to facilitate the diagnosis of sialidosis.

Dr. P.L. Jaison was awarded a post doctoral fellowship at the Tufts University School of Medicine, Boston, USA. Dr. Fairwell Thomas from National Heart Lung and Blood Institute,

Bethesda, USA, visited the Division and held discussions on the current trends in research on lipoprotein metabolism.

The new equipments procured during the year included Sorvall RC5B Plus refrigerated centrifuge, Nikon Labophot-2 microscope and Vitalab 31 photometer.

A project on brain glycoconjugate recognition by serum sugar-binding antibodies was initiated. Using formalin-fixed paraffin-embedded human brain tissue and peroxidase labelled human serum antibody, it was demonstrated that human brain glycoconjugates bear terminal-linked galactose units (TAG). Similarly, labelled peanut agglutinin was used to demonstrate presence of

exposed T-antigen in human brain. Since autologous antibodies to both TAG and T-antigens exist in serum, these observations are significant in autoimmunity. Human serum T-antigenic glycoproteins which may neutralise or stimulate anti-T-antibodies that are crucial in anti-tumour defence were detected and purified using peanut agglutinin. An ELISA was developed for detection of serum antibodies specific for terminal-galactoside groups of bacterial lipopolysaccharides. An enzyme-linked lectin assay (ELLA) for tumour-specific T-antigens in biological samples was also developed using enzyme labelled peanut agglutinin. Using enzyme labelled lectins and Western blot, it was demonstrated that

glycoproteins co-purified with bovine heart lectin are endogenous ligands for the latter.

A study on the efficacy of allopurinol as a free radical scavenger was taken up in patients undergoing valve replacement surgery. In the placebo group at the immediate reperfusion period, lipid peroxide level was found to increase several-fold compared to the pre-operative value and a maximum rise was observed at 5 minutes of reperfusion. Study

on patients receiving allopurinol prior to reperfusion was in progress.

In order to examine the importance of micronutrient vitamins such as vitamin E, C and β -carotene in human health, the department conducted a study on healthy subjects. Normal sera were subjected to oxidation induced by copper ions. The status of antioxidant vitamins and the extent of lipid peroxidation were monitored over different time periods of oxidation. ■

Division of Blood Transfusion Services

DR. JAISY MATHAI MBBS,DCP
Chief Blood Transfusion Officer

DR. P. V. SULOCHANA MBBS
Blood Transfusion Officer

DR. SATHYABHAMA MBBS
Blood Transfusion Officer

The division provided round the clock service to surgical and medical specialities.

Introduction of guidelines for transfusion therapy (MSBOS - Maximum Surgical Blood Order Schedule) and Typing and Screening for antibodies have changed the blood usage pattern and provided scope for efficient utilization of available blood resource. Use of blood components (Concentrated cells, fresh frozen plasma, (77p) Platelet rich plasma (PRP) and liquid plasma (SDP) went up to 75%. These were possible

through the continuous effort of the Hospital Transfusion Committee.

- Screening of blood donors for Hepatitis C virus started ensuring safer blood transfusion practice.
- Enrolment of voluntary donors through blood grouping camps formed an important part of routine activity.

The division addressed

- (i) Study of the prevalence of infectious markers in blood donors.

- (ii) Assessment of platelet yield by employing different centrifugation variables in platelet preparation.
- (iii) Introduction of Maximum Surgical Blood Order Schedule (MSBOS) and Type & Screen as pretransfusion workup for optimization of blood.
- (iv) Study of storage lesions in CPDA blood bags and quality control during storage of blood in the hospital and transportation.
- (v) Standardization of cryopreservation of blood samples and its deglycerolization.
- (vi) Study of the incidence of post Transfusion Hepatitis on patients.
- (vii) Rh Genotyping of blood donors.

(viii) Comparison of ELISA Screening Kits for HIV.

Essential equipments for blood collection and serological work like:

Bench top centrifuges
Water baths
Incubators
Refrigerator
Blood bag stripper & sealers
Cell Washer - Bacter
Tube Sealer - Terumo were added.

Joint collaborative research activity in progress:

- (i) Screening of blood donors for HTLV-I with the Division of Microbiology in collaboration with the University of Tokyo.
- (ii) With the Thrombosis Research Unit of BMT Wing, the division continued to give support for the preparation, standardisation and evaluation of fibrin glue as topical sealant and platelet concentrate preparation for raising antibodies specific for detection of platelet activation.
- (iii) With the Rajiv Gandhi Centre for Biotechnology, Trivandrum, comparative study of the correlation of Hepatitis C virus antibody

positive, blood donor samples by ELISA and PCR techniques.

Following important persons visited the division

1. Dr Ira Ray, Director National Institute of Biologicals, New Delhi.
2. Takaimi Istida of Department of Anthropology, University of Tokyo, Japan.
3. Evert Jan Klip Director R&D Technology Transfer, NPBI, Netherlands.

5 Medical officers sponsored by the State AIDS Cell underwent one month training Blood Banking.

- Dr.Jaisy Mathai & Dr. P.V Sulochana Prepared a "Users Manual and Guidelines for Transfusion Practice" on behalf of Hospital Transfusion Committee.
- A detailed predonation questionnaire for blood donors was introduced for thorough screening of blood donors.
- Shri Sivan kutty, Honourable Mayor of Trivandrum, visited SCTIMST Blood Bank for inaugurating a voluntary blood donor forum on the eve of Gandhi Jayanthi, '96. ■

Department of Cardiology

DR. K. G. BALAKRISHNAN MD, DM, FAMS, FACC

Professor & Head (on leave)

DR. JAGANMOHAN A. THARAKAN MD, DM

Professor

DR. THOMAS TITUS MD, MNAMS(MEDICINE) DM

Additional Professor

DR. RAMAKRISHNA PILLAI MD, DM

Associate Professor (on leave)

DR. V. AJITH KUMAR MD, DM

Associate Professor (on leave)

DR. ANIL BHAT MD, DM.

Associate Professor

DR. S. SIVASANKARAN MD, DM, DIP NB (CARDIOLOGY)

Assistant Professor

DR. BIMAL FRANCIS, MD, DM

Assistant Professor

DR. SUSAN GEORGE MD, DM

Assistant Professor

DR. K.R. SYAM SUNDER MD, DM

Assistant Professor

DR. P.KADER MUNEER MD, DM

Assistant Professor (Ad-hoc)

DR. P.K. JOSEPH MD, DM

Assistant Professor (Ad-hoc)

MR. VIJAYASENAN BSc.

Scientific Assistant

Candidates for DM:

Dr. Buvanesh Babu MD

Dr. K.U. Natarajan MD

Dr. S. Manoj MD

Dr. K. J. James MD

Dr. G. Justin Paul MD

Dr. Harikrishnan MD

Dr. Nageswara Rao MD

Dr. C. Rajiv MD

Dr. K. Siva Kumar MD

Dr. K.P. Balakrishnan MD

Dr. Mahesh MD

Dr. C. Mohamed MD

The out-patient statistics for the Cardiology Department shows that 5691 new patients were registered in the year 1996-1997. There were 2109 admissions to the hospital

during the same period. A majority of admissions was for cardiac catheterisation studies and interventional procedures.

Table: 11. Different Procedures Performed During the Year

| Procedure | Number |
|---|--------|
| Coronary angiography | 679 |
| Cardiac catheterisation | 531 |
| Cardiac Catheterisation with Coronary angio | 91 |
| Electrophysiological Studies | 45 |
| PTCA | 41 |
| PTCA with Stent | 17 |
| Balloon mitral valvotomy | 16 |
| Balloon Pulmonary valvotomy | 27 |
| RF ablation for SVT | 4 |
| Pacemaker Implantation | 77 |
| Balloon Atrial Sestostomy | 20 |

The department organised a workshop on 'Coronary angioplasty and Coronary stenting' in June 1996 and 4 patients underwent Coronary angioplasty with stenting with excellent results. Dr. Mathev Samuel, Cardiologist at Apollo Hospital, Madras, participated in the workshop. The department also implanted the first ICD (implantable Cardioverter Defibrillator) during 1996-97 with the help of Dr. Kler, Cardiologist at Escorts Hospital, Delhi.)

With the installation of the BARD Electrophysiology recorder, the department undertook electrophysiologic studies on underlying mechanisms of various cardiac arrhythmias and also carried out radio frequency ablation procedures on 4 patients with intraventricular arrhythmias. The department routinely carried out Dual Chamber Pacemaker Implantations during the year. Dr. S. Manoj was awarded the best paper award at CSI (Kerala Chapter) conference held at Palghat, in Dec. 1996, for the paper 'PTCA with Coronary Stenting'.

Department of Cardio Vascular and Thoracic Surgery

DR. M. P. MOHAN SINGH, F.R.C.S (ENG), F.R.C.S(EDIN)
Professor & Head

DR. K. S. NEELAKANDHAN. M.S,MCH
Professor

DR. R. SANKAR KUMAR. M.S,MCH
Additional Professor

DR. K. G. SHYAMKRISHNAN. M.S, MCH
Additional Professor

DR. M.UNNIKRISHNAN M.S, MCH
Additional Professor

DR. S. R. KRISHNAMANO HAR M.S,MCH
Associate Professor

DR. S. K. NAIR M.S, MCH
Associate Professor

DR. AVINASH DAL M.S, M.CH
Assistant Professor(Ad-hoc)

MR. THOMAS MALIAKKAL
Scientific Assistant

Candidate for M Ch Course in CVTS

Dr. Sandeep Attawar
Dr. Mohammed Akbar Bhat
Dr. Shipra Gupta
Dr. Ravindrasingh Rathor
Dr. Sandeep Shrivastava
Dr. Joseph Xavier
Dr. Avjit Basu
Dr. Vijit Koshy Cherian
Dr. Jigeesh Doshi
Dr. Jayant Kumar
Dr. Devananda N.S
Dr. Jacob Jamesraj
Dr. Apurvakumar Sarma

Routine clinical work included outpatient and inpatient management and the perioperative management of 1456 patients who underwent a variety of surgical procedures (Table:12). Of the 1456 cases 818 were open heart operations.

Teaching and training programmes including graded responsibility, were conducted for the M.Ch students.

The Chitra vascular graft was approved for limited clinical trials by the Ethics Committee. On going project on total chordal preservation with M.V.R

(using Starr-Edward valves) was in progress. The technique was used in 30 patients.

Intra Aortic Balloon Pump and sequential pacing (external) box were procured during the year.

Table :12
List of cases done in 1996-97

| Type of cases | Number |
|---------------|-------------|
| CABG | 215 |
| ASD | 222 |
| VSD | 59 |
| ICR | 189 |
| AVR | 18 |
| MVR | 81 |
| DVR | 26 |
| MV Repair | 8 |
| CMV | 127 |
| PDA | 107 |
| LUNG | 68 |
| ANEURYSMS | 48 |
| VASCULAR | 68 |
| SHUNTS | 34 |
| OTHER | 186 |
| Total | 1456 |

Division of Cellular and Molecular Cardiology

DR. C.C. KARTHA, MD. FASC.
Professor & Head

DR. K. SHIVAKUMAR, PH.D.
Scientist

DR. R. RENUKA NAIR, PH.D.
Scientist

DR. JOHN T. EAPEN, PH.D.
Scientist

The Division focused on pathogenetic mechanisms of the cardiomyopathy of magnesium deficiency and arterial calcification using animal models.

A significant achievement during the year was the successful completion of experiments to delineate structure-function relationship in the cardiac lesions of rabbits fed a magnesium-restricted diet and administered cerium - adulterated water. Dr. Arthur Vijayan Lal and Dr. Uma Shankar of Biomedical Technology Wing helped in recording electrocardiogram, intraventricular pressures, dp/dt and (dp/dt)/P in anaesthetised, intubated and open-chested animals. The results of histology, elemental analysis and collagen estimations are awaited for correlative analysis. These experiments are a component of the studies to evaluate the geochemical hypothesis on the causation of the tropical cardiomyopathy, endomyocardial fibrosis.

Given the role of cerium in the causation of the disease and the earlier report that nanomolar levels of the element enhance collagen synthesis in cardiac

fibroblasts, the mechanisms underlying fibroblast stimulation or proliferation were probed using cardiac fibroblasts.

Vitro investigations were carried out to study the effect of magnesium deficiency on contractility of cardiomyocytes using isolated cells and a video-based edge detection device. The observation that the contractile response to suboptimal levels of extra cellular magnesium differs according to the age of the animals from which the cells are harvested prompted investigations into the underlying cause of the variation.

In animal studies, magnesium deficiency was found to promote reparative fibrogenesis in the heart following free radical - induced damage to the myocardium. Evidence was obtained for increased lipid peroxidation and depressed antioxidant defence in the myocardial tissues from magnesium-deficient animals. The temporal relationship between oxidative damage, expression of growth factors and collagen synthesis is being defined.

A clinical study of trace element profile of serum in malnourished children during episodes of diarrhoea and acute infections was also completed.

As part of the ongoing research on the relation between arterial calcification and vitamin D, aortic calcification was induced in rabbits by administering the vitamin through intramuscular injections. Techniques were standardised to estimate 1,25 (OH)₂D₃ receptor levels and calcium uptake in aortic smooth muscle cells. Attempts were being made to relate histologically and biochemically proved calcification in aorta with 1,25 (OH)₂D₃ receptor levels and calcium uptake in vascular smooth muscle as well as levels of lipid, vitamin D and calcium in serum.

A binocular microscope and a stimulator for electrical stimulation of cardiomyocytes were purchased during the current year.

Postgraduate students from the School of Environmental Sciences, MG University, Kottayam, underwent training in the use of atomic absorption spectrophotometer. ■

Division of Microbiology

DR. J.SHANMUGAM, PH.D (MOSCOW), M.D (HON.)

Professor and Head.

MRS.MOLLY ANTONY, MSc., D.M.V.

Assistant Professor

DR.MURALIDHAR K. KATTY, PH.D

Assistant Professor

MR.M.RAVINDRANATH, B.Sc,

Scientific. Asst.

MRS.K.NASEEMA, M.Sc

Scientific Assistant

The routine microbiological investigations increased significantly compared to the previous year, particularly in diagnostic bacteriology. In the virology section, four more investigations were conducted during the year-IgG & IgM ELISA techniques for the diagnosis of viral (Rubella, CMV & EBV) and protozoal infections (T.gondii).

All diagnostic data were computer -analysed periodically.

Table: 13
Laboratory Investigations:

| | |
|--------------|-------|
| Bacteriology | 13430 |
| Immunology | 9952 |
| Virology | 460 |

Studies on sternal wound infections among cardiac surgery patients revealed the carrier state of potential pathogens like staph. aureus, staph. epidermidis, Klebs pneumoniae and Ps aeruginosa.

Another study was in progress on the efficacy of various hospital disinfectants against pathogenic bacteria causing nosocomial infections.

Postgraduate students of the Sree Sankara College, Kalady, carried out their dissertation work in the department. A joint epidemiological study was initiated on the prevalence of HTLV-1 infections in Kerala, in collaboration with Dr. Takafumi Ishida of the University of Tokyo.

Dr.Kalyan Banerjee, Director of the National Institute of Virology, Pune and Dr. Vasant Pandit, former Director of the Pasteur Institute, Coonoor, Nilgiris visited the Division.

M.D students from the Trivandrum Medical College underwent two months training in Tissue Culture and Virological Techniques.

Six M.Sc final year students from MG University, Kottayam spent two weeks to learn Immunological and Virological techniques.

B.Sc MLT Students from the Priyadarsini Institute of Paramedical Sciences, Trivandrum, also underwent two weeks training in the department.

Five medical microbiologists working in various Hospitals in Kerala underwent short-term training. "Hospital Infections Awareness Week" was organised in collaboration with the Nursing Staff of the Institute.

Two Binocular Microscopes, a ELISA Strip Reader, and a horizontal model Autoclave were procured.

Department Of Neurology

DR. K. RADHAKRISHNAN MD, DM, MNAMS

Professor and Head of the Department

DR. C. SARADA MD, DM.

Additional Professor of Neurology

DR. M. D. NAIR MD, DM.

Additional Professor of Neurology

DR. SANJEEV V. THOMAS MD, DM, DIP. NB. (ON LEAVE)

Associate Professor of Neurology

DR. ASHA KISHORE MD, DM.

Assistant Professor of Neurology

DR. P. A. SURESH MD, DM.

Assistant Professor of Neurology

DR. ABRAHAM KURUVILLA MD, DIP. NB, DABN (NEUROLOGY),
DABN (Cl.-NPH)

Assistant Professor of Neurology

DR. B. SANTHOSH KUMAR MD, DM.

Assistant Professor of Neurology (ad hoc)

DR. S. DINESH NAYAK MD, DM.

Assistant Professor of Neurology (ad hoc)

Candidates for DM

Dr. B. Reghunath MD.

Dr. Joseph Cherian MD, Dip. NB

Dr. Mathuranath Dip. NB

Dr. Lally Alexander MD.

Dr. P.N. Sylaja MD.

Dr. Sudeep Balakrishnan MD.

Dr. Jacob MD.

Dr. Sujatha MD.

Dr. Jairaj Pandian MD.

Dr. Beena MD.

Routine activities

There was a steady increase in the various services provided by the department. The outpatient service included a variety of special clinics in addition to regular neurology clinics (see

box). Epilepsy clinics were held twice weekly to shorten the waiting period.

| Special Clinic | Day |
|-------------------------|-------------------|
| Movement Disorder | Monday |
| Neuromuscular Disorders | Tuesday |
| Epilepsy | Wednesday, Friday |
| Behavioural Neurology | Thursday |
| Stroke | Friday |

The laboratory services also registered an increase in the procedures : 1808 EEGs compared to 1346 last year, and 1661 ENMGs compared to 781 last year. Sixty-nine VEEGs were performed. The number of patients operated for intractable epilepsy reached 65. Nearly 80% of them are seizure free.

Research Activities

The department had initiated a number of new research projects during this year in addition to consolidating the already operating projects. Ten research projects were underway on diverse neurological aspects relevant to Kerala state. A large epidemiological survey of epilepsy in Central Kerala was initiated during this period. The phase I was successfully carried out in which 12000 suspected cases of epilepsy had been identified from a population of 2.5 lakhs residing in 10 panchayats belonging to

three districts of Central Kerala, namely Thrissur, Malappuram and Palakkad. Phase II part of the survey is in progress and is expected to be completed by October 1997.

Comprehensive Epilepsy Program

The Comprehensive Epilepsy Program saw new milestones by completing over sixty-five anterior temporal lobectomies and initiating corpus callosotomy for intractable multifocal seizures such as in Lannox Gastaut Syndrome. Intracarotid amygdala (Wada) test was done on a regular basis. An outreach clinic for epilepsy was started in collaboration with a local hospital in Perumpilavu, a remote village about 350 kilometers north of Trivandrum. The award for the best scientific paper presented during the NSI Meeting, Cochin, March 1997, was won for the work on intractable epilepsy. The outcome of surgical treatment of intractable epilepsy was also presented at the Asian-Oceanian Epilepsy Congress at Seoul, Korea, September, 1996 and the First National Meeting on Intractable Epilepsy at CMC, Vellore, October 1996.

Two more digital EEG machines were installed in order to minimise the waiting period. Four new beds were added in the Neurology ICU to cater to a greater number of critically ill patients. ■

Department of Neurosurgery

DR. DAMODAR ROUT M.S., M.Ch., FAMS
Professor (On leave)

DR. N. SURESH NAIR, M.Ch.
Additional Professor in Charge

DR. M. BHASKAR RAO, D.M. NB.
Assistant Professor

DR. UMA NAMBIAR, M.S., M.Ch.
Assistant Professor

DR. N. KURIEN, M.S., M.Ch.
Assistant Professor (Ad-hoc)

DR. RAJANEESH KACHHARA, M.S., M.Ch.
Assistant Professor (Ad-hoc)

DR. GIREEESH MENON, M.Ch.
Assistant Professor (Ad-hoc)

Candidates for MCh:

Dr. Sonal A. Thakker MBBS

Dr. Narendra K. Das MS

Dr. Prithvi Varghese MS

Dr. Ravi Gopal Varma MS

Dr. Parameswaran MBBS

Dr. Jain George MS

Dr. Ananda Babu MS

Dr. Satyendra Kumar MS

The department continued to get referrals of more and more complex intracranial problems.

The volume of operative work remained the same as in the previous year (Table). The emphasis was on surgery for aneurysms, skull base tumors, Cranio Vertebral - junction lesions and complex partial seizures of temporal lobe origin.

Dr. Sonal Thakker was awarded the best paper prize in Neurosurgery during the annual conference of the Neurological Society of India held in December, 1996.

Table : 14. Operative procedures performed during the year

| Diagnosis | Number of cases |
|---------------------------------------|-----------------|
| Aneurysm (patients 96) | 111 |
| Arteriovenous malformations | 6 |
| Acoustic neurinoma | 25 |
| Petroclival and other CP angle tumors | 21 |
| Pituitary tumors | 32 |
| Craniopharyngioma | 13 |
| Tumors of the base of skull | 28 |
| Intraventricular tumors | 16 |
| Surgery for epilepsy | 45 |
| CV Junction anomaly | 72 |
| Gliomas | 34 |
| Meningiomas (excluding skull base) | 30 |
| Intradural spinal tumors | 30 |
| Other spinal lesions | 64 |
| Cerebellar tumors | 17 |

Research Activities

In collaboration with the Thrombosis Group and Vivarium of the BMT Wing, animal experiments were conducted on the effect of fibrin glues in preventing C.S.F leak.

Ongoing research project on the effect of urokinase and papaverine on chronic vasospasm in an animal model of subarachnoid haemorrhage made significant progress.

1. Prof. MICHAEL R. GABB, Professor and Chairman, University of Greifswald, Germany visited the department and delivered a lecture on 'Neuroendoscopy - present and future'.
2. Dr. Madhavan Pisharodi, Neurosurgeon, Brownsville

Pain Research Centre, Brownsville, Texas, USA delivered a lecture on "Lumbar intervertebral disk stabilisation" Surgical techniques and early follow-up.

3. Dr. J.B. Peiris, Consultant Neurologist and Director, Postgraduate Institute of Medicine, University of Colombo visited the department.

M.Ch (Neurosurgery) trainees from NIMHANS (Bangalore) and Kottayam Medical College spent short periods in the departmental instruments as observers.

Important additions to the department were 2 ventilators, 2 Monitors, and a Defibrillator. ■

Division of Pathology

Dr. V. V. RADHAKRISHNAN MD
Professor & Head

Dr. S. SANDHYAMANI MD
Additional Professor

Dr. ANNAMMA MATHAI Ph.D
Scientific Assistant

During the year 1996-97, more than 800 surgical and medical pathology specimens from neuro and cardiac diseases were subjected to histopathological examination. Frozen - section diagnosis during intra-operative phase was performed in 200 patients. Routine

immunopathological investigations were undertaken in over 2500 patients. Besides these, muscle biopsies were conducted in 50 patients. All the enzyme histochemical techniques in cryostat sections were found to be very useful in the diagnosis of muscular and neuromuscular diseases.

As a part of the teaching programme for DM and M.Ch. students, regular case demonstration, clinico-pathological conferences and lectures were conducted. The department also helped the post graduates in their research programme.

A new project - "Development of an immunodiagnostic system for tuberculous meningitis - suited to laboratories in developing countries" was initiated during the year. A specific mycobacterial antigen was purified from the culture filtrates of *M. tuberculosis*. The physiochemical and immunological properties of this antigen was characterised. Specific antibody against this antigen was raised so that circulating mycobacterial antigen can be detected in patients with tuberculous meningitis.

A newly installed cryostat (Leica model 300c) was useful in frozen section diagnosis, muscle biopsies and immunofluorescence studies.

In collaboration with the Rajiv Gandhi Centre for Biotechnology, Trivandrum, a study on the molecular basis of brain tumours was initiated. The role of tumour suppressor genes and proliferation indices in brain tumours will be evaluated.

The ongoing DST-funded project "Studies on mucoid vasculopathy in Kerala" made

considerable progress. A simple and specific test, quantitative dye-detection method for mass screening urinary mucopolysaccharides (glycosaminoglycans or GAGs) to detect cases of mucoid vasculopathy, was standardised. Preliminary analysis showed large quantities of GAGs in aortas of patients with this disorder when compared with control tissue specimens obtained from another state (Karnataka). Elemental analysis, using ICPMS technique, carried out in collaboration with the Institute of Pathology, New Delhi, showed abnormal accumulation of copper and zinc, particularly the latter, in aortas of cases with mucoid vasculopathy.

Morphometric analysis of islets of Langerhans was carried out in bonnet monkeys which developed mucoid vasculopathy when fed a protein deficient, starch-based diet. Marked islet hypertrophy and hyperplasia were observed in these animals. Serum insulin levels, estimated in some of the monkeys, were found to be reduced, in spite of histological evidence of islet hyperplasia in the pancreas. These studies were aimed at understanding the pathogenesis of coronary artery and other vascular diseases and the insulin resistance syndrome, resulting from nutritional pancreatic diseases commonly seen in Kerala and other developing regions.

Prof. Robin Cooke, Karolinska Institute, Sweden, visited the department and held discussions.

Post graduate students in Pathology, Medical College Trivandrum, were trained in frozen section diagnosis and interpretation and muscle biopsies.

Department of Radiology

DR. A. K GUPTA MD

Additional Professor and Head

DR. SANTHOSH JOSEPH DMRD, MD

Additional Professor

DR. KESAV DAS. MD

Consultant (Ad-hoc)

DR. S. GAYATHRI

Consultant (Ad-hoc)

DR. PANKAJ MEHTA

Consultant (Ad-hoc till 10.01.97)

DR. N. K. PRABHU

Consultant (Ad-hoc)

DR. P. V SANTHOSH

Consultant (Ad-hoc)

DR. K.G. RAMAKRISHNAN

Consultant (Ad-hoc)

Table : 15. Routine Procedures done

| Procedures | Number |
|---------------------------------------|--------|
| Plain X-rays | 18729 |
| CT Scan | 2207 |
| MRI Scan | 2310 |
| Invasive Diagnostic procedures | |
| Cerebral Angiogram | 289 |
| Spinal Angiogram | 9 |
| Aortogram/Peripheral Angiogram/ | |
| IVDSA | 289 |
| Other Diagnostics | 40 |
| Interventional Procedures | |
| Cerebral Embolization | 68 |
| Balloon Angioplasty | 50 |
| Cerebral Thrombolysis | 6 |
| PLDD | 27 |
| Bone-Biopsy | 1 |
| Cerebral Chemotherapy | 6 |
| WADA'S Test | 31 |
| ERCP | 47 |
| Others | 16 |

Research Activity

Research activities in the department included:

Intervertebral disc ablation using Nd:YAG Laser

Development of barium sulphate impregnated hydrogel beads for embolization

MRI study of vascular lesions of the brain and aortoarteritis

Evaluation of different drugs in the prevention of restenosis following angioplasty.

Development of animal model of post subarachnoid haemorrhage vasospasm to establish the role of papavarine and urokinase in vasospasm.

Photodynamic Therapy for tumours

A joint collaborative research activity on 'Study of cranio vertebral region and relation of cerebellar tonsil in vivo using MRI' with the Department of Anatomy, Medical College, Trivandrum, was undertaken.

Dr. A Gangi, Consultant Radiologist, University School of Medicine Strasbourg, France, visited the department and delivered lectures on Laser ablation of Intervertebral disc and Osteoid Osteomas.

An International Workshop on use of Lasers in Medicine was organised in the Institute. ■

Biomedical Technology Wing

Biomaterials

DR. R. SIVAKUMAR, PH.D.
Leader

DR. A.C. FERNANDEZ, PH.D.
Scientist

DR. K. SREENIVASAN, PH.D.
Scientist

DR. PRABHA D. NAIR, PH.D.
Scientist

DR. T. RAMACHANDRAN, PH.D.
Scientist

SHRI. B. AJITH KUMAR, M.TECH.
Scientist (on leave)

DR. P. R. HARIKRISHNA VARMA,
PH.D.

Scientist

DR. ANNIE JOHN, PH.D.
Scientist

SHRI. NIRANJAN D. KHAMBETE,
M.TECH.

Scientist (on leave)

SHRI. R. SREEKUMAR, B.Sc.
Scientific Assistant (SEM)

SMT. C. RADHAKUMARY, M.Sc.
Scientific Assistant (Analytical)

i) Analytical Laboratory

(Dr. K. Sreenivasan &
Dr. Prabha D. Nair)

The analytical facilities in the laboratory such as HPLC, IR, Thermal analyzer system and Instron were extended to the R&D programmes of the Institute and on a chargeable basis to external organisations. A new FT-IR Spectrophotometer was installed in the laboratory.

ii) Molecular Imprinting

(Dr. K. Sreenivasan)

Research effort continued on molecularly imprinted polymers (MIPs), cyclodextrins and antibacterial materials. Synthesis of MIPs with selectivity towards clinically relevant molecules and cyclodextrin containing MIPs were carried out. Methods were also developed to synthesize

MIPs as films for applications as sensors and affinity separations. A composite matrix containing polyvinyl alcohol, alginate and silver ions was developed which has a potential in antibacterial wound dressing.

iii) Ophthalmic Sponge

(Dr. Prabha D. Nair and
Dr. R. Sivakumar)

The clinical evaluation of Ophthalmic Sponge at Sankara Nethralaya, Madras, was completed this year. The sterilization protocol for the sponge was also standardized. Subsequent to Technology Transfer of the know-how to M/s. FDC Ltd., Mumbai, training was imparted to the representative of the company. The Technology Transfer documents were also prepared and handed over to the industry.

iv) Polyurethane Membrane

(Dr. Prabha D. Nair)

A polyurethane membrane developed for use as a guided tissue regeneration membrane was evaluated in rabbit at the Dental College, Manipal. It was found to be dimensionally stable and functionally prevented the proliferation of fibroblasts. Work continued on the development of an IPN membrane for islet cell encapsulation as part of a project funded by the Department of Science & Technology.

v) Bioceramics and Glasses

(Dr. H.K. Varma,
Dr. Annie John and
Dr. R. Sivakumar)

The porous hydroxyapatite (HA) granules prepared by the

laboratory underwent clinical trials at (1) College of Dental Surgery, Manipal, under the supervision of Prof. B.R.R. Varma and (2) Department of Oral and Maxillofacial Surgery, Mangalore under Prof. Mohan Baliga. Effort was initiated to commercialise the technology of production of porous HAP granules.

A programme was initiated to develop bioglasses and bio-glass-composites using sol-gel techniques, a joint activity with Polymer Processing Group to develop HA - bioglass - polymer composites through injection moulding technique.

As a part of evaluation of different calcium phosphate ceramics, both in-vitro and in-vivo experiments with HA, B-TCP, HA-TCP composites was carried out. A new study on evaluating the osteo induction in porous HA and other materials implanted in heterotopic site (muscle) of mice was initiated.

vi) Microscopy

(Dr. Annie John and
Dr. H.K. Varma)

Tissues from the brain, blood vessels, pericardium and bone-implants were processed and studied using Transmission Electron Microscope (TEM). The samples were both from within and outside the Institute.

Scanning Electron Microscopy was heavily used by both the institute staff and outside

agencies like RRL, Kerala University, Manipal Dental College and Carborundum Universal Ltd., on payment basis. The samples ranged from polymer, metal, ceramics, dental composites and natural products.

vii) Laser

(Dr. T. Ramachandran)

In laser research, the thrust was on:

- 1) Development of fiber optic based-sensor
- 2) Laser applications in dentistry, specifically the rate of demineralisation of enamel.
- 3) Study of the effect of He-Ne laser and diode laser on bacteria and yeast for potential antibiotic therapy.

viii) Plant-based Products

(Dr. A.C. Fernandez)

A search for antibacterial and antifungal compounds was initiated by screening the plants based on Ayurvedic and other literature.

ix) Concentric Needle Electrode

Following a limited clinical evaluation at the Institute, a wider clinical evaluation and standardization of the product was planned with the participation of an industry. ■

Thrombosis

LISSY K. KRISHNAN, M.Sc., Ph.D.
Scientist Leader.

R. AJAY KUMAR, M.Sc., Ph.D.
Post Doctoral Fellow.

The routine activity related to in vitro evaluation of blood-material interaction, which included protein absorption, activation of coagulation, platelet activation and consumption of hemostatic components continued.

The DST funded research project "Monoclonal antibodies against B.TG and GMP-140 to detect clinical platelet activation" made significant progress.

Polyclonal antibodies against electrophoretically separated bone morphogenic proteins were raised in chickens. The purified antibody was expected to enable isolation and purification of sufficient quantity of bone morphogenic proteins in vitro and in vivo evaluation of its effect on osteo induction.

The isolation procedure for concentrating fibrinogen from single donor plasma units was standardised. The quality control procedures were also standardised. Methods to improve the shelf life of the product were worked out.

Evaluation of fibrin glue for its mechanical strength and efficacy in various surgical techniques was taken up with the help of the vivarium, the Departments of Cardiovascular and Thoracic Surgery and Neurosurgery. Mechanical strength was studied in rat models using skin grafts. Histological analysis of tissue reaction and healing effect of the glue was undertaken in collaboration with the Division of Pathophysiology.

The major steps completed included detailed literature and product review, development of target specification and conceptualization and development of new designs. A new method for the in-vitro evaluation of oxygen transfer characteristics using a blood analogue was developed successfully.

The Technology Transfer document on Jigs and fixtures for the heart valve was completed and support to TTK Pharma on problems related to valve production was extended.

Local Area Network of personal computers of the BMT Wing was successfully implemented by the group. The system now supports 32 terminals and has provision to handle 50 concurrent users. The present hardware consists of a 100 MHz Pentium server, 10 Mbps connectivity and provision to connect 55 terminals. The cabling system has been so designed that it can be easily upgraded to 100 Mbps when needed. Major software implementations are ISIS library information service, BMT Mail - internal e-mail

Artificial Internal Organs

DR. G.S. BHUVANESHWAR, M.S., Ph.D.
Engineer and Leader

SRI. C.V. MURALEEDHARAN, M.TECH.
Engineer

SRI. S. VIJAYAN, M.Sc.
Scientific Assistant.

The development of a hollow fibre-based membrane oxygenator sponsored

by SPIC Pharma Ltd., Madras made further progress.

system and a common virus protection umbrella.

The final report on the additional testing on vascular grafts was prepared for presentation of the results to the Ethics Committee. The vascular graft was cleared for the first phase of limited clinical trials in May 1996 by the Committee.

A project proposal in collaboration with Dr. Suryanarayan of the University of Paris and Mr. Sampeur, industrialist from France for the "Development of diamond like coatings for medical and other applications" was presented for funding by the Indo-French Council at New Delhi.

Biosurface Technology

DR. CHANDRA P. SHARMA, M.TECH., M.S., SC.D., M.E.B.E.
Scientist and Leader

DR. THOMAS CHANDY, M.SC., PH.D.
Scientist (on leave)

MR. P.R. HARI, AIE.
Scientific Assistant

Bovine pericardium (BP) was modified by the grafting of poly(ethylene glycol) (PEG) after glutaraldehyde crosslinking and evaluated for calcification in vitro and in vivo rat subcutaneous models. A co-matrix system was designed from chitosan and polyethylene vinyl acetate for the controlled delivery of aspirin/heparin or ferric/magnesium ions (drugs having synergistic effects in inhibiting the calcification). PEG-modified pericardium with the drug-loaded co-matrix was evaluated through a rat subcutaneous model and explanted samples were evaluated for calcification and alkaline phosphatase activity by biochemical, histological and electron microscopic techniques.

A procedure for co-immobilization of phenylalanine and heparin on PVA microspheres was standardised (for improved blood compatibility) for direct hemoperfusion application, without affecting the specificity in adsorption of IgG proteins significantly. Columns filled with this absorbent may be utilized for the specific removal of antibodies which belong to or consist of immunoglobulins of class G, i.e., antibodies such as anti-DNA, anti-GBM and circulating immune complexes.

An affinity membrane was prepared from cellulose membrane by immobilizing Cu^{2+} ions which act as a ligate to proteins. Effort was on to

evaluate specificity in the adsorption of proteins.

Poly(lactic acid)-coated, albumin-loaded (model protein) porous spherical HA particles were studied for sustained delivery. Slow release of upto 60 days was observed in vitro. The system coated with sodium alginate was studied for intestinal delivery of albumin.

An attempt was made to explain the adhesion of bacteria to various substrates based on theoretical calculations.

Pilot clinical evaluation of artificial skin/wound dressing based on chitosan alginate was in progress in collaboration with Dr. Binoy Varghese, Plastic Surgery Department, Medical College, Trivandrum.

Toxicology

DR. K. RATHINAM, M.Sc., Ph.D.
Scientist and Leader

MR. P.V. MOHANAN, M.Sc.
Scientist

MR. ASHOKAN K. KUTTIYIL, M.Sc.
Scientist (Temporary)

Toxicological evaluation involving intracutaneous irritation, and sensitization studies was carried out for the catheter and dental materials. Intramuscular implantation of catheter materials was also carried out.

Some of the other tests carried out included intracutaneous irritation, sensitization and sterility tests of ophthalmic sponge, haemolysis tests of different HAP materials, systemic, intracutaneous irritation, haemolysis, implantation tests of UHMWPE materials supplied, sterility tests of polyester fabrics, systemic, intracutaneous and haemolysis test of silicone rubber supplied by TTK Pharma., and sterility test of Needle electrode.

Bioburden estimation of aquaguard water, antibacterial properties of different materials

incorporated with antibiotics, bacteriological studies of polymer and silver bioglass materials were carried out, as microbiology based activity.

Cytotoxicity studies (Cytobiocompatibility) using in vitro mast cell systems, in vivo and in vitro cytogenetic studies (like, chromosomal aberration, and micronucleus studies) were carried out. Isolation and estimation of nucleic acids and proteins from different tissues treated with biomaterial extracts was established during the year.

The group also managed a small animal facility. An inter-institutional collaborative project with the Regional Research Laboratory, Trivandrum, on "Scientific analysis of tribal medicines and therapeutic uses - Diabetes", was completed this year.

with fibrin glue was done at different time periods. Post-surgery evaluation included healing at wound site and effect on adjacent liver and lung tissue morphology. Linear wounds made in duramater and sealed with fibrin glue were also evaluated.

- b) Hydroxyapatite granules as implants in mandibular cysts and as periodontal implants. Assessment of healing and bone formation was carried out at different time intervals.
- c) Treated bovine pericardial subcutaneous implants were evaluated for healing and evidence of calcification.
- d) Routine evaluation of histological response around intramuscular implants of polyester fabric and catheter material (rubber) at different time intervals.

Routine cytotoxicity tests were done with 65 samples using L929 fibroblasts. The samples included catheter material, ceramics, silver coated gel, polyurethane, bioglass and

Pathophysiology

DR. MIRA MOHANTY, MD.
Scientist and Leader

Histological evaluation for study of biocompatibility of the following materials was carried out:

DR. T.V. KUMARY, Ph.D.
Scientist

- a) Fibrin glue gross and histological evaluation of specimens of lungs and liver with stab wounds sealed

ophthalmic sponge. Tests were carried out as per ISO standards.

Investigations on cell-material interactions with ceramics, bioglass and carbon fibres using fibroblasts and osteoblasts were carried out. The studies addressed

morphological (Light & scanning microscopy) and functional changes.

Methods for collection and preparation of collagens from human placenta were standardized to initiate studies on feasibility of using it as a biomaterial.

Polymer

DR. M. JAYABALAN, PH.D.
Scientist & Leader

MISS. P.P. LIZYMOL, M.Sc.
Scientific Assistant.

Work on the development of hollow fiber haemodialyser was continued and the process variables for the development of polyurethane potting compound were finalised which became the subject of a new patent application.

Polyurethane-coated PVC sheets were made with reduced leaching and possessing weldability which could be optimized for the desired thickness of the modified PVC sheet.

Development of high flex life polyurethane for cardiac applications was started as a part of a Department of Biotechnology sponsored project. The designing of the polyurethane polymer for this speciality application was taken up by considering the nature as well as the concentration of

hard and soft segments. Soft segments possessing reduced concentration of either linkages and hard segments possessing reduced concentration of urethane linkages were incorporated. Hydroxy-terminated polybutadiene polyol and dicyclohexyl methane diisocyanate were used in combination with chain extender such as 1,4 butane diol, hexa methylene diamine and meta phenylene diamine. The polyurethane formed with diol chain extender and polyurethane-urea formed with diamine chain extender were characterised for tensile properties, molecular weight between cross-links and surface properties. Polymers prepared with higher concentration of polyol were found to have low tensile strength and molecular weight between cross-links.

However, all these polymers were found to be hydrophilic in nature. The stability of these polymers was investigated in vitro using Ringer's solution and phosphate buffered - saline. Polyurethane-urea polymers were found to be more stable than the polyurethane polymers. The stability of these polymers in environmental stress corrosion was found. No polymer underwent cracking. Determination of flexural fatigue life was initiated. ■

Polymer Chemistry

DR. A. JAYAKRISHNAN, PH.D.
Scientist and Leader.

SHRI. M.C. SUNNY, B.Sc., AIC.
Scientific Assistant.

The Division mainly concentrated on the development of blood compatible and migration-resistant polyvinyl chloride by means of phase transfer catalyst-mediated surface modification and also by chemical grafting of poly(ethylene glycol) onto the surface of PVC. Physical, mechanical and surface property evaluation of the modified PVC was carried out. Improvement was observed in blood-compatible properties and migration resistance. This has potential commercial application and Peninsula Polymers Ltd., Trivandrum, manufacturers of blood bags, expressed interest in the process. Continuing the work on modified PVC, a dithiocarbamate substituted PVC was synthesized and its potential for photocrosslinking was explored and physical, mechanical and surface property measurements were carried out.

Continuing earlier work which showed that polycaprolactone microspheres could act as a good carrier for sustained delivery of vaccines, attempts were made to prepare

polycaprolactone microspheres containing varying quantities of poly(ethylene glycol) as excipient in order to modulate the release of entrapped proteins. In vitro release studies showed that this technique could increase the rate of release of entrapped antigens.

Using both casein and chitosan microspheres cross-linked with glutaraldehyde and loaded with progesterone, it was shown in rabbit models, that both systems have the potential of sustaining steroid delivery for about five months by a single injection whereas injection of powdered steroid was not able to sustain serum concentration beyond the first week.

Floating type dosage forms were investigated in order to prolong the delivery of many oral drugs. In this regard, polycarbonate microspheres which were developed in the laboratory were found to float on gastric and intestinal fluids. Attempts were initiated to incorporate oral drugs into such microspheres.

Under the aegis of the Indo-French Centre for Promotion of Advanced Research, the

Division took up a proposal to prepare a state-of-the art report on controlled drug delivery using microspheres, nanospheres and liposomes in India and in France in co-ordination with the Faculty of Pharmacy, University of Paris Sud (XI), Paris. ■

Polymer Processing

DR. V. KALLIYANA KRISHNAN, M.Sc., Ph.D.
Scientist

MR. ROY JOSEPH, M.Sc., M.TECH.
Scientist

DR. P. RAMESH, M.TECH., Ph.D.
Scientist

i) Dental Composites

The clinical trials of light cured dental composite (3rd batch) were carried out at the Manipal Academy of Higher Education (MAHE) by Prof. Bhat and Prof. (Mrs.) Ashima Valiathan. It was observed that bond failure rate for Chitra light cure was favourable in comparison with the imported control samples. Surface staining problem was encountered and the composite was found comfortable to patients.

The following studies were carried out on dental composites:

1. The effect of the initiator and exposure time of light source and particle size of filler upon the mechanical properties.
2. Aging studies of radiopaque light curing composite in food simulating liquids.
3. Development of a radiopaque dental composite using indigenous Bis-GMA and an imported radiopaque glass made progress. Properties such as compressive and diametri-

cal tensile strength were evaluated. Toxicity studies were in progress.

The development of a bioactive cement using Bis GMA as resin matrix and glass filler was explored.

Physical properties such as shear strength and tensile strength of a class III bonding agent under development were evaluated.

The Technology Transfer activities of dental composite were continued by holding informal discussions with entrepreneurs.

ii) Urinary catheter development

The complete set up required for the performance evaluation of foleys catheter was made and a number of commercially available catheters as well as the catheters under development were tested.

The effect of aging of Foleys catheter in simulated urine was carried out. The various brands of catheters were tested and evaluated.

Attempts to reduce friction in foleys catheter resulted in the development of a process for reducing the friction coefficient by hydrogel coating. The process optimisation was in progress. For this, an apparatus for the measurement of coefficient of friction of biomaterials in aqueous environment was designed. The set up was fabricated at Tool Room and was used for the measurement of friction coefficient of a number of brands of commercially available catheters.

iii) Joint programme on development of urinary catheters with the Rubber Board, Kottayam.

1. Chemical analysis of a number of commercial catheters showed that all of them contained a rubber accelerator called dithiocarbamate. The qualitative evidence was further supported by UV absorption measurements.
2. Factors which affect the shrinkage parameter of rubber were identified. These data were required for the catheter mould design.
3. Six latex formulations were screened for cytotoxicity using cell culture. Even though the formulations passed the cell culture test, when tested for intra-cutaneous response in

rabbit, they were causing irritation. This is because additives such as accelerators do not migrate appreciably in extraction medium used for cell cultures, but get easily extracted in oil medium used for intracutaneous irritation test with resultant toxicity.

Detailed studies to compare and evaluate the irritation response of various rubber additives in animals were planned.

iv) New Product

A mould for Applanation Tonometer and plate was designed. The mould fabricated at the Tool Room was used to obtain a number of end plates. The contact angle was measured and suitable plastics were identified for making end plates with identical contact angles. One plunger unit for holding the end plates was also fabricated.

Technology Proving Facility

DR. G.S. BHUVANESHWAR, M.S., Ph.D.
Biomedical Engineer and In Charge

SHRI D.S. NAGESH, M.TECH.
Engineer

Cleaning and overall maintenance of the clean areas were carried out regularly and the facilities made available to various users.

In the development of Hollow fibre-based Membrane Blood Oxygenator, the fabrication and assembly of prototype oxygenator were taken up. The prototypes went through two rounds of modifications and improvements during this period.

TPF continued to give support to the Industry sponsored programme on pilot plant production of Chitra Heart Valves by M/s. TTK Pharma. During the year, about 360 valves were made in the facility for clinical use.

Post-pilot plant production support was also given to M/s. Hindustan Latex Ltd., for the Hydrocephalus shunt which was already under commercial production.

Technical Co-ordination Cell

SHRI. D. RANJIT, B.E. (ELECTL.)
Engineer

The Technical Co-Ordination Cell handled matters related to the Intellectual Property Rights

of the Institute, liaisoning between the scientists of the Institute and the Patent

Attorney M/s. L.S. Davar & Co., Calcutta. Five new topics were submitted as fresh Indian patent applications.

The status of the Institute's INTELLECTUAL PROPERTY RIGHTS was as follows;

| | |
|---------------------------|----|
| Patents sealed | 21 |
| Designs held | 12 |
| Patents filed and pending | 35 |

Attempts were made to convert the commercially viable patents into appropriate technology package, suitable for the Transfer of Technology by organising meetings between the scientists and the industry.

The cell also coordinated orientation courses for the Institute's Hospital Wing students and the guests who visited the B.M.T. Wing. It also provided SDI documentation service.

The Institute participated in the 84th Annual Indian Science Congress, held in the DELHI University in January, 1997.

A Science exposition detailing the Biomedical R & D activities of SCTIMST was organised at Thalasserry. ■

Engineering Services

SRI. O.S. NEELAKANTAN NAIR, B.Sc., ENGG.
Engineer and Leader.

SRI. V. RAMESH BABU, B.E.
Engineer

SRI. K.P.R. BHAS, DIP (ELEC. ENGG.)
Junior Engineer.

The division was instrumental in the fabrication of a number of dies and fixtures for various groups. Some of them were as follows:

1. A new fixture for the concentric needle electrode alignment and two fixtures to maintain the straightness of the electrode at final assembly stage.
2. Designed and fabricated a prototype model for the biological syringe system.
3. Fabrication of a mould and machining of a plunger unit for Applanation Tonometer.
4. Fabrication of two moulds for urinary catheters.

5. Fabrication of a fixture for measuring the coefficient of friction in polymer.
6. Machining of membrane oxygenator prototype & testing the set-up.
7. Cutting trials for membrane oxygenator components.
8. Fabrication of dialysis cells for permeability test.

In addition to the above, the operation and maintenance of utilities such as electric power supply, air-conditioning system, sanitary system as well as the panbit, incinerator, telephone exchange and maintenance of faculty quarters were carried out by the division.

Vivarium

DR. ARTHUR VIJAYAN LAL, B.V.Sc.
Veterinary Scientist & Leader

DR. P.R. UMASHANKAR, B.V.Sc., & AH.
Veterinary Surgeon / .Scientist

Large animals like calf, sheep, goat, dog and poultry were procured and maintained in this division for various surgical experiments. The availability of a well-equipped infrastructure for executing experimental

surgical procedures in the field of ophthalmic, dental, neuro and cardiac surgery provided necessary investigative support in safety and biocompatibility evaluation. The activities are listed below.

- 1) Animal studies using rabbit for the biocompatibility evaluation of silicone scleral buckling device were completed.
- 2) Adhesive and shear strength evaluation of fibrin glue was done on rat model.
- 3) Functional evaluation of the cardio-vascular system in a rabbit model of endomyocardial fibrosis
- 4) Animal studies on laser ablation of intervertebral disc were under way in a canine model.
- 5) Renal immobilization using radiopaque microspheres was done in a canine dog model to evaluate the microspheres.
- 6) Evaluation of neuro-surgical application of fibrin glue was attempted in a rabbit model.
- 7) Preliminary studies on membrane oxygenator were carried out.
- 8) Granular hydroxyapatite was tested for its application on cysts of mandible in a canine model.
- 9) Periodontal application of hydroxyapatite granule was evaluated in a canine model.
- 10) Osteoinduction study with hydroxyapatite in combination with certain proteins was studied.
- 11) Application of fibrin glue during vascular graft surgery was evaluated.
- 12) Aseptic collection of neonatal calf serum was standardized.

Technology Transfer Cell

SHRI. S. BALRAM, B.TECH.

Scientist

Current Status of the Technologies Commercialised by the Institute

Technology profiles of the know-how ready for commercialisation were made for attracting the attention of potential industrial partners. These profiles carried a brief outline of the products, the technology status, the estimates of demand, market and the investment required to be made by the industry. These profiles were widely distributed to various industries. Publicity was also given through advertisements in trade journals.

The Technology of Ophthalmic sponge was licensed to M/s. FDC Ltd., Mumbai, this year. In the case of Concentric Needle electrode, SPIC was identified as the industrial partner for a joint programme for further standardization and clinical evaluation. Drawing up of relevant MOUs and contracts with other institutions and industries was carried out. A regular follow up on the technologies already licensed and the royalties due to the Institute was also carried out.

Engineering Services

Dr. G.S. Subramanian, M.Sc., Ph.D.,
Professor and Leader

Dr. P. Anand Das, B.E.
Engineer

Dr. L.R. Das, D.Tech. (Mech. Engrg.)
Senior Engineer

The division was instrumental in the fabrication of a number of thin and thick film devices for various groups - School of Data Science, etc.

1. A new process for the synthesis of polyimides was developed and the synthesis of polyimides was carried out.
2. Design and synthesis of polyimides was carried out for the synthesis of polyimides.
3. Synthesis of polyimides was carried out for the synthesis of polyimides.
4. Synthesis of polyimides was carried out for the synthesis of polyimides.

Visitation

Dr. Anand Das, B.E.,
Visiting Scientist - Leader

Dr. P. Anand Das, B.E.,
Visiting Scientist / Scientist

Large number of thin film devices were prepared and measured in this division for various research projects. The availability of a well equipped laboratory for research projects.

Visitors & Guest Lectures

1. Mr. Paul D. Uhlenhaut, M/s Collins GMBH, Germany, 2nd, August, '96 Presented a talk on: "Modern equipments for the processing of Polymers"
2. Mr. Klaus Mozer, Technical Sales Manager, M/s. Haake GMBH., Germany 24th, February, 1997, Presented a talk on : "Torque rheometer for the processing of Polymers".
3. Dr. Joseph Akkara, Natick Research, Development and Engineering Centre, Natick, USA, visited the Biosurface Technology Lab on December - 9, 1996
4. Prof. Denis Labarre, The Faculty of Pharmacy, University of Paris Sud (Paris XI), France, visited the Polymer Chemistry Division from March 19-26, 1996.

He delivered the following three lectures:
 - (i). "Blood Compatibility of polymer surfaces with respect to the complement and the coagulation system."
 - (ii) "Long circulating nanoparticles which avoid macrophages by inhibiting complement activation."
 - (iii) "Functionalised polymer microspheres for embolization."
5. Dr. R. Suryanarayanan, Laboratories de Chimie des Solides, University of Paris-sud and Mr . Yvon Sampeur, Director of Innovation Couches Minces (both in France) visited the Institute in December 1996.
6. Prof. J.J. Rouby, Department D' Anesthesia Reanimation, Hospital Pitie Salpetriere, Paris, France. He delivered a talk on; "Nitric Oxide."
7. Dr. Yerkesh Batyrbekov, Institute of Chemical Sciences, National Academy of Sciences, Almaty, Kazakhstan, Worked for 3 months.

Current Status of the Technologies Commercialised by the Institute

| Sl No | TECHNOLOGY | COMPANY | STATUS |
|-------|---|--|--|
| 1. | Blood Bag System (Licensed to four companies through NRDC., New Delhi) | Peninsula Polymers, Trivandrum Hindustan Latex Ltd., Trivandrum Electromedical and Allied Industries Ltd., Calcutta J. Mitra and Co., New Delhi | Prduction Since 1985 Production since 1985 Project initiation stage Project Implementation Stage. |
| 2. | Rigid Shell Bubble Oxygenator and cardiotomy Reservoir | South India Drugs and Devices Ltd., Madras | Production since 1992 |
| 3. | Hydrocephalus Shunt | Hindustan Latex Ltd., | Production since 1994 Ltd., Trivandrum |
| 4. | Heart Valves (Through NRDC., New Delhi) | TKK Pharma Ltd., Madras | Limited Production since 1995 |
| 5. | Bone Wax | TTK Pharma Ltd., Madras | Production since 1995 |
| 6. | Ophthalmic Sponge | FDC Ltd., Mumbai | Licensed in 1996 |

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PATENTS FILED

List of new patent applications:

(a) Filed by **SCTIMST**;

1. "A PROCESS FOR GRAFTING POLYETHYLENE GLYCOL ONTO THE SURFACE OF PLASTICIZED POLY (VINYL CHLORIDE)".
*Dr. A. Jayakrishnan,
Ms. Laxmi S. Nair.*
2. "A PROCESS FOR THE DEVELOPMENT OF A POLYVINYL ALCOHOL & ALGINATE COMPOSITE MATRIX AS AN ANTI-BACTERIAL MATERIAL."
*Dr. K. Sreenivasan,
Dr. K. Rathinam,
Dr. R. Sivakumar.*
3. "BIOCOMPATIBLE CROSS LINKABLE AND NON-AROMATIC POLY URETHANE POTTING COMPOUND."
*Dr. M. Jayabalan,
Ms. P. P. Lizzymol.*
4. "A NEW PROCESS FOR REDUCING FRICTION COEFFICIENT OF RUBBER ARTICLES"
*Mr. Roy Joseph,
Dr. P. Ramesh,
Dr. R. Sivakumar.*

5. "A PROCESS TO PROTECT RELATIVELY UNSTABLE DRUGS DURING THEIR INCORPORATION INTO POLYMERS TO IMPART ANTI-BACTERIAL PROPERTIES."

*Dr. K. Sreenivasan,
Dr. K. Rathinam,
Mr. Asokan Kuttiyil.*

(b) Filed by **Regional Research Laboratory, Trivandrum & SCTIMST**;

1. "A NOVEL PROCESS FOR ANTI-DIABETIC PREPARATION FROM GYMNEMA SYEVESTRE"
*Dr. K. Rathinam,
Dr. K. Mohan Das,
Dr. R. Sivakumar,
Dr. J. Madhusudhana Rao,
Dr. A.D. Damodharan,
Dr. M.A. Sumathy Kutty,
Dr. G. Vijayan Nair.*
2. "A NOVEL PROCESS FOR ANTI-DIABETIC PREPARATION FROM THE ROOT NODULES OF HUM BOLDLIA DECURRENS"
*Dr. K. Rathinam,
Dr. K. Mohan Das,
Dr. R. Sivakumar,
Dr. J. Madusudhana Rao,
Dr. M.A. Sumathy Kutty,
Dr. G. Vijayan Nair.*

Externally Funded Research Projects

1. Title

- ☛ Characterization of glycoconjugates containing the generally tumour - related epitopes, terminal α -gal and T-antigen in normal and neoplastic tissue using Jacalin.

Principal Investigator:

P.S. Appukuttan

Funded by:

Council for Scientific and Industrial Research, New Delhi.

Duration : 3 years

Status : Ongoing

2. Title

- ☛ Interaction of human serum anti- α -galactoside antibody (anti-gal) with autologous brain glycoconjugates bearing corresponding epitopes.

Principal Investigator:

P.S. Appukuttan

Funded by:

Science, Technology and Environment Committee, Government of Kerala.

Duration : 3 years

Status : Ongoing.

3. Title

- ☛ Cellular basis of myocardial injury by cerium in magnesium deficiency.

Principal Investigator :

K. Shivakumar

Funded by :

Department of Science & Technology, New Delhi.

Duration : 4 Years

Status : Completed

4. Title

- ☛ Mechanisms of cardiac fibrogenesis in experimental magnesium deficiency.

Principal Investigator:

K. Shivakumar

Funded by:

Department of Science & Technology, New Delhi.

Duration : 3 years

Status : Ongoing.

5. Title

- ☛ Developing an animal model for endomyocardial fibrosis.

Principal Investigator:

C C Kartha

Funded by:

Indian Council of Medical Research, New Delhi.

Duration : 2 years

Status : Completed

6. Title

- ☛ Structural and functional changes in the myocardium due to suboptimal concentration of magnesium.

Principal Investigator:

R Renuka Nair

Funded by :

Roussel Scientific Institute, Mumbai.

Duration : 4 years

Status : Completed

7. Title

- ☛ Stimulation of Cardiac fibroblast proliferation by lanthanides.

Principal Investigator :

R. Renuka Nair

Funded by :

Indian Council of Medical Research, New Delhi

Duration : 3 years

Status : Ongoing.

8. Title

- ☞ Registry of subacute sclerosing panencephalitis

Principal Investigator:

K. Radhakrishnan

Funded by:

Science & Technology, Environment Committee, Government of Kerala

Duration : 3 years

Status : Ongoing

9. Title

- ☞ Prognostic indicators of neuropsychological morbidity in epilepsy

Principal Investigator:

Sanjeev V. Thomas

Funded by:

Indian Council of Medical Research, New Delhi

Duration : 2 years

Status : Ongoing

10. Title

- ☞ Expert system for management of epilepsy

Principal Investigator:

Sanjeev V. Thomas

Funded by:

Department of Electronics, Government of India.

Duration : 3 years

Status : Ongoing

11. Title

- ☞ Epidemiological survey of epilepsy

Principal Investigator:

K. Radhakrishnan

Funded by:

Indian Epilepsy Association and SCTIMST

Duration : 1 year

Status : Ongoing

12. Title

- ☞ Epidemiological survey of developmental language disorders and learning disability among school children in Kerala

Principal Investigator:

P.A. Suresh

Funded by:

Centre for Development Studies, Trivandrum, and Government of Kerala

Duration : 2 ½ years

Status : Ongoing

13. Title

- ☞ Local intraarterial thrombolytic therapy for acute stroke

Principal Investigator:

K. Radhakrishnan

Funded by:

Indian Council of Medical Research, New Delhi

Duration : 2 years

Status : Ongoing

14. Title

- ☞ Ginkgo-Biloba for intractable epilepsy

Principal Investigator:

Santhosh kumar

Funded by:

German Pharmaceuticals Ltd.

Duration : 1 year

Status : Ongoing

15. Title

- ☞ Surgical Treatment of intractable epilepsy

Principal Investigator:

K. Radhakrishnan

Funded by:

Science Technology and Environment Committee, Government of Kerala.

Duration : 1 year

Status : Ongoing

16. Title

- ☞ Development of blood compatible functional polymers as selective adsorbents for protein bound antigens during hemoperfusion.

Principal Investigator:

Chandra P. Sharma

Principal

Co-investigator:

Thomas Chandy

Status:

Completed

Funded by:

Department of Biotechnology.,

New Delhi.

17. Title

- ☛ Bioprosthetic-associated calcification prevention via surface modification and target drug delivery.

Principal Investigator :

Thomas Chandy (on leave since July 4, 1996)

Principal Co-investigator:

Chandra P. Sharma

Status : On going

Duration : Three years

Funded by :

Department of Biotechnology., New Delhi.

18. Title:

- ☛ Development of hollow fibre based membrane oxygenator.

Principal Investigator:

G.S. Bhuvaneshwar

Status : Ongoing.

Duration : 2½ years

Funded by :

SPIC Pharma. Ltd., Madras.

19. Title:

- ☛ Effect of urokinase and papaverin on chronic vasospasm in an animal model of subarachnoid hemorrhage.

Principal Investigator:

B. K. Misra.

Status : ongoing

Duration : 3 years

Funded by:

Department of Science & Technology, New Delhi.

20. Title:

- ☛ Development of an Interpenetrating Polymer Network (IPN) membrane for encapsulation of islet cells of Langerhans.

Principal Investigator:

Prabha D. Nair.

Status : Ongoing.

Duration : 2 years

Funded by:

Department of Science & Technology, New Delhi

21. Title:

- ☛ Monoclonal antibodies against BTG and GMP-140, to detect clinical platelet activation.

Principal Investigator:

Lissy K. Krishnan.

Status : ongoing.

Duration : 3 years

Funded by:

Department of Science and Technology, New Delhi.

22. Title:

- ☛ Process optimisation in the development of high flex life poly urethane for cardiovascular applications.

Principal Investigator:

Dr. M. Jayabalan.

Co-investigator:

Ms. Lizzymol. P.P.

Status : ongoing.

Duration : 3 years

Funded by:

Department of Biotechnology, New Delhi.

23. Title:

- ☛ Use of lasers in medicine under National Laser Programme

Principal Investigator:

AK Gupta.

Status : Ongoing

Duration : 2 years

Funded by

Department of Atomic Energy, Government of India.

24. Title:

Development of animal model of post-subarachnoid hemorrhage vasospasm to establish the role of papavarine and urokinase in vasospasm

Principal Investigator:

Santhosh Joseph.

Status : Ongoing

Duration : 2 years

Funded by :

Department of Science and Technology,
New Delhi

25. Title

Study of post-operative sternal wound infections among cardiac surgery patient and its correlation with the carrier state potential pathogenic bacteria.

Principal Investigator:

Dr. J. Shanmugam.

Duration : 3 years

Funded by :

Science, Technology and
Environment Committee, Government of
Kerala

Visits by Academic Staff abroad for International Conferences

1. K Mohandas was a guest speaker at the first Omani Conference of Anesthesiology at Muscat.
2. C.P. Sharma presented a paper entitled "Development of immunoadsorbent matrix based on poly vinyl alcohol for direct hemoperfusion" at the Vth World Biomaterials Congress at Toronto, Canada, May 28-June 2, 1996.
He also attended the meeting of the International Liaison Committee of World Societies of Biomaterials, at Toronto.
3. J. Shanmugam delivered an invited talk on Chlamydia trachomatis infections - an update on epidemiology, diagnosis and treatment at the annual scientific meeting of the Sri Lanka College of Microbiologists held from 13th to 15th of December, 1996.
4. A. Jayakrishnan visited the Faculty of Pharmacy, University of Paris Sud (Paris XI), France, from September 15 to October 14, 1996, under the aegis of the Indo-French Centre for Promotion of Advanced Research, New Delhi, in connection with the preparation of the state-of-the-art report on controlled drug delivery.
5. A. Jayakrishnan delivered the following lectures in France:
 - (a) "Therapeutic opportunities using polymeric microspheres in medicine and surgery", Faculty of Pharmacy, University of Paris-Sud (Paris XI), France, September 24, 1996.
 - (b) "Therapeutic opportunities using polymeric microspheres in medicine and surgery", Laboratoires de Chimie-Physique Macromoleculaire, ENSIC, Nancy, France, September 27, 1996.
 - (c) Bovine milk protein as a potential drug carrier", Faculty of Pharmacy, University of Paris-Sud (Paris XI), France, October 10, 1996.
6. K.S. Neelakandhan attended the Vth Aortic Surgery Symposium, at New York in April 1996 and presented a paper on Syphylitic Aortic Aneurysms.
7. K. Radakrishnan delivered a talk on treatment of intractable epilepsy at the

- Asian - Oceanian Epilepsy Congress at Seoul, Korea, September 1996.
8. M.P Mohansingh attended an International Conference on Advanced Techniques in Cardiac Surgery, conducted by the Malayasian Heart Institute, Kualalampur, from 18th to 21st March, 1997.
 9. Mala Ramanathan, attended the eighth International Women's Health Meeting between 16-20 Mar, 1997, at Rio de Janeiro, Brazil.

She presented a preliminary report on 'Users' perspectives on NORPLANT - Pre Introductory Trial in Madras city, India', at the Women's Health Colloquium, Medical Anthropological unit, University of Amsterdam, Netherlands.

Further, she lectured on "Gender differentials in Health; Some observations from India" on 13 March, 1997, Population Reserch Centre, University of Groningen, Groningen, The Netherlands.
 10. Raman Kutty participated as an international faculty in two "Problem solving for Better Health" workshops organised by the Preyfus Health Foundation, at Jakarta and Swabaya, in March 1997.
 11. R.S Vasan participated in the 69th scientific session of the American Heart Association at New Orleans, U.S.A, in November 1996 and presented his paper on "Trends in Incidence of CHF." Dr. R.S Vasan was an invitee at the Framingham Heart Study, Massachusetts, USA, in November 1996 to discuss research collaboration.
 12. Santhosh Joseph participated in the Annual Conference of Radiological Society of North America for Accreditation Course, Dec 1-6, 1996. and GDC Coil Training Course for endovascular management of cerebral berry aneurysms at St. Annes College, Oxford, London, on Dec.12-14, 1996.

Participation in Conferences and Workshops

1. J. Shanmugam participated:
 - (a) As an Expert in Quality Control at the Ministry of Health and Family Welfare in New Delhi under the proposed World Bank programme on 'Quality Control in Clinical Microbiology'.
 - (b) As a Supervisor & Resource Person in the National Workshop on 'Diagnostic Microbiology' held at KMC, Manipal, under the sponsorship of the National Institute of Biologicals, New Delhi. He presented papers in three National Annual Conferences of (i) Indian Association of Medical Microbiologists at Agra, (ii) Indian Virological Society at Izat Nagar (Bareilly), and (iii) Indian Association of Biomedical Scientists at JIPMER, Pondicherry.
2. Molly Antony attended the National Workshop on 'Quality Control in Diagnostic Microbiology' held at KMC, Manipal from 5th to 8th of Jan., 1997.
3. Muralidhar K. Katty presented a paper in Bangalore during the Annual Conference of the Indian Association of Pathologists and Microbiologists, held from 19th to 21st of December, 1996.
4. M. Ravindranath presented a paper on 'Flavivirus Infections' at the Annual Conference of the Indian Association of Biomedical Scientists held at JIPMER, Pondicherry from 4th to 7th of October, 96.
5. P.S. Appukuttan was invited to the 23rd annual meeting of the Association of Clinical Biochemists of India at Kottayam, December, 1996, to present a paper entitled "Sugar-binding antibodies and lectins in ELISA of tumor specific epitopes, T-antigen and terminal a-galactoside."
6. P.S. Appukuttan presented a paper entitled "Separation of bovine heart galactose lectin from endogenous glycoproteins co-purified with the lectin during affinity chromatography" at the Symposium on Frontiers of Biology and Biotechnology, C.M.C. Hospital, Vellore, January, 1997.
7. B. Sasikumar attended the First National Conference on Therapeutic Drug Monitoring and Toxicology held at P.D. Hinduja

- National Hospital and Medical Research Centre, Bombay, in March, 1997.
8. M.P Mohansingh attended Cardiac Surgical Update for Junior Cardiac Surgeons conducted by Bakken Educational Centre and presented the Chitra experience on total chordal preservation of mitral valve with M.V.R.
 9. Krishna Manohar attended live demonstration and workshop in adult and paediatric cardiac surgery, during Jan 15th and 16th 1997, conducted at the Institute of Cardiovascular Diseases, Madras.
 10. A. Jayakrishnan visited:
 - a. The Department of Biochemistry, All India Institute of Medical Sciences, New Delhi,
 - b. Polymer Chemistry Division at National Chemical Laboratory, Pune,
 - c. Division of Biological Sciences at the Bhabha Atomic Research Centre, Bombay, and
 - d. Cancer Research Institute at the Tata Memorial Centre in Bombay.

All these visits were under the aegis of the Indo-French Centre for Promotion of Advanced Research, New Delhi, in connection with the preparation of the state-of-art report on controlled drug delivery.
 11. A K Gupta delivered lectures on :
 - i. Recent Advances in Vascular Recanalization Techniques at the 'Symposium on Recent Advances in Imaging and Interventions in Cardiovascular diseases' on April 13-14, 1996, at AIIMS, New Delhi.
 - ii. Role of International Radiology in Peripheral Vascular diseases at 'Mid-term CME Programme of Indian College of Radiology and Imaging', Government Medical College, Madras on 7-8 July 1996.
 - iii. Percutaneous Laser Disc Decompression at the PLDD workshop at Choitharam Hospital and Research Centre Indore, on 28-29th October, 1996.
 - iv. International Neuroradiology- Indian Radiological and Imaging Association (West Bengal) Calcutta on 14th December, 1996.
 - v. Intervention in peripheral vascular diseases- Military Hospital CT Centre, Pune, 28-29 March, 1997.
 12. Mala Ramanathan presented a paper entitled 'Sterilisation Regret in Tamil Nadu-some observations from NGHS' at the 20th Annual conference of the Indian Association for the Study of population, February 12-14, 1997, at Bharatiyar University, Coimbatore.
 13. Ramankutty presented a paper on Kerala's health services development into public and private sectors at the International Conference on Kerala's development experience at New Delhi in December, 1996.
 14. R.Prasanna Kumari attended the International Seminar on Information Super Highway 'INFOBAHN-96' held at Technopark, Trivandrum on 22nd September 1996.
 15. P.P Saramma, Instructor in Nursing, participated in a regional workshop on "Educational Technology", sponsored by the W.H.O and Ministry of Health and Family Welfare, Government of India, from 7th to 17th October, 1996 at MAHE, Manipal.
 16. Jaisy Mathai participated in the symposium on Transfusion Science at KEM Hospital Bombay.
 17. Sulochana delivered a lecture on 'New trends in Transfusion Medicine' at

- the South Regional Conference of the 1MA College of General Practitioners in October, 1996.
18. Usha Kandaswamy presented a paper entitled 'Swot Analysis of voluntary Donor Forum at the annual ISBT & I meet in New Delhi in December, 1996.
 19. C C Kartha organised a symposium "Injury and Response in the Cardiovascular System" during the annual meeting of the International Academy of Pathology-Indian Division held at Bangalore on 16th December, 1996.
 20. K. Shivakumar spoke on molecular mechanisms underlying cardiac fibrogenesis at the Annual meeting of the International Academy of Pathology-Indian division, held at Bangalore on 16th December, 1996.
 21. C C Kartha was an invited speaker at the International Symposium on "Frontiers in Surgical Pathology" held at Madras.
 22. Preetha Nair presented two papers at the Annual Conference of Association of Physiologists and Pharmacologists of India, held at Cuttack, December, 1996.
 23. Preetha Nair was awarded the Dev Raj Bajaj Research Prize for the paper "Selective use of calcium chelators enhances the yield of Calcium tolerant myocytes from adult heart".
 24. Sandhyamani gave invited talks on her research work at the Indian Institute of Science, Bangalore, and at the Tuberculosis Research Centre, Chennai.
 25. R. Sivakumar delivered invited talk at the International Conference on Instrumentation on "Critical Issues in the development of Biomedical Technologies" at Biomedical Institute & Technology, I.I.Sc., Bangalore, from 11th to 12th August, 1996. He also delivered the keynote address at the scientific session of the 9th Annual Conference of the Indian Society, for Dental Research held on 2nd-3rd November, 1996 in Trivandrum.
- R. Sivakumar delivered an invited talk at the Workshop on Oral implants, at Hyderabad on 3rd March, 1997.

STATEMENT OF ACCOUNTS

1996-97

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SREE CHITRA TIRUNAL
INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY
THIRUVANANTHAPURAM, KERALA

BALANCE SHEET AS AT 31st MARCH 1997

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BALANCE SHEET AS AT 31ST MARCH 1997

| Figures for the Previous Year | | GENERAL FUND AND LIABILITIES | Amount |
|----------------------------------|-----|--|---------------------|
| Rs. | Ps. | | Rs. Ps. |
| GENERAL FUND: | | | |
| 514874118.24 | | Balance as per last Balance sheet | 604874118.24 |
| | | Addition out of | |
| | | (a) Grant from Govt. of India for Capital expenses | 114500000.00 |
| 90000000.00 | | (b) Donation for Specific purposes utilised during the year | 2695950.00 |
| 0.00 | | | |
| 604874118.24 | | | 722070068.24 |
| 787597.96 | | Less: Capital Investments written off | 875049.96 |
| | | Less: Excess of Expenditure over Income adjusted out of General Fund up to 31.03.96 | 120343225.31 |
| 99533171.82 | | | |
| 20810053.55 | | Less: Excess of Expenditure over Income for the current year | 38113410.41 |
| 483743294.91 | | | 562738382.48 |
| 18292717.00 | | Sinking Fund | 27813434.00 |
| 8550639.60 | | Technology Development Fund | 10561386.00 |
| 4337836.44 | | Unutilised Grants for Research Projects | 12519589.68 |
| 37920192.80 | | Employee's Benefit Funds | 48245849.35 |
| | | Current Liabilities and Provisions | |
| 5064812.37 | | Sundry Creditors for expenses | 4926701.72 |
| 11287600.02 | | Other Liabilities | 11562553.13 |
| 569197093.14 | | Total | 678367896.36 |

Note : Revision in the Balance sheet and accounts was done at the instance of Audit.

(Sd.)
Financial Adviser and Chief Accounts Officer

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR
ENDED 31ST MARCH 1997-98

| Figures for the Previous Year | | ASSETS | Amount | | Amount | |
|-------------------------------|-----|--|--------------|-----|--------|--------------|
| Rs. | Ps. | | Rs. | Ps. | Rs. | Ps. |
| 407369199.64 | | FIXED ASSETS | 480420788.52 | | | |
| 787597.96 | | Less: Assets written off | 875049.96 | | | |
| 406581601.68 | | | | | | 479545738.56 |
| | | Current Assets | | | | |
| 3722108.25 | | General stores | 6804471.72 | | | |
| 1939157.00 | | Tools | | | | 1641086.40 |
| 1975237.00 | | Instruments | 2338533.32 | | | |
| 779038.00 | | Glasswares | 850429.60 | | | |
| 2845284.88 | | Medicines | 1966461.00 | | | |
| 2000.00 | | Investment in shares of Employees co-operative Society | 2000.00 | | | |
| | | | | | | 13602982.04 |
| 1248793.28 | | Deposits | | | | 1257548.28 |
| | | <i>Deposit with Banks</i> | | | | |
| 35663774.56 | | For Staff Benefit scheme | | | | 46525057.26 |
| 27025737.18 | | For Specific Purposes | | | | 86272459.58 |
| | | Loans and Advances | | | | |
| | | Advances Recoverable in Cash or in Kind or for Value to be recovered | | | | |
| | | Unsecured considered Good | | | | |
| 32231330.61 | | For Purchases | 22723999.60 | | | |
| 15422323.46 | | To staff | 15907527.46 | | | |
| 10187652.06 | | Other advances | 5703055.27 | | | |
| 1079398.40 | | Amount receivable from sponsors of Projects | 1154061.78 | | | |
| | | | | | | 45488644.11 |
| | | Cash & Bank Balances | | | | |
| 250670.76 | | Cash & Stamp in Hand | 245402.24 | | | |
| 28242986.02 | | Balance with Banks | 5430064.29 | | | |
| | | | | | | 5675466.53 |
| 569197093.14 | | Total | | | | 678367896.36 |

(Sd.)
Director

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 1997-GENERAL

| Figures for the Previous Year | | EXPENDITURE | Amount |
|----------------------------------|-----|---|---------------------|
| Rs. | Ps. | | Rs. Ps. |
| | | Excess of Expenditure over Income | |
| 70395758.62 | | Hospital Wing | 86601371.51 |
| 11392890.07 | | Biomedical Technology Wing | 13348059.36 |
| 451752.00 | | Expenses for committee meetings | 271863.65 |
| 49175.00 | | Legal charges | 42050.00 |
| 147155.60 | | Travelling expenses | 85550.00 |
| 0.00 | | Audit fees | 0.00 |
| 6339095.60 | | Expenses for Academic Programme | 6445235.80 |
| 288633.00 | | Travelling expenses for Seminars and Conferences | 361482.00 |
| 67483.00 | | Sundry expenses | 0.00 |
| 0.00 | | Expenses for Achutha Menon Centre | 157358.00 |
| 89131942.89 | | Total | 107312970.33 |

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR
ENDED 31ST MARCH 1997 - HOSPITAL WING

| Figures for the Previous Year | | INCOME | EXPENDITURE | Amount | |
|-------------------------------|-----|-------------------------------------|-------------|---------------------|-----|
| Rs. | Ps. | | | Rs. | Ps. |
| 62500000.00 | | Grant received from Govt. of India | | 66000000.00 | |
| 299826.00 | | Rent | | 292332.90 | |
| 714106.34 | | Sundry Receipts | | 717768.00 | |
| | | Examination fee-ACM | | 80220.00 | |
| 4626272.00 | | Interest received | | 1824912.00 | |
| 156685.00 | | Application & Examination fee | | | |
| | | from P G Students | | 196875.00 | |
| 25000.00 | | Income from sale of Assets | | 87452.00 | |
| | | Excess of expenditure over Income | | | |
| 20810053.55 | | transferred to General fund Account | | 38113410.43 | |
| 89131942.89 | | Total | | 107312970.33 | |

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 1997 - HOSPITAL WING

| Figures for the Previous Year | | EXPENDITURE | Amount |
|----------------------------------|-----|--|---------------------|
| Rs. | Ps. | | Rs. Ps. |
| 15749773.66 | | Medicines | 15787205.58 |
| 756041.80 | | Chemicals | 1357736.58 |
| 3186425.75 | | Medical Gases | 3422018.00 |
| 1984366.90 | | Films and Chemicals for Radiology Department | 2240738.00 |
| 299789.15 | | Uniforms and Hospital Linen | 450267.75 |
| 41440001.77 | | Hospital Items | 51773501.88 |
| 425562.25 | | Hospital Expenses | 597868.00 |
| 1895402.30 | | Inpatient Diet | 2348973.55 |
| 42212.60 | | Laboratory expenses | 227642.40 |
| 47329201.70 | | Salaries and Allowances | 55347935.75 |
| 127425.00 | | Honararium to visiting professors | 130694.00 |
| 0.00 | | Leave salary and pension contribution | |
| 1012563.00 | | Medical benefits to staff | 1070475.00 |
| 680362.00 | | Contribution to provident fund | 519405.00 |
| 99528.50 | | Travelling expenses | 224585.80 |
| 125289.00 | | Expenses for visiting faculty | 103664.00 |
| 305661.00 | | Home travel and Leave travel concession | 368066.00 |
| 500791.00 | | Postage, Telephone and Telegrams | 594750.75 |
| 980430.17 | | Printing and Stationery | 1206679.20 |
| 494115.00 | | Advertisement | 767596.00 |
| 303221.00 | | Recruitment expenses | 507553.00 |
| 5160460.00 | | Electricity and Water charges | 5893142.65 |
| 218330.90 | | Freight, Insurance and handling charges | 195699.50 |
| 414201.87 | | Vehicle maintenance expenses | 372999.37 |
| 311861.85 | | Bank charges and commission | 457550.08 |
| 20372.00 | | Agricultural expenses | 1335.00 |
| 1100414.00 | | Taxes and License | 278787.00 |
| | | Repairs and Maintenance | |
| 4771451.83 | | Equipment | 6245222.40 |
| 864935.45 | | Buildings | 1641463.35 |
| 715148.32 | | Others | 631151.32 |
| 7624.00 | | Staff training expenses | 9703.00 |
| 32017.00 | | Research expense - in house projects | 672171.00 |
| 133289.35 | | Other expenses | 222061.95 |
| 1364817.00 | | Bonus and festival allowances | 1029934.00 |
| 926215.50 | | Tools, Glasswares and instruments consumed | 931427.66 |
| 3593020.00 | | Contribution to pension fund | 3186273.00 |
| 9520717.00 | | Contributu in sinking fund | 8245930.00 |
| 146893039.62 | | TOTAL | 169062207.52 |

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 1997 - BIOMEDICAL TECHNOLOGY WING

| Figures for the Previous Year | | INCOME | EXPENDITURE | Amount | |
|-------------------------------|-----|---|-------------|---------------------|-----|
| Rs. | Ps. | | | Rs. | Ps. |
| | | Hospital Collections | | | |
| 54615232.00 | | Inpatient charges | | 63698843.00 | |
| 21487690.00 | | Investigation and Registration Charges | | 18755993.00 | |
| 394359.00 | | Income from Projects | | 6000.00 | |
| 70395758.62 | | Excess of expenditure over income transferred to income and expenditure Account-General | | 86601371.52 | |
| 146893039.62 | | TOTAL | | 169062207.52 | |

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 1997 - BIOMEDICAL TECHNOLOGY WING

| Figures for the Previous Year | | EXPENDITURE | Amount | |
|----------------------------------|-----|--|--------------------|-----|
| Rs. | Ps. | | Rs. | Ps. |
| 354058.65 | | Chemicals | 309673.66 | |
| 152428.60 | | Consumable stores | 102068.45 | |
| 345574.70 | | Laboratory expenses | 280812.60 | |
| 8119013.57 | | Salaries & Allowances | 9314354.75 | |
| 94191.00 | | Medical benefits to staff | 107944.00 | |
| 184436.50 | | Travelling expenses | 200878.00 | |
| 19624.00 | | Uniform to staff | 52344.75 | |
| 23228.00 | | Expenses for Visiting Faculty | 8107.00 | |
| 138468.00 | | Postage, Telephone and Telegrams | 143259.00 | |
| 75154.00 | | Printing & Stationery | 92623.70 | |
| 39925.00 | | Advertisements | 72800.00 | |
| 834696.00 | | Electricity & Water charges | 765635.00 | |
| 67913.00 | | Freight, Insurance & Handling expenses | 64475.00 | |
| 17455.00 | | Bank charges & Commission | 103336.00 | |
| 133529.00 | | Garden & Estate expenses | 102152.00 | |
| | | Repairs & Maintenance expenses | | |
| 466326.00 | | Equipments | 498443.00 | |
| 69546.00 | | Buildings | 74580.00 | |
| 42251.00 | | Others | 94300.00 | |
| 315120.00 | | Animal Research Lab expenses | 386421.95 | |
| 61429.45 | | Other expenses | 156875.60 | |
| 368086.14 | | Work shop & Tool room expenses | 342300.72 | |
| 9000.00 | | Honararium | 9000.00 | |
| 61710.00 | | Seminar & Conference expenses | 93234.25 | |
| 43134.00 | | Legal Charges | 21670.00 | |
| 11154.00 | | Documentary expenses - Research | 0.00 | |
| 91059.00 | | Exhibition expenses | 5649.00 | |
| 33506.00 | | Home travel & leave travel expenses | 143065.00 | |
| 0.00 | | Leave salary & Pension contributions | | |
| 25087.00 | | Vehicle maintenance expenses | 42735.30 | |
| 13204.00 | | Taxes & Licenses | 140514.00 | |
| 0.00 | | Insurance expenses | | |
| 247141.95 | | Tools, Glassware & Instruments - written off | 276084.68 | |
| 41606.00 | | Staff training expenses | 244570.00 | |
| 0.00 | | Expenses for Technology transfer | | |
| 5421487.12 | | Contribution to Technology Development Fund | 1617468.40 | |
| | | Research Expenses - In house Projects | 156583.95 | |
| | | Technology Development expenses | 45691.00 | |
| 17920542.68 | | Total | 16069650.76 | |

| Figures for the Previous Year | | INCOME | Amount | |
|-------------------------------|-----|---|-------------|-----|
| Rs. | Ps. | | Rs. | Ps. |
| 4991803.60 | | Premium and Royalty received | 1388168.40 | |
| 950160.00 | | Facility charges received | 833725.00 | |
| 114006.64 | | Over head charges collected | 196117.00 | |
| 12413.60 | | Interest received | 15409.00 | |
| 0.00 | | Income from Garden & Estates | 4236.00 | |
| 29585.25 | | Sundry Receipts | 53970.00 | |
| 429683.52 | | Interest from Funds | 229966.00 | |
| | | Excess of expenditure over income transferred to General Income & Expenditure Account | | |
| 11392890.07 | | | 13348059.36 | |

17920542.68

16069650.76

RECEIPTS AND PAYMENTS ACCOUNT FOR THE YEAR ENDED 31ST MARCH 1997

| Figures for the Previous Year | | RECEIPTS | Amount |
|----------------------------------|-----|--|---------------------|
| Rs. | Ps. | | Rs. Ps. |
| | | Opening Balance | |
| 354982.28 | | Cash in hand | 250670.7 |
| 13793601.16 | | Balance with banks for G.P | 28242986.0 |
| 41465791.92 | | Balance with banks for S.P. | 0.0 |
| | | Hospital Collection | |
| 55825401.00 | | Inpatient deposit | 63559734.0 |
| 17664481.00 | | Investigation and Registration charges | 18528235.0 |
| | | Research and Development wing | |
| 4991803.60 | | Royalty received | 1388168.4 |
| 0.00 | | Income from estate | 4236.00 |
| 20038.50 | | Sundry receipts | 24505.00 |
| 9269.00 | | Interest on bank deposits | 12085.00 |
| 429683.52 | | Interest on speci. deposit | 0.00 |
| 947160.00 | | Facility hire charges | 829965.00 |
| | | General Receipts | |
| 581884.94 | | Sundry receipts | 437490.80 |
| 105041.00 | | Rent | 61840.40 |
| 4058476.00 | | Interest received | 1734932.00 |
| 156685.00 | | Application & Examination fee from PG Students | 180950.00 |
| 166696.00 | | Notice Pay received | 127229.00 |
| | | Grant received from Govt. of India | |
| 62700000.00 | | For recurring expenses | 66000000.00 |
| 90000000.00 | | For Capital expenses | 114500000.00 |
| 0.00 | | For Plan 92-93 | 0.00 |
| | | Grant for specific research | |
| 6613687.00 | | Projects | 13160077.00 |
| 2155976.50 | | Receipts for specific purpose | 3015482.00 |
| 426534.45 | | Deposits received | 504370.15 |
| 25000.00 | | Receipts from sale of Assets | 88673.50 |
| 10061545.70 | | Receipt for PF & Pension fund | 10938459.70 |
| 0.00 | | Refund of Advances (cpwd) | 0.00 |
| 312553738.57 | | TOTAL | 323590089.73 |

Note: Payments for fixed assets includes advances granted for procurement.

SCHEDULE OF FIXED ASSETS AS ON 31ST MARCH 1997

| Figures for the Previous Year | | PAYMENTS | AMOUNT | |
|-----------------------------------|-----|--|---------------------|-----|
| Rs. | Ps. | | Rs. | Ps. |
| Expenses for Hospital wing | | | | |
| 53978503.10 | | To staff | 58227232.20 | |
| 78771897.16 | | To others | 101324201.67 | |
| Expenses for BMT wing | | | | |
| 8784170.40 | | To staff | 9819276.20 | |
| 4089574.79 | | To others | 3984491.93 | |
| 1233210.95 | | Expense for general purpose | 866669.60 | |
| 5630435.60 | | Expenses for Academic purpose | 6360222.80 | |
| | | Expenses for Achutha Menon Centre | 147828.00 | |
| 55816726.30 | | Payment for fixed assets | 58204227.21* | |
| 84203.00 | | Payment for tools | 4928.00 | |
| 299152.00 | | Payment for glasswares | 599999.85 | |
| 1067919.00 | | Payment for Instruments | 176184.00 | |
| 8054273.00 | | Payment for PF & SBF | 6388459.70 | |
| 5186545.75 | | Payment for Projects | 5676789.64 | |
| 327209.00 | | Deposits Refunded | 365354.00 | |
| 60736261.74 | | Deposit for specific expense | 65768758.40 | |
| Closing Balance | | | | |
| 250670.76 | | Cash in hand | 245402.24 | |
| 28242986.02 | | Balance with banks for general purposes | 5430064.29 | |
| 0.00 | | Balance with banks for specific purposes (Note. 1) | 0.00 | |
| 312553738.57 | | TOTAL | 323590089.73 | |

(Sd.)
Financial Adviser and Chief Accounts Officer

(Sd.)
Director

SCHEDULE OF FIXED ASSETS AS ON 31ST MARCH 1997

| Particulars of Assets | As on 1-4-96 | | Additions during the year | | Total | | Assets Disposed off | | Net Block | |
|--|---------------------|----|------------------------------|----|---------------------|----|------------------------|----|---------------------|------|
| | Rs. | Ps | Rs | Ps | Rs | Ps | Rs | Ps | Rs | Ps |
| 1. Land | 1463299.63 | | 0.00 | | 1463299.63 | | | | 1463299.63 | |
| 2. Land development | 122543.88 | | 0.00 | | 122543.88 | | | | 122543.88 | |
| 3. Satelmond Palace | 2166170.00 | | 0.00 | | 2166170.00 | | | | 2166170.00 | |
| 4. Building | 80847717.18 | | 437989.00 | | 81285706.18 | | | | 81285706.18 | |
| 5. Compound wall | 1096559.68 | | 0.00 | | 1096559.68 | | | | 1096559.68 | |
| 6. Equipments | 250618401.94 | | 35311505.87 | | 285929907.81 | | 505410.00 | | 285424497.81 | |
| 7. Gas Plant Installation | 387616.09 | | 13896.00 | | 401512.09 | | | | 401512.09 | |
| 8. Air Condition & Refregerators | 3563052.91 | | 8612338.00 | | 12175390.91 | | 25000.00 | | 12150390.91 | |
| 9. Cold Room Installation | 341700.00 | | 0.00 | | 341700.00 | | | | 341700.00 | |
| 10. Sub-station Installation | 1349552.25 | | 0.00 | | 1349552.25 | | | | 1349552.25 | |
| 11. Electrical Installations | 5429026.22 | | 420798.30 | | 5849824.52 | | | | 5849824.52 | |
| 12. Water cooler | 62866.50 | | 0.00 | | 62866.50 | | | | 62866.50 | |
| 13. Lift Installation | 1928511.10 | | 601623.00 | | 2530134.10 | | | | 2530134.10 | |
| 14. Canteen equipments | 58135.44 | | 13282.00 | | 71417.44 | | | | 71417.44 | |
| 15. Office equipments | 628130.54 | | 130233.00 | | 758363.54 | | | | 758363.54 | |
| 16. Furniture & Fixtures | 9752971.62 | | 754974.34 | | 10507945.96 | | 54107.00 | | 10453838.96 | |
| 17. Motor Vehicles | 2078204.30 | | 0.00 | | 2078204.30 | | 287114.89 | | 1791089.41 | |
| 18. Telephone Installations | 998489.94 | | 119369.00 | | 1117858.94 | | | | 1117858.94 | |
| 19. Library Books | 33780302.48 | | 5855986.21 | | 39636288.69 | | 3338.07 | | 39632950.62 | |
| 20. Kitchen Utincils | 392188.82 | | 0.00 | | 392188.82 | | | | 392188.82 | |
| 21. Mural Paintings | 271757.63 | | 0.00 | | 271757.63 | | | | 271757.63 | |
| 22. Cycles | 6135.33 | | 0.00 | | 6135.33 | | 80.00 | | 6055.33 | |
| 23. Roads | 647080.04 | | 0.00 | | 647080.04 | | | | 647080.04 | |
| 24. Animal house & cages | 326681.70 | | 33915.00 | | 360596.70 | | | | 360596.70 | |
| 25. Oxygen cylinders | 203362.42 | | 0.00 | | 203362.42 | | | | 203362.42 | |
| 26. Live stock | 3298.00 | | 0.00 | | 3298.00 | | | | 3298.00 | |
| 27. Bore wells | 129000.00 | | 45615.00 | | 174615.00 | | | | 174615.00 | |
| 28. Achutha Menon Centre Construction | 8716444.00 | | 20700064.16 | | 29416508.16 | | | | 29416508.16 | 0.00 |
| TOTAL | 407369199.64 | | 73051588.88 | | 480420788.52 | | 875049.96 | | 479545738.56 | |

AUDIT CERTIFICATE

I have examined the Receipts and Payment Account, Income and expenditure account for the year ended 31 March, 1997, and the Balance sheet as on 31 March, 1997 of the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram. I have obtained all the information and explanations that I have required and subject to the observations in the appended Audit Report. I certify, as a result of my audit, that in my opinion these accounts and Balance sheet are properly drawn up so as to exhibit a true and fair view of the state of affairs of the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram according to the best of informations and explanations given to me and as shown by the books of the organisation.

New Delhi.

Dated:

sd/

Principal Director of Audit
Scientific Departments

**AUDIT REPORT ON THE ACCOUNTS OF THE
SREE CHITRA TIRUNAL INSTITUTE FOR
MEDICAL SCIENCES AND TECHNOLOGY,
THIRUVANANTHAPURAM FOR THE
YEAR 1996 - 97.**

INSTITUTE REPLY TO AUDIT COMMENTS

1. Introduction

The Sree Chitra Tirunal Institute of Medical Sciences and Technology (Institute), Trivandrum is governed by the provisions of "The Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Act, 1980 (No 52 of 1980)". The Institute is financed mainly by the grants received from the Central Govt. . During 1996-97 the Institute received a sum of Rs.18.05 Crore as grants from the Central Government.

The accounts of the Institute are audited by the comptroller and Auditor General of India under section 19(2) of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act 1971 read with section 18(2) of the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Act, 1980.

Comments on accounts

2. Non-adjustment of advances for purchases

An amount of Rs.227.24 lakh was outstanding as on 31.03.97 against advances for purchases. This included items pertaining to even 1980-81. Non adjustment of these items from the advances for purchases despite audit observations in the earlier years had resulted in understating of the value of fixed assets and current assets in the Balance Sheet. The Institute stated in September 97 that bills amounting to Rs 176.65 lakhs were adjusted during first quarter of 1997-98 and scrutiny of the balance outstanding bills were being taken up by the Institute. The Institute further stated that they expected to settle all outstanding advances before end of the year.

No comments

Out of Rs.227.24 lakhs reported outstanding as on 31-3-97, we have adjusted bills amounting to Rs.176.65 lakhs during the first quarter of 1997-98. Balance outstanding bills are being scrutinised and steps are being taken to settle all outstanding advances. The book adjustments of balance outstanding will be done before the end of this year.

3. Non-realisation of hospital dues

As per the arrangements with Government of Kerala, bills relating to specialised treatment are to be paid within a period of three months. However, an amount of Rs 47.55 lakh was to be realised from ESI department of the Govt. of Kerala at the close of the financial year 1996-97, even though the institute had stated in December 1996 that further credit arrangements for ESI referred patients were discontinued. The Institute had also not obtained confirmation of the balance from the Govt. of Kerala. Institute stated in September 97 that Rs 31 lakhs had been remitted by the ESI Dept. of Govt. of Kerala and they had promised to settle the remaining amount before October 1997.

Institute had taken up the matter with Govt. of Kerala and the ESI department has now remitted Rs.31.00 lakhs, against the out standing bills. The department has also promised to settle the balance amount before October 97.

sd/

Pr. Director of Audit (SD)

sd/

Director

Place: New Delhi

Date:

Administrative Bodies

Institute Body

President: Dr.N.H. Wadia

- | | | |
|--|---|--|
| <p>1. Prof. P.S Bidwai, Chief Cardiologist and Senior Research Consultant, Central India Institute of Medical Sciences, 88/2, Bajaj Nagar, Nagpur -440 010 (Maharashtra)</p> <p>2. Prof. R.N. Chakravarti, Professor-emeritus (Rtd) Viswakshand-II, 3/261, Gomati Nagar, Lucknow - 226016</p> <p>3. Sri.S.V. Giri(Ex-officio) Secretary to the Government of India. Department of Education, Ministry of Human Resources Development, Shastri Bhavan, New Delhi.</p> <p>4. Sri.Gopal Krishna Pillai (Exofficio) Secretary to Government of Kerala, Department of Health and Family Welfare, Thiruvananthapuram.</p> <p>5. Dr. Gunawant Rambhau Sarode, Member of Parliament (Lok Sabha) 175, North Avenue, New Delhi.</p> <p>6. Prof. Indira Nath, Professor of Biotechnology All India Institute of Medical Sciences, New Delhi-110016.</p> | <p>7. Dr. P.K. Iyengar (Ex-officio) Chairman, State Committee on Environment, Science and Technology, Thiruvananthapuram.</p> <p>8. Sri. S.B. Krishnan (Ex-officio) Joint Secretary to the Government of India and Financial Advisor, Department of Science and Technology, Technology Bhavan, NewDelhi-110029.</p> <p>9. Sri Kodikunnil Suresh, Member of Parliament (Lok Sabha) 85, South Avenue, New Delhi.</p> <p>10. Dr.K. Mohandas(Ex-officio) Director, Sree Chitra Tirunal Institute, Thiruvananthapuram.</p> <p>11. Dr. A.K. Mukherjee (Ex-officio) Director General of Health Services, Government of India, New Delhi.</p> <p>12. Prof. Rajinder Kumar, Professor of Chemical Engineering, Indian Institute of Science, Bangalore.</p> <p>13. Dr.P.Rama Rao (Ex-officio) Secretary to the Government of India. Ministry of Science and</p> | <p>Technology, Department of Science & Technology, Technology Bhavan, New Delhi - 110 029.</p> <p>14. Dr. K. Rama Rao, Director II, Defence Research & Development Lab, Hyderabad - 500 258.</p> <p>15. Prof. D.V. Singh, Director, Central Road Research Institute, New Delhi 110 020.</p> <p>16. Dr. R.Sivakumar (Ex-officio) Head, Biomedical Technology Wing, Sree Chitra Tirunal Institute, Thiruvananthapuram.</p> <p>17. Secretary to the Government of India (Ex-officio) Ministry of Health and Family Welfare Nirman Bhavan, New Delhi-110011.</p> <p>18. Sri.Thennala G. Balakrishna Pillai Member of Parliament (Rajya Sabha) T.C-16/6, Krishnavilasom Road, Jagathy, Thiruvananthapuram -14.</p> <p>19. Dr. J. V. Vilanilam (Ex-officio) Vice Chancellor, Kerala University Thiruvananthapuram -34.</p> |
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20. Dr. B.N.S. Walia,
Director, Postgraduate
Institute of Medical
Education & Research,
Chandigarh - 160 012.

Governing Body

Chairman: Dr. N.H. Wadia

1. Dr. P.K. Iyengar. (Ex-officio)
Chairman, State Committee
on Environment,
Science and Technology,
Government of Kerala,
Thiruvananthapuram.
2. Dr. K. Mohandas (Ex-Officio)
Director, Sree Chitra
Tirunal Institute,
Thiruvananthapuram.
3. Dr. A.K. Mukherjee
(Ex-officio) Director
General of Health Services,
Government of India,
New Delhi.
4. Dr. P.Rama Rao
(Ex-officio) Secretary to the
Government of India,
Ministry of Science &
Technology,
Technology Bhavan,
New Delhi -110 029.
5. Dr. C.C. Kartha, Professor of
Cellular and Molecular
Cardiology, Sree Chitra
Tirunal Institute,
Thiruvananthapuram.
6. Prof. D.V. Singh,
Director, Central Road
Research Institute,
New Delhi 110 020.
7. Dr. R. Sivakumar (Ex-
officio) Head Biomedical
Technology Wing, Sree
Chitra Tirunal Institute,
Thiruvananthapuram.

Standing Committees

Academic Committee

1. Dr. K. Mohandas, Director
of the Institute (Chairman)
2. Dr. K.G. Balakrishnan,
Professor of Cardiology &
Dean, Sree Chitra Tirunal
Institute,
Thiruvananthapuram.
3. Dr. B.S. Das, Professor of
Neurosurgery National
Institute of Mental Health &
Neurosciences, Bangalore.
4. Prof. Indira Nath, Professor
of Biotechnology, All India
Institute of Medical
Sciences, New Delhi.
5. Dr. Placid Rodriguez,
Director, Indira Gandhi
Centre for Atomic Research
Kalpakkam, Tamil Nadu.
6. G. B. Parulkar, Professor of
Cardiovascular & Thoracic
Surgery & Dean (Rtd),
K.E.M. Hospital,
Bombay.
7. C.P. Sharma, Scientist,
Biosurface Technology,
Sree Chitra Tirunal
Institute,
Thiruvananthapuram.
8. Dr. R. Sivakumar,
Head, BMT Wing,
Sree Chitra Tirunal
Institute,
Thiruvananthapuram.
9. Prof. J.V. Vilanilam,
Vice Chancellor,
Kerala University,
Thiruvananthapuram.

Building Committee

1. Dr.K. Mohandas,
Director, Sree Chitra
Tirunal Institute
(Chairman).
2. Dr. P. K. Iyengar,
Chairman, State Committee
on Environment, Science
and Technology,
Government of Kerala,
Thiruvananthapuram.
3. Mr. P.A. Prabhakaran,
Construction Engineer,
Vikram Sarabhai Space
Centre, Thumba,
Thiruvananthapuram.
4. Dr. R. Sivakumar Head
Bio-Medical Technology
Wing, Sree Chitra Tirunal
Institute, Thiruvananthapuram.
5. Mr. P. Vijayakrishnan,
Financial Advisor & Chief
Accounts officer, Sree
Chitra Tirunal Institute
Thiruvananthapuram
(Convener).

Finance Committee

1. Dr. K.Mohandas,
Director of the Institute
(Chairman)
2. Prof. R.N. Chakravarti,
Professor-emeritus (Rtd)
Viswakshand-II,
3/261, Gomati Nagar,
Lucknow-226016
3. Sri S.B. Krishnan, Joint
Secretary & Financial
Advisor to the Ministry of
Science & Technology.
Government of India,
New Delhi.

4. Mr. P. Vijaykrishnan,
Financial Advisor &
Chief Accounts Officer,
Sree Chitra Tirunal Insti-
tute, Thiruvananthapuram
(Convener)

Junior Staff Selection Committee

Dr. P.R. N.Menon (Ex-officio)
Medical Superintendent
Sree Chitra Tirunal Institute,
Thiruvananthapuram.

Dr. R. SivaKumar, (Ex-officio)
Head, BMT wing,
Sree Chitra Tirunal Institute,
Thiruvananthapuram.

Three nominees of the
President

A Representative of the
Academic Staff of the Institute
nominated by the Director.

Senior Staff Selection Committee

Dr. K. Mohandas,
Director of the Institute
(Chairman)

Prof.P.S. Bidwai
(Institute nominee)
Chief Cardiologist &
Senior Research Consultant,
Central India Institute of
Medical Sciences, Nagpur.

A nominee of the
Secretary, Department of Science
& Technology, Government of
India, New Delhi.

An expert from outside the
Institute nominated by the
president.

Head, Biomedical Technology
wing (Ex-officio)
Sree Chitra Tirunal Institute,
Thiruvananthapuram.

A Professor from the Institute.

Technology Development Committee

Dr. K. Mohandas,
Director of the Institute
(Chairman)

Dr. A. Gopalakrishnan,
Chairman, Atomic Energy
Regulatory Board, Bombay.

Dr. A. Jayakrishnan,
Scientist,
Sree Chitra Tirunal Institute,
Thiruvananthapuram.

Prof. R.Kumar,
Professor of Chemical
Engineering, Indian
Institute of Science
Bangalore.

Dr. S.R. Rajagopal,
Emeritus Scientist,
Materials Science Division,
National Aeronautical
Laboratory,
Bangalore.

Dr. K. Rama Rao. Director II,
Defence Research and
Development Laboratory,
Hyderabad.

Dr. R.Sivakumar, Head
Biomedical Technology wing,
Sree Chitra Tirunal
Institute, Thiruvananthapuram.

Technology Transfer Committee

Dr. S. Varadarajan
(Chairman) Rtd.
Secretary to the Government of
India, DST, New Delhi.

A senior Officer of the DST
(nominated by the Secretary,
DST)

Mr. C.Venugopal,
Technology Transfer Division,
VSSC, Thiruvananthapuram.

Mr. A.K.Nair,
Kerala State Industrial
Development Corporation,
Thiruvananthapuram.

Head, Biomedical Technology
Wing(Ex-officio)
Sree Chitra Tirunal Institute.

Expert Nominee (in case of
devices) nominated each time.

Principal Investigator (for
specific devices)

FA & CAO of the Institute (Ex-
officio)

Ethics Committee

Mr. K.S. Rajamony (Chairman)
Member, Kerala Public Mens
Corruption Commission,
Trivandrum.

Dr. B. N.Dhawan, Scientist
Emeritus (Pharmacology),
Central Drug Research Institute,
Lucknow.

Head, Biomedical Technology
Wing, Sree Chitra Tirunal
Institute.

Dr. K.A. Kumar, Professor of
Psychiatry, Medical College,
Trivandrum.

An external expert on the
device technology (to be
identified and nominated by the
Director each time).

Director of the Institute.