

2010

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**REGIONAL CANCER CENTRE**

TRIVANDRUM-695 011, KERALA, INDIA

## REPORT OF ACTIVITIES 1988-'89

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St. Joseph's Press, Trivandrum-14

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2010

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## INTRODUCTION

During the year 1988-89, the Regional Cancer Centre, Trivandrum made rapid strides in many of its field of activities. Of these the most outstanding is the completion of the construction of the new building. This will accommodate, the Outpatient section, Tumour Registry (N.C.R.P.), Biostatistics, Cytopathology, Research, Imageology, Surgical and Medical Oncology Divisions, the Library and the Administrative Office etc., many of which were formerly in far flung locations. This building is centrally air conditioned and has a stand by generator and modern transformer system for faultless supply of electricity. Very soon the Chairman of the Centre's Governing body will inaugurate the new building. It is also gratifying to note that the construction of the new building donated by Instrumentation Ltd., Palghat for Early Cancer Detection Centre at Palghat has been completed and has been handed over to us.

Another significant development is the formation of the State Cancer Control Advisory Board of Kerala (SCCABK). This Board with Chief Minister as Chairman is expected to integrate cancer control programmes with the Health Services and Medical Education Services and to share the responsibilities. Of the two Preventive Oncology Units, sanctioned for the whole of the country, one is allotted to the Regional Cancer Centre Trivandrum in recognition of the signal contributions made by us in the realm of Community Oncology. The Indian Council of Medical Research, has approved of Regional Cancer Centre as a Centre for testing local remedies in cancer treatment.

The Japanese aid proposed for this Centre is likely to be sanctioned soon. The equipment costing nearly Rs. 10.5 crores available under this programme will certainly improve the diagnostic capabilities for many diseases to a higher level in Kerala. The additional income available through these sources shall be fruitfully utilised to subsidise the cancer treatment charges for the poor cancer patients.

The Regional Cancer Centre, Trivandrum with its accent on Technology Transfer Programmes, during the year under report,

trained three of its staff in United Kingdom under the British Council Programme and in turn received three faculty members from United Kingdom to conduct a course in Radiotherapy.

Despite several constraints, and paucity of sophisticated equipment, our centre gave paramount importance to Research as in the previous years. During 1988-'89, more than fifty scientific papers were either published in standard Journals or presented in conferences.

This report for the year 1988-89 contains details of activities of all divisions and the statement of accounts.

## DEPARTMENTAL ACTIVITIES

### DIVISION OF RADIOTHERAPY

Dr. M. Krishnan Nair	—	Professor
Dr. T. K. Padmanabhan	—	Professor
Dr. F. Joseph	—	Associate Professor
Dr. B. Rajan	—	"
Dr. T. Gangadevi	—	"
Dr. C. S. Kuttappan	—	"
Dr. C. S. Rafeeka Begam	—	"
Dr. V. Narayana Bhattathiri	—	Assistant Professor
Dr. P. G. Jayaprakash	—	Assistant Professor
Dr. Jayaprakash Madhavan	—	Assistant Professor
Dr. A. Sudhakaran	—	Tutor
Dr. C. S. Madhu	—	Tutor
Dr. P. R. Sasindran	—	Tutor
Dr. R. Gireesan	—	Tutor
Dr. K. Ratheesan	—	Lecturer

Dr. S. Parameswaran joined duty as Assistant Professor in March 1989 after obtaining the F. R. A. C. R.

### CLINICAL ACTIVITIES

Number of new cases	—	5265
Number of patients seen in the O. P.	—	44187
Number of patients admitted as inpatient	—	3072
Number of patients treated in Teletherapy	—	5032
Number of cases treated with brachytherapy	—	605
Number of cases treated with Mould	—	13

Number of cases treated with Interstitial implants	—	79
Intracavitary treatment of oesophagus	—	40
Intracavitary treatment of Gynaecological tumour	— Radium	54
	— Selectron	419
Number of Chemotherapy administration	—	7587

The workload in the O. P. has increased by about 15% as compared to that of the previous year.

### ACADEMIC ACTIVITIES

As in the previous years Noon Clinics were conducted on all working days where interesting cases were discussed. The Paediatric Tumour Board was conducted every Monday and Head and Neck Clinic on Thursdays. The Clinicopathological conference was conducted once a month. Journal Club and Symposia were held every Saturday and Imageology session on every Friday.

### ONGOING TEACHING PROGRAMME

MD Radiotherapy  
 Diploma in Medical Radiotherapy (DMRT)  
 MD. Radiodiagnosis  
 MD. General Medicine  
 MS. General Surgery  
 MD. Obstetrics and Gynaecology  
 MS. Orthopaedics and D. Ortho  
 MS. ENT and DLO  
 MBBS Classes  
 B. Sc Nursing  
 M. Sc Nursing  
 CRA (Certified Radiological Assistants Course)

Postgraduate students in Paediatrics are posted for 1 month.

Postgraduate students in Obstetrics and Gynaecology are posted in Radiotherapy Department for one month.

### TRAINING

Dr. T. K. Padmanabhan and Dr. Jayaprakash Madhavan visited the Christie Hospital and Holt Radium Institute, Manchester, U. K. for 3 months under the British Council Visitorship Programme.

### PAPERS PUBLISHED

1. Krishnan Nair, M., Sankaranarayanan, R., and Padmanabhan, T. K. Evaluation of Role of Radiotherapy in the management of Carcinoma of Bucca Mucosa. *Cancer-61* 1326-1331, 1988.
2. Krishnan Nair, M., Padmanabhan, T. K., Prabha, B., Radhakrishna Pillai, M., and Thomas Abraham. Natural Cytotoxicity and serum blocking effects in malignant cervical Neoplasia. *American Journal of Reproductive Immunology and Microbiology* 16-159-162, 1988.
3. Krishnan Nair, M., Padmanabhan, T. K. and Sankaranarayanan, R. Palliation of pain in Advanced Oral Cancer. *Headache* 28 : 258-259, 1988
4. Skich, H. F., Moriam Rosin, Paul Hornby, Babu Mathew, Sankaranarayanan, Krishnan Nair, M. Remission of Oral Leukoplakia and micronuclei on Tobacco Betel quid chewers treated with Betacarotene and with Betacarotene plus Vitamin A. *Int. J. of Cancer* 42 : 195-199, 1988.
5. Skich, H. F., Hornby, A. P., Babu Mathew, Sankaranarayanan, R. and Krishnan Nair, M. Response of oral leukoplakias to the administration of Vitamin A. *Cancer Letters* 40 : 93-101, 1988.
6. Krishnan Nair, M., Sankaranarayanan, R., Padmanabhan, T. K. and G. Padmakumari. Clinical Profile of 2007 Oral Cancers in Kerala, India. *Annals of Dentistry* 47 : 23-26, 1988.
7. Krishnan Nair, M., Padmanabhan, T. K. and Sankaranarayanan, R. Cancer of Nasopharynx. A review of 93 patients treated with radiotherapy. *Ind. Journal of Cancer* 25 : 144-150, 1988.



8. Prabha Balaran, Padmanabhan, T. K. and Vasudevan, D.M. Role of Levamisole immunotherapy as an adjuvant to Radiotherapy in oral cancer. Lymphocyte subpopulation Neoplasma 35 : 235-242, 1988.
9. Krishnan Nair, M., Najeed Mohideen, Padmanabhan, T.K. and Sankaranarayanan, R. Aetiology of Oral Cancer in patients less than 30 years of age. B. J. of Cancer 59 : 439-440, 1989.

#### CONFERENCES ATTENDED

- C. S. Madhu — 29/11, 30/11 & 1/12/88 Indo British - workshop on Radiation Oncology, Ahmedabad.
- V. N. Bhattathiri — Indo German Symposium Recent advances in Radiation Oncology, New Delhi. 15/3 to 20-3-'89.
- P. G. Jayaprakash — International C. M. E., in Radiation Oncology, New Delhi.

#### *Krishnan Nair, M :*

1. 2nd International Congress on Cancer pain, Rye, New York from 12th July to 21st July, 1988.
2. International Clinical Trials in Radiation Oncology at Bethesda, USA — October 16-19, 1988.
3. Xth Annual Congress of the Association of Radiation Oncologists of India at Thakurpukur, Calcutta from 16th to 19th December, 1988.
4. Indo-French Seminar at Tata Memorial Centre, Bombay on 10th February, 1989.
6. Indo-German Symposium at Institute of Nuclear Medicine and Allied Sciences, Delhi from 15th to 19th March, 1989.

#### DIVISION OF SURGICAL ONCOLOGY

Dr. Thomas Cherian	:	Assistant Professor
Dr. Paul Sebastian	:	Lecturer
Dr. Iqbal Ahamed	:	Lecturer
Dr. Jayakumar, K. L.	:	Resident Surgeon
Dr. Sivaramakrishnan, P.	:	Resident Surgeon
Dr. Gladys Jeevy	:	Anaesthesiologist

Most of the cases registered in Regional Cancer Centre requiring surgery and a few cases referred to us from Medical Colleges and other institutions and also patients coming regularly for follow up review are seen in the Cancer Surgery O. P. & O.P. functions six day a week. Due to several constraints like limited beds, personnel and operating facility we are able to take up for surgery only a small fraction of the total load of patients reporting to this department. The majority of the cases are extensive recurrent or residual lesions following radiotherapy which were considered inoperable. Most of them required extensive surgical ablation at the primary site and reconstruction. Most cases take six to eight hours of surgery. In spite of the poor general conditions of our patients and extensive surgery, there had been no operative death so far.

During the reporting year a total of 428 operations were carried out in the department.

Table I

Sl. No.	Site	Sex		Total
		Male	Female	
1	Ca. Buccal Mucosa	50	25	75
2	Ca. Lower Alveolus	21	9	30
3	Ca. Tongue	35	15	50
4	Ca. Breast	1	20	21
5	Ca. Thyroid	0	7	7
6	Ca. Lip	6	10	15
7	Ca. Floor of the Mouth	6	3	9
8	Ameloblastoma Maxilla	1	0	1
9	Malignant Melanoma Maxilla	1	0	1
10	Malignant Schwannoma Maxilla	1	0	1
11	Malignant Parotid	0	2	2
12	Pseudosarcoma	1	1	2
13	Ca. Penis	3	0	3
14	Ca. Vulva	0	1	1
15	Basal Cell Carcinoma	2	1	3
16	Secondary node neck	2	0	2
17	Squamous Cell Carcinoma	0	2	2
18	Orbital tumour	2	0	2
19	Soft Tissue Sarcoma	4	2	6
20	Malignant Melanoma	2	1	3
		Total:		236
Minor Cases				192
		Total:		428
Operative Mortality				0
Peri operative Mortality				3

At a glance it may appear that 236 cases an year is rather a small number. But it is to be remembered that most of these cases, operated elsewhere would have taken several stages, requiring multiple hospital admissions and surgeries, and prolonged hospital stay. This would restrain the hospital severely

and would have caused heavy strain on the patients and their families. By combining all these stages, surgery of the primary site, surgery of the diseased regional lymph node and reconstruction into one, the patient is hospitalised for surgery only once.

Table II

Sl. No.	Agewise distribution	Major Surgeries done	
		Male	Female
1	Above 10	3	1
2	Above 20	3	4
3	Above 30	11	13
4	Above 40	24	12
5	Above 50	38	32
6	Above 60	41	24
7	Above 70	15	9
8	Above 80	3	2

The table above shows the age distribution of the major cases during this reporting year. As noted above no patient was denied the benefit of treatment on account of the age provided they are fit to undergo surgery. It is gratifying to note that, inspite of old age, poor operative risks, extensive and prolonged surgeries, our operative mortality has been nil. The three cases of peroperative mortality occurred several days after surgery and were due to unrelated causes like myocardial infarction pulmonary embolism etc. Other complications like wound infection were less inspite of the fact that operated cases were nursed in general wards with other patients. It is attributed to the wound suction drainage system which has been developed by this institution and used in all cases. Average hospital stay after surgery has been about 5 days.

**Table III**

*Major Flaps used in the Primary Reconstruction*

Pectoralis major myocutaneous flap	—	39
Platysma myocutaneous	—	10
Tongue	—	9
Sternomastoid myocutaneous	—	32
Deltpectoral	—	22
Latissimus Dorsi myocutaneous	—	2

In treating the cancer patients, the aim is not only to cure, but also to leave a patient physically, functionally and socially well rehabilitated in the shortest time possible. This centre has developed several new reconstructive techniques for repair of the lip, jaws and palate, and uses them routinely in the patients. It is quite gratifying to note that even where attempts to cure has failed the unfortunate patient lived a good quality life. They were relieved of the debasing stink, pain and were able to live what is left of their life with dignity. The argument against the primary reconstruction is that it will hide recurrence at an early stage. The observation in this centre does not support the belief that primary reconstruction affects the patients adversely. In several cases we had excised recurrences following reconstruction and again reconstructed without compromising the results. Our results of functional tongue reconstruction has been extremely good. They could speak & eat reasonably well and almost recovered taste functions even.

**Table IV**

A review of the results from 1983-'88 show that we have been able to achieve the following results

Site	No. of Cases	Microscopic Tumour clearance of Margin and Base	Recurrence
Low Alveolus	86	88.37%	27 (31%)
Buccal Mucosa	130	91.5%	32 (24%)
Ca. Tongue	127	90.42%	39 (31%)
Ca. Lip	45	91.1%	7 (15%)

The table shows that we were able to achieve microscopic clearance of the tumour all round the margin and base in almost 90% of cases. The recurrence rate after two years compares favourably with the results achieved in any of the advanced centres of the world. Most of the recurrent diseases occurred in cases where the excision was reported as complete pathologically, but the disease free mucosa showed severe dysplastic changes.

**ANAESTHESIOLOGY**

Of the 236 cases, 201 patients had general anesthesia for surgery. The others were done under spinal anesthesia, regional nerve blocks or I. V. Ketamine. All cases had routine pre-operative check up before admission, and were treated for controllable associated conditions. Most of the patients were anaemic, hypoproteinaemic and had varying degrees of electrolyte imbalances. Many had associated concurrent diseases like hypertension, diabetes mellitus, cardiac and respiratory diseases. They were treated to make them as normal as possible before major surgery. Many were geriatrics with problems and required special attention. Since a large majority of the lesions were extensive recurrent carcinomas of the oral cavity with varying grades of trismus, nasal intubation, often blind, had to be done to give anesthesia. No tracheostomy was ever done. Balanced anaesthesia was the routine practice. Almost all surgical procedures took long hours. Depending on the extent of the disease it took eight to ten hours for the longest procedure. We had no anaesthetic accidents so far.

**Major Concurrent Diseases**

Diabetes mellitus	—	13 on treatment
Heart Diseases	—	12 on treatment
Myocardial infarction	—	10
Angina pectoris	—	3
Chronic bronchitis and asthma	—	15



Pulmonary tuberculosis	—	2
Heart block	—	4
Hypertension	—	42 on treatment

#### A S A grading

Grade II	—	79
Grade III	—	91
Grade IV	—	1

#### PAIN CLINIC

Dr. Gladys Jeevy and Dr. Paul Sebastian are in charge of the pain clinic. 161 patients were registered in the reporting year and 507 repeat cases attended the pain clinic conducted weekly or Thursdays. 40 patients were started on Step I oral analgesic drugs and had acceptable pain relief for about a month. After this period of time, they had to be controlled by Step II drugs. 121 patients required step II drugs from the onset and had acceptable pain relief for varying periods of time. 68 patients eventually required Step III drugs and were advised buprenorphine as oral morphine was not available.

#### Academic Activities

Being responsible for the academic programmes of the Medical College, this division is actively involved in the training programmes of the undergraduates and postgraduates and participates in all academic activities of the R. C. C. like noon clinics, Symposia, Seminars & Clinico-pathological meeting.

#### Research

This division actively co-operates with the research division of our institution especially in supplying the clinical materials. A project entitled "Plasma glutathione-a prognostic marker of oral cancer" has been sanctioned for 3 years by the Kerala Science Technology and Environment Committee.

#### Training

1. Dr. Paul Sebastian underwent advanced training in Head and Neck Surgery under Mr. Neville Gleave and Mr. Clive Orton at Christie Hospital, Manchester, UK for 3 months.
2. Dr. Paul Sebastian had special training in Palliative Medicine at Sir Michael Sobell House, Oxford, St. Oswald's Hospice, Newcastle-upon-Tyne and the Princess Alice Hospice Esher U. K. for a period of 2 months. This was sponsored by the International School for Cancer Care, London.
3. Dr. Thomas Cherian and Dr. Iqbal Ahamed underwent a part time course on "Computer Applications" conducted by the Institute of Human Resources Development for Electronics, Trivandrum

#### Seminars and Conferences

- Dr. Gladys Jeevy : Attended the Annual Conference of the Indian Society for the Study of Pain in Feb. 1989, at A.I.I.M.S., New Delhi.
- Dr. Paul Sebastian : Attended a workshop on "Head and Neck Cancer" organised by the Association of ENT Surgeons of Britain at Christie Hospital, Manchester, UK in Nov. 1988.
- : Attended an International Workshop on Cancer of Patients with Advanced Cancer at Sir Michael Sobell House, Oxford, UK. in Dec. 1988.

## DIVISION OF PAEDIATRIC ONCOLOGY

Dr. P. Kusuma Kumary : Assistant Professor

\* Dr. Dinesh, M. : Lecturer

In spite of several constraints this division during the year under report made steady progress in all activities. All the paediatric cases were registered in this division.

### Clinical activities:

No. of New patients seen — 241

Total No. of patients seen in O.P. — 3261

Inpatient admission — 262

There was a slight increase in the number of new cases registered during this year. Following is the list of new cases registered:-

Leukaemias	: 67 (28%)
Brain tumour	: 40 (16.7%)
Lymphomas	: 16 (6.7%)
Wilms' tumour	: 18 (7.5%)
Soft tissue sarcoma	: 16 (6.7%)
Neuroblastoma	: 13 (5.4%)
Bone tumors	: 12 (5%)
Retinoblastoma	: 7 (2.9%)
Germ Cell tumors	: 10 (4%)
Histocytosis	: 4 (1.6%)
Hepatic tumor	: 3 (1.2%)
Miscellaneous	: 34
Male : Female	131 : 110

As in the previous years the most common malignancy in this age group was acute leukaemias, of which 3/4 were acute lymphatic leukaemia and the remaining were acute myeloid leukaemia. There was only one case of chronic myeloid leukaemia of juvenile type. More than 50% of acute lymphatic leukaemia patients had induction treatment from other institutions before reporting to us.

Brain tumors formed the next large group. Among the brain tumors glioma were most common. Histopathological proof was not available in few cases since the surgical risk was very high in attempting a biopsy in these cases. There was not much change in the relative frequencies of other solid tumors.

Out patient clinic in paediatric Oncology is being held on all days except Sundays. Detailed diagnostic work up of all the patients were done as a routine. This included complete haematology, blood biochemistry, urinalysis bone marrow aspiration/trephine biopsy, C.S.F. studies, ultrasound, X-rays and C. T. Scan. About 250 bone marrow aspirations..... and 450 lumbar punctures for diagnosis & therapy were done.

Chemotherapy was given to all cases of acute lymphatic leukaemia (except those who came just for Cranial XRT).

Surgery was the primary modality of treatment for solid tumors followed by irradiation and/or chemotherapy depending upon the diagnosis and stage of the disease. Patients requiring aggressive chemotherapy were admitted to the wards and appropriate treatment were given.

A well organised and co-ordinated multi-disciplinary team consisting of paediatric oncologist, paediatric surgeon, pathologist and radiation oncologist meet every Monday at 12.00 Noon and major management decisions were taken by this team as in previous years.

### Academic activities

The division imparted teaching and training to MD (RT) DMRT, MD (Paediatric) students of Medical College, Trivandrum.

Dr. P. Kusumakumary is a Co-guide for

- (1) M. D. Thesis in Pathology of Dr. Meena on "Rhabdomyosarcoma in Childhood".
- (2) MD Thesis in Paediatrics of Dr. Chandrasekharan Nair, on 'Solid tumors in Children'.

Dr. P. Kusumakumary is a co-investigator for Science and technology funded project on "Immunohistochemical staining of Childhood Rhabdomyosarcoma and correlation with prognosis". This work is in progress.

#### Papers published

1. Babu Mathew, Thressiamma Joseph, Kusumakumary, P. and Mani Ninan — Melanotic neurectodermal tumor of infancy — Review of literature & report or a case. Journal of Indian Society for Paedodontic and preventive dentistry. (Accepted for publication)

#### Conference attended

Dr. P. Kusumakumary attended International update in Paediatrics' held in Trivandrum January — 3-5-1989.

### DENTAL WING

× Dr. L. Sudha : Tutor

Dr. K. R. Nalinakumari : Lecturer

Main activities of this division are :

1. Dental Extraction.
2. Biopsies.
3. Preparing bite blocks, prosthetic appliances.
4. Preparing moulds.
5. Management of precancerous and other Oral lesions.

6. Attending Early Cancer Detection Camps and awareness Camps and
7. Participation in research projects.

During the year 1988-89 the following Services were rendered:

1. Total No. of sittings of patients	—	2867
2. No. of Biopsies	—	627
3. No. of Bite blocks	—	120
4. No. of new cases	—	818
5. Miscellaneous	—	130

#### Details of site and No. of biopsies

I. Buccal Mucosa		
(a) Right buccal mucosa	—	115
(b) Left buccal mucosa	—	166
II. Tongue		
(a) Right border of tongue	—	54
(b) Left border of tongue	—	70
(c) Dorsum of tongue	—	10
(d) Other sites of tongue	—	5
III. Floor of mouth	—	21
IV. Alveolus		
(a) Upper alveolus	—	13
(b) Lower alveolus	—	50
V. Palate		
(a) Hard palate	—	17
(b) Soft palate	—	7
VI. Lip		
(a) Upper lip	—	9
(b) Lower lip	—	38

VII. Commissures (Right & Left)	—	15
VIII. Upper sulcus	—	4
IX. Lower sulcus	—	3

For most of the cases with poor oral hygiene total dental extraction was done at the earliest. Bite blocks are prepared for patients who require radiation. We also prepare moulds for cases requiring radium brachytherapy in sites like hard palate, maxillary antrum and lip cases.

This division attended to pre-cancerous lesions like leukoplakia, submucous fibrosis and other oral lesions like lichenplanus etc. We give proper guidance on oral hygiene, oral prophylaxis and advice on modified diet to the patients with preancerous and cancerous lesions. We give monthly check up to these patients.

Biopsies were taken from all the suspected cases. We could help a few patients to get free from disease by proper diagnosis, treatment as well as complete excision of the disease.

This division actively participated in the cancer detection camps, dental camps and awareness programmes conducted in rural areas. Health education was given to the Multipurpose health workers.

We participated training programmes at Chirayinkil, Kanyakulangara, Manamboir, Vamanapuram, Kesavapuram and cancer detection camps on Erumali and Mavelikkara. We also attended study programmes on Adimalathura, Poonthura & Vettukadu.

#### Research Activities

The Staff of this division are also involved in the research activities and are collaborating with research division as well as the radiotherapy Department and actively participate in projects undertaken in collaboration with research division was on detection of antitumor antibodies in oral Cancer (D.S.T. Project Immuno diagnosis of oral Cancer using antitumor antibodies)

and ultrastructural studies of oral Cancer and precancer lesions. Another aspect of study of this division was the natural killer cell activity in patients with precancerous lesion of the oral cavity and a paper has been sent for publication.

Dr. Sudha is one of the investigators in Kerala D.S.T.E. funded project on "Changes of peri dental tissue in relation to tooth and alveolus bone in case of Cancer of alveolar bone".

Our dept. is the major collaborating department of the projects jointly run by the R. C. C. and the British Columbia Cancer Control Agency of Canada (BCCA).

*Nuclear Medicine*

## DIVISION OF IMAGEOLOGY

Dr. K. Sasidharan	—	Associate Professor
Dr. P. Ramachandran Nair	—	Associate Professor
Dr. V. M. Pradeep	—	Assistant Professor
Mr. Raghu Ram K. Nair	—	Lecturer
Dr. K. Ramachandran	—	Lecturer

*V. P. Ramachandran*

### Activities:

20,089 new cases were registered in the department during the year 1988-89.

The break up of various investigations is as follows:

Ultrasound	—	9850
Isotope scan for thyroid	—	2562
"    Liver	—	78
"    Bone	—	197
"    Renal	—	148
Blood sample assay	—	71144
Radio-iodine therapy	—	55
Mammography	—	85
		<hr/>
		20089
		<hr/>

A major equipment of the department the gamma camera could not be utilized fully for a period of 6 months. The number of ultrasound examinations showed a marginal increase to 12,497 compared to last year's figure of 11761. This includes ultrasonography of abdomen, pelvis, thyroid, breast, brain, trans-rectal ultrasonography and interventional procedures. As we are fully stretched for doing ultrasound examination a further

increase in the number is not possible without adding a new machine.

Interventional procedures using ultrasonography had to be restricted to the minimum for want of machine time. Interventional procedures included renal cyst puncture, percutaneous, nephrostomy, drainage of liver abscess and encysted fluid collections.

The number of patients registered for blood sample assay for hormones increased to 7114 from 5909 of previous year for the same period.

The break up is as follows :

Thyroid hormones	—	6236
B HCG	—	1344
Prolactin	—	300
		<hr/>
Total	—	7880
		<hr/>

Thyroid hormone studies include over 12,500 separate tests for T3, T4 and TSH. The total number of individual hormone assay is 14,116.

Radio-iodine therapy was given to 55 patients with thyrotoxicosis.

A combination of film and intensifying screens were continued to be used for mammography and the technique standardised. All the patients had ultrasonography of the breast.

### Academic activities

Short term training course in ultrasonography was given to doctors working in government and private institutions. This is in addition to the undergraduate teaching of medical, CRA, Pharmacy and nursing students.

Important topics on Imageology with demonstration of films are being conducted regularly between 8.30 and 9.30 on Fridays.



Under the co-guideship of Dr. V. Padmanabhan, Dr. V. M. Pradeep and Dr. K. Ramachandran three M. D. thesis were completed and submitted.

Dr. K. Sasidharan and Dr. V. M. Pradeep attended and gave lectures on basic principles of **ultrasonography**, obstetrical and paediatric ultrasonography at the quarterly meeting of the South Tamil Nadu Chapter of Indian Society of Medical Ultrasound at Nagercoil at the Thiruvalla Medical Mission Hospital and at the meeting of the Chirayinkil Branch of Indian Medical Association at Attingal.

Dr. K. Sasidharan gave talks on 'Recent advances in Imageology' at the South Zone CME Programme sponsored by the National Academy of Medical Sciences, New Delhi and on 'Ultrasonography in the neonates' in the CME programme in neonatal surgery and neonatology and at the State branch meeting of the Indian Association of Paediatric surgery held at Medical College, Trivandrum.

Dr. V. Padmanabhan gave a lecture on 'Thyroid Imaging' at the annual meeting of the association of Zoologists at Quilon.

Dr. V. M. Pradeep and Dr. K. Ramachandran attended the state meeting and CME Programme of Kerala State Branch of IRIA at Calicut and the South zone meeting of IRIA at Bangalore.

One candidate was registered under Dr. V. Padmanabhan for Ph. D. in 'Physics applied to Medicine'.

Dr. G. Haridas, Head of Department, BARC, Bombay and President of Biomedical Engineering Society of India visited the department and gave a lecture on Imaging and image processing.

Dr. V. M. Pradeep had training in Radio Iodine Therapy of differentiated thyroid cancers at the Radiation Medicine Centre, Bombay and was granted license to treat such cases.

## DIVISION OF RADIATION PHYSICS

- |                                   |                       |
|-----------------------------------|-----------------------|
| 1. Dr. T. P. Ramachandran         | : Associate Professor |
| 2. Shri P. G. Gopalakrishna Kurup | : Associate Professor |
| 3. Shri C. A. Davis               | : Assistant Professor |
| 4. Shri T. S. Elias               | : Lecturer            |

### Patient Services

For patients undergoing teletherapy and brachytherapy treatment planning and related dose computations were carried out routinely. The following number of cases were planned during the year.

External beam therapy	: 5032
Intracavitary treatment using Selectron Remote Afterloading System	: 419
Interstitial implants	: 70
Intracavitary treatment for carcinoma oesophagus	: 40
Mould treatments	: 13

Plaster of Paris shells were made for patients undergoing radical external beam therapy for head and neck cancers. Random monitoring of dose delivered was carried out in patients treated with external beam. As a part of AERB research project doses to organs like eye and thyroid were measured in some patients using thermoluminescent dosimetry. The computerised treatment planning system (TPS) was used in checking the treatment plans in some cases.

### Quality Assurance of Radiotherapy Equipment :

Linear Accelerator 4 MV	— 1
Cobalt-60 Teletherapy machines	... 3
Radiotherapy simulator	— 1



Selectron Remote Afterloading System	— 1
Computerised Treatment planning system	— 1
Radium sources	— 603 mg.

For intracavitary therapy in Cancer of cervix uteri manual afterloading system using Caesium-137 for two patients was purchased from BARC, Bombay and we have started using this too.

Routine checking and quality assurance tests on all the radiotherapy machines were undertaken which ensured proper dose delivery. The downtime of the equipments was reduced considerably resulting in almost uninterrupted treatment for patients.

The division has all the required instruments for calibration of beam therapy machines, patient dose monitoring and radiation protection surveys.

We are participating in the postal dose inter-comparison programme using TLD conducted by the Radiation Standardisation Laboratory, Division of Radiological Protection, BARC, Bombay.

#### Radiation Safety Activities :

Personnel monitoring is done by using film badge and about 90 personnel of the Regional Cancer Centre, Radiodiagnostic Dept., S.A.T. Hospital and Dental College are monitored this way. Radiation Protection surveys conducted periodically in the teletherapy and brachytherapy section ensure safety of radiation workers and the public.

The division extends the necessary physics support to the Department of Radiodiagnosis of the Medical College Hospital, Trivandrum by way of acceptance tests on newly installed X-ray machines, periodic quality assurance tests, inspection and possible repairs of these equipments.

#### Academic Programme

Physics teaching and training were imparted to the following categories of students.

M. D. (Radiodiagnosis and Radiotherapy)

D. M. R. D.

D. M. R. T.

C. R. A.

III Year M. B. B. S.

As in the previous years, one month field training was given to three students of the Diploma in Radiological Physics course of the BARC, Bombay.

Government approval is awaited for the starting of the M. Sc. Medical Physics course.

Shri P. G. Gopalakrishna Kurup and Sri. C. A. Davis have registered for Ph. D in the Kerala University.

#### Research Project

Work is continuing in the AERB Research Project "Dose to thyroid and eyelens in radiotherapy especially in the cancer of the upper trunk and head and neck regions."

#### Training Programme:

- Dr. T. P. Ramachandran visited the Christie Hospital & Holt Radium Institute, Manchester, U. K. for a period of 12 weeks under the auspices of the British Council. He was attached to the Physics Department of the hospital during his training.

#### Participation in Workshop/Meeting :

Dr. T. P. Ramachandran and Shri P. G. Gopalakrishna Kurup participated in the Workshop on Quality Assurance and Surveillance in Diagnostic Radiology held in Kidwai Memorial Institute of Oncology, Bangalore during January 31 — February 2, 1989.

Sri P. G. Gopalakrishna Kurup attended the meeting on Calibration Service Programme on Radiation Metrology and National Standards for Ionising Radiation held in Bombay during 18-19, August, 1988.

### Papers presented/published

The following papers were presented in the Xth Conference on Medical Physics held in Kidwai Memorial Institute of Oncology, Bangalore during 28-30, January, 1989.

1. "Calibration and beam energy stability of 4 MV accelerator": P. G. G. Kurup, T. S. Elias, T. P. Ramachandran and C. A. Davis.
2. "Measurement of dose to organs outside radiotherapy fields", T. P. Ramachandran, V. Jayan and P. G. G. Kurup.

### DIVISION OF CYTOPATHOLOGY

1. Dr. N. Sreedevi Amma — Professor
2. Dr. B. Chandralekha — Associate Professor
3. Dr. Elizabeth K. Abraham — Asst. Professor
4. Dr. G. Rajasekharan Pillai — Asst. Professor
5. Smt. J. Ambikakumari — Senior Scientific Officer
6. Sri. G. Reghunathan Nair — Cytologist.

### ACTIVITIES :

The important activities are more or less on the same lines as those of the previous year.

1. Screening of symptomatic women attending gynaecological outpatient of SAT Hospital Trivandrum for detection of precancerous and early cancerous lesion of the uterine cervix.
2. Assessment of hormonal status of early pregnant women attending the SAT Hospital especially in those with bad obstetric histories like repeated abortions, spotting in the early months etc.
3. Cytodiagnostic aspirations and their interpretation from patients attending the Regional Cancer Centre, MCH, SATH, SCD Hospital pulayanarkottah, Dental College & few near by Govt. Hospitals viz. General Hospital, W & C Thycaud etc.
4. Peripheral smear & Bone marrow examination & reporting of cases of Regional Cancer Centre & Occasional referred cases from haematology unit of MCH.
5. Examination of body fluids like Ascitic fluid, Pleural fluid, C. S. F., Urine, bronchial washings etc. for malignant cells from patients attending the RCC, M. C. H., SAT H., SCD Hospital and other near by Govt. Hospitals.

6. Examination of sputum for malignant cells from patients suspected to have carcinoma of the lung. Patients are mainly from RCC, SCDH & MCH.
7. Population screening for cervical cancer from PHC Thrirkadavoor, Quilon & from various medical camps.
8. Histopathological examination of surgical specimen & review of histopathology slides of patients referred to RCC from other hospitals.
9. Teaching & Training

#### Cytology services rendered to the various departments.

##### Gynaec smears.

Unit	No. of cases	% of Total
01 SAT H.	1604	21.10
02 ..	1338	17.60
03 ..	1181	15.54
03 ..	1181	15.54
04 ..	1235	16.25
05 ..	852	11.21
06 ..	771	10.14
Camps	302	3.97
RCC	58	0.76
Govt. Hospitals	130	1.71
Private Hospitals	131	1.72
<b>Total</b>	<b>7602</b>	<b>100.00</b>

During the year cervical smears were examined from 7602 women, majority being from SAT Hospital. Compared to the

previous year the total number is slightly less, but there is slight increase in the number of smears from Medical camps, other Govt. Hospitals and private hospitals indicating that awareness regarding the importance of cervical smears is slowly gaining momentum.

##### Non Gynaec & aspiration cytology including fluids.

As in the previous year, maximum number of cases are received from surgical units of MCH (18.96%). Next in frequency is Radiotherapy (RCC 13.24%). The following table gives details of the cases received from various departments.

##### Department-wise distribution of smears

Department	No. of cases	% of Total
Surgical	1084	18.96
Radiotherapy	757	13.24
ENT	671	11.74
Medical	512	9.96
Medical Gastroenterology	438	7.66
Thyroid clinic, Endocrinology & Nuclear Medicine	329	5.75
Urology	219	3.83
Medical paediatrics	172	3.01
Obstetrics & Gynaecology	150	2.62
SCD, Pulayanarkottah	123	2.15
Surgical paediatrics	103	1.80
General Hospital & Peroorkada	101	1.77
Surgical gastroenterology	54	0.95
Thoracic	53	0.93
Orthopaedics	43	0.75
Others	132	2.31
Private Hospitals	151	2.64
Unit not mentioned	625	10.93
<b>Total</b>	<b>5717</b>	<b>100.00</b>

This is the total number of smears in the Register of which 319 are repeat smears. In the analysis of lesions total number of cases (5398) are taken.

### Analysis of cervical smears

Detailed analysis of cervical smears shows the following findings.

Normal	—	2112	
Inflammation	—	3805	
T. V. Infection	—	236	(15 cases are associated with dysplasia)
Fungal infection	—	13	
Herpes simplex	—	3	
Glandular cell hyperplasia	—	97	
Reserve cell hyperplasia	—	110	
Endocervical Regeneration	—	79	
Mild dysplasia	—	585	
Moderate dysplasia	—	46	
Severe dysplasia	—	44	
Atypical cells	—	12	
Suspicious of malignancy	—	22	
Suggestive of malignancy	—	8	
Carcinoma in situ	—	12	
Microinvasive carcinoma	—	2	
Malignant cells+	—	33	
Invasive carcinoma	—	115	
Adenocarcinoma	—	8	
Sarcoma	—	1	
Radiation change	—	4	
Miscellaneous	—	225	
<b>Total</b>	—	<b>7802</b>	

### Hormonal Cytology

Vaginal smears for hormonal assessment are done in 981 cases during 1988-89. These included mostly cases of early

pregnancy with history of repeated abortions and suspected hormonal deficiency, a few cases from primary and secondary amenorrhoea, sterility, carcinoma breast etc. Compared to those of last year the total number is slightly lesser (189 cases less).

### Population Screening

376 cervical smears were received from primary Health Centre, Thrikkadavoor, Quilon. One case of carcinoma in situ (treated in SAT H), 2 cases of moderate dysplasia & 13 cases of mild dysplasia are reported.

### Non Gynaecological & Aspiration Cytology — Analysis of lesions FNACS

<i>Site of Aspiration</i>	<i>Total No. of cases</i>	<i>Benign</i>	<i>Malignant</i>
Thyroid	1077	1047	30
Lymphnodes	812	498	314
Breast	692	542	150
Liver	410	314	96
ENT all sites	358	248	108
Oral cavity	154	113	41
Skin & S/C tissue	123	87	36
Salivary gland	63	57	6
Abdominal cavity lump	59	37	22
Bone & joints	52	36	16
Female genital Tract	42	29	13
Gastro intestinal tract	41	31	10
Neck cysts	23	23	nil
Male Genital	22	16	6
Kidney	20	15	5
Lung	19	13	6
Scalp	13	0	4
Pancreas	4	2	2
Eye	3	2	1
Spleen	2	2	nil
Pelvis	1	1	nil
Site not mentioned	38	33	5
<b>Total</b>	<b>4028</b>	<b>3155</b>	<b>871</b>



## Analysis of body fluids

Site	Total No. of cases	Benign	Malignant
Ascitic fluid	535	483	52
Pleural fluid	315	279	36
Urine	222	214	8
C. S. F.	223	207	16
Pouch of Douglas	32	24	8
Bronchial washings & Brushings	25	19	6
Pericardial fluid	12	9	3
Gastric washings	8	8	nil
Total	1372	1243	129

Grand Total of FNAC & fluids = 5398

## Some - Highlights of FNACS

### Thyroid

Out of a total of 1077 aspirations 30 cases are reported as malignant. These included 20 cases of papillary carcinoma, 4 cases of follicular carcinoma, 3 cases of anaplastic carcinoma, 2 cases of medullary carcinoma and one case of squamous carcinoma.

### Lymphnodes

Lymphnode aspirations were received from 812 cases out of which 314 were reported as malignancies. Majority are metastatic lesions. 30 cases, are reported as lymphomas (NHL-21 and HL-9) Predominent metastatic lesions are from squamous cell carcinomas (90 cases) 71 cases of metastatic lesions are reported as undifferentiated carcinoma/NHL. Others are metastasis from various sites & lesions. Rare cases included three cases of CML in blast crisis one case of retinoblastoma, two cases of malignant fibrous histiocytoma and one case of mucoepidermoid carcinoma.

## Breast

Out of 692 aspirations, 150 cases are reported as malignant which includes 3 cases of lobular carcinoma, one case of squamous cell carcinoma one case of sarcoma and one case of NHL.

## Liver

A total of 410 liver aspirations are received and 96 malignancies are reported in them. There were 62 cases of hepatomas & one hepatoblastoma. 17 cases are reported as malignant cells and it was not possible to classify them further. The rest were metastasis from various sites & lesions.

## ENT

356 aspirates are received from ENT sites and 108 malignancies are reported predominant malignant lesions are squamous carcinomas and anaplastic carcinomas. One case of myeloma of frontal sinus & two cases of NHL of the Tonsil are also reported.

## Oral cavity

154 aspirates are received from various sites and 41 malignancies are reported. Most of these were squamous carcinomas and one was a case of NHL.

## Skin & S/C tissue

36 malignancies are reported in 123 aspirations. Rare lesions included metastasis from malignant fibrous histiocytoma, neuroblastoma, pigmented basal cell carcinoma, and Endodermal sinus tumour.

## Salivary gland

Total 63 aspirations are received and 6 malignancies are reported which included mucoepidermoid carcinoma, Adenoid cystic carcinoma, Acinic cell carcinoma and squamous carcinoma.



### Bone & joints

Out of 52 FNACs 5 cases are reported as osteosarcomas, 2 cases as Ewings tumour and one case as synovio sarcoma. The rest were metastasis from various primary sites.

### Female genital tract

13 malignancies are reported out of 42 aspirates from various sites. There was one case of endodermal sinus tumour.

### G. I. T.

A total of 41 aspirates are received & 10 malignancies are reported including one case of lymphoma from rectum.

### Male genital system

22 aspirates are received from various sites like testes, scrotum & prostate and 6 malignancies are reported. In testis there was one case of metastasis from neuroblastoma, two cases of leukaemic infiltration and one case of NHL.

### Kidney & Retroperitoneum

20 aspirates are received. 5 cases are reported as malignant. 3 cases of wilm's tumour, one case of renal cell carcinoma, one case of NHL/undifferentiated carcinoma.

### Lungs

6 malignancies are diagnosed from 19 FNACs which included 3 cases of large cell anaplastic carcinoma, one case each of adenocarcinoma & Oat cell carcinoma, one case was diagnosed simply as malignant cells.

### Scala nodules

13 aspirates are received & 4 cases are diagnosed as metastatic lesions, 2 from thyroid & 2 from small round cell neoplasm.

### Pancreas

Out of 4 aspirates one case is diagnosed as adenocarcinoma and another one as malignant cells.

### Eye

One case of retinoblastoma is diagnosed.

### Sputum cytology

During 88-89 a total number of 6768 smears are examined from 3384 samples collected from 846 patients. 3-5 or more samples are collected from each patient. Malignancy is reported in 56 cases out of which 24 are squamous cell carcinomas all in males. A detailed analysis is shown below.

Lesion	Total	Male	Female
No malignant cells	568	471	97
Fungus	99	84	15
Paragonimus Ova & crushman spirals	3	3	0
Dysplastic squamous cells	73	61	12
A typical and suspicious	47	40	7
Malignant cells (unclassified)	1	1	0
Squamous cell carcinoma	24	24	0
Adenocarcinoma	12	9	3
Large cell anaplastic carcinoma	10	9	1
Small cell undifferentiated carcinoma	9	8	1
Total	846	710	136

### Bone marrow & peripheral smear

380 samples of Bone Marrow and peripheral smears are examined. On an average 4 Bonemarrow slides are examined from each case & hence the total number of smears screened comes to about 1900 (including peripheral smears). Predominant lesions are acute leukaemias and NHL infiltration. A detailed analysis is shown below.



<i>Lesion</i>	<i>Fresh cases</i>	<i>Followup</i>
ALL	34	78
AML	19	6
Acute Leukaemia (Notyping)	4	..
CML	6	3
CLL	6	—
Multiple Myeloma	16	3
NHL infiltration	27	3
NHL No infiltration	82	—
Hodgkins disease (infiltration)	2	—
HD—No infiltration	38	—
Neuroblastoma infiltration	4	3
Neuroblastoma — no infiltration	5	—
I. T. P.	1	—
Aplastic anaemia	1	—
Hairy cell leukaemia	1	—
Myelodysplastic syndrome	1	2
Others	35	—
<b>Total</b>	<b>282</b>	<b>98</b>
<b>Grand Total (Fresh cases &amp; follow up)</b>	<b>380/-</b>	

### Histopathology

Histopathologic examination is carried out on surgical specimens received from RCC. This section also deals with review of histopathology slides of patients referred to RCC from various hospitals, whose biopsies are done by the referring hospitals. These review slides sometimes involve recutting of the blocks for better staining or special staining and sometimes even processing of fresh bits from the tissue available.

### Total cases

During 1988–89 we had specimens from 1848 cases for processing & reporting and 748 review slides coming to a total of 2596. This is 539 cases more than that of the previous year.

### Histopathology at a glance

<i>System</i>	<i>Total</i>	<i>Benign</i>	<i>Malignant</i>
Oral cavity pharynx and salivary gland	978	296	682
Female genital system	646	252	394
Lymphnode & haemopoietic system	301	76	225
Breast	150	26	124
G. I. T. including liver	64	11	53
Endocrines — Thyroid	47	7	40
Adrenal	6	1	5
Skin	51	18	33
Soft tissue	49	12	37
Male genital	28	—	28
Bone & joints	21	8	13
Urinary system	15	—	15
Larynx & lung	14	1	13
Nervous system	7	2	5
Eye & orbit	3	—	3
Miscellaneous	104		
Repeat specimens	112		
<b>Total</b>	<b>2596</b>		

112 specimens are repeat samples like excision of the tumour after a first biopsy or when the first sample was not representative. These are excluded from the analysis where the diagnosis was the same in both the samples.

### Some highlights of histopathology

#### Oral cavity and pharynx

Maximum lesions are from the buccal mucosa (461) out of these 293 are different grades of squamous carcinoma. There are also 46 cases of verrucous carcinoma.

Tongue lesions constituted 243 out of which 179 are squamous cell carcinoma. Predominant lesions diagnosed

from alveolus, floor of mouth, retromolar region and palate are also squamous cell carcinomas. One case of malignant melanoma is diagnosed from palate.

### Female genital tract

Second in frequency are lesions of the uterine cervix (336) of which 208 cases are Non-keratinising squamous cell carcinoma. This year since we started colposcopic biopsies followed by cone biopsy in relevant cases, we could diagnose 21 cases of carcinoma insitu as against 9 cases last year. In 4 other cases there was carcinoma insitu with microinvasion. Rare lesions of cervix include small cell undifferentiated carcinoma (2) adenocarcinoma (8) and papillary adenocarcinoma (2). One case of Non-Hodgkins lymphoma infiltrating the cervix is also diagnosed which is later confirmed by subsequent lymphnode biopsy.

While studying colposcopic biopsies, cases with different grades of dysplasias are also observed — Mild (18) Moderate (22) and severe (26) which could be properly followed up.

Other sites from where squamous cell carcinomas are diagnosed include vagina (18), vault (5) and Vulva (1).

Uterine lesions include 7 cases of adenocarcinoma, one rare case of Mullerian adenosarcoma and one case of stromal sarcoma.

Out of 38 cases of ovarian tumours, the predominant lesions are papillary serous cystadenocarcinoma (7) Mucinouscystadenoma with borderline malignancy (4), dysgerminoma (4) Mucinous cystadenocarcinoma (3), EST (3) etc. Rare lesions include NHL ovary (1) struma ovarii with papillary carcinoma (1) endometrioidadenocarcinoma (1), mixed germ cell tumour (1) and immature teratoma (2). There are also two cases of papillary adenocarcinoma of the fallopian tube.

This year we started getting true cut biopsies from the parametrium & one case of infiltration of parametrium by squamous cell carcinoma is diagnosed.

### Lymphnodes & Hemopoietic system

Third in frequency is lymphnode lesions (265). Majority are metastatic lesions (114) from squamous cell carcinoma (24) poorly differentiated carcinoma (15), adenocarcinoma (13) papillary carcinoma thyroid (11) etc. One rare case of Myeloid metaplasia is also diagnosed.

Among Lymphomas NHL is the predominant type (58) compared to HD (34), subtyping of NHL shows the following order of frequency. Lymphoblastic type (19), Poorly differentiated lymphocytic lymphoma (7) well differentiated lymphocytic lymphoma (7) Histiocytic lymphoma (5) & mixed lymphohistiocytic type (2), typing is not possible in 15 cases. Rare cases diagnosed Lennert's are lymphoma (1) T. cell lymphoma (1) & Burkitt's lymphoma (1).

Among 34 cases of Hodgkins lymphoma mixed cellularity are maximum (19) followed by Nodular sclerosing type (6) Lymphocytic depletion (2) & lymphocytic predominant (2). Classification was not possible in 5 cases.

Other rare lymphnode lesions diagnosed are Angioimmunoblastic lymphadenopathy (1) Angiofollicular lymphnode hyperplasia (1) and sinus histiocytosis with massive lymphadenopathy (1).

### Bone Marrow

As a continuation of bone marrow biopsy study started last year we got 36 specimens of which 13 showed NHL infiltration and two showed Hodgkins' lymphoma infiltration. Two cases of myeloma and 3 cases of acute leukaemia are also diagnosed.

### Breast

Out of 150 breast lesions 109 cases are infiltrating duct carcinomas with 26 of these showing lymphnode metastasis. Rare malignant lesions include medullary carcinoma (4) Mucinous carcinoma (3) infiltrating lobular carcinoma (2) squamous cell carcinoma (2) and malignant cytosarcoma phylloides (2). Two cases of metastatic lesion from poorly differentiated carcinoma are also diagnosed. Out of 26 cases of Non-malignant lesions there was one case of caseating granulomatous lesion.

### G. I. T. including liver

A total of 64 specimens are examined and 53 malignancies are diagnosed from various sites. Rare lesions diagnosed are one case each of basaloid carcinoma, alveolar rhabdomyosarcoma and malignant melanoma of rectum.

Liver lesions are mainly hepatocellular carcinoma (7). One case each of metastatic carcinoma and sarcoma is also observed.

### Endocrines

#### Thyroid

Out of 47 samples, papillary carcinoma is the maximum (22), three of them being follicular variant, others are mixed papillary and follicular (8) and follicular carcinoma (7). Rare case are undifferentiated carcinoma (2) and medullary carcinoma (1).

#### Adrenal

5 cases of neuroblastoma and one case of adrenal carcinoma is diagnosed.

#### Skin

Out of 51 cases 18 are benign and 33 are malignant lesions. Predominant lesions are Basal cell carcinoma (8), squamous cell carcinoma (7), Malignant melanoma (6), Lymphoma/Leukaemia infiltration (5), Rare lesions diagnosed are one case of Hodgkins lymphoma infiltration and one case of metastasis from malignant pleomorphic adenoma.

#### Soft tissue

Out of 49 soft tissue lesions 12 are benign. The malignant tumours include malignant fibrous histiocytoma (8), Neurofibrosarcoma (6) Fibrosarcoma (4), Embryonal rhabdomyosarcoma (4), Malignant schwannoma (3), Alveolar rhabdomyosarcoma (2) etc. Rare lesions include one case each of soft tissue Ewings sarcoma and angiosarcoma.

### Male genital system

28 specimens are received from Testis, prostate and penis. Predominant lesions from testis are seminomas (9). Rare lesions include NHL (2), Embryonal carcinoma (1) gonadal stromal tumour (1) & Mixed germ cell tumour (1). One case of paratesticular sarcoma is also diagnosed. From penis 7 cases of squamous carcinoma are diagnosed including one case of verrucous carcinoma. 6 cases of adenocarcinoma are diagnosed from prostate.

### Bone & Joints

21 specimens are studied, the predominant lesions are Osteogenic sarcoma (5) giant cell tumour (4) metastatic carcinoma (3) synoviosarcoma (2) Ewings sarcoma (1) chondrosarcoma (1) and Plasmacytoma (1). One Case of myositis ossificans is also diagnosed.

### Urinary system

Out of 15 specimens 8 are from kidney and 7 from urinary bladder. Kidney tumours include 7 cases of nephroblastoma and one case of metastasis from malignant pleomorphic adenoma. Bladder tumours include 4 cases of transitional cell carcinoma, one case each of squamous cell carcinoma, undifferentiated carcinoma and clear cell adenocarcinoma.

### Larynx and Lung

There are 12 cases of squamous carcinoma of the larynx and one case of poorly differentiated squamous carcinoma of the bronchus.

### C. N. S.

Out of 7 cases of lesions of CNS are included 3 cases of astrocytoma, two of them being anaplastic. One case of metastatic papillary adenocarcinoma is also diagnosed.

### Eye & adnexa

Lesions of eye-ball and adnexa include one case each of Meibomian carcinoma of lid, malignant melanoma & granulocytic sarcoma of the orbit.

## Others

Other rare lesions in the list are 2 cases of eosinophilic granuloma, one case each of thymic carcinoma and Askin's tumour.

112 specimens are repeat samples like excision of the tumour after a first biopsy.

## Teaching and Training

The cytopathology division actively participates in the routine teaching programme of the Medical College Trivandrum. MBBS students are regularly posted in the Cytology lab during their rotation posting in clinical pathology. The pathology post-graduates are given training in Cytology for 3 months during their M.D. course and candidates appearing for Diploma in clinical Pathology (DCP) are given training in Cytology for 1½ months. Training is also imparted to students of paramedical courses. DMLT students are posted in cytology for one week & B. Sc. MLT students are posted for one month and are taught the Cytopreparatory techniques. General nursing students in their final year are posted for one week in cytology and are taught collection, fixation & mailing of cervical smears, register maintenance and organisation of population screening programme. Female Health supervisor trainees (FHS) are also posted in Cytology & are also given training in the same manner as for general nursing students.

Besides these pathology M. D. students of Kottayam Medical College are posted for one week in cytology in March 1989 & are given training in interpretation of cytology material. B. Sc. MLT students of Gandhiji University are posted here for one week in January 1989 & are given training in Cytopreparatory techniques.

Postgraduates of other Departments are given guidance in their thesis work which involve cytological aspects. One P. G. student of Obst. & Gynaecology department had submitted a thesis in Dec. 88 on "Colposcopic screening" of women with clinically abnormal cervix and abnormal cervical smears under the coguidance of Dr. N. Sreedevi Amma.

As a means of continuing education regular oncocytology-histopathological CPCs are being conducted every month.

## Inservice Training

Dr. Maya, Lady Medical Officer of ESI Hospital, Ernakulam has been given 2 weeks training in practical aspects of cervical cytology and fine needle aspiration cytology in Feb. 1989.

Full time training courses are also conducted for cytotechnicians (6 months) and cytotechnologists (1 year) based on set objectives & specified curriculum. The fifth batch of cytotechnicians has passed out in Feb. 1989 & third batch of cytotechnologists in August 1988.

## Research

In collaboration with the Department of Obst. & Gynaecology of SAT Hospital, Colposcopy was done in 70 women and a clinicocytology-histology correlative study was done. The P. G. student who has been allotted a thesis on the subject submitted it in Dec. 1988. The analysis showed that it is highly useful to detect early lesions & pinpoint the site for biopsy. It is found to be complementary to Cytology and the detection rate is increased when both the methods are combined.

## Conferences attended

Dr. Elizabeth K. Abraham attended IAPM Kerala Chapter held in Calicut Medical College in June 1988. Drs. N. Sreedevi Amma, B. Chandralekha, Elizabeth K. Abraham, Rajasekharan Pillai and Mr. Muralidharan R., attended the IAPM Kerala Chapter held in Trichur Medical College in November 1988. The diagnostic slide seminar was on cytology and was conducted by this department 30 slides from different organs and lesions were circulated to the pathologist of all the Medical Colleges of the state & leading private pathologists of Kottayam, Ernakulam, Trichur & Calicut and were discussed with projection slides at the conference as detailed below:--



- Dr. N. Sreedevi Amma — Cytology of uterine cervix & Lymphnode cytology.
- Dr. B. Chandralekha — Cytology of Thyroid & Breast lesions
- Dr. Elizabeth K. Abraham — Cytology of Neuroblastoma, Ganglioneuroma & Seminoma.
- Dr. Rajasekharan Pillai — Cytology of salivary gland tumours and body fluids.
- Sri R. Muraleedharan — Sputum cytology

A pre-seminar workshop on cytology technique was organised as a CME programme along with the conference and Drs. N. Sreedevi Amma, B. Chandralekha, R. Rajasekharan Pillai and Sri R. Muraleedharan participated as faculty members. There were 25 participants from all over Kerala & few a from Tamil Nadu including pathologists, surgeons, Gynecologists and technicians. The topics covered by the cytology Division are —

1. Organisation of cytology laboratory including the one for National Cancer Control programme (NCCP) — Dr. B. Chandralekha.
2. Quality control in cytology laboratory — Dr. N. Sreedevi Amma.
3. FNAC Technique with demonstration of technique — Dr. Rajasekharan Pillai.
4. Fixation of smears & cytology staining technique with demonstration of preparation of stain — Sri. R. Muraleedharan.
5. Practical demonstration of the technique of cervical smear collection & fixation — Dr. N. Sreedevi Amma.

Dr. N. Sreedevi Amma attended the Annual Review meeting of National Cancer Registry project (NCRP) held at Gandhiji Medical College Bhopal in November 1988, participated in the pannel of pathologists meeting and discussed selected cases of carcinoma cervix.

Dr. N. Sreedevi Amma and Dr. G. Rajasekharan Pillai attended the annual conference of Indian Academy of cytologists, held in Ahamedabad in Feb. 1989.

Dr. N. Sreedevi Amma attended Annual Seminar on All India Hospital postpartem programme held in SAT Hospital, Trivandrum in Feb. 1989.

Dr. Elizabeth K. Abraham and Dr. G. Rajasekharan Pillai attended the Kerala Chapter of IAPM held in Lisic Hospital Ernakulam in March 1989.

#### Training of staff

Dr. Elizabeth K. Abraham attended the "Short term training course on computer application" conducted by Institute of Human Resource development for Electronics from 23-1-1989 to 20-3-1989.

#### Papers presented and published

Drs. N. Sreedevi Amma, B. Chandralekha, Elizabeth K. Abraham, G. Rajasekharan Pillai & Sri R. Muraleedharan conducted the diagnostic cytology slide session of the Kerala chapter of IAPM held in Trichur Medical College in November 1988 and presented papers on the data of 5 year analysis of cervical lesions, and lymphnode lesions. (Dr. N. Sreedevi Amma), Breast and thyroid lesions (Dr. B. Chandralekha), Salivary gland tumours (Dr. G. Rajasekharan Pillai) and sputum cytology (Sri. R. Muraleedharan).

Dr. N. Sreedevi Amma presented a paper on fine needle aspiration cytology of lymphnodes and Dr. G. Rajasekharan Pillai presented a paper on fine needle aspiration cytology of salivary gland tumours in the XVIII Annual conference of Indian Academy of cytologists held in Ahamedabad in February 1989.

Dr. N. Sreedevi Amma presented a paper on 'Pap smear facilities in Medical Colleges of Kerala in the Annual Seminar on All India Hospital post partem programme held in SAT Hospital, Trivandrum in Feb. 1989.

In the CME programme in connection with the 10th Annual conference of Association of surgeons of India, Kerala chapter

held in Holy Cross Hospital, Kottiyam. Dr. N. Sreedevi Amma presented a paper on "Techniques & practical applications of Fine needle aspiration cytology".

### Papers Published

Elizabeth K. Abraham — "Bone Marrow biopsy in Non Hodgkins' Lymphoma".

Ind. Jour. Cancer 25, 218-229, 1988.

### Other activities

As in the previous years, th Division had an active role in the activities of the early cancer detection programmes. The staff of this Division also co-operated and participated in various cancer detection camps (8 camps) organised by RCC (Community Oncology), National service scheme, District collectors and other voluntary organisations and were given facilities to collect cervical smears and FNAC at the camp site. The staff also participated in the training programme for Health visitors organised by the Community Oncology division.

+ 4 Ph. D. Fellows

### DIVISION OF RESEARCH

1. Prof. A. Joseph : Officer-in-Charge
2. Dr. (Mrs.) Prabha Balam : Associate Professor
- ×3. Dr. K. K. Vijayan : Lecturer
4. Mr. Thomas Abraham : Scientific Officer
5. Mr. Ravindran Ankathil : Scientific Officer
6. Mrs. B. Padmavathi Amma : Technical Officer

The research activities of the Division followed the same trend of the previous years and centred round the immunological, biochemical, cytogenetic, immuno-chemical and electron microscopic aspects of human cancers. Screening of plant seeds and latexes for their tissue binding property, and the best inhibiting sugar was carried out. Of the 57 new seeds and four latexes tested, only four showed lectin activity. The investigations were carried out using hemagglutinating properties against a wide spectrum of human and animal erythrocytes and hemagglutination inhibition assays using a number of mono and disaccharides. Jack Fruit lectin (JFL) isolated earlier, and found to give promising results with oral cancers and pre-cancers were tested for its activity in cancer of the breast. JFL showed higher affinity to neoplastic cells as compared to normal cells shown by the higher intensity of staining. The potential of this lectin as a histochemical marker of malignancy is being worked out further. A small degree of background binding and nonspecific binding has been observed in normal tissues.

In Immunology, cell mediated and humoral immune response of solid tumours were the main focus of study. A Ph. D. thesis entitled "immunobiology of malignant cervical neoplasia; the effects of radiotherapy and biological response modifiers" was submitted to the University of Kerala. The work was carried out under the supervision of Dr. Prabha Balam and Dr. M. Krishnan Nair. Carcinoma of the uterine cervix, the most prevalent female cancer was investigated to assess the changes in the immune responses before and after radiotherapy at various



periods. The follow up was done for three years. Comparisons were also made between the results obtained for the patients and apparently healthy age-matched controls. An attempt was also made to see if any immunological variable (s) alone or in combination showed a consistent change with the extent of disease. A total of 229 patients belonging to various stages and histological groups were included in the study of which 151 were followed up. The results pointed towards an immunodeficiency at the time of presentation itself which correlated with the tumour load. Of the forty immune variables studied, five were selected out using discriminative statistical analysis. In the above analysis CD4<sup>+</sup> lymphocytes, CD4<sup>+</sup>/CD8<sup>+</sup> lymphocyte ratio, NK cell activity, Con A induced suppressor index and circulating immune complex levels were seen to be consistently deranged with very high level of significance. Using a multivariate analysis an equation could be derived and the patients grouped into different immunological stages based on the behaviour of the above five parameters. This immunological staging system could identify patients prone to recurrence and showed good potential as a prognostic indicator. Another interesting feature noticed was radiation induced eosinophilia in the recurrence free group of patients in contrast to radiation induced monocytosis in the recurrence group. The ability of interleukin-2 (IL-2) and interferon (IFN) to enhance the immune response was assayed in *invitro* studies. The results showed that the lymphocyte responses could be enhanced with IL-2 and IFN, the time of restoration being longer with higher tumour load. Hence, it would be worthwhile trying immunotherapy with these response modifiers in *invivo* system.

Investigating further into the localisation and nature of the antitumour antibodies in autologous systems, 33% of the sera bound positively to the sections at a titre above 100. In the previous year, it was shown that about 80% of the oral cancer sera bound positively to oral cancer cells when used without dilution. Three different staining patterns were observed. About 90% of the positive sera showed positive staining of the cornified layer along with the keratinised cells of the rete pegs. The keratin pearls were negative in these cases. A second group,

mainly those belonging to the moderately differentiated Squamous Cell Carcinoma group, the staining was restricted to cancer cell nests. The staining was mainly cytoplasmic with isolated cells showing high intensity staining. The third pattern of staining was that which was restricted to the keratin pearls and the surrounding cells alone. Work is in progress to characterise the antibody. Another aspect of tumour immunology was the study to evaluate the changes in tissue immunoglobulins in patients with solid tumours. The study on the distribution of blood groups in cancer patients completed its term of three years. In total 9905 cancer patients who had registered over the last thirty months at the Centre were evaluated for the distribution of the ABO & RH blood groups. The results are being analysed to find any possible association of any particular blood group to a cancer.

Ultrastructural studies were carried out in 60 oral cancer tissues and the following features were noticed. Different types of carcinoma such as squamous, verrucous and spindle cell could be indentified without doubt. The general observations were the following. Intercellular bridges were broken and few in number, presence of frequent intracytoplasmic bridges and desmosomes, conspicuous large intercellular spaces and periphery of basal cells ruffled and contained lobulated bizzare nuclei with conspicuous nuclear pleomorphism. Nucleoli were very often multiple and large.

The amount of tonofilaments and keratohyaline granules in the cytoplasm varied in accordance with the degree of differentiation. Well differentiated squamous cell carcinoma had abundant tonofilaments and keratohyaline granules while these were few in poorly differentiated carcinomas. The tonofilaments were arranged in a scattered form in verrucous carcinoma in contrast to bundles in normal case. Presence of dense keratinocytes were also seen in this type of cancer. Abundance of granules and vesicles with elongated nucleus were characteristic of spindle cell carcinomas.

In the field of cytogenetics, emphasis was given to assessment of chromosome abnormalities in the bone marrow of multiple myeloma patients and its potential as a prognostic indicator.



Of the 80 cases studied, chromosomal abnormalities were observed in 47.5% cases. The most striking observation was the presence of marker chromosomes in 15% of the cases. Loss of Chromosomes in group C, gain of chromosomes in group A and group G and involvement to a lesser degree of chromosomes 11, 1 and 14 were the other important observations. Chromosomal changes noticed above showed a definite pattern of correlation with the survival of the patient. Patients with only normal metaphases in their bone marrow had a longer median survival period of 14 months. Patients with all abnormal metaphases had a median survival period of 7 months and patients with a mixture of normal and abnormal metaphases had an intermediate survival period of ten months.

### Teaching

Teaching activities include a weekly journal club and seminars in various aspects of cancer and thesis guidance and supervision. 4 M.D. thesis from various departments of Medical College (Medicine, Paediatrics, Pathology and Dental College) and one Ph. D. thesis from the research division were completed this year. Six Research fellows are working for doctoral degree in various aspects of cancer.

### Clinical Laboratory Services

1. Total No. of Routine investigations	:	1,36,982
(a) Hematology	:	86,556
(b) Biochemistry	:	33,108
(c) Urine, CSF and others	:	17,318
2. Serum immunoglobulins	:	113
3. Cytogenetics	:	42
4. Lymphocyte typing	:	15
5. Antinuclear antibodies, Cryoglobulins, complement levels etc.	:	12
6. VMA	:	10

### Aided Research Projects :

<i>Project</i>	<i>Agency</i>	<i>Investigators</i>
1. Isolation and Purification of specific Plant lectins and their use in the diagnosis and treatment of cancer.	ICMR 1986-89	Dr. M. Krishnan Nair Mr. T. Vijayakumar Dr. K. K. Vijayan
2. Immunodiagnosis of oral cancer using antitumour antibodies	Dept. of Science, Technology & Environment, Kerala 1987-1990	Dr. Prabha Balam Dr. Thomas Cheriyan Dr. Lalitha Bai Dr. K. T. Sreelatha
3. Major Blood groups in human malignancies	Dept. of Science Technology and Environ- ment, Kerala 1986-1989	Dr. M. Krishnan Nair Dr. Prabha Balam
4. Isolation, Purification of Immune complexes from sera of cancer patients	STED, Kerala 1987-90	Mr. T. Vijayakumar Mr. K. K. Vijayan
5. Synthesis of antitumour peptides	In collaboration with Kerala University, STED Kerala State 1988-90	Dr. P. K. Rajan (Kerala University) Mr. K. K. Vijayan
6. Cytogenetic studies in hematological malignancies	STED, Kerala State, 1987-89	Mr. Ravindran Ankathil Dr. M. Krishnan Nair Dr. Joy Augustine

7. Serum and tissue Immuno-globulins as biological makers in pre-malignant and malignant lesions of the oral cavity, uterine cervix and breast
- STED,  
Kerala State  
1988-91
- Mr. Vijayakumar, T.  
Dr. V. N. Bhattathiri  
Dr. C. S. Madhu

#### Papers Published

1. Prabha Balaram, Radhakrishna Pillai, M., Padmanabhan, T. K., Thomas Abraham, Harondran, N. K. and Krishnan Nair, M; Immune functions in malignant cervical neoplasia — Multiparameter analysis. *Gynaecol. Oncology* 31 : 409-423, 1988.
2. Sasidharan, V. K., Anilkumar, K. K., Vijayakumar, T., and Vasudevan, D. M. changes in the concentration of carbohydrate components of glycoproteins in the serum of oral cancer patients. *Ind. Med. Gaz.* 122 : 53, 1988.
3. Hasoena Beevi, V. M., Remani, P., Ravindran, A., Vijayan, K. K. and Vijayakumar, T., Search for tissue specific plant lectins — a preliminary study. *Biol. Plant.* 31; 51-57, 1989.
4. Prabha Balaram, Padmanabhan, T. K. and Vasudevan, D. M. Role of levamisole as an adjuvant to radiotherapy in oral cancer. II Lymphocyte subpopulations. *Neoplasma* . 35 : 235-242, 1988.
5. Radhakrishna Pillai, M., Prabha Balaram, Thomas Abraham, Padmanabhan, T. K. and Krishnan Nair. Natural cytotoxicity and serum blocking in malignant cervical neoplasia. *Amer. J. Reproductive Immunol and Microbiol.* 16 : 159-162, 1988.
6. Radhakrishna Pillai, M., Prabha Balaram, Padmanabhan, T. K., Thomas Abraham and Krishnan Nair, M. : Inter-

leukin-2 and alpha interferon induced *in vitro* modulation of spontaneous Cytotoxicity in patients with cancer of the uterine cervix undergoing radiotherapy. *Acta. Oncol.* 28 : 39-44, 1989.

7. Sasidharan, V. K., Remani, P., Vasudevan, D. M. and Vijayakumar, T. Leucocyte migration inhibition assay in oral cancer patients. *Ind. Med. Gaz.* 122 : 339, 1988.
8. Rajendran, R., Iype Varghese, Sugathan, C. K., and Vijayakumar, T. Ackerman's tumour (Verrucous Carcinoma) — a clinicopathological study of 426 cases. *Aust. Dent. J.* 33 : 295, 1988.
9. Anil, S., Hari, S., and Vijayakumar, T; A randomised placebo-controlled, double-blind trial of oxytetracyclin in acute phase of periodontal disease. *Dental Dialogue* 13 : 51, 1988.
10. Rajendran, R., Radhakrishnan, N. S., Vasudevan, D. M. and Vijayakumar, T. An alternative pathogenetic pathway for oral submucous fibrosis (Potent precancer lesion) based on epidemiological, biochemical, immunological and ultrastructural evidences. *Anticancer Research.* 1149-1150, 1988.
11. Prabha Balaram, Remani, P., Padmanabhan, T. K. and Vasudevan, D. M. Role of levamisole immunotherapy as an adjuvant to radiotherapy in oral cancer. *Immune Responses. Neoplasma.* 35 : 617-626, 1988.
12. Radhakrishna Pillai, M., Balaram, P., Padmanabhan, T. K. and Krishnan Nair, M.; Immunological profiles of T Lymphocytes in malignant cervical neoplasia. *J. Exp. Clin. Cancer. Res.* 7 : 251-257, 1988.
13. Sivasankaran, S., Das, K. V. K., Thomas, M. Radhakrishna Pillai, M. Prabha Balaram, Augustin, J., Alekutty, M. A. Adrenal carcinoma with reactive plasmacytosis. *JAPI.* 37 : 237-239, 1989.

### Conference Attended:

1. Prabha Balaram, Radhakrishna Pillai, M., Thomas Abraham and Krishnan Nair, M. Immunology of premalignant and malignant conditions of the oral cavity. Decennial Conference of Amala Cancer Hospital, Trichur, April 1988.
2. Vijayakumar, T., and Panicker, C. K. J. "Cell mediated and humoral immune responses in solid tumours" Decennial Conference of Amala Cancer Hospital, Trichur, April 1988.
3. Vijayakumar, T., Ravindran, A., Remani, P., Haseena Beevi, V. M. and Vijayan, K. K. Tissue specific plant Lectins. First national Seminar on Frontiers in Biology, September 1988, Trivandrum.
4. Vijayakumar, T., Rajendran, R. and Anil, S. "Prevalence of OSMF among factory workers of Kerala". International Conference on Primary Health Care, September 1988, New Delhi.
5. Vijayakumar, T., Ravindran, A. and Remani, P. "Viruses in human Cancers". 12th National Congress of Indian Association of Medical Microbiologists. November 18th - 20th 1988, Trivandrum.
6. Vijayakumar, T. "Immunology of solid tumours and pre-malignant lesions". 16th Annual Conference of Indian Immunology Society, 25th - 30th November 1988, Siliguri (ORATION).
7. Vijayan, K. K., Remani, P., Haseena Beevi, V. M., Ravindran, A. and Vijayakumar, T. Erythroagglutins of plant origin. International Conference on Aromatic and medicinal Plants held in New Delhi, January 28-31, 1989.
8. Ravindran Anakathil, "Cytogenetics of Hodgkins Diseases". Invited lecture in the Symposium on Cancer Cytogenetics at the 8th Annual Convention of Indian Association of Cancer Research at Ahmedabad, February 1989.

9. Ravindran Anakathil, Vijayakumar, T., Vasudevan, D. M., Joy Augustine and Krishnan Nair, M. "Chromosome abnormalities in multiple myeloma patients and their clinical significance". 8th Annual convention of Indian Association of Cancer Research at Ahmedabad, February 1989.
10. Ravindran Anakathil, Vijayakumar, T., Vasudevan, D. M., Joy Augustine and Krishnan Nair, M. "Practical value of Cytogenetic (chromosome) studies in the diagnosis and/or prognosis of patients with malignant neoplasms. Kerala Science Congress, Cochin, February 1989.
11. Thomas Abraham, Prabha Balaram, Radhakrishna Pillai, Stephen, J. and Krishnan Nair, M. "Discriminative Analysis of Tumour Markers in Oral Squamous Cell Carcinoma. National Seminar on oral cancer by Indian Academy of oral Medicine March 25 - 26, 1989, Madras.
12. Radhakrishna Pillai, M., Prabha Balaram, Sudha, L. Nafinikumari, K. R., Krishnan Nair, M. "Role of Alpha, Interferon in Modulation of Natural Killer cell Activity in oral precancer-possible clinical implications". National Seminar on oral cancer by Indian Academy of oral Medicine, March 25 - 26, 1989, Madras.
13. Prabha Balaram, Radhakrishna Pillai, M., Thomas Abraham, Sudha, L., Kannan, S. "Anti-tumour Immune Function in the Immunopathogenesis of Precancer and Cancer of Oral Cavity". National Seminar on oral cancer by Indian Academy of oral Medicine, March 25, 26, 1989 Madras.
14. Vijayan, K. K. "A study of Nitration of Osthol with Benzoyl Nitrate". National symposium on Recent Advances in Organic Chemistry, Kalyani University, Calcutta, March 26-28, 1989.

### Workshops/Training Courses attended

1. Dr. Prabha Balaram  
ICPO Workshop on molecular biology of HPV and cervical cancer (Institute of Cytology and Preventive Oncology) New Delhi, February 20 - 28, 1988.

2. **Mr. S. Kannan (UGC Sponsored)**

DBT sponsored short term course on Hybridoma Technology with special reference to the application of monoclonal antibodies in the early detection of malignant diseases. (Cancer Institute, Adyar, Madras) February 2 to March 1, 1989

**DIVISION OF MEDICAL RECORDS AND STATISTICS  
AND HOSPITAL CANCER REGISTRY (N.C.R.P.)**

Mr. P. Gangadharan	— Associate Professor
Dr. R. Sankara Narayanan	— Assistant Professor
Mr. S. Muraleedharan Nair	— Medical Statistician
Mr. R. Raveendran Nair	— Medical Records Officer
Mrs. G. Padmakumari Aruna	— Senior Research Fellow

**A. Medical Records and Statistics: H. C. C.**

During the year 1988, the new case registrations in the outpatient department numbered 5265 which was 6.7% more than the previous year. In the year 1982, the new registrations were only 3626. This indicated that 1639 more new patients registered for check up and treatment in 1988 than in 1982, i.e. an increase of 45% over the 1982 registrations. This increase in new patient attendance increased the work load in all the departments. On an average a 7% annual increase was noted. The Site Distribution of cases registered in the Regional Cancer Centre is presented in Table 1.

**Patient Statistics: 1988**

Total New Registrations	: 5265
Number of cancer cases	: 4798 (91% of total)
Males	: 2648
Females	: 2250
Sex Ratio	: 1.1 : 1
No. of benign tumours	: 85
All other & non cancer	: 382
Inpatient admissions	: 3072
Deaths in the hospital	: 142
No. of follow up post cards sent	: 5088

The ten leading sites of cancer seen in males and females attending the Regional Cancer Centre is given in Table II.



REGIONAL CANCER CENTRE, 1988 :  
TEN LEADING CANCER SITES

	Male			Female	
	No.	%		No.	%
Buccal mucosa & Palate	311	12.2	Cervix uteri	504	22.4
Lung	269	10.6	Breast	485	21.6
Tongue	191	7.5	Buccal mucosa & Palate	162	7.2
Oesophagus	158	6.2	Ovary	149	6.6
Brain	112	4.4	Tongue	89	4.0
Larynx	108	4.2	Thyroid	82	3.6
Oropharynx	93	3.6	Brain	65	2.9
Leukaemia	93	3.6	Leukaemia	51	2.3
Stomach	91	3.6	Oesophagus	50	2.2
Hypopharynx	89	3.5	Gum	49	2.2
	<u>59.4</u>			<u>75.0</u>	

Regular efforts to evaluate and maintain the quality of case recording are made by group discussions with other specialities. The Medical Record Department staff are at present involved in several patient service activities like treatment cost certification, travel concessions etc. The medical records are constantly used by the staff of Regional Cancer Centre and Medical College Hospital for clinical research activities.

The peripheral out patient clinic conducted at the Early Cancer Detection Centre, Ernakulam every third Saturday of the month is proving every useful for patients from the northern districts. Case records of patients with prior appointment are taken to Ernakulam by staff of record department for conducting the clinic.

Table 1  
Regional Cancer Centre, Site distribution of Cancer Cases — 1988

ICD-9. Mal. Neoplasm of	Male		Female		Total		Sex Ratio	
	No.	%	No.	%	No.	%	M : F	
1	3		5		7		8	9
140 Lip	14	0.5	19	0.8	33	0.7	0.7	1.1
141 Tongue	191	7.5	89	4.0	280	5.8	2.1	1.1
142 Major salivary glands	14	0.5	11	0.5	25	0.5	1.3	1.1
143 Alveoli	55	2.2	49	2.2	104	2.2	1.1	1.1
144 Floor of mouth	39	1.5	3	0.1	42	0.9	13.0	1.1
145 Buccal mucosa, Palate	311	12.2	162	7.2	473	9.9	1.9	1.1
146 Oropharynx	93	3.6	15	0.7	108	2.3	6.2	1.1
147 Nasopharynx	27	1.1	8	0.4	35	0.7	3.4	1.1
148 Hypopharynx	89	3.5	15	0.7	104	2.2	5.9	1.1
149 Other & ill defined sites	3	0.1	—	—	3	0.1	—	—
150 Oesophagus	158	6.2	50	2.2	208	4.3	3.2	1.1
151 Stomach	91	3.6	32	1.4	123	2.6	2.8	1.1
152 Small intestine	2	0.1	1	—	3	0.1	2.0	1.1
153 Colon	29	1.1	23	1.0	52	1.1	1.3	1.1
154 Rectum, rectosigmoid Jn. & Anus.	47	1.8	18	0.8	65	1.4	2.6	1.1



1	2	3	4	5	6	7	8	9
155	Liver	72	2.8	26	1.2	98	2.0	2.8 : 1
156	Gall bladder etc.	6	0.2	4	0.2	10	0.2	1.5 : 1
157	Pancreas	25	0.8	8	0.4	28	0.6	2.5 : 1
158	Retroperitoneum	9	0.3	4	0.2	12	0.3	2.0 : 1
160	Nasal cavity etc.	36	1.4	20	0.9	56	1.2	1.8 : 1
161	Larynx	108	4.2	7	0.3	115	2.4	15.4 : 1
162	Lung	269	10.6	18	0.8	288	6.0	14.2 : 1
163	Pleura	2	0.1	3	0.1	5	0.1	0.7 : 1
164	Mediastinum etc.	4	0.2	—	—	4	0.1	—
170	Bone	34	1.3	22	1.0	56	1.2	1.5 : 1
171	Conn. & other soft tissue	34	1.3	42	1.9	76	1.6	0.8 : 1
172	Malignant melanoma	13	0.5	6	0.3	19	0.4	2.2 : 1
173	Skin	37	1.5	23	1.0	60	1.3	1.2 : 1
174	Female breast	—	—	485	21.6	485	10.1	—
175	Male breast	1	—	—	—	1	—	—
173	Uterus	—	—	10	0.5	10	0.2	—
180	Corvix	—	—	504	22.4	504	10.5	—
181	Placenta	—	—	—	—	—	—	—
182	Body uterus	—	—	29	1.3	29	0.6	—
183	Ovary	—	—	149	6.6	149	3.1	—
184	Vagina, vulva	—	—	38	1.7	38	0.8	—
185	Prostate	28	1.1	—	—	28	0.6	—
186	Testis	29	1.1	—	—	29	0.6	—
187	Penis	37	1.5	—	—	37	0.8	—
188	Urinary bladder	44	1.7	3	0.1	47	1.0	14.7 : 1
189	Kidney	19	0.7	14	0.6	33	0.7	1.4 : 1
190	Eye	19	0.7	4	0.2	23	0.5	4.8 : 1
191	Brain	112	4.4	65	2.9	177	3.7	1.7 : 1
192	Nervous System	6	0.2	—	—	6	0.1	—
193	Thyroid	42	1.6	82	3.6	124	2.6	0.5 : 1
194	Other endocrine glands	8	0.3	6	0.3	14	0.3	1.3 : 1
195	Other ill defined sites	8	0.3	11	0.5	19	0.4	0.7 : 1
196	Lymphnodes	70	2.7	15	0.7	85	1.8	4.7 : 1
197	Sec. Resp. & Dig. System	20	0.8	4	0.2	24	0.5	5.0 : 1
198	Sec. other specified	36	1.4	13	0.6	49	1.0	2.8 : 1
199	Unknown primary	32	1.3	27	1.2	59	1.3	1.2 : 1
200	§	—	—	—	—	—	—	—
202	Non Hodgkins Lymphoma	79	3.1	32	1.4	111	2.3	2.5 : 1
201	Hodgkins disease	35	1.4	14	0.6	49	1.0	2.5 : 1
203	Multiple Myeloma	24	0.9	15	0.7	39	0.8	1.6 : 1
204	Lymphoid leukaemia	60	2.4	28	1.3	89	1.9	2.1 : 1
205	Myeloid leukaemia	30	1.2	22	1.0	52	1.1	1.4 : 1
208	Leukaemia of unspecified type	3	0.1	—	—	3	0.1	—
140-208	All sites	2548	100	2250	100	4798	100	1.1 : 1

## B. The Hospital Cancer registry (ICMR Assisted Project)

The National Cancer Registry Project of Indian Council of Medical Research was launched in 1981. The Hospital Cancer Registry was started for registering cancer patients seen in Medical College Hospital since 1st January 1982 and the registry has now completed 7 years. The data collected by the registry provides important information on the cancer problem as seen in this hospital.

Medical College Hospital, Trivandrum attracts patients from all over the state; however, almost 60% of the cancer patients are from the districts of Trivandrum and Quilon. Though the Hospital has almost all speciality clinics, it may be debated whether the spectrum of diseases seen at this hospital truly represent the disease pattern in the community. This is because the hospital statistics has always an inherent bias due to patient selection. Further, the Medical College Hospital, Trivandrum is a referral hospital, hence the diseases referred may be of a special nature. It is to be noted that facilities for radiotherapy which is the major form of treatment for cancer, is not available within a wide area surrounding the college. The current report is based on cancer cases seen during the four year period 1983-1986 at the Medical College, Trivandrum. The yearly registration of incident cancer cases (new cases diagnosed during the year) were as in Table 2.

Table 2  
Hospital Cancer Registry, Trivandrum: 1983-1986  
'INCIDENT' Cases and Microscopic verification  
( 'INCIDENT' - Newly diagnosed during  
the Year)

Year	Male	Female	Total	M. V%	M : F
1983	2024	1691	3715	81%	1.2 : 1
1984	2097	1755	3852	85%	1.2 : 1
1985	2067	1790	3857	86%	1.2 : 1
1986	2297	1935	4232	86%	1.2 : 1
Total	8485	7171	15656	85%	1.2 : 1

M. V. % — Microscopic Verification Percentage.

During the four year period, 15,656 cancer cases have been recorded by the registry. There has been an apparent increase in the number of cancer patients, but this cannot be interpreted as due to an increase in cancer incidence in the population. As stated earlier several factors may be operating. A high proportion of microscopically verified cases is an index of diagnostic standard. A consistent M : F ratio is another feature of the data obtained.

The cancer cases were distributed widely with regard to age, sex and site of cancer. The site distribution of cases with regard to age groups, 0-14, 15-44 and 45 + in male and female are shown in table 3.

The age group 0-14 is the paediatric age group as designated by the World Health Organisation. The age group 15-44 will include the reproductive age group and the 45 + age group will include old age as well. The cancer cases in this 45 + age group will reflect in a broad way the effect of environmental factors cumulated over the years along with the ageing process. Overall, the cancer incidence rate is known to increase with years.

The diagram 1 shows the distribution of cancer in the different organ systems in the body among males and females. Among males, cancers in Oral Cavity and pharynx, Gastro-intestinal and Respiratory system together formed almost 60% of the total load. Oral and pharyngeal group of cancers formed the majority of cases in men with 30% of the total group.

Among females, Genital cancers lead the list with 33% of all female cancers followed by breast cancer (17%) and oral and pharyngeal cancer (17%).

Individually the sites affected in men were: "Other parts of mouth" (11.2%) (WHO ICD No. 145) and lung 10.8%. "Other parts of mouth" includes Buccal mucosa, and palate; thus, lung cancer was the leading cancer site in men. Other important sites affected with cancer in men were Tongue (7%) oesophagus (5.6%), stomach (5.6%), larynx (4.4%), leukaemia (4.2%), brain (3.8%) and hypopharynx (3.4%). Among females, cancer of the uterine cervix was the predominant site (25.3%) followed by breast cancer (17.2%) other parts of mouth (7.1%), ovary (4.9%), thyroid (4.4%) and tongue (3.8%).

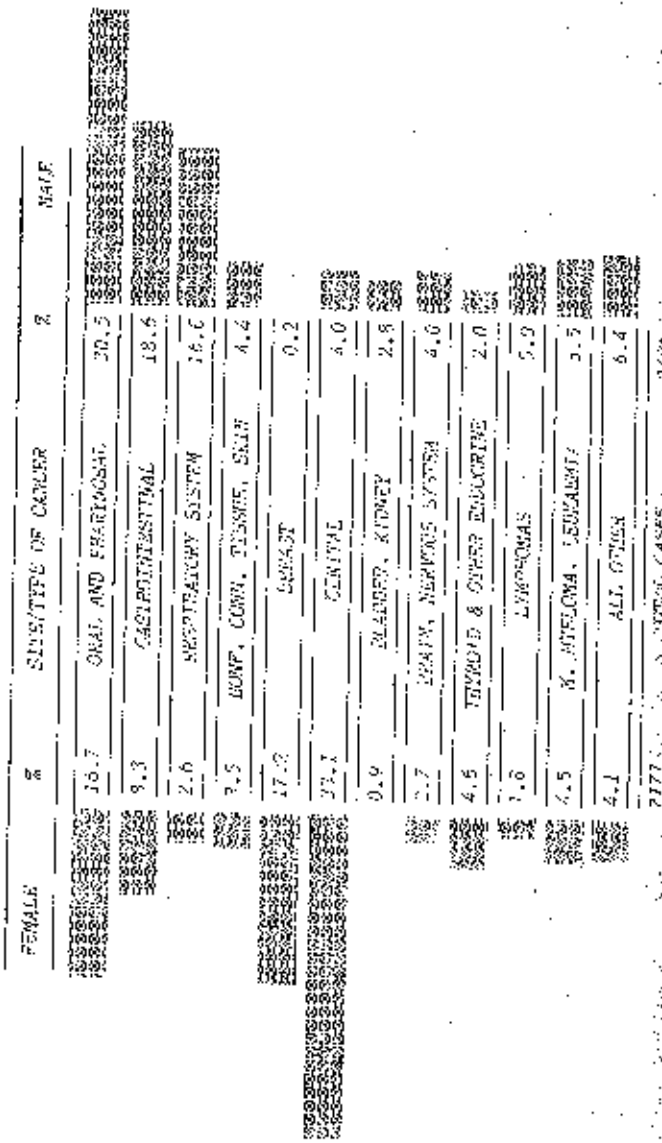
Table 3

Hospital Cancer Registry, Trivandrum: ICD distribution of incident Cancer Cases in Males and Females 1983 - 1986

ICD	Site	Male					Female				
		0-14	15-44	45+	Total	%	0-14	15-44	45+	Total	%
1	2	3	4	5	6	7	8	9	10	11	12
140	Lip	—	5	44	49	0.6	1	8	67	76	1.1
141	Tongue	—	95	495	590	7.0	—	42	229	27	3.8
142	Salivary Gland	3	23	27	53	0.6	1	14	15	30	0.4
143	Gum	1	15	215	231	2.7	—	14	142	156	2.2
144	Floor of Mouth	—	5	76	81	1.0	—	3	11	14	0.2
145	Other parts of Mouth	2	104	847	953	11.2	1	46	463	510	7.1
146	Oropharynx	—	24	193	217	2.6	1	6	23	30	0.4
147	Nasopharynx	7	40	55	102	1.2	2	21	16	39	0.5
148	Hypopharynx	—	33	252	285	3.4	—	17	48	65	0.9
149	Pharynx & Ill defined sites	—	5	15	20	0.2	—	—	2	2	—
150	Oesophagus	—	39	438	477	5.6	—	17	126	143	2.0
151	Stomach	—	51	421	472	5.6	1	26	123	150	2.1
152	Small Intestine	—	1	4	5	0.1	—	2	6	8	0.1
153	Colon	2	29	68	99	1.2	—	15	34	49	0.7
154	Rectum	—	25	25	51	0.6	—	1	75	76	1.0
155	Liver	10	95	25	130	2.7	15	28	35	68	0.9
156	Gall Bladder	—	3	19	22	0.3	—	8	9	17	0.2
157	Pancreas	—	30	72	102	1.2	—	12	36	48	0.7
158	Retroperitoneum	3	7	11	21	0.2	2	8	12	22	0.3
159	Oth. Ill Def. sites-Dig. Org.	—	—	—	—	—	—	—	—	—	—
160	Nasal Cavity	2	18	82	102	1.2	2	12	56	70	1.0
161	Larynx	1	21	349	371	4.4	—	4	20	24	0.3
162	Lung	—	90	825	916	10.8	—	21	68	89	1.2
163	Pleura	—	1	4	5	0.1	—	1	2	3	—
164	Thymus, Heart & Mediastinum	2	10	5	17	0.2	—	—	1	1	—
165	Oth. Respiratory System	—	—	—	—	—	—	—	—	—	—
170	Bone	21	69	14	104	1.2	25	40	9	74	1.0
171	Connective Tissue	11	25	33	70	0.8	14	27	22	63	0.9
172	Skin-Melanoma	—	11	40	51	0.6	—	7	12	19	0.3
173	Skin, Other	3	20	129	152	1.8	1	19	75	95	1.3
174, 175	Breast	—	3	18	21	0.2	—	485	748	1233	17.2
179	Uterus, Nos	—	—	—	—	—	—	7	11	18	0.3
180	Cervix Uteri	—	—	—	—	—	—	355	1459	1814	25.3
181	Placenta	—	—	—	—	—	—	21	2	23	0.3
182	Corpus Uteri	—	—	—	—	—	—	20	75	95	1.3
183	Ovary	—	—	—	—	—	17	132	201	350	4.9
184	Vagina	—	—	—	—	—	3	9	62	74	1.0
185	Prostate	1	4	138	143	1.7	—	—	—	—	—

	1	2	3	4	5	6	7	8	9	10	11	12
186 Testis			4	47	15	56	0.8	—	—	—	—	—
187 Penis			—	20	112	132	1.6	—	—	—	—	—
188 Bladder			—	11	147	158	1.9	1	—	16	17	0.2
189 Kidney			17	17	43	77	0.9	28	8	12	48	0.7
190 Eye			8	2	4	14	0.2	19	—	3	22	0.3
191 Brain			61	16	99	321	3.8	52	85	32	179	2.5
192 Other Nervous System			5	11	3	19	0.2	8	3	2	13	0.2
193 Thyroid			3	55	84	142	1.7	3	179	135	317	4.4
194 Other Endocrine Gland			16	7	1	24	0.3	12	4	—	16	0.2
195 Other Ill defined sites			1	2	3	6	0.1	—	2	4	6	0.1
196 Secondary Lymph Node			1	29	173	203	2.4	—	9	53	82	0.9
197 Sec. Resp. & Dig. System			—	18	76	94	1.1	—	20	40	60	0.8
198 Sec. Other Specified Sites			2	16	114	132	1.6	1	12	61	74	1.0
199 Unknown Primary			1	17	77	95	1.1	2	15	52	59	1.0
200 Lymphosarcoma & Reticulo Sarcoma			15	71	82	168	2.0	7	15	38	60	0.8
201 Hodgkins disease			16	51	43	110	1.3	4	13	7	24	0.3
202 Oth. Lymphoid & Histiocytic Tissue			16	41	85	142	1.7	7	15	26	48	0.7
203 Multiple Myeloma			—	8	97	105	1.2	—	5	55	60	0.8
204 Lymphoid Leukaemia			36	53	27	171	2.0	35	15	13	102	1.3
205 Myeloid Leukaemia			32	88	50	170	2.0	21	64	50	135	1.9
206 Monocytic Leukaemia			—	—	1	1	—	—	—	1	1	—
207 Other specified Leukaemia			—	—	1	1	—	—	—	—	—	—
208 Leukaemia, Unspecified			4	10	6	20	0.2	5	13	8	26	0.4
Total			357	1644	6484	8485	100	321	1939	4911	7171	100

HOSPITAL CANCER REGISTRY, TRIVANDRUM  
DISTRIBUTION OF INCIDENT CANCER CASES  
IN MALES & FEMALES 1983-1986



0-14 Years Age Group Paediatric Cancer:

Altogether, 678 paediatric cancer cases have been recorded during the four year period; i.e. on an average about 170 patients annually. With 357 boys and 321 girls, the male to female ratio was almost 1:1. The number of cases in males and female for some sites were almost equal. Compared to females, oral, nasopharyngeal and digestive system cancers were more seen in males, which was mainly due to nasopharyngeal cancer and liver cancer in males. Bone, connective tissue and skin cancers were seen in 40 female children whereas there were only 35 male children with this disease. The frequency of cancers of kidney (28), eye (19) in female children were much more than in boys (17 & 8 cases).

Brain tumours were almost equal in number in both boys (61) and girls (62), so was cancer of thyroid (M-3: FF-3). Hodgkin's disease was four times more common in boys (16 cases) than in female children (4 cases) and Non-Hodgkin's Lymphoma also had a male preponderance (31 males: 14 females); though not as much as in Hodgkin's disease. Leukaemia was observed in 91 girls and 122 boys.

Leading paediatric cancers are shown in table 4.

16-44 years Age Group.

In this age group, there were 1644 males and 1939 females. The female preponderance was due to the female genital cancers. Among males, during the four year period, 161 cases of Brain Tumour was seen and this was the most predominant cancer in this age group followed by 156 cases of Leukaemia, 112 cases of Non Hodgkin's Lymphoma, 104 cases of cancer of other parts of mouth, 96 cases of liver, 95 cases of cancer of tongue. Among females, Breast Cancer was the leading cancer site in this age group with 485 cases. Cancer of cervix was seen in 355 cases, cancer of thyroid was next in frequency with 179 cases and ovarian cancer was seen in 312 patients. Leukaemia cases were seen in 96 patients and Brain Tumours in 85 patients.

The high frequency of thyroid cancers and ovarian cancers are noteworthy here. It may also be mentioned here that in the

Table 4.  
Ten leading Paediatric Cancers: Hospital Cancer Registry, Trivandrum: 1983-1986.

Site/type of Cancer	Boys	Site/type of cancer	Girls
Leukaemia	122 (34.2%)	Leukaemia	91 (28.3%)
Brain	61 (17.1%)	Brain	62 (19.3%)
Lymphoma & HD	47 (13.2%)	Kidney	28 (8.7%)
Bone	21 (5.8%)	Bone	25 (7.8%)
Kidney	17 (4.8%)	Eye	19 (5.9%)
Oth. endocrine gland	16 (4.5%)	Lymphoma & HD	18 (5.6%)
Connective tissue	11 (3.1%)	Ovary	17 (5.3%)
Liver	10 (2.8%)	Con. tissue	14 (4.4%)
Eye	8 (2.2%)	Oth. endocrine gland	12 (3.7%)
Nasopharynx	7 (2.0%)	Nervous system Nos	8 (2.5%)
Total	320 (88.6%)	Total	294 (90.7%)
All Sites	357	All Sites	321

90% of childhood cancers seen are found in the above 10 leading sites.

The 15-44 age group were 349 cases of oral and pharyngeal cancer in males where as in females only 171 cases were recorded. The large difference in lung and larynx cancer in males when compared to females is striking. (Lung, M.: 90 F.: 21; Larynx, M.: 21 F.: 4).

#### Age Group 46+ and over.

The maximum number of cancer cases were seen in this age group. This is consistent with the known characteristic of increasing incidence of cancer in old ages. There were 6484 males and 4911 females with cancer in this age group. In males cancer of 'Other parts of mouth' (ie Buccal mucosa and palate) were seen in 847 patients, lung cancer was next in frequency with 626 cases. Cancer of tongue (495), oesophagus (438), stomach (421) and larynx (349) were other leading sites of cancer. In females, 1459 cases (29.7% of all cancer in females) of cervix cancer were recorded and was the leading site of cancer in females in this age group. Breast cancer cases were seen in 748 cases (15.2%), which was almost 50% of cervix cancer cases. In the 15-44 age group, Breast cancer number exceeded that of cervix cancer by about 37%. Other leading cancer sites in women of this age group were 'Other parts of mouth', 460 cases, Tongue 229 cases, Ovary 201 cases, Alveolus 142 cases and Thyroid 135 cases.

There were certain cancers which were more prevalent in women than in men. They were the following. (Table 5).

Table 5.  
Cancers which were seen more in females than in males.

Cancer	Male	Female
Uterus		76
Small Bowel	5	8
Retroperitoneum	21	22
Liver	14	22
Thyroid	142	317



The reasons for the female preponderance are not yet known. The predominance of certain cancer types in men is well known. Such preponderance may be attributed to habits, occupation etc.

Table 6. shows the cancer types which were more than two times common in males than in females.

**Table 6**

**Cancers (site wise) seen more than double in males than in females**

Site	Male	Female	M : F
Tongue	580	271	2.2 : 1
Floor of mouth	81	14	5.8 : 1
Oropharynx	217	30	7.2 : 1
Nasopharynx	102	39	2.6 : 1
Hypopharynx	286	65	4.4 : 1
Pharynx Etc.	20	2	10.0 : 1
Oesophagus	477	143	3.3 : 1
Stomach	472	150	3.1 : 1
Colon	99	49	2.0 : 1
Liver	332	68	3.4 : 1
Pancreas	102	48	2.1 : 1
Larynx	371	24	15.5 : 1
Lung	916	89	10.3 : 1
Thymus	17	1	17.0 : 1
Skin melanoma	51	19	2.7 : 1
Urinary Bladder	158	17	9.3 : 1
Lymphoma	310	108	2.9 : 1
Hodgkin's Disease	110	24	4.6 : 1
Met. Ca (Unknown primary)	524	265	2.0 : 1

These above data collected from the Medical College Hospital reflect the following aspects of the cancer problem as seen in this part of the State.

(A) As a group, the Oral and Pharyngeal Cancer is the most important cancer problem.

(B) Lung cancer is the leading cancer in men.

(C) Cervix cancer is the leading cancer in women.

(D) Almost 50-60% of male cancers are tobacco related (Most of the cancers in the oral, pharyngeal, oesophageal regions, cancer of lung, larynx, kidney etc.).

(E) Almost 20-25% of all cancer in female are tobacco related.

(F) Cancers which can be detected either by simple tests or by self examination are in a majority.

(G) Only 19% of all cancers attend the centre in the localised state of disease.

(H) Other important findings of the Hospital Cancer Registry (1986 data)

#### (A) Spread of Disease

Among the new cases 19.1% of males and 20.6% of females had localised disease, 53.1% males and 64.3% females had regionally spread disease, 27.8% males and 15.0% females had advanced disease.

#### (B) Treatment Patterns

Among the localised cancer cases, 84% received treatment and among the regionally spread cancer cases, 86% were treated and among the advanced cancer cases, 95% received treatment. Such treatment may be with a curative intent or for palliation.

#### Scientific Activities:

The Epidemiologic study of Stomach Cancer, is being continued by the Hospital Cancer Registry. This is a collaborative study between Population Cancer Registry, Bombay, Cancer Institute, Madras and the Hospital Cancer Registry, Thiruvandrum. The Hospital Cancer Registry is publishing the Cancer Registry Abstracts, (CRAA) the News letter of the National Cancer Registry Project.

### Training:

Dr. R. Sankaranarayanan has gone on a one year Commonwealth Fellowship for higher training in Cancer Epidemiology at the Medical Research Council, Cambridge, England. Mr. G. Rajasekharan Nair was awarded a Government of India Scholarship (DGHS) for attending the one year "Medical Record Officers" course at Jawaharlal Institute of Post Graduate Medical Education & Research, Pondicherry.

### Other Activities:

Mr. P. Gangadharan attended the Project Advisory Committee Meeting of the Bhopal Gas Disaster Research Group.

Mr. P. Gangadharan participated in the Short Term Training Programme at Cancer Institute, Madras for Tumour Registry Personnel as a Faculty Member.

### Papers published/Presented

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2. Sankaranarayanan, R, Krishnan Nair, M, Padmanabhan, TK. Palliation of pain in advanced oral cancer. *Headache* 1988; 26:250-251.
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5. Stich, HF, Rosin MP, Hornby, AP, Mathew, B, Sankaranarayanan, R, Krishnan Nair, M. Remission of oral leukoplakias and micronuclei in tobacco/betel quid chewers treated with beta carotene and with beta carotene plus vitamin A. *Int J Cancer* 1988; 42: 195-199.
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8. Padmanabhan TK, Sankaranarayanan R, Krishnan Nair M. Carcinoma of the nasopharynx: A review of 93 cases treated with radiotherapy. *Indian J Cancer* 1988; 25: 144-150.
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11. Sankaranarayanan R. Risk factors in the aetiology of cancer of the uterine cervix leading to differential rates among Hindu and Muslim Women in India. *Br J Cancer* 1988; 57-442.
12. Babu Mathew, Sankaranarayanan R, Krishnan Nair M. Early detection of cancers. *Proc of International Conference on Primary health care, New Delhi, 1988.* pp 43-48.

## DIVISION OF COMMUNITY ONCOLOGY

Dr. Babu Mathew : Associate Professor

Dr. Ramani S. Wesley : Lecturer

During the past four years of its existence, this division, the first of its kind in our country, made signal contributions towards cancer prevention and control programmes. The major activities centred round health education, generation of software for awareness programmes, conduct of early cancer detection camps, training of health workers and other paramedicals, utilisation of National Service Scheme Volunteers (college students) for detection of oral cancer and community based epidemiological and intervention researches.

### Generation of manpower for early detection :

An I. C. M. R. project to determine the utilisation of Multi-purpose Health Workers for Primary and Secondary prevention of oral cancer in the rural areas of Trivandrum was launched during the year under report. This programme was inaugurated by the Hon'ble Minister for Health Shri A. C. Shanmukha Das, on 16th June 1988 at Chirayinkil.

The rural areas under the 8 developmental blocks, on the northern part of Trivandrum formed the study area, and those 6 in the southern blocks were the control area. Accordingly 292 health workers and 10 medical officers in the northern area were given one-day training, with the aid of a guide specially prepared for this purpose in five Primary Health Centres, within 15 days. They were given lectures, and clinical demonstrations to examine and identify oral lesions. This work is in progress and so far 3 cases of oral cancer and 42 precancer cases were detected through them.

This division played a pioneer's role by harnessing the services of the N. S. S. Volunteers (college students) for cancer control and prevention work. During the year under report, 10 Colleges were selected and the students were given one day training in identification of oral lesions, in addition to awareness classes. These volunteers have done excellent work and

examined 4014 persons, by domiciliary visits in villages. Among the cases referred by them i.e. 4014, there were 15 cases of total cancer, 1 Carcinoma breast, 1 lymphoma and 94 with precancerous lesions. Several other N. S. S. units later on expressed their willingness to participate in cancer control programmes.

Two batches of 66 health supervisory workers were also given training in cancer awareness and detection programmes.

M/s. Mangalam Publications, Kottayam were kind enough to give free of cost 10000 copies of the pamphlet "Self examination of mouth for early detecton of oral cancer" and these served as a valuable training aid to all these trainees. Copies of the same were distributed among the villagers.

### Health Education Activities:

Few articles on cancer were published in newspapers and magazines. There were broadcasts through AIR and telecast through Doordarshan, on cancer control, cancer and tobacco hazards etc. Display cards on oral cancer were prepared by this division and were displayed in the major exhibitions at Varkala, Calicut, Cannanore and Malappuram. Dr. Babu Mathew has prepared a book "Tobacco or Health in Malayalam" meant for Basic Health Workers.

### Cancer Awareness Programmes:

Thirty cancer awareness programmes were conducted for various voluntary and social organisations mostly in remote villages. The details are as shown below:

Date	Sponsored by	Place	Approximate no. attended
21-5-88	N. S. S. Unit, Eng. College, Palghat	Palghat	100
22-5-88	P.H.C. Koduvayoor and Rotary Club, Palghat	Koduvayoor Panchayat	250

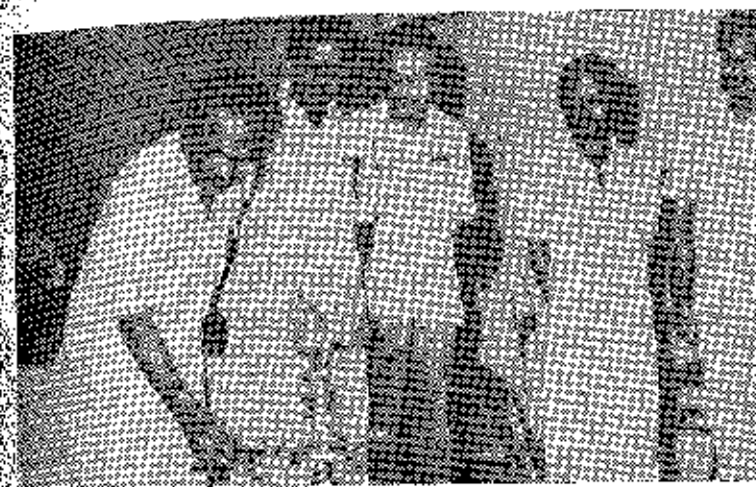
3.	2-7-88	Mahatmaji Memorial School, Karunagappally	Karunagappally	50	15	21-12-88	St. Stephens College N. S. S. Unit	Maloor	200
4.	10-9-88 FN	N.S.S. Unit of N.S.S. College, Shoranur	Shoranur	250	16	24-12-88	S. N. College, Chempazhanthi	Chempazhanthi	150
5.	10-9-88 AN	N.S.S. Unit, V.T.B. College, Sreekrishnapuram	V.T.B. College	400	17	28-12-88	NSS Unit of N.S.S. College, Pandala	Pandalam	200
6.	10-9-88 Night	Do	Sreekrishna Panchayat Office	100	18	29-12-88	NSS Unit — Mar Thoma College, Thiruvalla	Ranni	75
7.	3-10-88	DMO, Trivandrum	Kosavapuram P. H. C.	30	19	30-12-88	NSS Unit — M. S. M. College, Kayamkulam	Azeekal	250
8.	6-10-88	Y's Mens Club, Trivandrum	Pattom	40	20	5-1-89	NSS Unit -- St. Thomas College, Kozhencherry	Kozhencherry	75
9.	13-10-88	University Health Centre	Iqbal College Peringamala	150	21	10-1-89	NSS Unit — All Saints College, Trivandrum	Trivandrum	75
10.	24-10-88	N. S. S. Unit, Govt. Homeo College	Trivandrum	100	22	11-1-89	NSS Unit — University College, Trivandrum	Thonnakal	75
11.	26-10-88	Loyola College	Sreokariam	60	23	14-1-89	Nandiyod Panchayat	Pallode	150
12.	5-11-88	N.S.S. of Kerala University	Govt. College Chavara	100	24	10-2-89	NSS Unit — Govt. Ayurveda College	Trivandrum	100
13.	11-11-88	Karnataka State Dental Association	Chithradurga	60	25	3-5-89	NSS Unit — Medical College, Trivandrum	Karakonam	250
14.	17-11-88	Zoology Association N.S.S.College, Nilamel	Nilamel	120	26	26-3-89	NSS Unit — Law academy	Muttada	125
15.	10-12-88	N.S.S. Unit, Mahatma Gandhi University	Medical College Kottayam	60	27	28-3-89	S.N.S. Samithi Sreekaryam	Sreekaryam	60
16.	16-12-88	N.S.S. Unit, Govt. Law College	Cheriyakonni	120	28				
17.	17-12-88	N.S.S. Unit, Mar Ivanious College	Poovathur	300	29				

### Cancer Detection Camps :

19 Cancer detection camps were held during 1988-89

The details are shown below:

Sl. No.	Sponsors	Date	Place	No. of new cases
1.	D. H. S.	6-4-88	Chirayinkil	Nil
2.	ECDC, Palghat	17-4-88	Kanji code	5
3.	PHC, Koduvayoor	22-5-88	Koduvayoor	7
4.	KSRTC	18-7-88	Pappanamcode	2
5.	NSS Unit, Medical College, Trivandrum	20-7-88	Veli	1
6.	Nisar Rahim Trust	18-9-88	Quilon	Nil
7.	Kamala Nehru Memorial Vanitha Samithi	22-10-88	Thamarakulam	4
8.	NSS Unit — DB College Sasthankottah	28-12-88	Mynagappally	3
9.	NSS Unit — St. Thomas College, Ranni	29-12-88 FN	Junda Junction	1
10.	NSS Unit — Mar Thoma College, Thiruvalla	29-12-88 AN	Ranni	Nil
11.	NSS Unit — DB College, Paramala	30-12-88 FN	Channithala	3
12.	NSS Unit — MSM College, Kayamkulam	30-12-88 AN	Azeekal	3
13.	NSS Unit — St. Stephens College, Malloor	5-1-89 FN	Malloor	2



Shri A. C. Shanmughadas, Hon'ble Minister for Health, Govt. of Kerala inaugurating the training programme for health workers under the I. C. M. R. Scheme. Shri Anathalavattam Anandan, M.L.A., Chirayinkil presided over the function on 15th June 1989.



Multipurpose Health Workers Training Programme at Chirayinkil. Trainees and Faculty members.





With the aid of a guide provided, College Students (N.S.S.) conducting Field Survey and Health Education on Oral Cancer in a Harijan Village.



Training Programme of National Service Scheme Volunteers (College Students) on Early cancer Detection at Kottayam.

14.	NSS Unit — St. Thomas College, Kozhenchery	5-1-89 AN	Kozhenchery	1
15.	Nandiyod Panchayat	14-1-89	Peringamala	2
16.	NSS Unit — University College, Trivandrum	17-1-89	Thonnakkal	1
17.	Rotary Club, Varkala	1-2-89	Varkala	Nil
18.	NSS Unit — Govt. Ayurveda College	10-2-89	Noyyadam	2
19.	Dist. Collect, Kottayam	9-3-89	Erumeli	4

It may be noted that 36 frank new cases were detected through these camps during the year.

#### Research Activities:

A. Collaborative Research Projects with University of British Columbia Environmental Carcinogenesis Unit, Canada.

The programme of collaborative studies on the various aspects of intervention studies on oral cancer were continued.

1. Comparison of Protective effects of Red Palm oil Vs. Beta carotene on the oral mucosa of heavy chewers.

2. Estimation of Beta carotene levels to maintain the protective effect on the oral mucosa of heavy chewers.

3. Estimation of nitrosamine content of the uterine cervical fluid in heavy chewers.

4. The Nature of hydroxylated DNA in betelnut tobacco chewers.

5. Estimation of N-7 methylation of DNA in oral cancer, precancers and normal controls.

6. Estimation of presence of HPV and HBV subtype in the oral mucosa of oral cancers, oral precancers and normal controls.

7. Comparison of protective effect on oral mucosa of heavy chewers with Vit. A, Beta-carotene and canthaxanthine.

B. I. C. M. R. Project on "The feasibility of utilising trained multi-purpose health workers for Primary and Secondary Prevention of oral cancer in the rural areas".

The first component has been dealt with earlier. The second component of the study is a tobacco habit survey in 1% sample of the rural population of Trivandrum District. Census enumerator blocks were taken as units of survey. Out of 28 randomly selected enumerator blocks, 25 blocks were covered till 31-3-89.

B. Collaborative studies on Oral submucous fibrosis with British Commonwealth Foundation.

Eventhough this project work was not flagged off as per schedule, the community oncology division made initial studies on the role assigned to it. Accordingly 100 patients were identified from the field. It is very interesting to note that during the survey we found out that in one family 3 out of the five members and in yet another 5 out of 7 have oral submucous fibrosis.

#### New Programmes

A scheme submitted by us and the E. S. I. for "Comprehensive Cancer detection and Health Education Programme" for the workers under the E. S. I. in and around Udyogamandal, has been sanctioned by the Labour Department. We have started the initial work of the scheme.

W. H. O. has approved the Ten Year Action Plan of the Kerala State Cancer Control Board, submitted by our Centre. Those activities pertaining to the Community Oncology division will be implemented soon.

Proposals were sent to ICMR for starting a Community Oncology Cell and if sanctioned it will be an added augmentation to the activities of this division.

#### Conferences attended and papers presented:

Babu Mathew, M. Krishnan Nair, and R. Sankaranarayanan. Early Detection of Cancers. International Conference on Primary Health Care, New Delhi, 1988.

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2. Stich, H. F., Babu Mathew, Sankaranarayanan, R. and Krishnan Nair, M. Remission and prevention of the new leukoplakias in the tobacco chewers following short term administration of Vitamin A. Proc. Am. Assoc. Cancer Res. 29 : 208 : 1988.
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Dr. Babu Mathew was a visiting Professor in Oral Medicine and Oral Pathology in the S. J. Dental College, Chithradurga and P. S. G. I. of Medical Education, Coimbatore. He was selected as Senior Vice-President of the Indian Academy of Oral Medicine. He served as Chairman, Scientific Committee, National Seminar on Oral cancer 1989 and as member Project Advisory Committee (PAC) of the Indian Council of Medical Research.

### Acknowledgements :

We wish to thank Prof. C. Thomas Abraham, N. S. S. Programme Co-ordinator, Mahatma Gandhi University, Prof. M. Salihu, N. S. S. Programme Co-ordinator, Kerala University and the Programme Officers and Volunteers of the N. S. S. Units who actively participated in the oral cancer detection programme. Thanks are due to the people and Parish Priests of Valiyathura, Thope, as well as residents of the Brahmin streets around

Padmanabhaswamy temple, Staff of KSRTC Workshop, Pappanamcode, for their co-operation in our intervention studies. Special thanks are due to Smt. B. Lalithambika, Mass Education Officer, Trivandrum for arranging the training programmes very well and actively participating in them. We thank M/s. Mangalam Publication Kottayam for printing 10,000 copies of the pamphlet on self-examination of oral cavity.

### EARLY CANCER DETECTION CENTRE, ERNAKULAM

Dr. B. Syamala Kumari : Cytopathologist

This Centre has successfully completed 5 years of activities. The work undertaken by the Centre are as follows:-

- 1. Routine examination of patients in the Centre and fine needle aspiration smears.
- 2. Cancer Detection Camps & Clinics in rural areas.
- 3. Pap smear tests in the Centre.
- 4. Conducting Cancer Awareness Programmes throughout the District.

### Routine Examination:

A total of 6679 persons underwent Cancer detection check up during the year under report. These are patients referred from clinics or attended for thereon. Fine needle aspirations were performed in relevant cases and proper guidelines were given to patients requiring treatment. Pap smear test is performed in patients attending the Centre. Smears were also received from ESI Hospital, Udyogamandal, JNM Hospital and FACT Udyogamandal. Fine needle aspiration smears were received from Thoracic Surgery Unit of Samaritan Hospital, Pazhanganad and a large number of Lung Cancer cases are reported from these smears. Specimens were also received for body fluid examination. 201 smears were received from ESI Hospital, Udyogamandal and 168 smears from JNM Hospital during this year.

Cancer Awareness Programmes were conducted in different areas of this District and were well attended by the Public.

### Cancer Detection Camps and Clinics:

During the year 14 Cancer Detection Camps were conducted in the District, examining 2778 and taking 915 smears. Cancer Detection Camps were also conducted in the nearby Districts of Kottayam and Alleppey. A regular monthly Cancer Detection Camp has been arranged at Kottayam as a part of District Collector's Programme "To the people". A regular monthly Cancer Detection Clinic was conducted at Government Hospital, Parur. During this year 612 smears were studied out of which 4 malignancies were detected from these clinics.

Representatives of the dailies 'Hindu' and 'Mathrubhumi' made detailed observations on the activities of this Centre and published excellent reports on the same. Routine examination of workers of some Industrial Institutions have also been done by this Centre.

### Publication:

Sri. K. Raveendran Pillai, Cytotechnologist -

1. Cancer Prathirodhavum Nivaranavum — Desabhimani Daily dated 6-7-1988.
2. Sambanna Streekalil Cancer Sadhiyatha — Mathrubhumi daily dated 27-10-1988.
3. Pukayillatha Noottendilekulla Prayanam — Evid daily (Serial I, II, III) — 11, 12, 13 October '88.

### Acknowledgements:

We are grateful to the Managing Director, Travancore Cochin Chemicals Ltd. for the immense help to this Institution especially for donating of Rs. 30,000/- for starting the Biopsy Unit. We are thankful to the Indian Rare Earth Co. Ltd. for the liberal donation to start the Colposcopy Unit. We are indebted the Rotary Club, Ernakulam for the various help rendered. We are grateful to the Mayor and the Corporation of Cochin for helping us in our expansion work. Thanks are due to the Managers of the various Industrial Institutions and Health Officers for the generous help.

### BREAKUP OF CYTOLOGICALLY DETECTED LESIONS 1988-89 (1-4-88 to 31-3-1989)

	Centre	Camp	Total
<b>GYNAECOLOGICAL (Female Genital Tract)</b>			
1. Normal	906	235	1141
2. Inflammation	1637	413	2050
3. Inflammation with Squamous metaplasia	64	—	64
4. Inflammation with Reserve Cell hyperplasia	100	3	103
5. Inflammation with endocervical regeneration	4	—	4
6. Inflammation with squamous metaplasia and Reserve Cell hyperplasia	5	—	5
7. Inflammation with atypical squamous metaplasia	15	12	27
8. Squamous metaplasia	1	—	1
9. Atypical squamous metaplasia	3	—	3
10. Atypical glandular cell hyperplasia	1	—	1
11. Fungal infection	12	18	30
12. T. V. Infection	205	69	274
13. Mild dysplasia	4	—	4
14. Moderate dysplasia	2	—	2
15. Severe dysplasia	8	3	11
16. Atrophic smear with mild dysplasia	1	5	6
17. Inflammation with mild dysplasia	63	23	86
			87



	Centre	Camp	Total
18. Squamous metaplasia and mild dysplasia	2	—	2
19. Inflammation with Reserve cell hyperplasia & mild dysplasia	15	—	15
20. T. V. Infection with mild dysplasia	41	23	65
21. Fungal infection with mild dysplasia	2	—	2
22. Herpes infection with mild dysplasia	5	1	6
23. Inflammation with moderate dysplasia	6	1	7
24. T. V. with moderate dysplasia	3	1	4
25. Herpes infection with moderate dysplasia	3	1	4
26. Herpes infection & T. V. with moderate dysplasia	1	—	1
27. Inflammation with severe dysplasia	2	—	2
28. T. V. with severe dysplasia	2	—	2
29. HSV with severe dysplasia	4	—	4
30. HSV and TV with severe dysplasia	1	—	1
31. Hyperkeratotic Cx.	17	4	21
32. Ca-insitu	12	—	12
33. Invasive Squamous Carcinoma	27	—	27
34. Adenocarcinoma	2	—	2
35. Sarcoma	1	—	1
36. Carcinoma recurrence	1	—	1
37. Suspicious of malignancy	1	—	1

	Centre	Camp	Total
38. Radiation change	3	2	5
39. Unsatisfactory	1	—	1
40. Miscellaneous	12	—	12
<b>NON-GYNAECOLOGICAL</b>			
<b>Oral</b>			
Normal	1	—	1
Benign lesion	33	6	39
Pre-malignancy	64	44	108
Malignancy	21	3	24
Recurrence	—	—	—
Suspicious	1	—	1
<b>2. Sputum</b>			
No malignant cells	55	—	55
<i>Malignancy</i>			
1. Adeno Carcinoma	4	—	4
2. Oat Cell Carcinoma	7	—	7
3. Squamous Cell Carcinoma	6	—	6
Tuberculous lesions	1	—	1
<b>3. Bronchial Washings</b>			
Non malignant	37	—	37
<i>Malignancy</i>			
1. Squamous Carcinoma	1	—	1
2. Adeno Carcinoma	1	—	1
3. Mucoepidermoid Carcinoma	2	—	2
Tuberculosis	1	—	1



## EARLY CANCER DETECTION CENTRE, PALGHAT

Dr. R. Ananda Kamath : Medical Officer-in-charge

### Activities:

This year also this Centre witnessed rapid progress in all activities. The building constructed by M/s. Instrumentation Limited was handed over to us on 1-7-1988. With this, we have more conveniences and hence accelerated our activities. In addition to the routine work, we organised Cancer Detection Camps, and awareness camps in the various places even in far-flung places of Palghat District (See tables).

One of the highlights of activities of this year is our participation in the Science and Technology exhibitions held at seven places in this District, organised by KANFED with the help of Dep. of Science and Technology, Govt. of India. This Centre's Stall attracted the Public immensely and the exhibition served as an excellent tool to Health Education on Cancer.

The services of this Centre, were regularly utilised for the follow up of cases, and for the chemotherapy of a few patients.

### Acknowledgement:

We are extremely grateful to Sri. R. G. Kini, General Manager and other Staff of M/s. Instrumentation Limited, Palghat for donating a good building to the Centre and for their hearty co-operation. We are very thankful to Sri. R. M. Nambiar, Civil Engineer, for the Supervision and expeditious execution of the Construction work.

Our thanks are due to Dr. Alexander, DMOH of Palghat and teachers and students of Nursing School, for their Co-operation and help. We place on record our indebtedness and sincere gratitude to Dr. Indira Rajagopal for all the help especially during the conduct of camps. Thanks are also due to various Voluntary Organisations and Agencies who sponsored most of the Cancer detection and awareness Camps.

SMEAR TESTS DONE DURING THE YEAR 1988-89 (SEE TABLES)

Specimen	Male		Female		Carcinoma		Total	
	R	C	R	C	R	C	R	C
	Cervix			100	325	4	4	100
Buccal	50	55	25	14	7	0	75	69
Sputum	67	1	3	0	1	0	60	1
Breast	0	0	13	2	2	0	13	2
Others	7	5	8	8	1	0	15	13
Total	114	61	149	349	15	4	263	410

R = Routine in Centre  
C = From Camps

## RESUME OF WORK DONE DURING THE YEAR 1988-89

	Male	Female	Total	Ca. Cases
Total number of persons screened in the Centre	259	396	655	32
Number of smears taken for cytological Exam.	119	215	333	15
Total number of persons screened in the camp	730	551	1281	35
Number of smears taken for cytological exam.	61	349	410	18
Total number of smear taken			743	
Total number of biopsy sent for HPE			22	
-----				
Number of Cancer patients Refd. to RCC, TVM	—	30		
Number of Cancer patients Refd. to MCH., Calicut	—	2		
Number of patients Refd. to other institutions	—	25		
Total number of Refd. cases	—	57		

## DETAILS OF CAMPS CONDUCTED IN 1988-89

Sl. No.	Date	Place	Sponsored by	Total patients	Smear taken	Carcinoma	
						Clinically	Cytologically
1.	17-4-1988	Kanjikode	All India Democratic Women's Association, Kanjikode Unit	310	120	3	2
2.	8-5-1988	Koduvayoor	State Bank of Travancore, Koduvayoor Branch	131	32	1	1
3.	15-5-1988	Walayar	All India Democratic Women's Association	165	38	1	2
4.	22-5-1988	Koduvayoor	Primary Health Centre, Koduvayoor	176	53	5	2
5.	30-7-1988	Manjeri	EXPO-MEDEX-1988 Medical College, Calicut	20	4	2	—
6.	9-10-1988	Chittoor	KANFED-Science & Technology Exhibition	51	10	1	3
7.	16-10-1988	Alanyad	Sreekrishnapuram V. T. B. College, N. S. S. Unit	74	42	2	3
8.	30-10-1988	Shoranur	KANFED-Science & Technology Exhibition	27	1	—	—
9.	20-11-1988	Elavanchery	Prasad Theatres	154	37	—	4
10.	8-1-1989	Pirivusala	Rotary Club of Palghat East	26	4	—	—
11.	5-2-1989	Mankurussy	S.N.D.P. Unit, Mankurussy	147	69	2	1
Total				1281	410	17	18



## LIST OF CANCER AWARENESS PROGRAMMES IN 1988-1989

Sl. No.	Date	Place	Sponsored by	Name of Participants
1.	2-10-1988	Elapully	Science Exhibition	
		Chittur	Organised by KANFED	
		Palghat	Sponsored by the Science &	
		Shoranur	Technology Department,	
		Ottappalam	Government of India	50,000
	12-11-1988	Pattambi		
2.	13-11-1988	Elavancherry	Prasad Theatres, Periyottukevu	200
3.	29-1-1989	Mankurussy	S. N. D. P. Yogam, Mankurussy Unit	250
4.	25-3-1989	Kalleppully	R. F. L. P. Kalleppully	100

SPECIAL CLINICS  
(multi disciplinary)

In addition to the routine clinics and noon clinics, the following special clinics with the active participation of faculty members from other departments were conducted regularly.

Paediatric, Oncology — All Mondays at 12 noon. Resource persons from other departments — Dr. V. G. Chellam, Prof. of Paediatric Pathology, Dr. Mami Niran, Director & Prof. of Paediatric Surgery, Dr. N. Sundaram, Prof. of Paediatric Surgery.

Head and Neck Clinic — All Tuesdays 12 noon. Resource person — Dr. S. Krishnamoorthy, Prof. of E. N. T.

Trophoblastic tumour clinic — All Wednesdays 12 noon. Resource persons — Dr. Thomas Chandiy, Director and Prof. of Obst. & Gynaecology.

Clinico Pathological Conference — on 1st Saturday of every month at 11.30 A.M. Resource persons Dr. M. A. Aleykutty, Prof. of Pathology & Other staff of Department of Pathology.

Pain Clinic — All Thursdays at 1 P. M. Conveners — Dr. Gladys Jeevy and Dr. Paul Sebastian

**CONFERENCES/SEMINARS/TRAINING/WORKSHOPS  
ETC. ATTENDED BY VARIOUS STAFF.**

Dr. Prabha, B. Assoc. Prof. of Cancer Research	Amala Cancer Centre, Trichur, April, 1988.
Dr. K. Sasidharan, Assoc. Prof. of Imageology	Seminar on CME, Medical College, Kottayam
Dr. K. Ramachandran, Lecturer in Imageology	South Zone Conference of I. R. S. I. A., Bangalore, August, 1988.
Dr. Babu Mathew, Assoc. Prof. Community Oncology	Conference on Primary Health Care, New Delhi, September, 1988.
-do-	Conference of Indian Academy of Oral Medicine, Hyderabad, October, 1988
Dr. C. S. Madhu, Tutor, Radiotherapy	Indo - British Collaboration Workshop on Radiation Oncology, Ahmedabad, November, 1988.
Dr. B. Syamalakumari, Cytopathologist, E.C.D.C., Ernakulam	Cyto techniques — Workshop, Trichur November, 1988.
Mr. K. S. Jayalal, Cyto-technician, E.C.D.C., Ernakulam	-do-
Mr. K. Raveendran Pillai, E.C.D.C., Ernakulam	-do-
Mr. P. G. Gopalakrishna Kurup, Assoc. Prof. of Radiation Physics.	Indo-British Collaboration Workshop on Radiation Oncology, Ahmedabad, Nov. 1988.
Dr. N. Sreedevi Amma, Prof. of Cytopathology	I. A. P. M. Kerala Chapter, Trichur, November, 1988.
Mr. R. Muralidharan, Cytopathology Department	-do-

Dr. B. Chandralekha, Assoc. Prof. of Cytopathology	I. A. P. M. Kerala Chapter, Trichur, November, 1988.
Dr. Elizabeth. K. Abraham, Asst. Prof. of Cytopathology	-do-
Dr. G. Rajasekharan Pillai, Asst. Prof. of Cytopathology	-do-
Dr. Kusumakumary, P., Lecturer, Paediatric Oncology	Biennial Conference, Indian Society of Paedi. Oncology, Trivandrum, January, 1989.
Dr. Thayilsingh Elias, Lecturer, Radiation Physics	Xth Conference of Medical Physics, Bangalore, January, 1989.
Dr. K. K. Vijayan, Lecturer, Cancer Research Division	International Conference of Medical and Aromatic Plants, New Delhi, January, 1989.
Dr. P. Gopalakrishna Kurup, Assoc. Prof. of Radiation Physics.	Xth Conference, Medical Physics, Bangalore, February, 1989.
Dr. T. P. Ramachandran, Assoc. Prof. of Radiation Physics	-do-
Dr. N. Sreedevi Amma, Prof. of Cytopathology	XVIII Annual Conference Ind: Acad: Cytology, Ahmedabad. February, 1989
Dr. G. Rajasekharan Pillai, Asst. Prof. of Cytology	-do-
Dr. Gladys Jeevy, Anaesthesiologist, Cancer Surgery.	Vth Annual Conference on Pain, New Delhi, February, 1989.
Dr. N. Sreedevi Amma, Prof. of Cytopathology	All India Hospital Post-partum programme, Annual Seminar, S. A. T. Hospital, Trivandrum, February, 1989.

Dr. Prabha, B, Assoc.  
Prof. Cancer Research

Mr. Raveendran Ankathil  
Scientific Officer Research

Dr. N. Sreedevi Amma,  
Prof. of Cytopathology

Dr. V. N. Bhattathiri  
Asst. Prof. of Radiotherapy

Mr. P. Gangadharan  
Assoc. Prof. of Cancer  
Epidemiology

Mr. Thomas Abraham,  
Scientific Officer, Cancer  
Research Division

I. C. P. O. Workshop on Molecular  
Biology: New Delhi, February, 1989

Kerala Science Congress, Cochlin  
February, 1989

10th Annual Conference of Assoc-  
iation of Surgeons of India, Kerala  
Chapter, Quilon, March, 1989.

Indo - German Symposium on  
Recent advances in Radiation On-  
cology, New Delhi, March, 1989

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National Seminar on Oral Cancer,  
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Dr. Frank Neal  
Western Park Hospital  
Whitham Road  
Sheffield, UK.

Dr. Robert Sandler  
University of North Carolina  
Chapel Hill, NC., USA

Dr. David Deakin  
Christie Hospital & Holt Radium  
Institute, Manchester,  
UK.

Dr. Nirmal Gupta  
Christie Hospital & Holt Radium  
Institute, Manchester,  
UK.

Dr. John Hondry  
Christie Hospital & Holt Radium  
Institute, Manchester,  
UK.

Shri Robert Arbuthnott  
Minister for Culture Affairs  
British Council Division  
British High Commission

Shri Andrew Picken  
First Secretary  
British Council Division, BDHC  
Madras

## ADMINISTRATION

### GOVERNING BODY MEMBERS OF THE REGIONAL CANCER CENTRE SOCIETY, TRIVANDRUM

1. Shri E. K. Nayanar : Chairman  
Chief Minister of Kerala
2. Shri A. C. Shanmukhiadas, : Vice-Chairman  
Minister for Health  
Government of Kerala
3. Shri Palat Mohandas, IAS, : Alternate  
Secretary to Government, : Vice-Chairman  
Health & Family Welfare Dept.
4. Shri R. Narayanan, IAS, : Member  
Commissioner & Secretary to Govt.  
Finance Department
5. Shri V. Krishnamurthy, IAS, : Member  
Secretary to Government,  
Planning Department
6. Secretary to Govt., : Member  
Union Ministry of Health &  
Family Welfare, Govt. of India  
or  
his nominee
7. Director General of Health Services : Member  
New Delhi  
or  
his nominee
8. Dr. S. C. Gupta, : Member  
Director,  
Vikram Sarabhai Space Centre,  
Trivandrum
9. Dr. M. S. Valiathan, : Member  
Director, Sree Chitra Tirunal Inst.  
of Medical Science & Technology

10. Dr. G. Santhakumari, : Member  
Director of Medical Education,  
Trivandrum

11. Dr. Elsie Philip, : \*Member  
Principal, Medical College,  
Trivandrum.

12. Senior most Pathologist in the Medical : Member  
College Services in the Kerala Govt.

13. Dr. M. Krishnan Nair, : Convener  
Director,  
Regional Cancer Centre,  
Trivandrum



**MEMBERS OF EXECUTIVE COMMITTEE  
1988 - 1989**

1. (a) Shri V. Krishnamurthy, IAS, : Chairman  
Secretary to Government,  
Health and Family Welfare Dept.,  
(upto 8/88)
- (b) Shri Palat Mohandas, IAS, : Chairman  
Secretary to Government,  
Health & Family Welfare Dept.,  
(from 8/88)
2. Shri R. Narayanan, IAS, : Member  
Commissioner and Secretary,  
Finance Department
3. (a) Shri M. Vijayanunni, IAS, : Member  
Secretary to Government,  
Planning Department,  
(upto 8/88)
- (b) Shri V. Krishnamurthy, IAS, : Member  
Secretary to Government,  
Planning Department,  
(from 8/88)
4. Dr. G. Santhakumari, M. D., : Member  
Director of Medical Education,  
Trivandrum.
5. Dr. Elsie Philip, M. D., : Member  
Principal,  
Medical College, Trivandrum.
6. Dr. M. Krishnan Nair, : Convener  
Director,  
Regional Cancer Centre,  
Trivandrum.

**BUILDING COMMITTEE MEMBERS OF THE  
REGIONAL CANCER CENTRE, TRIVANDRUM**

1. Sri. E. Kurien Mathew : Chairman of the  
Chief Engineer Building Committee  
General Buildings & Local Works upto 6/1988.  
P. W. D., Trivandrum.
- Sri. N. S. Moni : -do- upto 3/89  
Chief Engineer  
General Buildings & Local Works  
P. W. D., Trivandrum.
- Sri. P. R. Balakrishnan : -do- continuing  
Chief Engineer  
General Buildings & Local Works  
P. W. D., Trivandrum.
2. Sri. M. Ramaswamy Iyer : Member-upto 6/88  
Chief Architect  
P. W. D., Trivandrum.
- Sri. Thomas Panicker : Member  
Chief Architect  
P. W. D., Trivandrum.
3. Dr. M. Krishnan Nair : Member  
Director, Regional Cancer  
Centre, Trivandrum.
4. Dr. G. Santhakumari : Member  
Director of Medical Education  
Trivandrum.
5. Dr. Elsie Philip : Member  
Principal  
Medical College  
Trivandrum.
6. Sri. Joseph Stephen : Member  
Finance & Accounts Officer  
Regional Cancer Centre  
Trivandrum.
7. Sri. G. Ravindranathan Nair : Convener  
Project Engineer  
Regional Cancer Centre  
Trivandrum.

**SCIENTIFIC COMMITTEE MEMBERS OF THE  
REGIONAL CANCER CENTRE SOCIETY,  
TRIVANDRUM**

1. Dr. Sundram, M. S., : Chairman  
Head, Biomedical Division,  
BARC, Bombay.
2. Dr. Elsie Philip, M. D., : Vice-Chairman  
Principal, Medical College,  
Trivandrum.
3. Dr. M. S. Valiathan, MS, FRCS, FAMS. : Alternate  
Director, Sree Chitra Thirunal  
Institute for Medical Sciences &  
Technology, : Vice-Chairman  
Trivandrum
4. Dr. N. Lakshminpathy, M. D., : Member  
Director, Institute of Nuclear  
Medicine & Allied Sciences, Delhi.
5. Dr. (Mrs.) G. Sudha Gangal, Ph. D., : Member  
Head, Division of Immunology,  
Tata Memorial Hospital,  
Bombay.
6. Dr. Renadev, Ph. D., : Member  
Retd. Director,  
Cancer Research Institute,  
Tata Memorial Centre,  
Bombay.
7. Dr. Jayaram Panicker, M. D., : Member  
Principal, Medical College,  
Calicut.
8. Dr. Yagnanarayana Iyer, Ph. D., : Member  
Prof. of Biochemistry,  
St. John's Medical College,  
Bangalore,

- Dr. N. Sreedevi Amma, M. D., : Member  
Prof. of Cytology,  
Regional Cancer Centre,  
Trivandrum.
- Dr. T. P. Ramachandran, Ph. D., : Member  
Associate Prof. of Radiation Physics  
Regional Cancer Centre,  
Trivandrum.
- Head, Nuclear Medicine Division, : Member  
Regional Cancer Centre,  
Trivandrum.
- Dr. M. Krishnan Nair, MD, FRCR, : Member  
Director, Regional Cancer Centre,  
Trivandrum.
- Dr. M. Thangavelu, MD. : Member  
Dean, P.S.G. Institute of Medical  
Science,  
Coimbatore.
- Dr. T. K. Padmansabhan, M. D., : Convener  
Superintendent,  
Regional Cancer Centre,  
Trivandrum.

## MAJOR DECISIONS OF THE GOVERNING BODY DURING THE YEAR 1988-89

1. The governing body approved the annual report of 1987-'88 and the budget proposals of the Centre for the year 1988-'89 and revised estimates for the year 1988-'89.

2. The Governing Body resolved that the Director in consultation with the Secretary, Health & Family Welfare and Secretary to the Chief Minister shall prepare the norms to upgrade this State Government Institution as a National Institute. It was also resolved that the following 10 research projects of different areas of research shall be submitted to the Central Science & Technology Department for support.

1. Health education of the population and profession on methodologies of early detection and self-examination.
2. Behavioral modification methods.
3. Generation of manpower in cancer related areas.
4. Role of diagnostic facilities - their development and optimisation.
5. Re-orientation to health workers on cancer.
6. Optimisation of therapy facilities and appropriate referral practices and evaluation of indigenous medicines for cancer.
7. Adoption of appropriate technology in purchase and maintenance of equipment.
8. Utilisation of cancer data base.
9. Domiciliary pain control.
10. Domiciliary rehabilitation of cancer patients.

It was estimated that a amount of Rs. 10 crores would be required to undertake the research & Scientific Programmes.

The Governing Body ratified the action of the Director in having executed agreement to avail institutional finance from banks.

The Governing Body resolved to accord permission to the Regional Cancer Centre of World Health Organisation assistance of US \$ 10,000 and to utilise the same for the establishment of a cancer control Training Centre on the basis of a programme approved by the Executive Committee of the Society.

The Governing Body resolved that the Government of Kerala may be requested to fix certain norms in fixing the financial assistance on the basis of the realistic assessment of the total activity under taken by each Regional Cancer Centres in the country in view of the fact that the grant -in-aid provided by the Central Government was for lower than the State Government assistance to this Centre and that the assistance given to the different centres in the country very considerably.

The Governing Body also resolved to implement a project of evaluation of various remedies under the indigenous system of medicine for treatment of Cancer in the Regional Cancer Centre, Trivandrum in response to the request from Prof. Usha K. Mathra, Additional Director General, ICMR, written on the advice of the Hon'ble Minister of Science & Technology Shri K. R. Narayanan with the support of Dr. Vasant Gowariker, Secretary, Department of Science & Technology.

The Governing Body resolved to amend rule 5(d) (Xiii) of the Rules relating to the Regional Cancer Centre Society with the retrospective effect from 27-2-1986 as follows:-

"To assign from time to time such functions and duties and delegate such powers as it may deem fit to the committee or committees or Director". It was further resolved to modify the resolution of the Governing Body dated 27-2-1986 regarding the delegation of powers to the Director as "to execute agreements wherever necessary. But before exercising the power to execute agreements in the case of hypothecation or Mortgage of any of the movable or immovable properties or fixed or capital assets of the Regional Cancer Centres, the approval of the Executive Committee of the society shall be obtained".



## MAJOR DECISIONS OF THE EXECUTIVE COMMITTEE DURING THE YEAR 1988-89

The Executive Committee resolved

- (i) to purchase one Tale-cobalt unit from M/s. I. G. E. Company at a cost of Rs. 33 lakhs.
- (ii) to permit opening of an extension counter of the Indian Overseas Bank in the new building
- (iii) to accept a donation of Rs. 6,000/- from M/s. Tamil Nadu Pharmaceuticals, Madras for the purchase of a Colour T. V. set for the cancer patients.
- (iv) participation of Dr. M. Krishnan Nair, Director in the 2nd International Congress on Cancer pain in New York.

It was resolved to accord sanction to the Centre to avail overdraft subject to the limit of Rs. 15 lakhs from Commercial banks as per the usual terms.

It was resolved to conduct a seminar on "Cancer in Women" with the assistance of British Council, U. G. C., I. C. M. R., W. H. O. and U. I. C. C. and permit the Director to incur the expenditure limited to Rs. 10,000/- from the funds of the Society, if absolutely essential.

The Committee resolved to create some additional posts like Staff Nurses, Nursing Supdt., Telephone operator, Librarian etc. for starting new services in the new building.

It was also resolved to approve the rules and guidelines for regulating the claims and settlements of 'Cancer Care for Life' patients.

It was resolved to purchase 16 laboratory equipments by availing Govt. of India grant and available resources from State Govt. funds.

It was also resolved to get necessary clearance from Govt. of India for Dr. Elankovan, Oral and Maxillofacial Surgery, Cannisburn Hospital, Glasgow for training in R. C. C.

It was resolved to purchase one Eicher Mitsubishi Canter Mini Bus for transportation of cancer patients from Railway station/Bus stand to the Hospital & back.

It was resolved to approve construction of a canteen and 10 rooms with a floor area of 480 sq. metres near the new Building making use of the income available from the C. C. L. Scheme to improve patient amenities.

It was resolved to accord sanction to R. C. C. to function as a Quality Assurance and Surveillance Unit for diagnostic X-ray installations in this region and accord sanction to accept the diagnostic kit from B. A. R. C., Bombay.

It was resolved to accord sanction to permit Dr. Alton I. Sudnick, Sr. Vice-President for Health Affairs, Medical College of Pennsylvania, Philadelphia to spend his sabbatical leave of 3 months in the R. C. C. with the concurrence of the Union Ministry of Health and Family Welfare, Ministry of Home and External Affairs.

It was resolved to accord sanction to 2, third year Medical students from Poland to undergo training at R. C. C. for a period of 2 months, with permission of the Ministry of External Affairs, Home, Health and Family Welfare and the Medical Council of India.

## ENGINEERING DEPARTMENT

The financial constraints of the preceding year were eased by a loan of Rs. 90 lakhs from the Canara Bank and Indian Overseas Bank. These loans were received in the latter half of 1988 and the building work progressed rapidly aiming for an inauguration by the middle of '89 when the building will be ready for occupation.

The Civil works by M/s. P. Rathnaswamy, Engineers and Contractors, Trivandrum is almost complete. Site Development Works and Compound wall construction is continuing. Electrification work of the project except for yard lighting, undertaken by M/s. Harrisons Malayalam Limited is also complete. On March 1st '89 the K. S. E. B. connected power supply from 2 feeders following which equipments like Cast resin indoor type transformer, HT & LT panel etc were commissioned. M/s. Blue Star Limited have made arrangements for testing 2 Numbers 200 TR Heat Recovery Centrifugal Chillers supplied by YORK, U. S. A.

The Plumbing and Water Supply Works done by M/s. Madras Engineering Concerns is almost complete. Kerala Water Authority through a separate line supplied water to the 500 cub.mtr. storage sump in April '88. A 26 person Hospital cum bed lift which was installed in 1988 by M/s. Best and Crompton, was tested and commissioned for use. Smoke detection, fire fighting, fire protection and domestic pump systems being installed by M/s. C. M. E. Industries, Bombay is nearing completion. A communication system consisting of 96/200 EPAX has been installed by M/s. Indian Telephone Industries, Bangalore.

Allied works such as false ceiling work and horticultural work to beautify the place is almost complete. So far Rs. 350 lakhs were spent for the new Project.

## ACCOUNTS



**REGIONAL CANCER CENTRE SOCIETY, TRIVANDRUM**  
**BALANCE SHEET AS AT 31ST MARCH, 1989**

As at 31-3-1988	LIABILITIES			As at 1988	ASSETS		
Rs.		Rs.	P.	Rs.		Rs.	P.
	<b>CAPITAL FUND</b>				<b>FIXED ASSETS</b>		
	As per last Balance Sheet	3,66,14,389.	88	5,02,887	As per Schedule	5,02,94,272.	96
	Add: Transfer of Capital Grants:			Nil	Add: Capital Goods-in-Transit	4,41,384.	40
3,66,14,400	State Government	47,17,899.	92			5,07,35,657.	36
		4,13,32,288	80				
	<b>CAPITAL GRANT :</b>				<b>INVESTMENTS</b>		
	Kerala State Government :				Term Deposits in respect of		
	As per letter No. G. O. (Rt) 8/1/	4,00,000.	00	55,143	Cancer Care for Life Scheme,	99,04,275.	00
	89/H & FWD dated 25-3-1988				with Banks		
	Kerala State Government Grants	43,17,899.	92		In Non-Operational Account with	1,56,488.	45
	Capitalised	47,17,899.	92		Banks		1,00,60,783.
	Less: Amount utilised for Con-			1,46,444	<b>CURRENT ASSETS, LOANS</b>		
	struction of Building trans-	47,17,899.	92		<b>AND ADVANCES :</b>		
Nil	ferrred to Capital Fund			27,412	Stock of Chemicals, Films & Sundry	3,72,818.	00
				250,303	Medical Items etc.	1,66,784.	50
Nil	Donation Received for purchase of		10,000	15,000	Interest Accrued on Bank Deposits	2,64,273.	77
	Capital Assets				Advances : Considered Good	15,000.	00
				7,115	Considered Doubtful	1,97,115.	00
	<b>UTILISED GRANTS :</b>			484	Deposits	105.	65
	From Government of India, for			6,893	Stamps on Hand	9,989.	85
	setting up Cobalt Therapy Unit				Cash on Hand (including imprest	9,989.	85
	with Rotational Head & Collimation			36,889	Rs. 6,850)		
	facilities :				Balances with Banks and Treasury		
	As per letter No. T-20013/13/86-R	12,00,000.	00	31,728	State Bank of Travancore, Medical	1,83,685.	94
	dated 20-5-1986				College	27,054.	95
	As per letter No. V-22015/6/88-R	20,00,000.	00	Nil	Canara Bank, Puthenchanthai	12,01,905.	00
12,00,000	dated 20-1-1989		32,00,000	Nil	Indian Overseas Bank, Pattom	1,36,436.	08
					Kerala State Co-operative Bank,	25,07,212.	00
				10,00,613	Trivandrum		50,64,378.
					Government Treasury		74
3,76,14,400	Carried Over	4,45,42,288	80	5,78,611	Carried Over	6,58,80,799.	55

REGIONAL CANCER CENTRE  
BALANCE SHEET AS AT

SOCIETY, TRIVANDRUM  
31-3-1989 (CONTD.)

As at 31-3-1989		LIABILITIES (Contd.)	
Rs.		Rs.	P.
3,78,14,400	Brought forward :	4,45,42,280	
	<b>CANCER CARE FOR LIFE FUND ACCOUNT :</b>		
	As per last Balance Sheet	76,56,294.60	
76,56,294	Add: Receipts during the year	20,05,319.00	
		96,60,613.60	
	<b>CURRENT LIABILITIES</b>		
52,45,800	Sundry Creditors	23,89,800	
	<b>SECURED LOANS</b>		
	From Banks :		
	On loan against Fixed Deposits relating to Cancer Care for Life Scheme - State Bank of Travancore	8,99,914.00	
	State Bank of India	6,03,552.50	
	On Equitable Mortgage by deposit of title deeds of Land and Building at Trivandrum and hypothecation of all movable assets -		
	Consara Bank	49,62,740.80	
	Indian Overseas Bank	48,26,400.00	
9,68,448		1,12,92,600	
5,16,83,940		6,78,05,128	

As at 31-3-1989		ASSETS (Contd.)	
Rs.		Rs.	P.
96,70,611	Brought forward :	6,58,00,799.55	
	<b>INCOME AND EXPENDITURE ACCOUNT</b>		
	Cancer Centre :		
	Balance as per last Balance Sheet	25,42,583.82	
	Add: Excess of Expenditure over Income	7,97,580.44	
		33,40,164.26	
	Less: Cancer Care for Life Scheme		
	Balance as per last Balance Sheet	5,38,255.16	
	Add: Excess of Income over Expenditure	7,97,580.44	
		13,35,835.60	
20,04,328		20,04,328.66	
10,83,940		6,78,05,128.21	

Vide our Report of date attached

For SURI & CO.  
Chartered Accountants

Sd/-  
N. SUBBIAH  
Partner

Trivandrum,  
17-10-1989.

**REGIONAL CANCER CENTRE  
INCOME AND EXPENDITURE ACCOUNT**

**SOCIETY, TRIVANDRUM  
FOR THE YEAR ENDED 31ST MARCH, 1989**

Figures for the previous year		EXPENDITURE		Figures for the previous year	
Rs.		Rs.	P.	Rs.	P.
2,29,696	To Opening Stock of chemicals, Films and other Sundry Medical items etc.			1,46,444	.00
3,01,758	.. Purchase of Chemicals, Films etc.	5,51,393	.03		
20,40,947	.. Salaries, Wages, Bonus, Contribution to Provident and Other Funds	25,59,003	.65		
5,61,196	.. Purchase of Medicines	9,83,475	.45		
4,35,264	.. Purchase of Nuclear and Radio-therapy Isotopes	6,44,508	.50		
24,258	.. Consultation Service Fee	32,467	.50		
12,978	.. Uniform	19,696	.40		
33,000	.. Rent	30,500	.00		
86,358	.. Postage, Telegrams & Telephones	89,370	.65		
89,093	.. Printing and Stationery	1,09,934	.25		
1,22,379	.. Travelling Expenses	54,348	.90		
58,299	.. Advertisement Charges	28,360	.00		
	.. Electricity Charges	21,776	.20		
4,326	.. Legal Expenses	3,250	.00		
6,500	.. Audit Fee	7,500	.00		
	.. Repairs and Maintenance :				
	Equipments	2,97,394	.83		
	Buildings	5,997	.30		
	Vehicles	1,17,362	.10		
4,86,497		4,20,754	.23		
51,824	.. Interest Paid	8,60,100	.20		
11,160	.. Conference, Seminars & Workshops	14,033	.10		
80,752	.. Books and Periodicals	87,838	.75		
	.. Early Cancer Detection Centre Expenses :				
	Salaries	3,41,125	.34		
	Travelling and				
	Other Expenses	88,717	.95		
4,26,535		4,29,843	.29		
	.. Proportionate Share of Expenditure of National Tumour Registry	1,19,801	.00		
91,388	.. Miscellaneous Expenses	25,029	.50		
20,135				70,92,984	.60
7,63,548	.. EXCESS of Income Over Expenditure				
59,37,891				72,39,428	.60

(Sd.) Director

Figures for the previous year		INCOME		Figures for the previous year	
Rs.		Rs.	P.	Rs.	P.
	By Grant from Government of Kerala Health & Family Welfare Department received during the year :				
	1st Instalment as per letter No. G.O. (Rt) 1364/88/H & PWD dt. 25-5-1988	10,00,000	.00		
	2nd Instalment as per letter No. G.O. (Rt) 1615/88/H & FWD dt. 20-6-1988	10,00,000	.00		
	3rd Instalment as per letter No. G.O. (Rt) 2200/88/H & FWD dt. 17-8-1988	15,00,000	.00		
	4th Instalment as per letter No. G.O. (Rt) 2669/88/H & FWD dt. 12-10-1988	10,00,000	.00		
	5th Instalment as per letter No. G.O. (Rt) 3321/88/H & FWD dt. 15-12-1988	10,00,000	.00		
	6th Instalment as per letter No. G.O. (Rt) 355/89/H & FWD dt. 6-2-1989	10,00,000	.00		
	7th Instalment as per letter No. G.O. (Rt) 737/89/H & FWD dt. 13-3-1989	3,00,000	.00		
	8th Instalment as per letter No. G.O. (Rt) 967/89/H & FWD dt. 31-3-1989	11,00,000	.00		
	9th Instalment as per letter No. G.O. (Rt) 981/89/H & FWD dt. 31-3-1989	12,00,000	.00		
		91,00,000	.00		
	Less: Part of the grant capitalised and transferred to Balance Sheet	43,17,899	.92		
49,44,646				47,82,100	.08
8,11,522	.. Investigation Fee	12,50,383	.75		
14,780	.. Interest Received	7,019	.40		
3,375	.. Cytotechnician Course Fee	3,000	.00		
1,125	.. Fee and Charges on Radio Immune Assay Course	500	.00		
	.. Fee on Ultrasonography training	2,000	.00		
15,999	.. Miscellaneous Receipts	24,028	.93		
1,46,444	.. Closing Stock of Chemicals, Film & Other Sundry Medical items etc.	3,72,816	.00		
	.. EXCESS of Expenditure over Income	7,97,580	.44		
59,37,891				72,39,428	.60

Vide our Report of date attached

**REGIONAL CANCER CENTRE  
CANCER CARE FOR  
INCOME AND EXPENDITURE ACCOUNT FOR**

<i>Figures for the previous year</i>		<b>EXPENDITURE</b>	
<i>Rs.</i>		<i>Rs.</i>	<i>P.</i>
	To Salaries	35,000.	00
87,118	.. Advertisement and Publicity	7,250.	00
63,615	.. Processing and mailing charges of Application forms and membership cards	25,310.	50
13,416	.. Printing and Stationery	9,218.	33
	.. Rent	2,500.	00
683	.. Travelling Expenses	1,168.	00
	.. Cost of Medicines and Expenses reimbursed to patients	20,495.	50
921	.. Miscellaneous Expenses	87.	00
5,52,794	.. Excess of Income over Expenditure	7,97,580.	44
<b>7,18,547</b>		<b>8,98,613.</b>	<b>79</b>

Trivandrum,  
17-10-1989.

Sd/-  
Director

**SOCIETY, TRIVANDRUM  
LIFE SCHEME  
THE PERIOD ENDED 31ST MARCH, 1989**

<i>Figures for the previous year</i>		<b>INCOME</b>	
<i>Rs.</i>		<i>Rs.</i>	<i>P.</i>
12,419	By Sale of Application forms	9,183.	00
7,03,431	.. Interest on Fixed Deposits	8,89,430.	79
2,697	.. Donations Received		
<b>7,18,547</b>		<b>8,98,613.</b>	<b>79</b>

Vide our Report of date attached  
For SURI & CO.,  
Chartered Accountants

Sd/-  
N. SUBBIAH  
Partner.



REGIONAL CANCER CENTRE  
Scheduled of Fixed Assets

SOCIETY, TRIVANDRUM  
as on 31st March, 1989

	Written down value as on 1-4-1988		Additions during the year	
	Rs.	P.	Rs.	P.
Building (Under Construction)	1,41,23,815.07		47,84,332.72	
Boundary Wall	..		1,27,118.63	
Furniture and Fixtures	4,42,984.35		50,267.10	
Office Equipments	99,692.10		4,014.40	
Vehicles	1,02,253.95		..	
Library Books	1,96,340.55		..	
Hospital & Lab Equipments	1,62,31,669.54		56,939.85	
Lift/Elevators (Under Installation)	4,39,433.00		..	
Electrical Installation & Fittings (Under Installation)	30,66,472.80		27,66,764.00	
Air Conditioning (Under Installation)	38,42,393.65		17,80,991.00	
Telephone Equipments (Under Installation)	5,15,695.00		..	
Water Supply (Under Installation)	4,81,827.00		3,21,158.00	
Addition to Old Building	8,60,110.25		..	
Capital Work-in-Progress	1,00,000.00		..	
	4,05,02,687.26		98,91,585.70	

	Deductions during the year		Balance as on 31-3-1989		Depreciation for the year	Written down value as on 31-3-1989	
	Rs.	P.	Rs.	P.		Rs.	Rs. P.
	..		1,89,08,147.79		..	1,89,08,147.79	
	..		1,27,118.63		..	1,27,118.63	
	..		4,93,251.45		..	4,93,251.45	
	..		1,03,706.50		..	1,03,706.50	
	..		1,02,253.95		..	1,02,253.95	
	..		1,96,340.55		..	1,96,340.55	
	..		1,62,88,609.39		..	1,62,88,609.39	
	..		4,39,433.00		..	4,39,433.00	
	..		58,33,236.80		..	58,33,236.80	
	..		56,23,384.65		..	56,23,384.65	
	..		5,15,695.00		..	5,15,695.00	
	..		8,02,985.00		..	8,02,985.00	
	..		8,60,110.25		..	8,60,110.25	
	1,00,000.00		..		..	..	
	1,00,000.00		5,02,94,272.96		Nil	5,02,94,272.96	

Note: A sum of Rs. 93 lakhs and 80 lakhs have been utilised till 31-3-1989 on purchase of Hospital and Laboratory equipments and construction of building respectively out of the grant-in-aid received from the Government of India.

Sd/-  
Director

Trivandrum,  
17-10-1989

For SURI & CO.,  
Chartered Accountant

Sd/-  
N. SUBBIAH  
Partner.



**SURI & CO.**  
*Chartered Accountants.*

M. G. Road,  
Trivandrum-695 001

### AUDITORS' REPORT

We have examined the accounts of REGIONAL CANCER CENTRE SOCIETY TRIVANDRUM (Regn. No. 567/81) for the year ended 31st March 1989, the attached Balance Sheet as at 31st March, 1989 and the Income and Expenditure Account for the year ended that date annexed thereto and we certify the same to be correct and in agreement with the books of account and other records kept by the Society so far as it appears from our examination of those books and records, subject to the following :

1. Proper records showing description of the assets, classification, location, individual cost, etc. in respect of Fixed Assets have not been maintained.
2. Depreciation on Fixed Assets has not been charged since 31-3-1986, and the unprovided depreciation amounted to Rs. 88,65,421, including Rs. 15,15,253, relating to the year ended 31-3-1989.
3. In respect of additions to the old building, capitalised during the year 1987/88 at Rs. 8,60,110, pending negotiation and/or settlement with the State P. W. D. additional claim of Rs. 4,16,940 made by the State P.W.D. has not been provided for in the accounts.
4. In respect of land of 69 cents at Palghat, assigned by Government in G.O. No. 619/88-RD dated 28-7-1988 and building constructed thereon, the value of which amounted to Rs. 1,27,119 and is included under Fixed Assets, the receipt of pattas favouring the Society is still awaited.
5. In the absence of verification of the imported equipments, for which no confirmation has been produced to us, the amount of Rs. 4,41,384 is shown under Fixed Assets as capital goods-in-transit, without capitalising under the appropriate heads.
6. Stock records in respect of chemicals, films and other medical items have not been properly maintained. The closing stock of Rs. 3,72,816 as on 31-3-1989 has been valued as per the inventories furnished by the different Departments.
7. Advances considered good includes Rs. 18,388 towards travelling advances and Rs. 77,082 towards advances for purchases, aggregating to Rs. 95,470, outstanding for more than one year, in respect of which no proper adjustments/recoveries have been made in the accounts.
8. Provision has not been made in respect of Advances considered doubtful at Rs. 15,000.
9. Existing internal control procedure for the purchase of chemicals, films and other medical items and also capital assets should be strengthened further to the advantage

of the Society by conducting physical verification at periodical intervals to enable comparison of the physical stock with the records and to make adjustments, if any in the financial records.

10. In the absence of specification as to capital and revenue nature for the grant of Rs. 91,00,000 received from Government of Kerala, the grant received has been treated as revenue grant shown under Income and Expenditure Account to the extent of excess of expenditure over income, including Cancer Care for Life Scheme, and the balance of grant received has been treated as capital grant, carried to Balance Sheet.

For SURI & CO.  
*Chartered Accountants.*

Sd/-  
N. SUBBIAH  
*Partner.*

Trivandrum,  
17-10-1989.

17-10-1989

### UTILISATION CERTIFICATE

Certified that the Grants of Rs. 95,00,000 (Rupees Ninety Five Lakhs only) received during 1988/89 by REGIONAL CANCER CENTRE SOCIETY, TRIVANDRUM (Regn. No. 567/81) from Health and Family Welfare Department, Government of Kerala, as per the following Government Orders :

	Rs.
G.O. (Rt) No. 1364/88/H & FWD dt. 25-5-1988	10,00,000
G.O. (Rt) No. 1615/88/H & FWD dt. 20-6-1988	10,00,000
G.O. (Rt) No. 2200/88/H & FWD dt. 17-8-1988	15,00,000
G.O. (Rt) No. 2669/88/H & FWD dt. 12-10-1988	10,00,000
G.O. (Rt) No. 3321/88/H & FWD dt. 15-12-1988	10,00,000
G.O. (Rt) No. 355/89/H & FWD dt. 6-2-1989	10,00,000
G.O. (Rt) No. 737/89/H & FWD dt. 13-3-1989	3,00,000
G.O. (Rt) No. 871/89/H & FWD dt. 25-3-1989	4,00,000
G.O. (Rt) No. 967/89/H & FWD dt. 31-3-1989	11,00,000
G.O. (Rt) No. 981/89/H & FWD dt. 31-3-1989	12,00,000
	<hr/>
	95,00,000

has been utilised by the Society during the year 1988/89 for the purpose of Chemotherapy and Nuclear Medicine and allied services and also for the purpose of maintenance of the Institution and other working expenses, implementation of projects, construction of building, functioning of Early Cancer Detection Centres and maintenance of National Tumour Registry.

Sd/-  
For SURI & CO.,  
Chartered Accountants

Sd/-  
N. SUBBIAH  
Partner

### REMARKS OF REGIONAL CANCER CENTRE ON AUDITORS' REPORT

1. Stock Registers of Fixed Assets are now rewritten to indicate description of assets, classification, location, individual cost etc.
2. Government of Kerala in letter No. 1771/32/86/B & FWD dated 31-1-1987 intimated that there is no necessity for providing depreciation in respect of Fixed Assets.
3. Additional claim of State P. W. D. has not been verified and accepted. Action has been taken to verify and settle the claim.
4. Action has been taken to get patta of 69 Cents of land at Palghat, assigned to the Centre.
5. The goods referred to have since been received, verified and taken to stock.
6. The procedure followed in respect of consumable items such as Chemicals, films, stock records etc. is to take them in the Central Stock Register maintained in the Purchase Division and issue them to different Departments, where they are accounted through a Stock Register. The closing stock as on 31-3-1989 was worked out with reference to the stock position in different Departments.
7. Claims have been received in respect of Travelling Advances, paid in some cases and advance will be adjusted in the accounts for the current year. In the remaining cases, advances paid will be got refunded. Rs. 77,082/- towards advance for purchase represents, customs duty paid, to be got refunded from the Customs Department. The matter is pursued with Customs Department.
8. Legal action was taken to recover the amount of Rs. 15,000/- and decision of Court in favour of the Department was obtained. Further action to recover the decreed amount is pursued.
9. The remarks are noted and action has been taken to streamline the procedures.
10. Part of the grant was utilised on Capital Projects, such as construction of Building for Regional Cancer Centre and hence part of the grant shown in the accounts as Capital grant is in order.

Sd/-  
DIRECTOR



## GOVERNMENT OF KERALA

NO. 84038/PU-C1/89/FIN.

FINANCE DEPARTMENT

COMMENTS OF COMMISSIONER & SECRETARY (FINANCE) TO THE GOVERNMENT OF KERALA ON THE AUDITED ACCOUNTS OF THE REGIONAL CANCER CENTRE, TRIVANDRUM FOR THE YEAR ENDED 31ST MARCH 1989 AS REQUIRED UNDER RULE 11 OF THE RULES RELATING TO THE REGIONAL CANCER CENTRE SOCIETY.

"NO COMMENTS"

Sd/  
COMMISSIONER & SECRETARY  
(FINANCE)

TRIVANDRUM  
21-12-1989.

## LIST OF STAFF

<i>Director</i>	— Dr. M. Krishnan Nair
<i>Superintendent</i>	— Dr. T. K. Padmanabhan
<i>Secretary (Academic)</i>	— Prof. A. Joseph
<i>Nursing Superintendent</i>	— Sr. Sabeena, S. D.

## RADIOTHERAPY

Dr. M. Krishnan Nair	— Director & Professor
Dr. T. K. Padmanabhan	— Professor
Dr. F. Joseph	— Associate Professor
Dr. C. S. Kuttappan	— "
Dr. B. Rajan	— "
Dr. T. Gangadevi	— "
Dr. C. S. Rafeeka Beegum	— Assistant Professor
Dr. P. G. Jayaprakash	— "
Dr. V. Narayana Bhattathiri	— "
Dr. Jayaprakash Madhavan	— Tutor
Dr. C. S. Madhu	— "
Dr. A. Sudhakaran	— "
Dr. P. R. Sasindran	— Lecturer
Dr. Ratheesan, K.	— Tutor
Dr. Gireesan	

## DENTAL SECTION

Dr. L. Sudha	— Tutor
Dr. K. R. Nalinakumari	— Lecturer
Smt. Krishnambal. M.	— Dental Hygienist

## NUCLEAR MEDICINE

Dr. K. Sasidharan	— Associate Professor
Dr. P. Ramachandran Nair	— "
Dr. V. Padmanabhan	— "
Dr. V. M. Pradeep	— Assistant Professor
Sri. Raghuram Nair K.	— Lecturer

## RADIATION PHYSICS

Dr. T. P. Ramachandran	— Associate Professor
Sri. P. G. Gopalakrishna Kurup	— "
Sri. C. A. Davis	— Assistant Professor
Sri. Thayal Singh Elias	— Lecturer
Smt. B. Vimala	— Radiographer
Sri. N. Sadasivan Nair	— "
Smt. Suseelamma	— "
Sri. V. Gangadharan	— "
Smt. P. Seethalekshmy	— "
Sri. C. Viswanathan	— "
Smt. M. Leela	— "
Smt. Raheena Beegum	— "
Smt. V. Sheela	— "
Sri. Joe D'Cruz	— "
Sri. T. Prasad	— "
Sri. P. Ramabhadran	— "
Sri. N. Satheesh Kumar	— "
Sri. K. P. Radhakrishnan	— "
Smt. R. Suja	— "
Smt. Susamma George	— "
Sri. S. Sreenivasan	— Radium Technician

## CYTOLOGY

Dr. N. Sreedevi Amma	— Professor
Dr. B. Chandralekha	— Associate Professor
Dr. Elizabeth K. Abraham	— Assistant Professor
Dr. Rajasekharan Pillai. G.	— "
Smt. J. Ambika Kumari	— Senior Scientific Officer
Sri. Raghunathan Nair	— Cytologist
Sri. K. Vijayagopal	— Junior Research Officer
Sri. P. Gopalakrishnan	— Research Assistant
Sri. R. Muraleedharan	— Cytotechnologist
Smt. C. Radhamma	— Lab. Technician Gr. II.
Smt. S. Najeeya	— "
Smt. J. Omana	— U. D. Typist
Smt. Molykutty John	— Cytotechnologist
Smt. G. Leelamma	— Technician
Smt. G. Lekha	— "
Sri. Abraham P. T.	— Cytotechnician

## CANCER SURGERY

Dr. Thomas Cherian	— Assistant Professor
Dr. Gladys Jeevi	— Anaesthetist
Dr. Paul Sebastian	— Lecturer
Dr. Iqbal Ahmed	— Lecturer
Dr. N. Sivarama Krishnan	— Resident Surgical Officer
Dr. K. L. Jayakumar	— "
Sri. R. Harikumar	— Theatre Assistant
Smt. S. Geetha	— Staff Nurse
Smt. Saly Augustine	— "

## PAEDIATRIC ONCOLOGY

Dr. P. Kusuma Kumari	— Assistant Professor
Dr. Geetha Raveendran	— Lecturer
Dr. Dinesh M.	— Lecturer
Smt. P. M. Aleykutty	— Nurse

## CANCER RESEARCH

Dr. B. Prabha	— Associate Professor
Dr. K. K. Vijayan	— Lecturer
Sri Raveendran Ankathil	— Scientific Officer
Sri. Thomas Abraham	— "
Smt. B. Padmavathy Amma	— Technical Officer
Smt. C. Gangadevi	— Lab. Technician Gr. II.
Smt. J. Usha	— "
Smt. P. Renuka	— "
Sri. Anil Kumar	— "
Smt. A. Leela	— Animal House Keeper cum-attender
Sri. K. Vikraman Nair	— "

## HOSPITAL CANCER REGISTRY AND MEDICAL RECORDS

Sri. P. Gangadharan	— Associate Professor of Cancer Epidemiology (Statistics)
Dr. R. Sankaranarayanan	— Assistant Professor of Cancer Epidemiology (Medical)



Sri. R. Raveendran Nair	—	Medical Records Officer
Sri. S. Muraleedharan Nair	—	Medical Statistician
Smt. G. Padmakumari Amma	—	Senior Research Fellow
Smt. P. T. Latha	—	Social Investigator
Smt. Anitha Nayar	—	"
Smt. Jalajakumari. V.	—	Clerk
Sri. L. G. Amaldas	—	Clerk
Sri. G. Rajasekharan Nair	—	"
Smt. C. Sreedevi Kutty	—	Typist
Sri. B. Sreekumar	—	Coding Clerk
Smt. D. Chandrika	—	"
Smt. S. Ponnammal	—	Receptionist
Sri. S. Rajayyan	—	Technical Helper
Smt. T. Chandrika	—	Clerk Typist.

#### COMMUNITY ONCOLOGY

Dr. Babu Mathew	—	Associate Professor
Dr. Ramani S. Wesley	—	Lecturer

#### ADMINISTRATIVE OFFICE

Sri. K. Lekshmana Iyer	—	Registrar
Sri G. Sadasivan	—	Administrative Officer
Sri. Joseph Stephen	—	Finance & Accounts Officer
Sri. C. Somasekharan Nair	—	Financial Assistant
Sri. S. Sukumaran Nair	—	Cashier-cum-Accountant
Sri G. Gnaneswaran	—	Accountant
Smt. R. Sudevi	—	Confidential Assistant
Smt. B. Savithri Amma	—	"
Smt. S. Mallikadevi	—	"
Sri. N. Ramaswamy Iyer	—	Office Assistant
Sri. S. V. Sasikumar	—	"
Smt. B. Lalitha	—	"
Sri. K. Sasikumar	—	"
Sri. T. Padmakumar	—	"
Sri. N. Sudarsanan Pillai	—	"
Smt. K. Rajalekshmi	—	"
Sri. P. Krishnan Nair	—	Driver
Sri. P. Sreekumaran Nair	—	"

Sri. M. Subair	—	Helper
Sri. P. Antony	—	"
Sri. K. Devaraja Panicker	—	"
Sri. G. Surendran	—	"
Sri. R. Anil Kumar	—	"
Sri. C. Hari	—	"
Sri. K. Thankappan Chettiar	—	"
Sri. K. G. Balachandran	—	"
Sri. P. Gopakumar	—	"
Sri. P. S. Suresh	—	"
Sri. L. Balachandran	—	"
Sri. K. Sivankutty	—	"
Sri. S. Senan	—	"
Smt. P. Seethalekshmi	—	"
Sri. R. Sasikumaran Nair	—	Helper-cum-Watchman

#### SECURITY

Sri. S. Vijayan Nair	—	Sergeant
Sri. K. Thankappan Nair	—	Security Guard
Sri. N. Achuthan Nair	—	"

#### ENGINEERING WING

Sri. G. Raveendranathan Nair	—	Project Engineer
Sri. A. Rajan	—	Maintenance Engineer (Electrical)
Sri. P. Rajagopal	—	Asst: Project Engineer
Sri. R. Asokan Nair	—	Ist Grade Overseer
Smt. P. Suseela	—	Confidential Assistant
Smt. N. Beena	—	Office Assistant
Sri. Santhosh Kumar A. R.	—	Supervisor (Electrical)
Sri. Sasidharan. N.	—	"
Sri. Rajendran. K. R.	—	"
Sri. Rajeevan . B.	—	"

#### EARLY CANCER DETECTION CENTRE, ERNAKULAM

Dr. B. Symala Kumari	—	Cytopathologist
Sri. Raveendran Pillai	—	Cytotechnologist
Smt. Mercy Joseph	—	"



Sri. K. S. Jayalal	— Cytotechnician
Smt. T. P. Ramani	— U. D. Typist
Smt. L. Madhavikutty Amma	— Staff Nurse
Sri. P. M. Abdul Rahiman	— Helper
Smt. N. Santhakumari	— Hospital Attender Gr. II

#### EARLY CANCER DETECTION CENTRE, PALGHAT.

Dr. R. Ananda Kamath	— Cytopathologist
Smt. C. Radha	— Cytotechnologist
Sri. K. Sujathan	— Cytotechnologist
Sri. A. Nataraj	— Cytotechnician
Smt. P. C. Bhavani	— Staff Nurse
Smt. Lekshmikutty	— Hospital Attender Gr. II
Sri. G. Das	— Helper.

#### ACKNOWLEDGEMENT

Government of India, Ministry of Health & Family Welfare.

Government of India, Department of Science & Technology.

Government of Kerala, Department of Health & Family Welfare.

Chief Secretary to Government of Kerala.

Indian Council of Medical Research, New Delhi.

World Health Organisation, New Delhi.

International Union Against Cancer (UICC) Geneva, Switzerland.

British Council, Madras.

American Cancer Society, New York.

National Cancer Institute, Bethesda, Maryland, USA  
Allegheny General Hospital, Pittsburg, USA.

Christie Hospital & Holt Radioun Institute, Manchester.

Chester Beatty Research Institute, London.

University of British Columbia - Environmental Carcinogenesis  
Unit, Vancouver, Canada.

Bhabha Atomic Research Centre, Bombay.

Director General of Health Services, Government of India,  
New Delhi.

Director, Vikram Sarabhai Space Centre, Trivandrum.

Director, Sree Chitra Thirunal Institute for Medical  
Sciences & Technology, Trivandrum.

Kerala State Committee on Science, Technology and  
Environment, Trivandrum.

Director of Medical Education, Kerala.

Director of Health Services, Government of Kerala, Trivandrum.

Principal, Medical College, Trivandrum.

Superintendent, Medical College Hospital, Trivandrum.

Superintendent, Sree Avittom Thirunal Hospital for Women and Children, Trivandrum.

Dean, Dental College, Trivandrum.

Dr. Calvin Zippin, Director, Tumour Registry, San Francisco.

Dr. R. Pathmanathan, Consultant, Monklands District General Hospital, UK.

Dr. A. S. Paintal, Director General, Indian Council of Medical Research, New Delhi.

Dr. Usha K. Luthra, Sr. Deputy Director General, Indian Council of Medical Research, New Delhi.

Dr. John Young, Demographic Analysis Section, National Cancer Institute, USA.

Dr. R. Sudha Gangal, Cancer Research Institute, Tata Memorial Hospital, Bombay.

Dr. V. Shanta, Director, Cancer Institute, Madras.

Dr. P. B. Desai, Director, Tata Memorial Centre, Bombay.

Dr. M. Krishna Bhargava, Director, Kidwai Memorial Institute of Oncology, Bangalore.

Dr. B. D. Gupta, Postgraduate Institute, Chandigarh.

Dr. Sneh Bhargava, All India Institute of Medical Sciences, New Delhi.

Controller of Stationeries., Government of Kerala, Trivandrum.

Director of Census Operations, Kerala.

Director Bureau of Economics and Statistics, Kerala.

M/s. Mangalom Publications, Kottayam.

Dr. H. F. Stich, Chief Environmental Carcinogenesis Unit, University of British Columbia, Canada.

Managing Director, Travancore Cochin Chemicals, Alwaye.

M/s. Instrumentation Ltd., Palghat.

