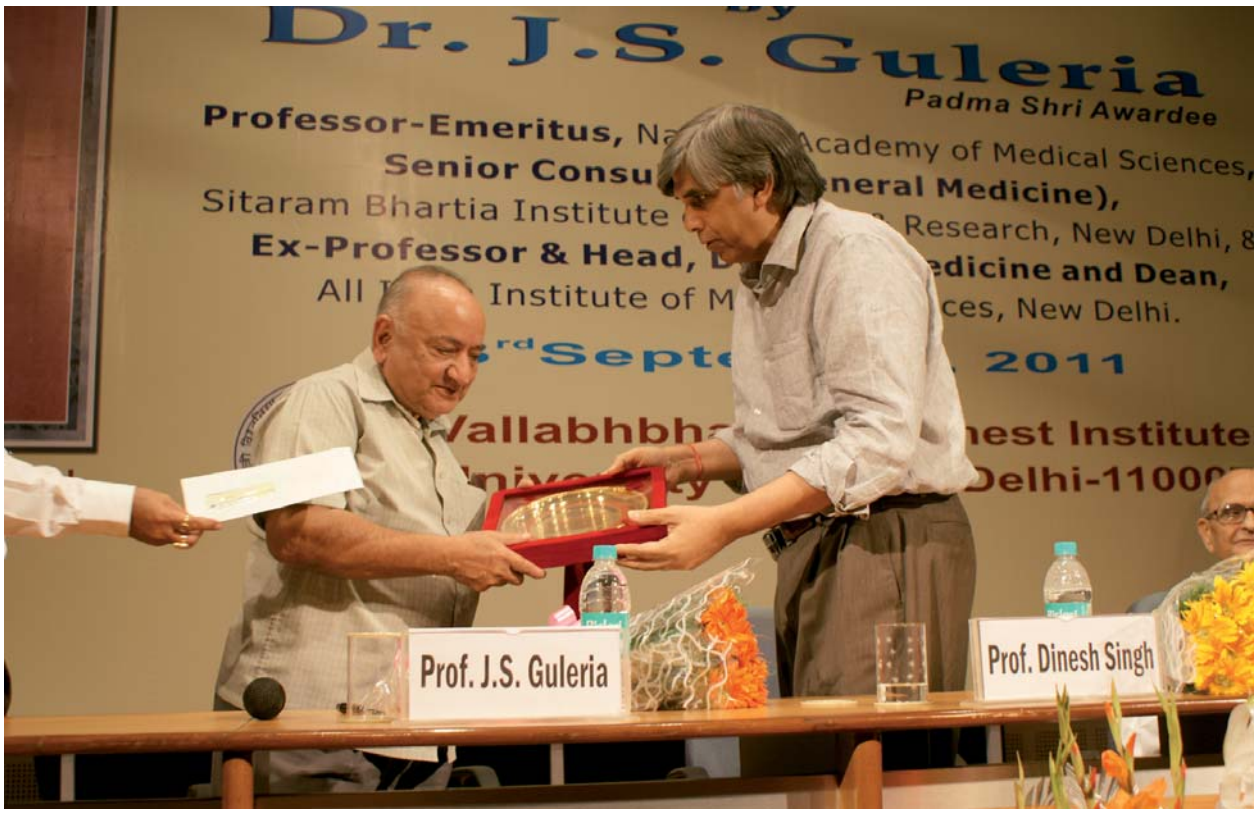
ANNUAL REPORT
2011-12

Vallabhbhai Patel Chest Institute
University of Delhi, Delhi, India

Dr Vishwa Mohan Katoch, Secretary to the Government of India, Department of Health Research, Ministry of Health & Family Welfare and Director-General, Indian Council of Medical Research, New Delhi, receiving the memento from Dr V.K. Vijayan, Director of the Institute, on the occasion of 13th "Prof. R. Viswanathan – VPCI Oration" held on 6th April 2011.



Prof. J.S. Guleria, Senior Consultant (General Medicine), Sitaram Bhartia Institute of Science and Research, New Delhi and former Professor and Head, Department of Medicine, and Dean, A.I.I.M.S., New Delhi, receiving the memento from Prof. Dinesh Singh, Vice-Chancellor, University of Delhi, Delhi, on the occasion of 6th "Prof. A.S. Paintal Memorial Oration" held on 2rd September 2011.

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Vallabhbhai Patel Chest Institute
University of Delhi, Delhi, India

Published and printed by Prof. Rajendra Prasad, Director, Vallabhbhai Patel Chest Institute, University of Delhi, Delhi-110 007; Phone: 27402435 (Direct), 27667102, 27667441, 27667667, 27666182 (Extn. 135) and printed at Bengal Offset Works, 335, Kahzoor Road, Karol Bagh, New Delhi-110 005 (Phone: 23610455, 23674614).

From the Director's Desk

It is my proud privilege to present the Annual Report of the Vallabhbhai Patel Chest Institute (VPCI) for the year 2011-12. This report reviews the manifold activities of the Institute in the areas of "teaching and education", "research" and "patient care". I joined the Institute on 21st November 2012. The Institute would like to record our gratitude and appreciation to Dr V.K. Vijayan, the previous Director of the Institute, who retired on 30th June 2011, for his untiring efforts towards the development of the Institute for the last 13 years and Prof. S.N. Gaur acting Director from 1st July 2011 to 20th November 2012.

The first batch of the DM course (2011-14) started from 2011 and two students were enrolled. The 13th "Professor Raman Viswanathan-VPCI Oration", started in 1999 to perpetuate the memory of the Founder-Director of the Institute, was delivered by Dr Vishwa Mohan Katoch, Secretary to the Govt. of India, Department of Health Research, Ministry of Health and Family Welfare and Director General, Indian Council of Medical Research, New Delhi, on 6th April 2011. The 7th "Prof. Autar Singh Paintal Memorial Oration" was delivered by Prof. J.S. Guleria, Professor-Emeritus, National Academy of Medical Sciences, presently Sr. Counsultant (General Medicine), Sitaram Bharatia Institute of Science & Research, New Delhi and former Professor & Head, Department of Medicine, All India Institute of Medical Sciences, New Delhi, on 23rd September 2011.

The Institute organised Symposium on Thoracic Imaging on the occasion of the 62nd Foundation Day of the Vallabhbhai Patel Chest Institute, Delhi, April 5, 2011 and the National Conference on Pulmonary Diseases (NAPCON-2011), [the joint national conference of the Indian Chest Society and the National College of Chest Physicians (India)] on November 27-30, 2011 at the India Habitat Centre, New Delhi. A Workshop on Advance Methods in Pre-clinical Pharmacology was also organized by the Pharmacology Department of the Institute on December 12, 2011. The Workshop on **'Respiratory Allergy: Diagnosis and Management'** is a regular annual event of the Institute for last 36 years which is being held jointly with the Institute of Genomics and Integrative Biology (IGIB), a CSIR unit.

Postgraduate medical education is one of the thrust areas of the Institute. Students are trained for DM, MD and DTCD degree courses in Pulmonary Medicine; MD in Biochemistry, Physiology, Microbiology and Pharmacology and for PhD degree in Chest Medicine and Allied sciences. A large number of students from other institutions/colleges were also trained in various departments of the Institute. The research contributions from the Institute are widely acclaimed. The vibrancy of these research projects/activities can be well judged from the list of publications in peer reviewed journals, guest lectures delivered and original papers presented in the International and National conferences by the faculty members and students of the Institute. The faculty members also received various Awards and Honours in their field of specialization. Reputed Scientists from UK, the Netherland, Canada visited the Mycology Department of the Institute, delivered lectures and interacted with the faculty as a part of academic activity. They appreciated the work done at the Mycology Department and even proposed to have accreditation and also exchange training programmes with this Department. Reputed scientists from Bangaladesh also visited the institute. The Faculty members are engaged in various research projects sponsored by different agencies of Government of India, W.H.O., etc.

The Viswanathan Chest Hospital, the clinical wing of the Institute, is a tertiary care Chest Hospital with state-of-the-art patient care facilities. It continues to provide excellent diagnostic and treatment services

including Critical Care management to patients from Delhi, other parts of the country and from neighbouring countries suffering from Respiratory and allied diseases. It also continues to provide other facilities like; Skin testing, Bronchoscopy, Sleep studies, Pulmonary rehabilitation, Cardiorespiratory exercise.

Prof. Rajendra Prasad
Director

Prof. Rajendra Prasad taking over as Director of VPCI from Prof. S.N. Gaur, Acting Director on 21st November 2012.

ANNUAL REPORT (2011-12)

CONTENTS

MILESTONES OF VPCI

April 6,	1949	Foundation stone of the Institute was laid down by Sardar Vallabhbhai Patel.
November	1951	Ad-hoc Governing Body was appointed by the Executive Council of University of Delhi for administrative affairs of the Institute.
December	1951	Main building of the Institute was completed.
January 12,	1953	The Institute was formally opened by Rajkumari Amrit Kaur, the Union Minister of Health, Government of India.
		Prof. R. Viswanathan was appointed as the Founder-Director. The grant for 1953-54 was Rs. 2 lakh.
January 21,	1955	A regular Governing Body was constituted by the Executive Council of the University of Delhi for the management and administration of the Institute.
April 4,	1955	The first meeting of the regular Governing Body was held.
	1955	Prof. A.S. Paintal reported the discovery of lung deflation receptors, a historical landmark in understanding the functioning of lung and its diseases.
July 1,	1957	Prof. R. Viswanathan took over as full-time Director of the Institute. Previously, he was the Deputy Director General of Health Services, Govt. of India and Honorary Director of the Institute.
September 24,	1957	Pt. Jawaharlal Nehru said in a message: "It was a brave act of the University of Delhi to start the V.P. Chest Institute".
October 24,	1957	Clinical Research Centre was inaugurated by Dr Rajendra Prasad, President of the Republic of India.
January 24,	1959	Indian Association for Chest Diseases was inaugurated by Sir A.L. Mudaliar. It was rechristened as National College of Chest Physicians (India) in January 1981.
July	1959	*The Indian Journal of Chest Diseases*, a Quarterly Journal, was started under the joint auspices of the V.P. Chest Institute and the Indian Association for Chest Diseases.
July	1959	A ward of 20 beds was opened to admit patients.
	1959	By a resolution of the Governing Body, V.P. Chest Institute was nominated as a "National Institute for Teaching and Research in Chest and Allied Diseases".
January	1960	A Diploma course in Tuberculosis Diseases, which was started in March 1947, was re-designated as "Diploma in Tuberculosis and Chest Diseases" (DTCD) from XIV Course. The XV DTCD Course started from July 1960.
April 6,	1961	Foundation Day Celebrations of the Institute was started.

April 7,	1962	Foundation stone of Patel Niwas, a Post Graduate Hostel, was laid down by Dr C.D. Deshmukh, Vice-Chancellor, University of Delhi, Delhi.
January 26,	1963	A contingent of V.P. Chest Institute staff participated in the Republic Day parade.
February 20-24,	1963	VII International Congress on Diseases of the Chest was held at Vigyan Bhawan under the auspices of V.P. Chest Institute, Indian Association for Chest Diseases and the University of Delhi.
August 1,	1964	Prof. A.S. Paintal joined as the Director of the Institute.
April 6,	1965	Patel Niwas was inaugurated by Dr C.D. Deshmukh on the XVI Foundation Day of the Institute.
	1966	Prof. A.S. Paintal was elected Fellow of the Royal Society of Edinburgh.
	1969	Padma Shree was awarded to Prof. R. Viswanathan.
	1974	Padma Bhushan was awarded to Prof. R. Viswanathan.
	1981	Prof. A.S. Paintal was elected Fellow of the Royal Society of London.
	1984	Prof. A.S. Paintal was elected General President of the Indian Science Congress Association [1984-85].
	1985	Prof. H.S. Randhawa was elected Vice-President of the International Society for Human and Animal Mycology [1985-88].
	1986	Prof. A.S. Paintal was appointed as Director-General of the Indian Council of Medical Research.
	1986	Padma Vibhushan was awarded to Prof. A.S. Paintal.
	1986	Prof. A.S. Paintal was elected President of the Indian National Science Academy [1986-88].
November 10,	1991	Prof. H.S. Randhawa joined as the Director of the Institute.
October 5,	1998	Dr V.K. Vijayan joined as the Director of the Institute.
April 6,	1999	Golden Jubilee Celebrations of the Foundation Day of the Institute.
		1st VPCI Oration by Prof. N.K. Ganguly, Director-General, Indian Council of Medical Research, New Delhi.
June 14,	1999	24-hour Respiratory Emergency Services started.
November 12,	1999	His Excellency, Shri K.R. Narayanan, President of India, received the copy of Compendium of Activities (VPCI) 1949-99.
April 6,	2000	2nd VPCI Oration by Prof. A.S. Paintal, former Director-General, ICMR and former Director, VPCI.

August 30,	2000	A New Ward (with an additional 40 beds) was inaugurated by Dr A.K. Walia, Honourable Minister for Health, Govt. of NCT of Delhi.
	2000	Dr V.K. Vijayan was elected International Regent, American College of Chest Physicians, U.S.A. [2000-06].
March	2001	A Respiratory Critical Care Unit was started.
March 15,	2001	CT Scan Centre was inaugurated by Honourable Padma Shree Dr C.P. Thakur, the Union Minister of Health & Family Welfare, Govt. of India.
April 6,	2001	3rd VPCI Oration by Dr S. Lakshminarayanan, University of Washington School of Medicine, Washington, Seattle, U.S.A.
April 21,	2001	1st Refresher (CME) Course in Respiratory Diseases started.
November 21,	2001	Tobacco Cessation Clinic was started.
April 6,	2002	4th VPCI Oration by Dr S. Padmavati, President, All India Heart Foundation and Director, National Heart Institute, New Delhi.
August 14,	2002	A State-of-the-Art Oxygen Plant was inaugurated by Prof. P.N. Srivastava, Chairman, Governing Body (VPCI).
January 12-14,	2003	International Conference on Chest Diseases and Allied Sciences was held at India Habitat Centre, New Delhi, to commemorate the Golden Jubilee of the Inauguration of the Institute.
April 7,	2003	5th VPCI Oration by Prof. J.S. Bajaj, former Member, Planning Commission, Government of India and former Professor and Head, Department of Medicine, All India Institute of Medical Sciences, New Delhi.
May 28,	2003	"Bhoomi Pujan" to start the construction work of the Auditorium.
	2004	Launching of the Institute website: <www.vpci.org.in>.
April 6,	2004	6th VPCI Oration by Prof. H.S. Randhawa, former Director, V.P. Chest Institute, University of Delhi, Delhi.
April 6,	2005	7th Prof. R. Viswanathan-VPCI Oration by Prof. Naranjan S. Dhalla, Distinguished Professor and Director, Institute of Cardio-vascular Sciences, St. Boniface General Hospital and Research Centre, University of Manitoba, Winnipeg, Canada. The VPCI Oration was re-named as "Prof. R. Viswanathan-VPCI Oration" in 2005.
September 24,	2005	First Prof. A.S. Paintal Memorial Oration by Prof. M.S. Valiathan, Honorary Adviser, Manipal Academy of Higher Education, Manipal (Karnataka).
January 10,	2006	An 8-bedded Intensive Care Unit was inaugurated by Prof. P.N. Srivastava, Chairman, Governing Body (VPCI).
April 6,	2006	8th "Prof. R. Viswanathan-VPCI Oration" by Prof. C.N. Deivanayagam, Former Medical Superintendent, Hospital for Thoracic Medicine, Chennai.

September 24,	2006	2nd "Prof. A.S. Paintal Memorial Oration" by Prof. P.N. Tandon, President, National Brain Research Centre Society, Gurgaon, Haryana.
December 8,	2006	Inauguration of the Golden Jubilee Auditorium by organising an International symposium on Herbal Drug Research and Therapy in Chest Medicine.
March 2,	2007	The Hospital wing of the Institute, Clinical Research Centre has been re-named as "Viswanathan Chest Hospital" in honour of the Founder-Director of the Institute and the Golden Jubilee Auditorium has been re-named as "Paintal Memorial Golden Jubilee Auditorium" in honour of the former Director of the Institute by a resolution of the Governing Body.
April 6,	2007	9th "Prof. R. Viswanathan-VPCI Oration" by Prof. K.K. Talwar, Director, Postgraduate Institute of Medical Education Research, Chandigarh.
June 22,	2007	Yoga Therapy and Research Centre [in collaboration with the Morarji Desai National Institute of Yoga (MDNIY), New Delhi], was inaugurated.
September 18,	2007	Cardio-pulmonary Rehabilitation Clinic was inaugurated.
September 24,	2007	3rd "Prof. A.S. Paintal Memorial Oration" by Prof. P.N. Srivastava, First Chancellor, Manipur Central University, Imphal and former Vice-Chancellor, Jawaharlal Nehru University, New Delhi.
April 6,	2008	10th "Prof. R. Viswanathan-VPCI Oration" by Prof. C.R. Babu, former Pro-Vice-Chancellor, University of Delhi, Delhi.
September 24,	2008	4th "Prof. A.S. Paintal Memorial Oration" by Prof. Nanduri R. Prabhakar, Director, Centre for System Biology of Oxygen Sensing, Department of Medicine, University of Chicago, U.S.A.
April 7,	2009	11th "Prof. Raman Viswanathan-VPCI Oration" by Prof. Peter J. Barnes, Head of Respiratory Medicine, Imperial College, London and Professor of Thoracic Medicine and Head of Airway Disease at the National Heart and Lung Institute and Honorary Consultant Physician at Royal Brompton Hospital, London.
September 17,	2009	Approval by the University of Delhi to start Superspeciality DM Course in Pulmonary and Critical Care Medicine in VPCI with an intake of two seats per year.
September 24,	2009	5th "Prof. A.S. Paintal Memorial Oration" by Prof. Arun Dharmarajan, Winthrop Professor, School of Anatomy and Human Biology, Faculty of Life and Physical Sciences, The University of Western Australia, Nedlands, Perth, Western Australia.
April 6,	2010	12th "Prof. Raman Viswanathan-VPCI Oration" by Prof. M.K. Bhan, Secretary, Government of India, Department of Biotechnology, New Delhi.
August 3,	2010	Approval by the University of Delhi to start Diploma Course in Allergy & Clinical Immunology in VPCI with an intake of two seats per year.
September 24,	2010	6th "Prof. A.S. Paintal Memorial Oration" by Prof. Chulani Tissa Kappagoda, Professor of Medicine, University of California, Davis, U.S.A.

February 12,	2011	Inauguration of the National Centre of Respiratory Allergy, Asthma and Immunology by Prof. P.N. Tandon, President, National Brain Research Centre Society, Gurgaon, Haryana and Chairman, Governing Body, V.P. Chest Institute, Delhi.
March 15,	2011	Permission from Medical Council of India to start DM (Pulmonary Medicine) course with annual intake of two students from the academic year 2011-12.
April 6,	2011	13th "Prof. R. Viswanathan-VPCI Oration" by Dr Vishwa Mohan Katoch, Secretary to the Government of India, Department of Health Research, Ministry of Health & Family Welfare and Director-General, Indian Council of Medical Research, New Delhi.
July 1,	2011	Prof. S.N. Gaur joined as the Acting Director of the Institute.
September 23,	2011	7th "Prof. A.S. Paintal Memorial Oration" by Prof. J.S. Guleria, Senior Consultant (General Medicine), Sitaram Bhartia Institute of Science and Research, New Delhi and former Professor and Head, Department of Medicine, and Dean, A.I.I.M.S., New Delhi.
November 21,	2012	Prof. Rajendra Prasad joined as the Director of the Institute.

THE INSTITUTE

The Vallabhbhai Patel Chest Institute (VPCI) is a post-graduate medical Institution devoted to the study of chest diseases. It is ideally located in the Delhi University main campus providing the requisite academic environment.

Objectives

The main objectives of VPCI have been to conduct research on basic and clinical aspects of chest medicine, to train post graduates in Pulmonary Medicine and allied subjects, to develop new diagnostic technology and disseminate it to other institutions in the country and to provide specialised clinical and investigative services to patients.

Administration

The VPCI is a maintained Institution of University of Delhi and is fully funded by the Grants-in-Aid received from the Ministry of Health and Family Welfare, Government of India. The Institute is governed and administered by its own Governing Body as Constituted under Ordinance XX (2) of the University of Delhi Act. The Director, who is appointed by the Executive Council of University of Delhi, is the Chief Executive of the Institute. The Director of the Institute also functions as Member-Secretary (Ex-Officio) to the Governing Body of the Institute. The composition of the Governing Body follows in the next page. The Institute also has a Standing Finance Committee constituted by the Governing Body to make recommendations about its budgetary requirements.

Organisation and Management

The organisation and management of the Institute is through Departmentation of activities based on various areas of specialisation and functions. The Academic, Scientific and Clinical services are organised under the Departments of Anaesthesiology, Cardiorespiratory Physiology, Radiodiagnosis and Imaging, Respiratory Allergy and Applied Immunology, Pulmonary Medicine and Thoracic Surgery. These Departments along with Outdoor/Indoor patient care services and Respiratoy Emergency section are housed in Viswanathan Chest Hospital. The other Departments of the Institute include Biochemistry, Clinical Biochemistry, Biostatistics, Medical Mycology, Microbiology, Pathology, Pharmacology, Physiology and Respiratory Virology. These Departments are headed by the Faculty Members in the respective fields. The General and Personnel Management including various maintenance activities required for the Institute are supported by administrative services of the Institute which are available through following three sections controlled by the Deputy Registrar who reports to the Director. These sections are; *1.* Administration - I, *2.* Administration - II, and *3.* Finance and Accounts. The Administrative Section at Viswanathan Chest Hospital is controlled by the Nursing Sperintendent. The administrative services and its sections functioning details are shown in the Administrative Structure chart in the succeeding pages.

GOVERNING BODY

CHAIRMAN

The Vice-Chancellor, University of Delhi (Ex-Officio) or a person nominated by him	**Prof. P.N. Tandon** President, National Brain Research Centre Society, 1, Jagriti Enclave, Vikas Marg Extn Delhi - 110092

MEMBERS

Treasurer, University of Delhi (Ex-Officio)	**Mrs Janaki Kathpalia**
Two members nominated by the Executive Council, University of Delhi	**Prof. Anil Tyagi** *(22.08.2008 onwards)* **Prof. I. Usha Rao** *(13.01.2011 onwards)*
Dean, Faculty of Medical Sciences, University of Delhi	**Prof. Upreet Dhaliwal**
Three members nominated by the Ministry of Health and Family Welfare, Government of India, New Delhi	**Shri R.K. Jain** Additional Secretary and Financial Advisor **Shri Debasish Panda** Joint Secretary **Dr Jagdish Prasad** Director General of Health Services
One member, not connected with the University, nominated by the Executive Council, University of Delhi	**Dr Satyajit Rath** Staff Scientist, National Institute of Immunology, Aruna Asaf Ali Marg, New Delhi-110067
One Professor of the Institute by rotation according to seniority for a period of one year	**Prof. Mridula Bose** *(till 02.11.2011)* **Prof. A. Ray** *(03.11.2011 onwards)*
One Reader or Lecturer of the Institute by rotation according to seniority for a period of one year	**Dr Kavita Gulati** *(till 02.11.2011)* **Dr Ritu Kulshrestha** *(03.11.2011 onwards)*

MEMBER-SECRETARY

Director, Vallabhbhai Patel Chest Institute, University of Delhi, Delhi (Ex-Officio)	**Prof. S.N. Gaur** Director (Acting)

Standing Finance Committee

Shri R.K. Jain — *Chairman*
Additional Secretary and Financial Advisor
Ministry of Health and Family Welfare
Government of India
Nirman Bhawan
New Delhi

Prof. S.N. Gaur — *Member-Secretary*
Director (Acting)
V.P. Chest Institute
University of Delhi
Delhi

Joint Secretary or Nominee — *Member*
Ministry of Health and Family Welfare
Government of India
Nirman Bhawan
New Delhi

Prof. Ashok Shah — *Member*
Department of Pulmonary Medicine
V.P. Chest Institute
University of Delhi
Delhi

Shri P.R. Santhanam — *Member*
Deputy Registrar
V.P. Chest Institute
University of Delhi
Delhi

Scientific Advisory Committee

Prof. S.K. Jindal — *Chairman*
Head, Department of Pulmonary Medicine
Post Graduate Institute of Medical Education and Research
Chandigarh -160 012

Prof. S.N. Gaur — *Member-Secretary*
Director (Acting)
V.P. Chest Institute
University of Delhi
Delhi

DDG (M) — *Member*
Ministry of Health and Family Welfare
Government of India
New Delhi

Principal — *Member*
University College of Medical Sciences (UCMS)
Delhi

Prof. S.K. Chhabra — *Member*
Department of Cardiorespiratory Physiology
V.P. Chest Institute
University of Delhi
Delhi

Prof. Mridula Bose — *Member*
Department of Microbiology
V.P. Chest Institute
University of Delhi
Delhi

Ethics Committee

Prof. S.K. Jain — *Chairman*
Senior Consultant (Pulmonology)
Mool Chand Hospital
New Delhi

Prof. S.N. Gaur — *Member-Secretary*
Director (Acting)
V.P. Chest Institute
University of Delhi, Delhi

Prof. Gurdip Singh — *Member*
Dean, Faculty of Law
University of Delhi, Delhi

Prof. Sushma Batra — *Member*
Head, Department of Social Work
University of Delhi, Delhi

Prof. R. Dewan — *Member*
Head, Department of Medicine
Maulana Azad Medical College and
Associated LNJP & GB Pant Hospitals
B.L. Taneja Block, 1st Floor
New Delhi-110 002

Prof. S. Dwivedi — *Member*
Dean/Principal
Hamdard Institute of Medical Sciences & Research (HIMSR)
Hamdard Nagar
New Delhi - 110 062

Prof. Ashok Kumar Saxena — *Member*
Department of Anesthesiology and Critical Care
University College of Medical Sciences (UCMS)
Shahdara
Delhi-110 095

Prof. B.D. Banerjee — *Member*
Department of Biochemistry
University College of Medical Sciences (UCMS)
Shahdara
Delhi-110 095

Dr Ashima Anand — *Member*
Principal Investigator
DST Project
V.P. Chest Institute
University of Delhi, Delhi

Animal Ethics Committee

Prof. A. Ray — *Chairman*
Head, Department of Pharmacology
V.P. Chest Institute
University of Delhi, Delhi

Prof. K. Ravi — *Member-Secretary*
Head, Department of Physiology
V.P. Chest Institute
University of Delhi, Delhi

Dr Anuradha Chowdhary — *Member*
Associate Professor, Department of Medical Mycology
V.P. Chest Institute
University of Delhi, Delhi

Dr Ritu Kulshrestha — *Member*
Assistant Professor, Department of Pathology
V.P. Chest Institute
University of Delhi, Delhi

Dr D.N. Rao — *Main Nominee of CPCSEA*
Professor, Department of Biochemistry
All India Institute of Medical Sciences
Ansari Nagar
New Delhi - 110 029

Dr Om Singh — *Link Nominee of CPCSEA*
National Institute of Immunology (in the event of non availability of
Aruna Asaf Ali Marg Dr D.N. Rao)
New Delhi - 110 067

Dr. B.B. Batra — *Nominee of CPCSEA*
A-36, Savita Vihar (Non Scientific Socially Aware
New Delhi - 110 066 Member)

Dr (Mrs) Promodkumari — *Nominee of CPCSEA*
Professor, Department of Pharmacology (Scientist from outside the
University College of Medical Sciences Institute)
University of Delhi, Delhi-110 095

Dr Rajinder Bajaj — *Member*
Veterinarian
V.P. Chest Institute
University of Delhi, Delhi

ORGANISATIONAL STRUCTURE

DIRECTOR (Acting)
S.N. GAUR, MBBS, MD, PhD (Medicine), FCCP,
FNCCP (I), FCAI

Biochemistry

S.K. Bansal, MSc, PhD
Professor

Biostatistics

Mujeeb-ur-Rahman, MSc, PhD, PGDCP
Assistant Professor

Cardiorespiratory Physiology

S.K. Chhabra, MBBS, MD
Professor

Clinical Biochemistry

Vishwajeet Rohil, MBBS, MD
Assistant Professor

Medical Mycology

(Mrs) Anuradha Chowdhary, MBBS, MD
Associate Professor

Microbiology

(Mrs) Mridula Bose, MBBS, MD
Professor

(Mrs) Malini Shariff, MBBS, MD, PhD
Associate Professor

(Mrs) Mandira Varma, MBBS, MD, DNB
Associate Professor

Pathology

(Mrs) Ritu Kulshrestha, MBBS, MS (Biomedical Sciences), DNB (Pathology), MNAMS
Assistant Professor

Pharmacology

A. Ray, MBBS, MD, MNAMS, PhD, FAMS
Professor

(Mrs) Anita Kotwani, M.Sc, PhD
Associate Professor

(Mrs) Kavita Gulati, M.Sc, PhD
Associate Professor

Physiology

K. Ravi, MSc, PhD
Professor

Vishal Bansal, MBBS, MD, DNB, PhD, MNAMS
Assistant Professor

Pulmonary Medicine

S.N. Gaur, MBBS, MD, PhD (Medicine), FCCP, FNCCP (I), FCAI
Director (Acting), Professor

Ashok Shah, MBBS, DTCD, MD, FNCCP (I), FCAI
Professor

Respiratory Allergy and Applied Immunology

Raj Kumar, MBBS, MD, MNASc, FNCCP (I), FCAI, MIAOH, MAAAAI
Professor

Balakrishnan Menon, MBBS, DMRD, MD
Associate Professor

Respiratory Virology

(Mrs) Madhu Khanna, MSc, PhD
Associate Professor

Viswanathan Chest Hospital
Officer-in-Charge
S.N. Gaur

Library

(Mrs) Uma Tyagi, MPhil (Physics), MLib. Sci.
Librarian

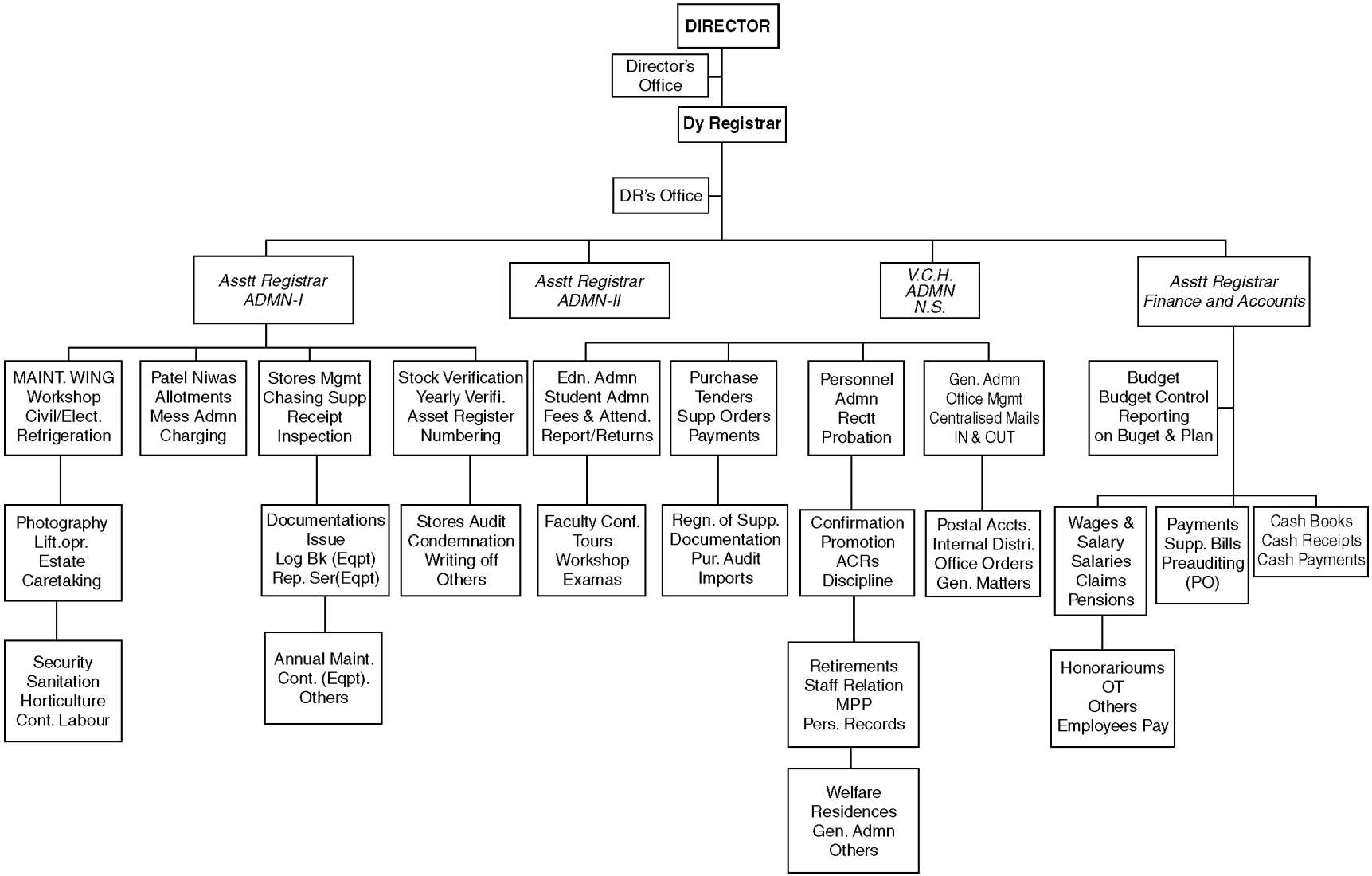
Animal House

Rajinder Bajaj, BVSc & AH
Veterinarian

Administration

P.R. Santhanam, MA (Publ. Admn), MHRM, MBA, LLB, PGDPM
Deputy Registrar

ADMINISTRATIVE STRUCTURE



CENTRAL FACILITIES

Viswanathan Chest Hospital

The Viswanathan Chest Hospital (VCH) attached to the Vallabhbhai Patel Chest Institute, has the following Departments/Facilities:

1. Pulmonary Medicine,
2. Respiratory Allergy and Applied Immunology,
3. Cardiorespiratory Physiology,
4. Radiodiagnosis and Imaging (including CT Scan Unit),
5. National Centre of Respiratory Allergy, Asthma and Immunology,
6. Outpatient Department,
7. Inpatient Facility with 60 beds,
8. 24 Hours Respiratory Emergency,
9. 8 bedded Respiratory Intensive Care Unit (with facilities of 7 ventilators),
10. Sleep Laboratory,
11. Tobacco Cessation Clinic,
12. National Yoga Therapy Centre,
13. Cardio-pulmonary Rehabilitation Clinic,
14. Picture Archiving and Communication Systems (PACS),
15. Medical Records Section,
16. Oxygen Plant.

During the year 2011-12, the Viswanathan Chest Hospital continued to provide specialised investigations and treatment to patients referred to this Institute.

The detailed data of patients attending VCH are as follows:

Number of new patients attending OPD	:	10811
Number of visits of old patients to OPD	:	53371
Total		**64182**

Total number of indoor patients

General Wards	:	1906
Emergency Wards	:	2011
Total		**3917**

Emergency treatment provided	:	16867
Total number of patients treated in ICU	:	491
Invasive ventilation	:	103
Non-invasive ventilation	:	335
Intensive care	:	53

Number of specialised investigations done

Pulmonary function tests	:	19009
Arterial blood gases	:	6231
Bronchoscopy	:	173
Bronchoalveolar lavage	:	38
CT scans	:	2856
Ultrasound examinations	:	424

X-rays	:	22059
Electrocardiogram	:	7488
Polysomnograms	:	82
HIV testing	:	423
Serum IgE test	:	2114
Skin tests	:	1983
Clinical biochemistry	:	37880

National Centre of Respiratory Allergy, Asthma and Immunology

The National Centre of Respiratory Allergy, Asthma and Immunology (NCRAAI) was established in February 2011. The aim of the Centre is to conduct research and training on various aspects of allergy and asthma – their aetiopathogenesis, diagnosis and treatment. A book titled, **"***An Atlas of Common Allergens***"** published last year was well appreciated.

Major Activities & Achievements

1. The Centre is involved in laboratory testing and *in vivo* procedures in the diagnosis of allergy as a part of patient care. The Centre is running a research study in the village - Khanpur, Near Tronica City, Loni, Ghaziabad, Uttar Pradesh under the project entitled, **"Indoor air pollution and asthma exacerbation in children: A population based study"**.
2. The Center presented the following titled papers in the ***"13th Joint National Conference of the Indian Chest Society and the National College of Chest Physicians" (NAPCON – 2011)*** held on 27th -30th, November 2011 at India Habitat Centre, Lodhi Road, New Delhi;
    a) Effect of indoor air pollution on health of children in biomass fuel- using house- holds in rural area.
    b) Asthma severity and obstructive sleep apnoea in adults.
    c) A study of skin sensitivity to various food allergens in patients of bronchial and/or allergic rhinitis in India.
    d) Obstructive sleep apnoea in asthma and COPD patients and its relation to atopy.
    e) Relationship of atopy and exhaled nitric oxide in patients of allergic rhinitis.
3. NCRAAI Faculty, Dr Raj Kumar visited the USA as ***Observer*** in the following Departments/Institutes are:
    a) Department of Allergy and Immunotherapy, at Adult and Pediatric Allergist of Central Jersey PA, New Jersey, USA, October 31, 2011.
    b) Section of Allergy and Immunology, Division of Rheumatology, Allergy and Immunotherapy, Winthrop University Hospital, Long Island, New York, USA, November 1, 2011.
    c) Department of Medicine – Allergy, Immunology and Rheumatology, New Jersey Medical School, New York, USA, November 2, 2011.
4. The Centre provided ***Shot-term training*** on Respiratory Allergy to Mrs. Kanis Fatema, Mrs. Suparna Biswas, and Mr. Md. Fazlul Haque, the paramedical staff form National Institute of Diseases of the Chest and Hospital (NIDCH), Dhaka, Bangladesh, from 04.04.2011 to 22.04. 2011.

Tobacco Cessation Clinic

A Tobacco Cessation Clinic has been running on every Monday and Wednesday from 2:30 - 4:30 P.M.

Nationa Yoga Therapy Centre

The National Yoga Therapy Centre [in collaboration with the Morarji Desai National Institute of Yoga (MDNIY), New Delhi], runs on every Monday to Saturday from 8:00 A.M. to 4:00 P.M.

Cardio-pulmonary Rehabilitation Clinic

Cardio-pulmonary Rehabilitation Clinic at Vishwanathan Chest Hospital, VPCI is involved in the management of chronic respiratory patients such as chronic obstructive pulmonary disease (COPD), interstitial lung diseases (ILD), bronchiectasis, post-TB sequelae and obstructive sleep apnoea (OSA) who have exercise limitation and are often disabled in activities of daily living (ADL) due to shortness of breath despite being on optimal pharmacological treatment including non-invasive ventilation (NIV) and long-term oxygen therapy (LTOT). This disability leads to functional dependence, loss of job, social isolation and depression. Recurrent medical expenses and hospital admissions along with loss of income adds to socio-economic burden on the family and health care resources.

Patients attending Vishwanathan Chest Hospital are referred for consultation and enrollment in this clinic, which is designed to help patients to improve their functional capacity so that they can live independently in the community.

The rehabilitation programme includes:

- Assessment of patients for their functional capacity, breathlessness, oxygen requirement during rest and exertion, disability in activities of daily living and quality of life.
- After assessment, patients are enrolled for 6-10 weeks in supervised exercise training sessions (3-5 sessions/week for Intensive and 1-2 sessions/week for Maintenance programme); which includes breathing retraining, inspiratory muscle training and strength and endurance training of upper and lower limbs. The programme also includes educational sessions on topics such as energy conservation, lung health, bronchial hygiene, chest physiotherapy, nutrition, medications and stress management.

Cardio-pulmonary Rehabilitation Clinic Timings:

- Monday to Friday (9.00 A.M. to 1.00 P.M.):
  - Supervised exercise training and education sessions for enrolled/in-door patients.
- Tuesday & Friday (2.00 P.M. to 4.00 P.M.):
  - Assessment of patients prior to their enrollment in or discharge from the rehabilitation programme.

Following number of patients attended the Cardio-pulmonary Rehabilitation Clinic during the year 2011-12:

• Explained Breathing retraining	:	312
• Chest Physiotherapy	:	1964
• Completed		
Intensive Programme	:	35 (Out of 59 enrolled)
Maintenance Programme	:	08 (Out of 14 enrolled)
• Continuing		
Intensive Programme	:	10
Maintenance Programme	:	02

Animal House

The Animal House of the Institute provides optimum environment for experimental animals, which is essential for obtaining reliable and reproducible experimental research. The most reliable result will be obtained from animals that are healthy, unstressed and at ease with their surroundings. Different species, pathogen free animals are bred in the Animal House.

The Animal House is registered for breeding and experiments on Animal with committee for the purpose of control and supervision of experiments on Animals (CPCSEA), Animal welfare division, Government of India, New Delhi.

The Institute Animal Ethics Committee (IAEC) kept a vigil to follow the ethical principles adopted by CPCSEA for use of animals in scientific experiments. The Animal house has also compliance (Assurance) with the standards of Public Health Services (PHS) Policy on Human Care and Use of Laboratory Animals, Office of Laboratory Animals Welfare (OLAW), Department of Health and Human Services, National Institute of Health, Bethesda, USA.

Library

The Institute has one of the best library in the field of Pulmonary Disease and Allied Sciences having 9,919 Books, 21,423 bound Journals, 145 CD's, 484 Thesis and 100 National and International Reports. A total of 99 Journals (94 International and 05 National) are being subscribed by the library, 20 Journals (08 International and 12 National) are being received on exchange programme with the Institute's Journal and 33 Journals (09 International and 24 National) are received on complimentary basis. Library is also subscribing six English and two Hindi newspapers.

Library renders its services not only to the scientists/research scholars of the Institute, but also to other Colleges and Institutes of the University of Delhi. Library is also affiliated with DELNET (Developing Library Network) to access various databases like Union Catalogue of Books/Periodicals for providing timely and current information. Much emphasis is also laid on to provide abstracts, references and specific information, if required. Apart from this, online searches are being carried out for providing instant access of Information Resources to the desktop of researchers through LAN (Local Area Network). The Internet services have been provided right on the desktop of each Faculty Member through LAN and leased line connectivity with 2 Mbps from MTNL. Library also provides inter-library loan facilities and reprographic services on demand.

The Library follows an Open Access system. Library is equipped with modern information technology equipments and continues to provide Internet / Email services to the users to access CAS (Current Awareness Services) and SDI (Selective Dissemination of Information) services. These are provided to the users in the form of online/offline through e-mail and print during the year. Library uses 'LibSys 4.0' software package, which is an integrated multi-user library management system that supports all in-house operations of the Library. The 'LibSys' consists of modules on acquisition, cataloguing, circulation, serials, article indexing and OPAC.

The Library services are available to Members/Users of Delhi University from Monday to Friday {8.30 A.M. to 7.00 P.M.}.

PUBLICATION DIVISION

The Publication Division of the Institute has been publishing a quarterly periodical, ***the Indian Journal of Chest Diseases and Allied Sciences (IJCDAS)***, which is also an official publication of the National College of Chest Physicians (India). The Journal started in 1959 by (late) Prof. R. Viswanathan, Founder-Director of VPCI. The Journal has a wide national and international circulation and is indexed in Index Medicus, Medline, IndMed, INSEAR, and Ulrich's Directory, etc. Full text articles published in the Journal (July-September 2003 onwards) can be accessed online through the following sites;

V.P. Chest Institute's site : <http://www.vpci.org.in>,

Indmed's site : <http://medind.nic.in>.

Moreover, the Division is also responsible for documentation and dissemination of research output through Annual Report and other publications of the institute.

DEPARTMENTAL ACTIVITIES

Biochemistry

Research

1. Pharmacogenomics of bronchial asthma: a study on polymorphism in β_2 adrenoceptor (*ADRB2*) and corticotropin releasing hormone receptor 1 (*CRHR1*) genes in responders and non-responders to salbutamol and budesonide

Asthma is a chronic inflammatory disease of the airways characterised by variable and recurring symptoms. A combination of genetic and environmental factors is considered to be responsible for its development. It is, in general, treated with an inhaled β2 agonist and/or a corticosteroid which may act through β2 adrenoceptors (*ADRB2*) or may involve the corticotropin releasing hormone receptors 1 (*CRHR1*) respectively. The response of the patient to these drugs is not similar in all the patients and some patients poorly respond or do not respond to a given drug. This may be due to the genetic variations in these genes. Hence, the aim of this study was to identify the genetic variations in responders and non-responders to β2 agonist (salbutamol) and corticosteroids (budesonide) in asthmatic patients by identifying the single nucleotide polymorphism (SNPs) in *ADRB2* and *CRHR1* genes in asthmatics and healthy individuals in Indian population and determine their influence in asthmatic patients.

A total number of 174 subjects, age ranging between 18 and 60 years, mild to moderate as per the EPR3 guidelines, all North Indian were recruited for the study. Out of these, 134 were asthmatics (71 males and 63 females), and 40 were healthy subjects (27 males and 13 females). The exclusion and inclusion criteria were strictly adhered to ensure the homogeneity of the groups. Peripheral blood (5 mL) was collected from each subject, genomic DNA isolated, its concentration determined and amplification of the genes done with the help of specific primers by PCR. Four sets of primers were designed for *ADRB2* gene and 14 sets of primers for *CRHR1* gene so that the entire genes could be amplified. The amplicons formed were checked in 1.5% of agarose gel with suitable DNA ladder. For genotyping, all the amplicons were cleaned by Exo-SAP (Exonuclease-Shrimp alkaline phosphatase) treatment, followed by their quantification, sequencing PCR, clean up and sequencing. The data shows the presence of SNPs in *ADRB2* gene in healthy to be at -1343 (A/G),-1023 (A/G) , -468 (G/C), -367 (C/T), -47 (C/T),-20 (T/C) 46 (A/G), 79 (G/C), 523 (C/A) and 1053 (G/C) and in asthmatics, in addition to these, two other known SNPs at positions, *viz.* -654 (G/A) and 1239 (A/G) were also observed. The analysis of *CRHR1* gene of a few patients did not show any variation so far in comparison with the wild type. Further studies are in progress.

2. Adenosine metabolism in bronchial asthma: a study on adenosine deaminase and 5′-nucleotidase activity and adenosine level in serum, lymphocytes and erythrocytes

Bronchial asthma is a complex disorder characterised by variable and recurring symptoms, airflow obstruction, bronchial hyper-responsiveness, and an underlying inflammation. Several cell types such as lymphocytes, mast cells, macrophages, eosinophils, neutrophils and epithelial cells produce inflammatory changes by release of various mediators like adenosine, histamine, kinin, leukotrienes, prostaglandins, Platelet-activating factor (PAF), chemokines, cytokines, etc., which interact in a complex way to produce airway inflammation. Adenosine, a purine nucleoside has a central role in the regulation of inflammatory responses like bronchoconstriction and ability to influence inflammatory cells in asthma. 5′-nucleotidase (5′NT) and adenosine deaminase (ADA) are crucial enzymes involved in adenosine metabolism in healthy individuals. An alteration in the activity of these enzymes can affect adenosine levels, which may result in inflammation. Thus, changes in adenosine metabolism were speculated in asthma, which were not clearly known.

For the study, blood samples were collected from healthy controls and asthma patients of different severity. Strict selection criteria were followed. The serum, lymphocytes and erythrocytes were prepared separately from the blood of each individual. This was followed preparation of cell lysates, determination of proteins, adenosine levels and assay of activities of 5′ NT, ADA and its isoenzymes. The analysis of data demonstrated that in asthma, the adenosine levels were raised in serum, lymphocytes and erythrocytes and

this increase was inversely related with the severity of airway obstruction. The increase in 5′NT activity and a concomitant decrease in activity of ADA and its isoenzymes in serum and lymphocytes were found. The rise in activity of 5′NT were inversely correlated, while decrease in activity of ADA and its isoenzymes was positively correlated with severity of airway obstruction in asthma. These findings suggest that in bronchial asthma the adenosine metabolism is altered, which favours accumulation of adenosine that may lead to the systemic inflammation associated with changes in airways and broncho constriction in bronchial asthma. The enzymes 5′NT and ADA may therefore, serve as targets for the development of new therapeutic molecules for the disease.

Biostatistics

The Department provides statistical assistance in planning, designing, analyses and execution for the research work of various departments of the Institute. It conducts teaching programmes for the postgraduate students as and when needed. Additionally, it compiles reports to Government of Delhi, Government of India, UGC, etc., periodically pertaining to the institute.

Research

1. To assess the prevalence, screening and recognition of anxiety and depression in COPD patients

Chronic obstructive pulmonary disease (COPD) is a disease with multiple co-morbidities. Two of the most common and least treated co-morbidities of COPD are 'Anxiety and Depression'. However, only a few prospective studies have addressed how to diagnose and manage these disorders and determine their impact on health status among patients with COPD. No studies in India have examined the joint occurrence of anxiety and depression together in the COPD patients.

The study designed to evaluate the prevalence and levels of anxiety and depression in COPD patients was conducted in the Vishwanathan Chest Hospital of Vallabhbhai Patel Chest Institute. Nearly 125 patients in the age group 40 & above was included in this study. Two questionnaire [Generalized anxiety disorder (GAD-7) and Patient health questionnaire (PHQ-9)] were administered to the patients with COPD. Further, anthropometric measurements were recorded and pulmonary function tests were carried out.

The co-morbid, psychiatric disturbances are frequently overlooked or regarded as natural feature of the lung disease. A co-morbid psychiatric disorder is possible to treat and successful treatment leads to improved quality of life and less restricted general functioning. The study will generate data about the prevalence and levels of anxiety and depression in the patients having COPD in Indian context.

Cardiorespiratory Physiology

Research

1. Pulmonary function in normal adults in India: development of reference standards for spirometry, static lung volumes and single breath diffusion capacity

A multicentric study to develop regression equations for spirometric parameters, lung volumes and diffusion capacity, coordinated by the Institute and funded by the Indian Council of Medical Research is in progress at four centers in India: North (Delhi), South (Bangalore), East (Kolkata) and West (Mumbai). After screening by chest radiograph and physical examination, lung function tests are being carried out. Similar methodology and equipments as per the standardisation guidelines of the American Thoracic Society-European Respiratory Society is being used at all the centers. So far, nearly 1200 subjects have been studied at the four centers including 470 at Delhi. FVC, FEV_1 and PEFR and other flow rates have been found to have a good correlation with height. The FEV_1/FVC ratio was found to decrease with increasing age. Diffusion capacity was observed to decrease with age.

2. Heart rate variability in chronic obstructive pulmonary disease: association with systemic inflammation and clinical implications

A study is currently in progress to study the phenomenon of heart rate variability (HRV) in patients with COPD and relate it to severity of disease. The effect of oxygen and drugs used in COPD, β_2 agonists and anticholinergics, on HRV is being examined and its relationship with the well-established marker of systemic inflammation, CR Protein is under investigation. The frequencies and patterns of arrhythmias is being recorded. Data collected so far shows that in normoxaemic patients at rest, the autonomic function is largely preserved and these patients do not have any symptoms attributes top autonomic neuropathy. Drugs including salbutamol and ipratropium do not have any impact on both the time domain and frequency domain parameters of HRV showing that at recommended doses and given by inhaled route, these drugs do not have adverse cardiac effects.

3. Regression equations for spirometry in children 6 to 17 years old for Delhi region

A major gap in information was filled with the development of publication of regression equations for spirometry in children 6 to 17 years old for Delhi region. This exercise has been carried out after several decades during which the standardisation protocols of spirometry and technology have changed. This necessitated development of new equations using the current protocols. Data was obtained in 365 boys and 305 girls. Forced vital capacity (FVC), forced expiratory volume in one second (FEV_1) peak expiratory flow rate (PEFR), forced expiratory flow rate at 50% and 75% exhalation of vial capacity (F_{50} and F_{75}) and mean forced expiratory flow rate over the middle 50% of the vital capacity (F_{25-75}) showed moderate to strong correlations with age, height and weight in both boys and girls. In both genders, the equations explained very high variability of FVC, FEV_1 and PEFR as shown by the R^2 values. The explained variability for flow rates was lesser for flow rates, with that for F_{75} being the least. These equations will be of immense use in proper interpretation of lung function data in children with chest diseases and therefore, help in better management. The equations have been published. These represent the first such effort from India after the publication of the ATS/ERS task force 2005 guidelines on standardisation of spirometry.

4. Non-invasive diagnosis of atherosclerosis in chronic obstructive pulmonary disease

Cardiovascular diseases are a major cause of mortality in COPD. It is likely that the common risk factor contributes to this association but an independent role for COPD as a risk factor for atherosclerosis has also been proposed. A study is currently on to demonstrate the occurrence of atherosclerotic vascular disease using tools such as ankle brachial index, pulse wave velocity, carotid intimal medial thickness and echocardiographic parameters.

5. Electrocardiographic screening for cardiac involvement in pulmonary sarcoidosis

Clinically recognisable sarcoid involvement of the heart occurs in < 10% of patients, although cardiac granulomas are found in as many as 30% to 50% at autopsy, and often with no electrocardiogram (ECG)

abnormalities. The characteristic manifestation of cardiac sarcoidosis (CS), *i.e.* conduction abnormalities, atorioventricular block (AVB) or bundle branch block (BBB) are detected in less than 5% of patients with sarcoidosis. The antemortem diagnosis of myocardial sarcoidosis is difficult because ECG abnormalities or cardiac failure are nonspecific and may be related to other causes. A study is currently on to study the occurrence of abnormalities in specialised electrocardiographic monitoring using signal averaged electrocardiogram (SAECG), QTc dispersion, microvolt T wave alternans and 24 hour holter monitoring in patients with pulmonary sarcoidosis and to explore the relationship between the electrocardiographic abnormalities and clinical, physiological and radiological features of pulmonary involvement in sarcoidosis.

Clinical Biochemistry

Research

1. Studies on implications of epigenetic modulation due to histone hyperacetylation in tumour cells induced by drugs targeting protein acetylation system through a novel mechanism

Transacetylation activity of the purified calreticulin protein was established. Inhibition of GST activity was considered as a measure of transacetylase of the calreticulin activity. GST assay was carried out by the method of Habig *et al*. Increase in the percentage inhibition of GST by poyphenolic acetate (DAMC) is interpreted as a measure of transacetylase activity of the calreticulin protein.

Establishment of the human non-small cell lung cancer (A549) cell line: Human non-small cell lung cancer A549 cell line (NSCLC, lung adenocarcinoma) was obtained from NCCS, Pune, India. The culture of the tumour cell line has been established. Human non-small cell lung cancer A549 cell line is maintained in Dulbecco's Modified Eagle Medium containing 10% (v/v), Fetal Bovine Serum, penicillin (100 U/mL) and streptomycin (100 µg/mL) in a humidified 5% CO_2 atmosphere. Logarithmically growing cells are being used in all the experiments. The cells are sub cultured when the confluency is 85-90%. Cell viability for the cells used in all the experiments is found to be 98% viable. First time the acetylation of histone proteins by the calreticulin (CRTAase) mediated novel method has been demonstrated. The calreticulin mediated acetylation of histone proteins has been established by us using Western Blot by anti-acetyl lysine antibodies with histone proteins. We have also used specific human anti-acetyl lysine H3 histones antibodies against human histones isolated from human non-small cell lung cancer cell line and have confirmed the CRTAase mediated acetylation of histone proteins.

Treating the A549 cells with polyphenol acetates (PAs), histone deacetylase inhibitor (HDI) and calreticulin (CAL or CRTAase) to induce histone hyperacetylation: The cells were harvested using 0.25% Trypsin/0.53 mM EDTA and the cell count was 1 x 10^6 cells/mL. The cells were divided into 11 groups and all groups were treated for 24 hours with 160 µg/mL of polyphenols acetates in all the groups comprising of various combinations of Polyphenol acetates (Ellagic acid peracetate or EAA, 7,8-diacetoxy-4-methyl coumarin or DAMC) with histone deacetylase inhibitor (Valproic Acid or VA) and calreticulin. Equivalent volume of DMSO was used as control. All the experiments were done in triplicate and appropriate control groups were taken for each experiment.

Studies on apoptosis: Apoptosis was studied by analysing the morphological features of cells on microscopy and appearance of hypo-diploid (sub G1) population in flow cytometric measurements of DNA content. *Microscopy:* The smear was stained with DNA specific fluorochrome 4', 6-diamidino-2-phenylindole (DAPI). DAPI stained slides were examined using fluorescent microscope (NIKON) with UV mode using blue filter. The percentage of apoptotic cells was calculated. *Flow cytometric analysis:* Using ribonuclease and propidium Iodide. Analysis of cell cycle phase distribution pattern of nuclear DNA was done to study apoptosis (appearance of sub-G0/G1 population). The data was presented as the mean ± S.E.M and statistically significant differences among groups were assessed by using analysis of variance (ANOVA) followed by Post hoc test. A 'p' value of less than 0.05 was considered statistically significant.

Flow cytometry and fluorescent microscopy data obtained clearly demonstrates:

- Increased apoptosis in all PA, PA + CAL, PA + CAL + VA treatment groups compared to DMSO control in both flow cytometry and fluorescent microscopy data analysis.
- Alone DAMC and EAA showed significant increase in apoptosis compared to control and CAL alone groups in both flow cytometry data analysis and apoptosis studies with fluorescent microscopy.
- VA alone did not show any significant increase in apoptosis compared to control in the flow cytometry data analysis though VA alone showed mild but significant increase in apoptosis compared to control in fluorescent microscopy.
- In flow cytometry G1, G2 and S phase though showed decreased % of cells in all treatment groups compared to control but results were not significant and will be analysed and interpreted when complete data of other PAs of flow cytometry and microscopic studies is available to us and studies are going on.

2. To elucidate the molecular mechanism of development of COPD in smokers in North Indian population

Nearly 90% of chronic obstructive pulmonary disease (COPD) is caused by long term cigarette smoking; however, only 25% of chronic tobacco smokers develop COPD. But why do only 25% of long-term smokers develop COPD, when others do not? It appears that smokers who acquire COPD may have a different genotype than those lifelong smokers in whom lung function declines at a slower pace or not at all. The association of COPD and smoking with SNPs in the candidate genes- ADAM33, MMP1, MMP9 and MMP12 genes in North Indian population is intended to be studied. We have formed three groups on the basis of smoking history and spirometry as mentioned in the project protocol (*Group I:* Smokers without co-morbidity with normal PFT, *Group II:* Smokers with spirometry proved COPD and without any other co-morbidity and *Group III:* Healthy non-smoker controls). We are trying to study the quantification of various metalloproteinases and polymorphisms in metalloproteinases genes, ADAM33, MMP1, MMP9 and MMP12 and their association with smoking and COPD. Primers are designed using appropriate software and initial studies have been done using gene runner programme. The detailed methodology has been given in the Project proposal submitted to the ICMR for the grant in aid. The following is the summery of the methodology followed by us:

We have included only those subjects who were willing to participate in the study and give their consent by filling the consent form and who fulfills the inclusion criteria (as given and approved in the Project). All the subjects have filled the questionnaire specially prepared for the study and gave consent for the biochemical and other laboratory tests. After taking consent from the subjects and filling up the questionnaire, X-ray chest and spirometry were performed and blood samples were obtained from the subjects in the morning into vacutainers for the estimation of various parameters including quantification of gene product proteins and PCR analysis. Genomic DNA was extracted from the fresh/frozen whole blood and its purity was checked by NanoVue Plus spectrophotometer, GE Healthcare. Amplification of gene was carried out in a gradient PCR thermal cycler from Bio-Rad (India) Pvt. Ltd. Amplification were carried out in 25µL volume containing 25 ng of gDNA, 0.2mM dNTPs (MP Biomedicals), 1 X Taq polymerase buffer (MP Biomedicals), 0.1 µM primers (Sigma, Aldrich) and 1Unit of Taq polymerase enzyme (MP Biomedicals) per reaction. All the parameters of PCR reaction were same except for the $Mgcl_2$ concentration (some PCR reaction required with extra $MgCl_2$). The PCR product *i.e.,* amplicons from the previous step were treated with exonuclease I (Fermentus Pvt. Ltd.) to remove the unused primers and shrimp alkaline phosphatase (SAP) (Fermentus Pvt. Ltd.) to remove the 3' OH group from unused dNTPs. DNA sequencing of cleaned up PCR products from the previous step were performed on an automated DNA sequencer from Hitachi, Applied Biosystem.

Number of samples processed till 31.03. 2012: So far we have collected and processed 135 subject's blood samples and studies are going on as per the protocol. Number of samples from the *Group I* are 33, *Group II* are 54 and *Group III* are 48. We are studying the following 9 SNPs by DNA sequencing in ADAM33 gene: Reference SNP ID: rs2787095, rs2280090, rs2280091, rs2280089, rs612709, rs511898, rs3918396, rs528557 and rs597980. We are studying the following SNPs by DNA sequencing in MMP genes: MMP1 gene: SNP 1G-16072G, SNP ID - rs1799750; MMP9 gene: SNP C-1562 T, SNP ID - rs3918242; MMP12 gene: SNP A-82G, SNP ID - rs652438. We have standardised PCR programme and complete set of primers which is being used for analysing various SNPs in ADAM33 and MMP1, MMP9 and MMP12 genes. Thus, we have already done the standardisation part of all the methodology successfully and now we are studying all the parameters and studies are going on. MMP1, MMP9 and MMP12 metalloproteinases were quantified for all of the serum samples, using the specific precoated ELISA kit from Boster Biological Technology Ltd, according to the manufacturer's protocol. Adam33 metalloproteinase was quantified using the specific precoated ELISA kit from CusaBio Biotech co., Ltd, according to the manufacturer's protocol. Protein concentrations were determined as absorbances using the Bio-Rad imark Microplate Reader. So far, we have obtained highly encouraging results in all the matrix metalloproteinases *i.e.* MMP1, MMP9, MMP12 and ADAM33 protein quantification analysis. After analysing all the 180 samples, complete statistical analysis will be done. But the general trend so far in 135 sample's analysis shows that compared to healthy non-smokers (*Group III*: Healthy non-smoker controls), there is a statistical significant increase in the mean of concentrations of all the metalloproteinases in the smokers without co-morbidity with normal PFT (*Group I*) and there is further more significant increase in concentrations of nearly all the metalloproteinases *i.e.* MMP1, MMP9, MMP12 and ADAM33 gene product proteins in the group of smokers with spirometry proved COPD and without any other co-morbidity (*Group II*). Analysis of SNPs is undergoing by DNA sequencing. As we have to analyse

total 12 SNPs (9 SNPs in ADAM33 gene and one SNP each in MMP1, MMP9, MMP12) therefore for 180 subject's samples x 24 (12 x 2 using reverse and forward primers) = 4320 DNA sequencing we have to perform. And we have obtained highly encouraging results in DNA sequencing too so far and the studies are going on, the whole data will be interpreted as soon as we are able to complete the sequencing analysis which we are anticipating by the end of this year. The data will be presented as genotype and allele frequency for all the groups. Chi-square test for statistical significance will be performed on the SNP data among different groups and differences in genotype and allele frequencies between patients and controls will thereby be analysed. Estimation of risk will be determined by odd's ratio. Influence of smoking, SNPs on COPD will be analysed by using logistic regression analysis. Statistical analysis will be performed by SPSS version 15.

3. A study to correlate the activity of ADAM33 gene protein with oxidative stress in asthma

All the required reagents for the study have been procured, methodology has been standardised and the samples are being taken as per the protocol. Studies are undergoing and will be presented in the next year's Annual Report

Diagnostic Services

Diagnostic services were provided to the indoor and outdoor patients. Supervision of the Clinical biochemistry Investigations was done and all the samples were analyzed by the Fully Automated BECKMAN COULTER SYNHRON CX-5 PRO and ALFA WASSERMANN *AUTOANALYZER*S. Recently we have installed a new Autoanalyzer TRIVITRON, Nano Lab 240 in place of ALFA WASSERMANN which had outlived its life and was unserviceable.

The following parameters are being done in blood and pleural fluid samples of the patients:

- Bl. Glucose,
- Bl. Urea,
- S. Creatinine,
- S. Total Protein,
- S. Albumin,
- S. Total Bilirubin,
- S. Direct Bilirubin,
- S. Alanine transaminase (ALT),
- S. A*spartate aminotransferase* (AST),
- *Alkaline Phosphatase* (ALP),
- Serum Electrolytes : S. Na^+, S. K^+, S. Cl^-, S. Ca^{++} and
- Pleural Fluid biochemical analysis including
    - Pl. Fluid Total Protein, Pl. Fluid Albumin, Pl. Fluid Glucose.

Total Number of Tests done from April 2011 – March 2012= 37,880

Months	Total Number of Tests
April 2011 – June 2011	9,250
July 2011 – Sept 2011	9,400
Oct 2011 – Dec 2011	9,449
Jan 2012 – March 2012	9,781
Total: 01.04.2011 – 31. 03. 2012	37,880

Medical Mycology

Research

1. Isolation of multiple-triazole resistant *Aspergillus fumigatus* strains, carrying the TR/L98H mutations in the *cyp*51A gene in India

Azole resistance in *Aspergillus fumigatus* isolates impacts the management of aspergillosis since the azoles are primary agents used for prophylaxis and management. We investigated the emergence of resistance to triazoles in *A. fumigatus* isolates from patients in Delhi, India. One hundred and three *A. fumigatus* isolates, collected from 85 patients with bronchopulmonary aspergillosis during 2005-2010, were investigated for susceptibility to itraconazole, voriconazole, posaconazole and isavuconazole. We undertook mixed-format real-time PCR assay for detection of mutations leading to triazole resistance in *A. fumigatus.* Resistant isolates were compared with 25 Dutch TR/L98H positive isolates by microsatellite analysis. Of the 103 *A. fumigatus* isolates tested, only two had high MIC values of itraconazole (>16 mg/L), voriconazole (2 mg/L), posaconazole (2 mg/L), isavuconazole (8 mg/L) and amphotericin B (0.25 mg/L). These *A. fumigatus* isolates exhibited the TR/L98H genotype and showed identical patterns by microsatellite typing but were different from 25 Dutch TR/L98H isolates. We report for the first time from India the occurrence of TR/L98H mutations in the *cyp*51A gene responsible for reduced azole susceptibility in two *A. fumigatus* isolates from patients with chronic respiratory diseases not previously exposed to azoles. The presence of TR/L98H is consistent with a route of resistance development through exposure to azole compounds in the environment. Keeping in mind the emergence of azole resistance in environmental strains, continued surveillance of resistance in clinical *A. fumigatus* strains is desirable for successful therapy of aspergillosis.

2. *Cryptococcus neoformans-Cryptococcus gattii* species complex: an International study of wild-type susceptibility endpoint distributions and epidemiological cutoff values for amphotericin B and flucytosine

Among the non-*Candida* yeasts, the *Cryptococcus neoformans*-*Cryptococcus gattii* complex have been the most common species recovered from clinical isolates as well as the second most common severe fungal infection after those caused by *Candida* spp. in certain regions. Cryptococcal infections are associated with high mortality rates (>12.7%). Although several newer antifungal agents are available, the conventional deoxycholate formulation of amphotericin B (especially in resource-limited settings) and its lipid formulations remain important therapeutic choices for the systemic treatment of cryptococcal infections caused by *C. neoformans* and *C. gattii*. Also, the combination treatment of flucytosine and amphotericin B is recommended for cryptococcal infections. However, relapses are frequent. The availability of reference methodologies has enabled the recognition of resistance isolates as well as the proposal of clinical breakpoints (CBPs) and epidemiologic cutoff values (ECVs) for *Candida* spp. and *Aspergillus* spp. to most available antifungal agents by both the Clinical and Laboratory Standards Institute (CLSI) and the European Committee of Antibiotic Susceptibility Testing (AFST-EUCAST). However, neither CBPs nor ECVs are available for either *C. neoformans* or *C. gattii versus* amphotericin B or flucytosine. In the absence of CBPs, ECVs could help to characterise the susceptibility of these species to amphotericin B, its lipid formulations and flucytosine and to monitor the emergence of strains with mutations that could lead to reduced antifungal susceptibility to these agents. The purpose of the study was to define wild-type (WT) susceptibility endpoint distributions of each species/molecular type and agent combination by using aggregated CLSI-RPMI broth MICs of amphotericin B and flucytosine gathered in 8 to 16 laboratories (3,590 to 3,045 MICs for *C. neoformans* and 985 to 853 MICs for *C. gattii*, species/molecular type and agent/combination dependent) in Europe, the United States, Australia, Brazil, Canada, India, and South Africa and to propose ECVs.

Additionally, 442 amphotericin B and 313 flucytosine MICs measured using CLSI-Yeast nitrogen base instead of CLSI-RPMI medium and 237 Etest amphotericin B MICs for *C. neoformans* were evaluated. CLSI-RPMI ECVs for distributions originating in >3 laboratories were (percentages of isolates for which MICs were <ECV): amphotericin B, 0.5 µg/mL for *C. neoformans* VNI (97.2%) and *C. gattii* VGI and VGIIa (99.2 and 97.5%, respectively) and 1 µg/mL for *C. neoformans* (98.5%) and *C. gattii* non-typed isolates (100%) and VGII (99.2%); flucytosine, 4 µg/mL for *C. gattii* non-typed (96.4%) and VGI (95.7%); 8 µg/mL for VNI (96.6%); and 16 µg/mL

for *C. neoformans* non-typed (98.6%) and *C. gattii* VGII (97.1%). ECVs may aid in the detection of isolates with acquired resistance mechanisms.

3. Resistance of Asian *Cryptococcus neoformans* serotype A is confined to few microsatellite genotypes

Cryptococcus neoformans is pathogenic yeast that causes cryptococcosis, a life threatening disease. The prevalence of cryptococcosis in Asia has been rising after the onset of the AIDS epidemic and estimates indicate more than 120 cases per 1,000 HIV-infected individuals per year. Almost all cryptococcal disease cases in both immunocompromised and immunocompetent patients in Asia are caused by *C. neoformans* var. *grubii*. Epidemiological studies on *C. neoformans* in pan-Asia have not been reported. The aims of this study were to analyse the genotypic diversity as well as the distribution of *C. neoformans* var. *grubii* from different geographical regions in Asia, and to test the *in vitro* antifungal susceptibility of the isolates against seven antifungal drugs. We studied the genetic diversity of the fungus by microsatellite typing and susceptibility analysis of approximately 500 isolates from seven Asian countries (China, Indonesia, Japan, India, Kuwait, Doha, Thailand) using microsatellite analysis with nine microsatellite markers. Samples were analysed on a MegaBACE 500 automated DNA analysis platform. Repeat numbers were assigned using Fragment Profiler v1.2, imported into BioNumerics v6.0 software and analysed using the multistate categorical similarity coefficient. The analysis revealed eight microsatellite complexes (MCs) which showed different distributions among geographically defined populations. A correlation between MCs and HIV-status was observed. Microsatellite complex 2 was mainly associated with isolates from HIV-negative patients, whereas MC8 was associated with those from HIV-positive patients. Most isolates were susceptible to amphotericin B, itraconazole, voriconazole, posaconazole, and isavuconazole, but 17 (3.4%) and 10 (2%) were found to be resistant to 5-flucytosine and fluconazole, respectively. Importantly, five Indonesian isolates (approximately 12.5% from all Indonesian isolates investigated and 1% from the total studied isolates) were resistant to both antifungals. The majority of 5-flucytosine resistant isolates belonged to MC17. The findings showed a different distribution of genotypes of *C. neoformans* var. *grubii* isolates from various countries in Asia, as well as an association of the microsatellite genotypes with the original source of the strains and resistance to 5-flucytosine.

Laboratory Diagnostic Services

The Department continued to provide diagnostic mycological and serologic services to the Viswanathan Chest Hospital of the Institute and to other hospitals in Delhi as and when feasible. A total of 3308 clinical specimens were processed during the year. These included 2004 sputa, 944 blood specimens, 218 bronchial lavage/aspirate/washings, 116 endotracheal aspirate/pleural fluid 13 tissue biopsies/nasal polyps/skin scrapings, and 13 miscellaneous (Blood culture/swabs/urine/CSF /FNAC) specimens. Besides, referral service for identification of clinical isolates of fungi was extended to other institutions on request.

Microbiology

Research

1. Genetic variations in the innate immune response genes and tuberculosis

Recent advances in analysing the role of genetic variants in disease have seen an emerging multitude of studies being taken up in multifactorial diseases such as tuberculosis. The aim is to understand and analyse the potential role of these variants in genetic proneness or resistance to the disease. The present study was carried out in three groups of subjects: *a.* Active pulmonary tuberculosis cases (n =160); *b.* Lymph node tuberculosis cases (n=50); *c.* Healthy unrelated controls (n=130) from the same population. The samples were collected from Rajan Babu Institute of Pulmonary Medicine and Tuberculosis, Kingsway Camp and Chest Clinic, Lok Nayak Hospital, Delhi Gate, New Delhi.

We selected a panel of 16 innate immune related genetic polymorphism through an exhaustive literature search by using NCBI (http://www.ncbi.nlm.nih.gov.in) database to identify the locus that have been studied in various ethnic populations world over. Moreover, an exhaustive search of Hapmap (www.hapmap.org) was done to identify the locus property and related information in the five world populations listed at Hapmap. Relative heterozygosity and frequency of the alleles was considered in an effort to select robust putative susceptible loci. The genes included were *NRAMP*1 (Natural resistance associated macrophage protein 1), *TLR* (Toll-like receptors)- *2,4,8, DC-SIGN* (Dendritic cell specific ICAM 3 grabbing non-integrin) or *CD209, IRGM* (Immunity related GTPase 1), *P2X7* (Purinogenic macrophage receptor 2X, ligand gated ion-channel7) receptor and vitamin D receptor.

Genotyping was done using Tetra-primer ARMS-PCR (Amplification refractory mutation system – Polymerase chain reaction). The genotypes obtained were subjected to genetic and statistical analysis. Common polymorphisms in *NRAMP1* gene *i.e.,* rs3731865 and rs17235409 which have been implicated in susceptibility to tuberculosis were not found to be effective in the north Indian population studied here. rs3731865 was found to be homozygous in both cases and controls with CC genotype being present equally in cases and controls. Similarly AG, the heterozygous genotype was found in all the cases and controls. Our results indicate that the above mentioned polymorphism in the *NRAMP1*gene is not responsible for tuberculosis susceptibility in north Indians. The remaining polymorphisms are under investigation presently.

2. Spectrum of serum cytokine responses to pulmonary and lymph node tuberculosis: A search for immunological biomarkers

We explored the spectrum of host serum cytokine response in two different manifestations of tuberculosis, the pulmonary TB and tubercular lymphadenitis in north Indians for possible host serum biomarkers with immunological value.

Sera from 212 patients with tuberculosis {Pulmonary tuberculosis (PTB) n= 80 and lymph node tuberculosis (LNTB) n = 50} and 80 regional healthy controls (HC) from north India was examined by ELISA in a panel of twelve cytokines TNF-α, IFN-γ, IL-2, IL-18, IL-1β, TNF-β, IL-10, IL-4, IL-6, IL-1Ra, IL-12, and IL-8. Serum levels were compared between all groups and multiple testing corrections applied. The resulting cytokines were further subjected to receiver operator characteristic curve (ROC) analysis to determine the sensitivity and specificity of the panel.

Elevated serum levels of IL-6 and IL-12 for PTB and serum IL-10, TNF-beta and IL-8 for LNTB emerged as prominent immunological markers. To the best of our knowledge, this is the first report from this region and perhaps one of the first in India exploring such vast panel of serum cytokines in PTB and LNTB to provide a clear insight into the host serum response and contributing immunological markers for north Indian population. These biomarkers may prove to be useful in management of respective form of TB as has been shown by this study.

3. Regulation of expression of *mce4* operon of *M. tuberculosis*: search for upstream promoter activity and regulatory proteins

The *Mycobacterium tuberculosis* harbours four copies of a cluster of genes named as *mce1, 2, 3* and *mce4*

operon. Regulatory elements for *mce1*, *mce2* and *mce3* operons have been characterised. We proposed to identify the promoter region as well as the regulatory proteins of *mce4* operon. *In silico* analysis using BPROM and Neural Network Promoter Prediction softwares revealed the possibility of promoter region in 300 bp upstream DNA region of *mce4* operon. This DNA region has been cloned in pSD5B promoter selection vector, electroporated in *Mycobacterium smegmatis* and ONPG (orthonitrophenol para galactosidase) assay was performed to establish promoter activity. Rapid amplification of 5'cDNA revealed that transcription start site (TSS) of *mce4* operon is 56 bp downstream from annotated translational start site. This finding was also supported by SCOPE analysis. As new TSS was found, 600bp DNA region with new TSS was cloned in pSD5B that has shown significant promoter activity. Further, promoter strength was analysed under different stress conditions like acidic stress, surface stress and oxidative stress to explore the environmental stimulatory factors for *mce4* operon. Promoter of *mce4* operon was found 1.4 fold over expressed in presence of surface stress and 1.5 fold during hypoxia. To search for regulatory proteins of *mce4* operon, 600bp promoter region was biotin labelled and pull down assay with *Mycobacterium tuberculosis* lysate was performed. Proteins obtained from pull down assay will be further identified by 2D gel electrophoresis and MALDI-TOF analysis.

4. Functional analysis of *mce4A* and *mce1A* proteins of *M. tuberculosis*: role in cholesterol transport and phago-lysosome fusion inside macrophages

Microorganisms have evolved a variety of strategies for survival and proliferation inside the mammalian host cells. Pathogenic mycobacteria, including *M. tuberculosis*, have been well known for its diverse lipid profile. These lipids provide *M. tuberculosis* with properties of effective survival and virulence inside the host. To be able to investigate the lipid content of this bacterium, we modified and standardised the conventional lipid extraction protocols and analysed and confirmed our modified protocol for its utility in the context to other non-pathogenic mycobacteia such as *M. smegmatis* also. We have developed an improved protocol for easy lipid extraction from the organisms of MTB complex. The efficacy of this protocol was established by extracting the spots from the thin-layer chromatography and subjecting them to GC-MS analysis. *This new protocol offered enhanced resolution of the peaks as compared to the conventional protocol.*

5. Expression analysis of an array of genes of *M. tuberculosis* clinical isolates from pulmonary tuberculosis and lymph node tuberculosis: search for mycobacterium factors associated with differential clinical manifestations

Tuberculosis generally infects the lungs. But, the bacilli also infect other parts of the body known as extra pulmonary tuberculosis. It is still not clear why *M. tuberculosis* causes pulmonary TB in some individuals and extra pulmonary TB in others. In the present study clinical isolates of *M. tuberculosis* from pulmonary TB and lymph node TB were analysed in detail up to the molecular level to address this question. We have grown *M. tuberculosis* clinical isolates, from lymph node tuberculosis and pulmonary tuberculosis patients and *M. tuberculosis* H37Rv (wild strain), on Lowenstein Jensen medium and in Middle brook 7H9 broth. We found that the clinical isolates (n=7) from lymph node tuberculosis has a slow growth rate as compared to the clinical isolates from pulmonary tuberculosis (n=6). Since lipids of mycobacteria are major virulence factors, we propose to analyse the lipid profile of these isolates by LCMS and GC-MASS to understand the possible difference in the virulence potential of the isolates from these two different forms of TB.

6. Development of a drug candidate against multi-drug resistant tuberculosis

A series of coumarin derivatives were synthesised and screened against *Mycobacterium tuberculosis* H37Rv strain. The effective series of compounds having MICs in the range of 1-3 µg/mL was further screened against a sensitive and a MDR-TB clinical isolate. The lead compound was found to display the lowest MIC of 1 µg/mL against all the aforementioned strains. The compounds were further evaluated to determine their Minimum Bactericidal Concentrations (MBCs), Fractional Inhibitory Concentrations (FIC indices) and cytotoxicity. These studies revealed the 'bactericidal' nature of our test compounds. Moreover, the sub-inhibitory concentrations of the candidate molecules were found to induce a significant increase in the antimycobacterial activity of isoniazid and rifampicin against *M. tuberculosis* H37Rv, thus, exhibiting synergy which further opens up their avenues for being incorporated in the standard treatment regimen. Electron microscopy analysis revealed the cell-wall attacking characteristics of this class of compounds. Also the lead molecule is not found to be cytotoxic for THP-1 cells upto 60 times MIC. Thus, it has selective antimicrobial activity making

it safe to be administered to humans. All these observations strengthened the prospects of these molecules being developed as promising drug candidates.

As a result of the work carried out, the patent application for the aforementioned compounds was filed at *the Indian Patent Office (Serial no. 983/DEL/2011; Filing date: 05th April 2011). International PCT Application for the same has also been filed (PCT Application No. PCT/IN2012/000242; Filing date: 04th April 2012).* Additional studies to elucidate the detailed mechanism of action as well as to establish the *in vivo* efficacy are warranted. Presently efforts are being made to decipher the mode of action of these molecules and identify the probable targets.

7. Functional analysis of *mce1A* and *mce4A* gene of *M. tuberculosis* H37Rv using overexpression approach

We have recently demonstrated that *mce4A* gene of *mce4* operon has a role in invasion and survival of the pathogen. It is also known that *mce4* operon has a role in cholesterol import system of *M. tuberculosis.* To investigate the role of *Mce4A* protein as substrate binding protein and its role in import of cholesterol during chronic phase of infection, *mce4A* gene was cloned and expressed in *E. coli* and recombinant *mce4*A protein was purified and refolded from the inclusion bodies and polyclonal antibodies were raised against *mce4A* and *mce1A* in NZW rabbit. We observe that *mce4A* overexpressed *M. tuberculosis* binds cholesterol more efficiently than other control and wild type *M. tuberculosis* H37Rv and *in vitro* CFU studies confirmed that *mce4A* overexpressed growth pattern in minimal media (MM) supplemented with cholesterol is higher than wild type strain. Mineralisation assay confirmed that not only uptake of cholesterol takes place but also overexpressed *mce4A* utilises cholesterol for survival. Using *ex-vivo* model also, we found that in THP1 cell line the *mce4A* overexpressed *M. tuberculosis* can utilise high amount of cholesterol from media. This study clearly proves our hypothesis that *mce4A* recombinant strain of *M. tuberculosis* has high ability to take up cholesterol from its environment in comparison to wild type *M. tuberculosis* H37Rv. These experiments clearly indicate that *mce4A* protein is playing a major role in import of cholesterol and helps the *M. tuberculosis* in survival inside the host.

8. Bacteriological studies on *Streptococcus pneumoniae* isolates from clinical samples

Streptococcus pneumoniae is a major cause of mortality and morbidity in young children and the elderly. In the present study, we evaluated antimicrobial susceptibilities, serotypes and sequence types of pneumococcal isolates recovered in New Delhi, India. A total of 126 clinical isolates of *Streptococcus pneumoniae* were investigated. They were subjected to disk diffusion susceptibility testing, broth microdilution testing, serotyping. Pulsed field gel electrophoresis (PFGE) and multilocus sequence typing (MLST). Broth microdilution assay showed that 5%, 20% and 23 % of the isolates exhibited resistance to penicillin, erythromycin and ciprofloxacin, respectively. Serotypes 19, 1 & 6 were more frequently isolated. Thirty percent of the strains comprised of serotypes 1, 3, 5,19A & 7F which are not included in the 7-valent vaccine. PFGE showed a high degree of genetic variability among the 100 isolates, including 86 distinct PFGE patterns with >20% difference in unweighted pair group method with arithmetic averages (UPGMA) generated dice coefficients. Six PFGE types consisting of two isolates each and one type consisting of 9 isolates was seen. Even with in the same clone isolates showed different serotypes and /or were isolated from different hospitals and differed in their clinical significance. Fifty-nine isolates were typed using multilocus sequence typing. Thirty new sequence types were encountered in this study. Only one clonal complex with four isolates was seen. 11 clonal complexes and 96 STs were observed among 115 Indian isolates. Only 18 of the 96 STs were found globally of which only four STs were found in many countries with larger numbers. Non-vaccine serotypes are gaining importance and hence, this should be kept in mind when recommending vaccines in India.

9. Phenotypic and molecular characterisation of clinical isolates of *Acinetobacter* spp.

Acinetobacter species was once considered as an opportunistic pathogen of low virulence but has emerged as an important pathogen in hospital acquired infections due to its ability to persist on the hospital environment for a long period and also due to its ability to acquire antibiotic resistance. The study was done to identify and characterise the clinical isolates of *Acinetobacter* species, to study their antibiotic susceptibility, to detect the various types of β-lactamase that is produced by the resistant isolates and to type the isolates using randomly amplified polymorphic DNA (RAPD) and multilocus sequence typing (MLST).

A total of 107 isolates of *Acinetobacter* species was recovered from different specimens (ET aspirate – 33, pus swab – 29, burn wound swab – 26, sputum – 17, drain fluid – 1 and high vaginal swab – 1) from Safdarjung Hospital and Vallabhbhai Patel Chest Institute. They were all identified as *Acinetobacter baumannii* by the commercially available API 20NE and further confirmed by amplified rDNA restriction analysis (ARDRA), a molecular fingerprinting method.

The antibiotic susceptibility test done by Kirby Bauer's disk diffusion method showed that 97.2-100% of the isolates were resistant to Cephalosporins, 97.2% to Fluroquinolones, 92.6-94.4% to Aminoglycosides, 85.9% to Carbapenem, 97.2% to Monobactams, 85.1% to Piperacillin-tazobactam and 66.4% to Ampicillin-sulbactam. 43% of the isolates were already resistant to Tigecycline while only 2.8% to Colistin. Out of the 107, isolates, 100 isolates were multi-drug resistant (MDR) out of which 88 were extensive drug resistant (XDR) and 3 were pan drug resistant (PDR).

The most common mechanism of resistance to the various antibiotics is the production of β -lactamases, thus, the isolates were screened for the presence of these enzymes. 95.3%, 100% and 85.98% of the isolates were screen positive for extended spectrum beta lactamase (ESBL), AmpC beta lactamase and metallo beta lactamase (MBL) respectively and out of these 37.3%, 99.1% and 31.5% were confirmed to be positive for the production of ESBL, AmpC and MBL respectively by the phenotypic tests. Among the 29 phenotypic MBL positive isolates only 18 showed the presence of MBL genes and out of the 18 it was seen that nine (50.0%), 6 (33.3%), two (11.1%) and one (5.5%) were blaVIM, blaGIM, blaSIM and blaIMP respectively. Also AmpC was produced by all except one isolates and it coexisted with ESBL in 38 isolates while with MBL in 29. Interestingly seven isolates produced all three.

Randomly amplified polymorphic DNA (RAPD) was done for molecular typing of the isolates in this study. It was found that a high degree of genetic variability existed among the 100 isolates, including 53 distinct RAPD patterns and 18 of these showed 100% similarity. MLST is a better typing technique where in inter laboratory data can be compared. In the present study, out of the 23 isolates for which MLST was done, STs 110(n=2), 188(n=3), 146(n=2), 69(n=2), 103, 108, 194 were encountered. Eleven isolates were found to be new and, all except one, were assigned new ST type, ST 386(n=1), ST 387(n=1), ST 388(n=1), ST 389(n=1), ST 390(n=3) and ST 391(n=3).

As there is no published data on the sequence types of Indian isolates, the prevalence of the ST types in India cannot be ascertained. To conclude, as the resistance to *Acinetobacter baumannii* is rapidly increasing, drastic measures will have to be taken to implement strict usage of antibiotics in hospitals and to promote sterilisation and disinfection policy to curb the spread of this bacteria and also other nosocomial pathogens.

10. Hospital infection control surveillance

Various samples from ICU and ward like suction ports, oxygen masks and ports, hands swabs from health professionals working in these units, environment samples, etc., are collected routinely to monitor infection in the ICU and wards. No major source of infection was found.

11. Drug resistance profiling and molecular typing of *M. tuberculosis* isolates from different community settings in North Delhi

The present study has been planned to ascertain the incidence of drug resistance in *M. tuberculosis* isolates from patients in Delhi being treated in the private setting and patients being treated in Government run DOTS or non-DOTS centers; and to determine the *M. tuberculosis* genotypes from the isolates of three groups of patients under study. Besides the drug resistance profiles in the three different centers, we will also investigate the presence of any clustered *M. tuberculosis* isolates, thus showing the impact of interventions aimed at reducing recent transmission.

The objectives of the study were, firstly, to study the prevalence of drug resistant, multi-drug resistant and extensively drug resistant *M. tuberculosis* isolates from 500 patients in North Delhi being treated; *a)* in the private setting, *b)* through a DOTS center and *c)* in a non-DOTS government center, in a follow up study and secondly, genotypic characterisation of the isolates obtained from the three groups of patients under study by MIRU typing, spoligotyping and IS*6110* RFLP shall also be performed.

Sputum samples were collected from 695 patients, 485 from the DOTS center at RBIPMT Hospital, Delhi, 70 from private clinics in North Delhi and 140 from Vallabhbhai Patel Chest Institute (VPCI). Of the 485 samples obtained from RBIPMT Hospital, 339 were new, 102 were previously treated and 44 had been categorised as multi-drug resistant. Of the 70 samples obtained from private clinics, 54 were new and 16 were previously treated; while of the 140 samples obtained from VPCI, 21 were new and 59 were previously treated and 60 could not be characterised. Of these, 372 patients from the DOTS center, 25 patients from VPCI and 12 patients from private centers were followed up after two months of therapy. 70 of the 372 patients followed up at the DOTS center, 6 of the 25 patients followed up from VPCI and all 12 patients from private centers gave repeat sputum samples. The rest of the patients had improved with therapy. Three patients from the DOTS center had died. Till date, 273, 20 and 83 samples from RBIPMT Hospital, private centers and VPCI, respectively, have been found to be culture positive. The other samples are still under observation. The isolated *M. tuberculosis* strains were assayed for Isoniazid (INH), Rifampicin (RIF), Streptomycin (SM) and Ethambutol (EMB) susceptibility by proportion method. The frequency of multi-drug resistance (MDR) in the *M. tuberculosis* strains obtained from those treated under DOTS, VPCI and in private centers and tested for drug susceptibility till date was observed to be 11% , 14% and 5% respectively.

Cluster analysis was carried out in the present study by IS*6110* and MIRU typing on 67 isolates and by IS*6110*, MIRU typing and spoligotyping on 101 isolates. On IS*6110* RFLP typing, 19% cases in the DOTS center and 15% cases in private centers were found to have <6 bands. We did not find any isolate with no IS*6110* bands. In the present study, four of the 12 strains with <6 IS*6110* bands, had been placed into two different clusters by IS*6110* typing. MIRU typing, however, revealed all the four strains to be unique isolates. Spoligotyping, in the present study, revealed 49 SIT patterns. Of these, seven SITs were newly created. This observation might suggest a possible introduction of new genotypes due to casual contacts and/or increased international travel. The most common spoligotype found in our study was SIT26 (CAS1-Delhi, n=21, 20.8% of isolates), followed by SIT11 (EAI3-IND lineage, n=11 strains, 10.9% of all isolates). Thus, the various spoligotypes found in our study were: EAI 26.7%, CAS 43.6%, Beijing 5.94%, and Manu 4.95%. Thus, CAS (prototype SIT26 for CAS1-DEL) > EAI (prototype SIT11 for EAI3-IND) > Manu (prototype SIT1378 for Manu-3).

The study is ongoing. The final analysis taking into account whether the source of an isolate was a new patient or a previously treated patient will be taken once all the isolates have been tested for drug susceptibility and their molecular epidemiology studies have been performed.

12. Expression analysis and protein profiling of drug efflux transporters in clinical isolates of *M. tuberculosis*

Mycobacterium tuberculosis is intrinsically resistant to various antibiotics due to its unusual thick cell wall. Involvement of efflux pumps is a second major cause to increase intrinsic drug resistance in *M. tuberculosis.*

We propose to investigate the mRNA expression analysis of efflux related genes under drug pressure to investigate the role of efflux pumps in drug resistance, particularly in multi-drug resistant isolates of *M. tuberculosis* obtained from patients of pulmonary tuberculosis.

In spite of several studies, the subinhibitory concentration of drug that leads to optimal expression of efflux pumps is still unclear. Various studies have been carried out to study the mRNA expression of efflux pumps but the subinhibitory concentration of drugs that was taken in these studies varied. Hence, we exposed log phase H37Rv to ½ MIC, $^1/_3$ MIC and ¼ MIC of Rifampicin (RMP), Isoniazid (INH), Streptomycin (SM), Ethambutol (EMB) and Ciproflox (CIP) over a period of 24 hrs and performed qRT-PCR to observe the expression of 11 efflux pump genes. We observed a gradual increase in the expression of efflux pumps with increasing subinhibitory concentration of INH. However, surprisingly, with SM, RMP, EMB and CIP exposure, the number of overexpressed genes were found to be higher on exposure to lower subinhibitory concentration (¼ MIC). In fact, a gradual increment in gene expression was observed with decreasing subinhibitory concentration of drugs. To conclude, more efflux genes are active under low subinhibitory concentration of all antituberculous drugs, except INH. The expression of efflux genes in the presence of subinhibitory concentration of antituberculous drugs, excluding INH, is also increased at lower concentrations.To our knowledge, this is the first report on the response of efflux pumps to increasing or reducing levels of drugs.

We have also observed the RNA expression of 11 efflux pump genes of three drug sensitive and three drug resistant isolates. For this purpose, we used ½ MIC of INH and ¼ MIC of RMP, INH, EMB and CIP. In addition, 2D gel has been standardised to study the protein profile of H37Rv, in order to determine the efflux proteins overexpressed in the presence of subinhibitory concentrations of antituberculous agents.

13. Efflux mechanisms in *M. tuberculosis*: to study the effect on drug susceptibility profile

The present study was designed to study the putative efflux genes in drug resistant and drug susceptible clinical isolates of *M. tuberculosis*. 60 clinical isolates of *M. tuberculosis* were obtained from the Department of Microbiology at Vallabhbhai Patel Chest Institute. The isolates were characterised by biochemical tests and MIRU-VNTR typing. MICs of six drugs *i.e*., Rifampicin, Isoniazid, Streptomycin, Ethambutol, Kanamycin and Ciprofloxacin were determined for the isolates using Microplate Alamar Blue Assay (MABA). On the basis of MICs, 5 drug resistant and 5 drug sensitive strains have been selected for further study to observe the affect of antituberculous drugs on ten putative efflux genes *viz.* Rv1272c, Rv1686c, Rv1687c, Rv1456c, Rv1457c, Rv0849, Rv2265, Rv0842, Rv0876c and Rv2256c. Primers for these genes have been designed and the PCR standardised. The expression profile of these genes will be studied under conditions of antibiotic stress using qRT-PCR. The genes showing altered expression will be overexpressed in H37Rv and the effect on MIC observed.

14. Real-time molecular analysis of drug resistant *M. tuberculosis* isolates in North Delhi

The present study is being conducted to determine the frequency of specific mutations that lead to drug resistance in *M. tuberculosis* isolated from patients of tuberculosis being treated in the North Delhi area.

Isolates of *M. tuberculosis* (n=108) were obtained from patients of tuberculosis attending the RBIPMT Hospital, Delhi and Vallabhbhai Patel Chest Institute. The isolates had been confirmed to be *M. tuberculosis* by biochemical tests and PCR restriction analysis. All the isolates were subjected to a sloppy molecular beacon assay to determine mutations in genes known to be associated with drug resistance *viz. katG, inhA, rpoB, rrs, embB*306, *gyrA* and *eis.* All the 21 isoniazid resistant isolates had a mutation at the 315 codon. Five of these also had a mutation at *inhA.* The most common mutation found in rifampicin resistance strains was 531 (55% of 20 rifampicin resistant isolates); followed by 516 (25% of 20 rifampicin resistant isolates). None of the isolates had a mutation at the *rrs*gene while six isolates had a mutation at the *embB*306 codon. The latter was also found to be resistant to ethambutol by proportion method.

Diagnostic Services

Details of diagnostic services provided to the indoor and outdoor patients are given below:

i. Bacteriology Laboratory

Clinical specimens processed for isolation and identification of aerobic pathogens

Nature of Specimen	***No.***
Sputum	3074
Urine	210
Bronchial Aspirate	126
Pleural Fluid	57
Blood	69
Endotracheal Aspirate	106
Pus (FNAC)	07
Total	**3649**

Organisms Isolated	***No.***
Pseudomonas	168
E. coli	35
Klebsiella	66

Enterobacter spp.	11
Acinetobacter spp.	74
GNB	10
Moraxella catarrhalis	05
Haemophilus influenzae	02
Streptococcus pneumoniae	07
Staph aureus	10
Enterococcus	03
Citrobacter spp.	06
Total	**397**

ii. Mycobacteriology Laboratory

Clinical specimens processed for AFB (Direct smear examination and culture)

Nature of Specimen	***No.***
Sputum	6641
Post Bronchoscopy Sputum	120
Bronchial Aspirate	139
Broncho Alveolar Lavage (BAL)	29
FNAC	05
Pleural Fluid	75
Endo-tracheal Aspirate	97
Urine	05
Pus	04
CSF	03
Skin Biopsy	03
Lymphnode Biopsy	02
Total	**7123**

Total AFB (Smear + culture +)	655
Drug susceptibility	41

Pathology

Research

1. Correlation of pulmonary arteriolar remodelling on transbronchial lung biopsies with basic FGF expression and computed tomographic indicators of pulmonary hypertension

Pulmonary hypertension (PH) is a significant cause of morbidity and mortality in patients with diffuse parenchymal lung disease (DPLD). Identification of vascular structural changes in transbronchial lung biopsies (TBLB) of these patients has been evaluated in only a few studies. The correlation of the microvascular changes with basic fibroblast growth factor (bFGF) expression and with CT indicators of PH may prove to be valuable for understanding their pathogenesis and for identifying prognosis. A retrospective analysis of the 1055 transbronchial lung biopsies (TBLB) received at Vallabhbhai Patel Chest Institute over a six year period from July 2005 to July 2011 was done. Vascular remodelling typical of PAH was seen in 12 biopsies. These included five males and seven females with a mean age of 54 years (22 to 75 years). On the basis of the lung parenchymal changes the TBLB's were categorised into pattern I (adequate biopsy without a specific diagnostic abnormality), pattern II (chronic interstitial pneumonitis with or without fibrosis), pattern III (granulomatous inflammation). Non specific interstitial pneumonitis like pattern was the most common parenchymal pathology. The associated microvascular remodelling was histologically graded as per the Heath Edwards classification. The small and medium sized arterioles in the peribronchiolar region and interstitium showed PH changes ranging from Grade 1 to Grade 4. The number and size of pulmonary vessels and vascular area were further measured by morphometry. The number of vessels identified in each biopsy ranged from 1 to 10 and varied in size from 55 to 790 µm. An increase in the index of medial smooth muscle density was associated with increasing grade of PH. bFGF expression was seen in the vascular smooth muscle cells and adventitial fibroblasts and correlated with the extent of morphological changes. CT diameter of the main pulmonary artery (MPAD), ascending aorta, and ratio of their areas (rPA), was measured. The MPAD varied from 23.33 to 35.05 mm and the rPA varied from 0.71 to 1.17. In TBLB, progressive changes of vascular remodelling and PH can be identified in patients with parenchymal lung diseases. The vascular changes are seen to be associated with bFGF expression in the media and adventitia of the vessel wall and indicative of a role of bFGF as a biomarker for PH in TBLB. These histopathological features when correlated with a combination of morphometric and CT measurements may be more predictive of PH than either test alone.

2. Morphometric evaluation of pulmonary pathology in bleomycin induced model of pulmonary fibrosis

Interstitial lung fibrosis (ILD) is a progressive disease with a potentially fatal prognosis. The pathogenesis of pulmonary changes in ILD, including interstitial and vascular remodelling and their interrelationship were studied in experimental bleomycin model. These pathlogical changes were morphometrically evaluated. Male Wistar rats were administered intratracheal bleomycin (7units/kg) and the lung histopathology was examined on day 7, 14 and 28 and compared to control. The time course of pathological changes in the lung parenchyma, distal airways and pulmonary arterioles were assessed on haematoxylin and eosin stained sections. Lung inflammation and fibrosis was semi quantitatively graded using the Ashcroft grading method. Peribronchiolar neutrophilic infiltrate with minimal fibrous thickening (Grade 1) was seen on day 7. On day 14 this progressed to chronic peribronchiolar inflammation with minimal fibrosis (Grade 3) and on day 28, interstitial fibrosis was observed (Grade 5). The morphometric evaluation of the distal bronchioles ranging from 50µm to 200µm in diameter was done using Nikon 90i fully motorised microscope and NIS-Ar image analyser. An average of 15 bronchioles and their accompanying arterioles were assessed in each case. The pulmonary arterioles were evaluated for muscularisation and intimal proliferation. There was a significant increase in muscularisation of the distal arterioles which started on day 7 (16.81µm, $P < 0.0001$), remained constantly elevated till day 14 (16.39 µm, $P = 0.0003$) and further increased till day 28 (19.80µm, $P < 0.0001$) as compared to control (12.64µm). This study reveals that there is an onset of vascular remodelling in pulmonary arterioles which occurs concurrently with peribronchiolar inflammation on day 7 after exposure to bleomycin and this significantly progresses up to day 28.

3. Role of bFGF signalling in vascular remodelling: an experimental study in bleomycin induced model of pulmonary fibrosis

Basic fibroblast growth factor (bFGF) is a potent mitogen for many cell types and promotes cellular proliferation and differentiation. In pulmonary fibrosis, bFGF may play an important role in the complex mechanisms that link alveolar interstitial and vascular remodelling. Therefore, we determined the bFGF expression in bleomycin induced pulmonary fibrosis and correlated with histopathological grading and morphometric analysis. Histopathological examination revealed ascending grade of fibrous interstitial thickening from day 7, which progressed to day 28. These changes were associated with vascular remodelling, characterised by medial hypertrophy and muscularisation of the distal arterioles and arteriolar vasoconstriction which started from day 7 and persisted till day 28. This was associated with an increased expression of bFGF. On day 7, the vascular adventitial fibroblasts and peribronchiolar fibroblasts showed bFGF expression and proliferation. On day 14 in addition the type II pneumocytes also showed bFGF expression. On day 28, bFGF expression was maximum in the interstitial macrophages and fibroblasts. The present study identifies the pulmonary adventitial and peribronchiolar fibroblast to be the primary site of fibroblast cell activation, after bleomycin administration. The central role of bFGF in the aberrant vascular remodelling associated with bleomycin induced pulmonary fibrosis is suggested.

Diagnostic Services

Diagnostic services were provided to the indoor and outdoor patients in subdivisions of haematology, histopathology, cytopathology and clinical pathology.

A. Haematology

A total of 55,598 tests were done during the period as per details given below.

Haematology tests	**Number**
Haemoglobin estimation	13888
Total leukocyte count	13888
Differential leucocyte count	13888
ESR	1715
Absolute eosinophil count	1558
Platelet count	10374
Peripheral smear	97
P/S for malarial parasite	187
Reticulocyte count	03

Coagulation Laboratory

A total of 1649 tests were done during the period as per details given below.

Coagulation Test	**Number**
Prothrombin time	172
Activated partial thromboplastin time	170
D-Dimer	123
Fibrinogen degradation product	124
Bleeding time	530
Clotting time	530

B. Histopathology

A total of 122 biopsies were done during the period as per details given below. Multi-discussion microscopy facility was added and used for interpretation of transbronchial lung biopsy.

Biopsies Processed	Number
Lung biopsy	117
Pleural biopsy	05

C. Cytopathology

A total of 617 samples were done during the period as per details given below.

Cytology Samples Processed	Number
Sputum	299
BAL fluid	25
FNAB : Percutaneous	91
Transbronchial (TBNA)	14
Bronchial aspirate	87
Pleural fluid	69
Tracheal aspirate	03
Nasal cytology	28
Urine cytology	01

D. Clinical Pathology

Total of 3184 tests were done during the period as per details given below.

Urine Analysis	Number
Specific gravity	635
pH	635
Albumin	635
Sugar	635
Microscopic examination	635
Ketone bodies	09

Haematology and Clinical Pathology laboratories continued to function on all holidays for emergency, indoor and ICU patients.

Pharmacology

Research

1. A clinical study to evaluate the efficacy and safety of UNIM-352 (a polyherbal Unani formulation) in patients of bronchial asthma

A double blind, placebo controlled, randomised, parallel design, prospective clinical trial was conducted to evaluate the efficacy and safety of UNIM-352, a polyherbal Unani formulation, in patients of bronchial asthma. The study protocol was approved by the Ethical Committee of the VPCI and after taking the written informed consent, the patients were divided into two groups – one receiving UNIM-352 and the other receiving placebo. After baseline PFT data was recorded the patients were put on standard anti-asthma treatment with bronchodilators and steroids as inhalation therapy. PFT data was recorded in both groups at 2, 4, 6, 8 and 12 weeks, as also the frequency of use of SOS salbutamol inhalers. Forty patients were initially enrolled out of which there were five drop outs – thus, 35 patients completed the study. Analysis of the results indicate that the test drug (n=19), UNIM-352, is more effective and better tolerated that the matched placebo (n=16). The comparisons were made by *(a)* PFT parameters (FEV_1, FVC and FEV_1/FVC ratio), *(b)* symptomatology score and *(c)* frequency of emergency medication (bronchodilator) usage. The study revealed that the polyherbal compound was more efficacious than and also had a similar safety profile as compared to the placebo. This validates the traditionally reported use of this formulation in Unani system of medicine and projects it as an important adjunct for the treatment of bronchial asthma.

2. Possible protective role of Livina (a polyherbal preparation) against anti-tubercular therapy (ATT)-induced hepatotoxicity

A single blind, randomised, placebo controlled clinical trial was conducted to evaluate the efficacy of Livina (a polyherbal formulation) against anti-TB drug therapy induced hepatotoxicity. The study protocol was approved by the Ethical Committee of the VPCI and after taking written informed consent, the patients were divided into two groups - one received Livina and the other receiving placebo. Baseline liver function tests were performed prior to the study, and subsequently at 2, 4 and 8 weeks after initiation of ATT/herbal drug therapy. A total of 42 patients completed the trial and the analysis of results showed that the experimental drug was more effective and better tolerated than the placebo. Specifically, the results showed that Livina has greater protective effects against ATT induced liver damage, as assessed by the qualitative and quantitative markers (SGOT, SGPT, Alkaline phosphatase, Bilirubin, Total proteins). Livina, which was earlier shown to be effective in other forms of liver disease, now appears to have great potential against ATT-induced liver dysfunction. A detailed evaluation of its mechanism of action at the cellular and molecular level is proposed as part of academia-industry interactions. Such studies could help in discovering herbal hepatoprotective agents against anti-TB drug induced hepatic dysfunction and promote drug compliance and prevent drug resistance.

3. Studies on the possible mechanisms of action of UNIM-352, a polyherbal Unani anti-asthmatic preparation, in experimental animals

UNIM-352 is a polyherbal preparation, which has been used in traditional Unani medicine for bronchial asthma. The scientific basis for its use, however, is still not clearly defined and validation of the same was warranted. Using the principles of reverse pharmacology experiments was designed in animal models to evaluate the possible mechanisms of action of UNIM-352. The salient findings are summarised below: Mast cell stabilisation activity of UNIM-352 was studied by using the acute systemic anaphylaxis model of rats. The effect of UNIM-352 (200 & 400 mg/kg oral) treatment at both the dose levels in OVA sensitised and challenged rats, significantly inhibited mortality and protected the rats against antigen challenge induced degranulation of mast cells. So, the evaluation of the protective effect of UNIM-352 on mast cell degranulation suggests that this polyherbal preparation ameliorated the shock symptoms and was effective against antigen-antibody reaction and/or IgE antibody production, which was responsible for degranulation of mast cells. Further, UNIM-352 was also able to significantly inhibit the serum IgE levels. Our findings also suggest that UNIM-352 plays an important role in preventing airway inflammation by inducing reductionin the levels of the cytokines in blood and BAL fluid which includes the proinflammatory markers such as TNF-α and IL-1β

(which amplifies the inflammatory response in asthma) and the Th2 derived cytokine IL-4 (which is important for Th2 cell differentiation and also needed for IgE formation). The study also revealed that the cell mediated immune response on pre immunised keyhold limpet haemocyanin (KLH) challenged rats was not much influenced as observed by no appreciable changes in the percentage change in the paw volumes of rats. Further, the bronchorelaxant activity of UNIM-352 against spasmogens like histamine and bradykinin was also evaluated. The results indicate that UNIM-352 *per se* did not exhibit any contractile or relaxant effect on isolated guinea pig tracheal chain preparation. However, it inhibited the contraction evoked by histamine and bradykinin in normal unsensitised guinea pigs. UNIM-352 also blocked the response of histamine precontracted trachea in sensitised guinea pigs. This bronchorelaxant effect of UNIM-352 was concentration dependent. These findings suggest possible histamine H1 receptor blocking properties of this polyherbal preparation that may contribute to its relaxant effect on trachea of guinea pigs. The potency of a drug may be expressed as EC_{50} or pD_2value and lower the EC_{50}/higher the pD_2 value, higher is the potency. Therefore, in this context, the EC_{50} value derived from our study of histamine and bradykinin along with pre-incubation of UNIM-352, using the guinea pig tracheal chain preparation in naïve and sensitised animals, may indicate the potency of the polyherbal preparation as a bronchorelaxant. Oxidative stress has a crucial role in asthma and studies with oxidative stress markers showed a significant reduction in MDA levels with the higher dose of UNIM-352 (400mg/kg oral) treated group induced reduction of MDA, suggests the protective effect of UNIM-352 on ROS and eventually on membrane damage. Therefore, UNIM-352 may exhibit antioxidant effects against membrane lipid peroxidative damage by its ability to interact with and penetrate the lipid bilayers. UNIM-352 pretreatment at dose levels of 200 and 400mg/kg oral for 14 days enhanced the levels of SOD, CAT and GSH in KLH immunised normal (no RS) and RS treated rats. These findings could lead to a hypothesis that UNIM-352 enhanced the antioxidant enzymatic activities which may also have contributed to the reduced production of ROS. This was further highlighted by the fact that UNIM-352 reversed stress (RS) induced reductions of SOD, CAT, and GSH in the KLH immunised rats. The FRAP (ferric reducing ability of plasma) assay offers a putative index of antioxidant or reducing potential of biological fluids. Therefore, the significant enhancement of total plasma antioxidant capacity in the 14 days treatment of UNIM-352, at both its dose levels, when compared to vehicle treated controls, indicates decreased oxidative stress and increased antioxidant activity status in KLH immunised rats. UNIM-352 significantly suppressed the NOx levels in both blood and BAL fluid in KLH immunised normal (no RS) and RS treated rats which may reflect its protective effect as an antioxidant on the airways of sensitised animals by reducing the levels of nitric oxide metabolites. Excess of exhaled NO is associated with bronchial asthma. Taken together, the above findings are suggestive of the anti-inflammatory, immunomodulatory, bronchorelaxant and antioxidant mechanisms in the effects of UNIM-352. Such reverse pharmacological studies for validation could be of great significance and in this case suggest that this herbal drug formulation will be used as an adjunct drug for prophylaxis and treatment of bronchial asthma.

4. Pharmacological studies on stress-induced modulation of inflammation and immunity in rats

Emotional and environmental stressors are known to influence lung function and precipitate pathophysiological states. The present study evaluated the possible involvement of nitrergic mechanisms and their downstream signalling pathways in inflammation and immunity with reference to lung diseases. Restraint stress was used as the experimental stressor and the effects of NO ergic agents were evaluated on lung markers of inflammation and immunity. Both humoral and cell mediated immune responses as well as markers of innate immunity were evaluated. Preliminary data indicate that stress induced changes in lung inflammation and immunity could be under the regulatory influence of NO. Further studies involving NO signalling pathways are ongoing to confirm some of the initial data obtained.

5. Studies on the possible role of NO in high altitutde stress induced neurobehavioural and immunological changes in rats

Emotional and environmental stressors can also influence the neurobehavioural profile of an organism. Further, behavioural factors like emotionality and cognition are recognised as important predictors of stress susceptibility. Ascent to high altitude is associated with decreased partial pressure of oxygen that in turn leads to reduced oxygen delivery to tissues, a condition referred to as hypobaric hypoxia. Brain in particular is highly vulnerable to such hypoxic stress due to its high oxygen requirement. There have been several reports on occurrence of cognitive dysfunctions on exposure to hypobaric hypoxia in both natural and

simulated conditions. High altitutde stress was simulated by exposing rats to hypoxia chamber and different grades of high altitutde were assessed on neurobehavioural profile in rats. Exposure to high altitude of 8000 and 12000 ft (in hypoxic chamber) induced behavioural suppression in the elevated plus maze (EPM) test – the effects being significant at the higher altitude of 12000 ft. Pretreatment with L-arginine attenuated whereas L-NAME aggravated such anxiogenesis. The lower level of altitutde *viz* 8000 ft when combined with restraint stress induced anxiogenesis and similar modulatory effects were seen after NO modulators. Brain NO metabolite assays are in progress and this will throw more light on this data. Further, NOS activity in the brain will also be assessed by gene expression studies and the role of NO in such changes will be investigated.

6. Experimental studies with chelidonic acid, a molecule of plant origin with possible therapeutic potential in bronchial asthma

Chelidonic acid is a secondary metabolite from several plants and its presence in many alkaloids containing plants is known since long and is the salt forming acid for several bioactive plant alkaloids. There is the possibility of its ability to modulate the pharmacological activity of the alkaloids with which it co-exists in plants. Chelidonic acid has also been reported as the leaf closing signalling molecule for *Cassia minosodia* (an Indian medicinal plant) and has been isolated from *Sorghum vulgare* seedlings (a common food material grown in India), flowers of *Cassia spectabilis* and leaves of *Gloriosa superba*. Structurally, the zinc site of the enzyme GAD is analogous to many other immunological sites involved in histamine release and many other inflammatory phenomenon and there are also several reports on its zinc chelating properties. One report indicates that chelidonic acid at a dose of 10 mg/k is as effective in inhibiting histamine release as the same dose of disodium cromoglycate, a mast cell stabiliser used in the prophylaxis of asthma and related allergic disorders. However, this is only an isolated report and needs to be confirmed. If so then, it could be well used for further development not only as a novel potential drug, but also as a simple lead molecule (from herbal sources) for identifying a novel pharmacological target useful for designing potential therapeutic agents in bronchial asthma and related inflammatory/immunological disorders. Preliminary studies showed that chelidonic acid (3, 10 and 30 mg/kg) dose dependently attenuated histamine release from rat peritoneal mast cells in ovalbumin immunised + challenged animals. Studies to estimate histamine levels from incubated mast cells are in progress, and the *in vitro* and *in vivo* data will provide directions for taking chelidonic acid forward for development of a viable adjunct/alternative to asthma therapy.

7. Medicine prices, availability and affordability in NCT, Delhi: WHO/HAI methodology

Access to health care is a fundamental right recognised by governments throughout the world. The Indian Government is responsible for providing health care to its citizens, however, out-of-pocket payments account for up to 80% of health financing in India. Medicines account for more than 70% on health spending for outpatient treatment in India. Therefore, the first step would be to measure the price and availability of essential medicines in public and private sectors in order to develop policies and strategies for improving the access to essential medicines.

The survey was conducted in National Capital Territory (NCT) of Delhi using the standardised methodology of World Health Organization and Health Action International (WHO/HAI).

Objectives

The main objectives of the survey were to answer the following questions –

a. What price do people pay for a selection of essential medicines in Delhi?

b. Do the prices and availability of these medicines vary in different regions of Delhi?

c. What is the difference in prices of originator brand (OB), highest priced generic (HPG) and lowest priced generic equivalent (LPG) medicines?

d. How do the prices of medicines in Delhi/India compare with international reference prices?

e. What is the availability of the medicines in the different sectors?

f. What is the availability of medicines, especially antibiotics in primary care, secondary care and tertiary care facilities?

g. What is the variation in procurement price and availability of medicines in different public sectors of Delhi?

h. How affordable are medicines for ordinary people?

The survey was conducted in both public and private sector facilities covering all eight districts of NCT, Delhi. Three predominant public health providers, Government of NCT, Delhi (GNCT, Delhi), Municipal Corporation of Delhi (MCD), and Central Government (CG) were included for the survey. Private sector sites included traditional private retail pharmacies and retail chain pharmacies of one particular corporate house. In each district, five randomly selected public facilities of GNCT, Delhi and MCD, five retail pharmacies and five retail chain pharmacies located near the public facilities were sampled. For central government, three tertiary care facilities of Delhi were included. Medicine price and availability data was collected for a basket of 50 medicines specified in dosage form and strength that includes 30 core medicines and 20 supplementary medicines added according to local needs and objective of the survey.

This survey revealed the procurement prices of essential medicines at various public sector agencies; poor availability of surveyed medicines at public facilities; newer antibiotics, like amoxicillin+clavulanic acid, cefuroxime axetil, cefixime, roxithromycin available at dispensaries. Details of prices and availability of branded and branded generic versions of medicines in the private sector. Many medicines had only one version of the product available which was usually the costly or branded medicine but patient has no choice but to buy that product and that becomes the lowest priced generic available.

A detailed report is submitted to WHO, South East Asian Regional Office and is available on HAI website.

8. Survey on medicines price components using WHO/HAI methodology

The price paid for a medicine is made up of a number of price components, including the manufacturer's selling price and all costs for freight, tariffs and taxes, wholesale and retail markups. Price components are a concern for all those involved in public health and access to medicines, whether the government, nongovernmental organisations (NGO), a social insurance plan, the prescribers or the patients.

Objectives:

To identify

a. The different price components that make up the price of medicines,

b. The relationship between medicine prices, price components and pharmaceutical pricing policy.

The WHO/HAI (Health Action International) methodology was used to collect and analyse price component along the supply chain in the public and private sectors in Delhi, India. Seven medicines were surveyed: amlodipine 5mg, amoxicillin+clavulanic acid 500mg+125mg, ceftriaxone 1gm injection, diclofenac 50mg, erythromycin syrup 125mg/5mL, omeprazole 20mg and ranitidine 150mg.

In the private sector, trade schemes were found between manufacturer, wholesaler and retailer: these schemes chiefly benefit the manufacturer and the retailer; savings are not passed on to patients. For the six non-scheduled medicines (not under price control) surveyed, the manufacturer reaped a majority of the profit (54%-74%) for branded medicines and the retailer made a similar profit in case of branded-generic (generic) medicines. Therefore, the main profit is for the actor who is pushing and responsible for promoting the sale of medicine. Retailer is also enjoying the benefit of trade schemes offered by the manufacturer. The scheduled medicine surveyed was ranitidine and the originator brand, branded or branded-generic had almost the same final price to the patient. Government levies 5% VAT on medications – a cost that is borne by patients.

A detailed report is submitted to WHO, South East Asian Regional Office and is available on HAI website.

9. Study of patterns of antibiotic dispensing in pharmacies in Tumkur, Karnataka, India

Antibiotics are obtained by patients from a variety of sources in India, including government and private hospitals, pharmacies and unlicensed dispensers. Studies on prescribing practices in specific hospitals, largely based in major cities, have been done in India. However, there exists no reliable quantitative or

qualitative description of antibiotic prescribing patterns in Primary Health Centers (PHCs) in rural areas, upon which much of India's rural poor depend. This study in Tumkur district of Karnataka has filled this gap; using methodology adapted from a WHO pilot study to examine antibiotic use in Delhi and later expanded the methodology for surveillance of antibiotic use in the community by Kotwani *et al* (2009, 2010).

Objectives:

a. Measure the use of all types of antibiotics in a rural setting;
    i. By type of antibiotic dispensed,
    ii. By month,
    iii. By type of pharmacy (Government and NGO-run PHCs, Taluka and District Hospitals, and private retail pharmacies).
b. Characterise the relationship between prescriptions and antibiotics dispensed;
    i. By characterising the complaint and the prescription and the acquired antibiotics,
    ii. Comparing antibiotics prescribed and acquired to local treatment guidelines.

The work is in collaboration with Dr H. Sudershan, Karuna Trust, Bangalore, Karnataka and Center for Disease Dynamics and Economic Policy (CDDEP).

Results have revealed few important findings but the pattern of antibiotic prescription is not very different from urban India.

Complaints leading patients to attend the facility where they obtained the antibiotic: fever was the most common complaint, followed by coughing, fatigue, skin rash and diarrhea. A detailed analysis is done and report submitted.

10. Survey of the availability and prices of children's medicines in Chhattisgarh and Odisha State

The Better Medicines for Children (BMC) project, initiated by the World Health Organization in 2009 with funding from the Bill and Melinda Gates Foundation, aims to improve access to essential medicines for children through by addressing issues of availability, safety, efficacy and price. The project includes activities to improve availability of children's medicines in India with a special focus on Chhattisgarh and Odisha.

The WHO initiated this project to improve availability of children's medicines in India with a special focus on Chhattisgarh and Odisha. Dr Anita Kotwani was invited by WHO to be the Technical Supervisor for measuring price and availability of children medicines in Chhatisgarh and Odisha.

Methodology used for these two surveys was standardised methodology of WHO/HAI for measuring medicine prices, availability, affordability and price components. Surveys and studies were completed. Data cleaning and analysis were done and the results were presented by the respective team leaders at International Conference on Improving Use of Medicines (ICIUM 2012) at Antalya, Turkey.

11. Antimicrobial drug prescribing pattern in hospitalised patients of community-acquired pneumonia: a retrospective study

Community-acquired pneumonia (CAP) is a common infectious disease associated with significant mortality and morbidity. The lack of an aetiological diagnosis when antimicrobial treatment needs to administered, the broad variety of antimicrobials available and increasing resistance to antimicrobials among the common aetiological pathogens have led different scientific societies to publish clinical guidelines in the selection of the appropriate initial antimicrobial regimens.

However, little is known about this important aspect from Indian subcontinent where the rate of occurrence of CAP is more than the developed world and there will be geographical differences. A better understanding of evolving trends of antimicrobial use, factors influencing choice of treatment is needed to plan optimal treatment. Appropriate antimicrobial therapy is the cornerstone of management of CAP. Therefore, we planed to conduct a retrospective study on inpatients admitted to tertiary care hospital due to community-acquired pneumonia over five years period in order to determine the pattern of antimicrobial use.

Objectives:

The objective of the study is to examine a database of medical records of inpatients hospitalised due to community-acquired pneumonia from two tertiary care hospitals (V. P. Chest Institute and Safdurjung Hospital, Delhi) to identify:

a. Evolving trends of antimicrobial drug prescription,

b. Leading factors and variables associated with initiation of antimicrobial prescription,

c. Leading factors for antimicrobial prescription variations during treatment.

The work on the project is started and pilot test is over at both the tertiary care hospitals.

12. Pharmacological studies on the possible role of nitric oxide (NO) and NO-mediated signalling pathways in the regulation of stress induced immunological changes in rats

Stress can be defined as any disturbance in the physiological homeostasis of the organism and if persists for a long period can lead to disorders of the cardiovascular, gastrointestinal, immunological and central nervous system. The concept of a 'stress system' is being strongly advocated in which a holistic approach involving interactions between CNS, neuroendocrine, immune and visceral systems are being explored. Nitric oxide (NO) is a ubiquitous molecule with multidimensional effects and NO modulators have been effectively used as experimental tools to study NO-ergic mechanisms in both experimental and clinical situations. The role of this versatile molecule in modulation of different type of stressors *viz.* predictable and unpredictable, have not been explored. Thus, the present study was designed to investigate possible predictable and unpredictable stress-induced changes in behaviour and immunity, and further, to evaluate the role of specific nitric oxide- mediated signalling pathways in such responses using pharmacological and biochemical techniques. The effects of different NO synthase inhibitors and precursors were assessed in anxiety in view of the increasing evidence for the role of NO as a chemical messenger in CNS and also because of reported differences in NO synthase expression. In the present study, the NO precursor, L-Arginine (L-Arg) consistently reversed the RS (x1) induced suppression of behavioural markers in the elevated plus maze. Attenuation of stress induced behavioural suppression was also observed by pretreatment with isosorbide dinitrate (ISDN), an organic nitrate that reacts with endogenous thiols to release NO. These effects of NO mimetics were very similar to those seen with diazepam, and thus, strongly suggestive of an antistress profile of NO. Pre-administration of L-NAME, a non-selective NOS inhibitor, prior to stress, dose dependently aggravated the RS (x1) induced behavioural suppression in both the tests of anxiety - suggesting that inhibition of NO synthesis have anxiogenic effects. Tissue nitrate and nitrite (NOx), stable metabolites of NO has been reported to act as reliable marker of NO activity *in vivo* and our results show that exposure to RS(x1) suppressed NOx levels. Since L-arginine pretreatment effectively reversed the stress-induced changes in behavioural and nitrosative stress markers in a consistent manner, it is possible that nitric oxide might have beneficial effect in situations of stress. The present study also investigated the repeated stress induced changes in behaviour and brain nitrosative markers using two stress paradigms: RS 1hr/day for 5 days and RS 1hr/day for 15 days in rats. The effects of sub-acute stress (RSx5) stress were quite different from those seen after RS(x1) exposure in rats. In both the tests, RS(x5) induced changes were far lesser in intensity as compared to the RS(x1) group. The reduced anxiogenic response on repeated exposure to RS for five days as compared to single acute exposure suggest that such exposure could induce adaptation or tolerance to stressful stimuli. Analysis of brain homogenates revealed that RS(x5) NOx levels were higher when compared to that of corresponding single restraint RS(x1) group. Treatment with NO mimetics, L-Arginine was shown to have protective effect on RS(x5) induced behavioural markers. The NO synthase inhibitor, L-NAME, on the other hand aggravated RS(x5) induced behavioural and biochemical parameters. Chronic stress RS(x15) also had differential behavioural and biochemical effects in rats. RS(x15) again showed a trend towards behavioural suppression and brain NOx levels were also reduced as compared to RS(x5) group. Treatment with NO mimetics had a protective effect while NO synthase inhibition tended to aggravate RS(x15) induced behavioural and biochemical changes. For comparing the impact of different types of stress *i.e.* predictable and unpredictable stress on neurobehavioural and biochemical parameters another set of experiments were performed. The rats were exposed to unpredictable stress in which different, novel stressor was given daily for 5 or 15 days. There was a marked reduction in total number of entries as well as time spent in open arm of the EPM. The percent

reduction was much more than that observed after predictable stress for 15 days. Prior administration of L-arginine (500mg/kg, ip) attenuated the neurobehavioural suppression whereas L-NAME (50 mg/kg, ip), a NO synthase inhibitor did not influence the results to a significant extent. Biochemical analysis showed that the neurobehavioural suppression was accompanied with reduction in levels of total nitates and nitrites (stable metabolites of NO) indicating reduced NO levels. Interestingly, the reduction in nitrosative marker was accompanied with elevations in the level of MDA, a marker of lipid peroxidation. Thus, the results suggest that NO may be involved to a greater extent in neurobehavioural suppression during unpredictable stress and oxidative stress could be one of the mediating mechanisms.

13. A clinical study to compare the efficacy, safety and plasma levels of two doses of theophylline in patients of bronchial asthma

Theophylline, a methylxanthine, is an effective bronchodilator used for the treatment of bronchial asthma and other obstructive airway diseases but its narrow therapeutic index and the resultant adverse drug reaction (ADR) profile have considerably restricted its therapeutic use**.** Further, factors like age, smoking, congestive heart failure, other diseases, and concurrent use of other drugs - all could contribute to alterations in theophylline kinetics. Thus, safe and rational use of the drug necessitates therapeutic plasma level monitoring. Fortunately, theophylline serum levels correlate well with both therapeutic and toxic effects and this is the basis of monitoring drug levels in plasma. Recently, there has been resurgence in the interest in the use of methylxanthines like theophylline, as an adjuvant, in the treatment of asthma and COPD, in view of its newly discovered anti-inflammatory and immunomodulatory effects at low doses. Further, preclinical data has shown that oxidative stress may be involved in some aspects of theophylline toxicity and antioxidants like ascorbic acid protect against such adverse effects. In view of the above findings, we conducted clinical studies to compare the safety and efficacy of low dose theophylline against its standard dose used in the clinic. It was a prospective, open label, randomised, parallel design study. A total of 60 patients were enrolled and divided into three groups and given *i)* standard treatment salmeterol + fluticasone, *ii)* in control group and *iii)* other groups received low and high dose of theophylline along with standard treatment. All three groups showed improvement in FEV_1, FVC and FEV/FVC ratio, but with differential temporal efficacy. Monitoring of serum theophylline concentration was done by HPLC at the end of the study and tthey correlated well with the ADR profile of the different doses of theophylline. The results suggested that serum level of theophylline are good markers of efficacy and safety of the drug and can be used as reliable predictors of therapeutic efficacy.

14. Experimental studies on the possible role of nitric oxide (NO) during acute and chronic morphine in normal and stressed rats

Complex opioidergic regulation of neurobehavioural states is reported and they play an important role in response to stress and related neuropsychiatric conditions. The existence of μ, δ and κ opioid receptors in the CNS is well documented and. Therefore, the present study was designed to investigate the differential involvement of the endogenous opioid systems in the CNS during stress induced changes in rats. Interactions of opioidergic agents with NO modulators were evaluated to study any possible opioid-NO interactions during stress. Restraint stress (RS) was used as an experimental stressor and the effects of various opioid agonists and their interactions with NO ergic agents were evaluated on neurobehavioural and immunological parameters in rats. In the behavioural studies, RS exposure reduced open arm entries (OAE) and time (OAT) in the elevated plus maze (EPM) test when compared to the control (no RS) group. These RS-induced neurobehavioural changes were associated with significant suppression in NOx activity in brain homogenates. In the present study, EPM test was used to assess behavioural responses after RS and various opioidergic and nitrergic agents. RS induced suppression of behavioural activity in the EPM was attenuated by all opioid agonists in a dose related manner, by differing degrees, with morphine (ì) and to a lesser extent, SNC 80 (δ) being more effective on a comparative basis. The k-agonist, U-50488H was, however, less effective in inducing behavioural effects. Plasma corticosterone, a sensitive and reliable marker for stress, was elevated after RS and was also attenuated by differing degrees with the opioid agonists, the most clear cut effect being seen with morphine. Neurobehavioural suppression after RS was associated with reductions in brain NO metabolite (NOx) activity, and these were also reversed towards normalcy (control levels) after morphine and SNC-80 (and to a lesser extent after U-50488H, the k-agonist). In the subsequent studies that followed morphine was used to evaluate interactions with NO modulators. Pretreatment with the NO precursor, L-arginine,

potentiated sub-threshold morphine, whereas, L-NAME, the NO synthase inhibitor, blocked higher dose opioid agonist induced effects. Potentiations in brain NOx activity were after (sub-threshold) morphine+L-arginine combined treatments, whereas, L-NAME showed opposite nature of interaction with morphine (higher dose) on brain NOx activity. Thus, opioid-NO interactions may be helpful in delineating strategies for combating problems associated with opioid /morphine overuse.

15. Experimental studies on the possible mechanisms involved in the effects of UNIM-352, a polyherbal, anti-asthmatic, Unani preparation

New drug development from herbal sources has been a thrust area in recent years and studies have indicated that indigenous plant products may be of some benefit in patients of such obstructive airway disease. Herbal (plant based) preparations have the unique distinction of generally being effective and less toxic, but a clear scientific basis for their use has always been a shortcoming for some very effective drugs/ preparations UNIM-352 is a polyherbal, Unani preparation consisting of the following ingradients: Linum usitattissimum Linn (Alsi), Trigonella foenumgraecum (Methi), Allium sativum Linn (Seer), Apis mellifera Linn (Chilbeenj), Honey (Asi), Caesalpinea Bondumello Fleming (Magze-e-Karanjwa) and Pongomia glabra Vent (Magz-e-Karanj). Toxicological data with UNIM-352 and its ingredients has shown that it is remarkably safe in tests of both acute and chronic toxicity. Though this traditional remedy has been used effectively in the treatment of patients of bronchial asthma its mechanism of action remains to be elicited. The present study was therefore, designed to evaluate the possible mechanism of action of UNIM-352 in experimental animals. Experiments were designed to study its anti-inflammatory and immunomodulatory effects in laboratory models of these conditions and the efficacy of UNIM-352 was evaluated. The study was carried out in inbred Wistar rats maintained under standard laboratory conditions. Bronchoalveolar lavage was performed 24 hrs after challenging with the antigen KLH. After sacrificing the animals, the trachea was cannulated and saline was slowly injected into the lung and withdrawn in 4×1mL aliquots. After the collection of blood and BALF the samples were maintained at 4 °C, centrifuged and the supernatant was collected for biochemical analysis. Analysis of the data showed that UNIM-352 significantly attenuated TNF-α and IL-1β levels in both blood and BAL fluid in KLH immunised rats. TNF-α and IL-1 are the key cytokines which amplify the inflammatory response in asthma and are produced in increased amounts in asthmatic airways while Th2 derived cytokine include IL-4 which is important for Th2 cell differentiation, development of allergic inflammation and also needed for IgE formation. So the attenuation of levels of the major Th2 derived cytokine IL-4 and the proinflammatory markers TNF-α and IL-1 reflects that UNIM-352 may play an important role as an anti inflammatory agent in preventing airway inflammation which is the major step involved in the pathophysiology of bronchial asthma. For investigating the effect of UNIM-352 on anaphylactic mortality and mast cell stabilisation activity, the total number of mast cells present in the mesentery *i.e.*, the percentage of intact and degranulated mast cells were counted following the antigen challenge. The vehicle treated control group of sensitised rats when challenged with the antigen ovalbumin (OVA) expressed extensive degranulation (80%). Prednisolone was used as reference standard and was found to cause degranulation of mast cells to an extent of 24%. UNIM-352 at 200 and 400 mg/kg oral was also able to significantly inhibit the mast cell degranulation as compared to controls *i.e.*, degranulation to an extent of 35% and 30% respectively was observed. Rats remaining alive after the antigen challenge were counted to record the percentage of mortality due to anaphylactic shock. UNIM-352 at both its dose levels and corticosteroid prednisolone showed no mortality while there was 50% mortality in the vehicle treated control group. UNIM-352 significantly inhibited mortality and protected the rats against antigen challenge induced degranulation of mast cells. The mast cell stabilisation activity of UNIM-352 indicated that it may ameliorate the shock symptoms, may inhibit histamine production and may be effective against antigen-antibody reaction and/or IgE antibody production, which is responsible for degranulation of mast cells. UNIM-352 also induced significant reductions in neutrophil and eosinophil counts in both blood and BAL fluid in ovalbumin immunised and challenged rats. These results indicate that UNIM-352 may suppress both eosinophil and neutrophil inflammation in asthma.

Physiology

Research

1. Responses of airway rapidly adapting receptors (RARs) to free radical induced airway hyperreactivity in rabbits

The main objectives of the present study were to investigate whether *a)* there is a change in the sensitivity of airway rapidly adapting receptors (RARs) to histamine in a guinea pig model of asthma and *b)* there is a reversal of this response by dietary anti-oxidants.

Guinea pigs, weighing 300-500 gm housed in the animal house and provided with food and water *ad libitum* were used as experimental animals. They were divided into four groups of six animals each – *Group 1* (Control, normal diet), *Group 2a* (Early asthmatic response- animals sensitised with ovalbumin for 4 weeks and challenged with ovalbumin, normal diet), *Group 2b* (Antioxidant supplementation and early asthmatic response – animals fed with antioxidants and sensitised with ovalbumin for 4 weeks and challenged with ovalbumin) and *Group 3* (Xanthine-xanthine oxidase inhalation – *in vivo* generation of oxidants, normal diet). In each group after anesthesia, RAR activity was recorded. Then histamine inhalation was given starting with 0.04 mg/mL and doubling the concentration until the airway resistance increased by 50%. The maximum concentration of histamine administered did not exceed 5 mg/mL at any given time. The changes in afferent activity were recorded. Along with the afferent activity, airway mechanics was recorded throughout. The dietary supplementation in *Group 2* consisted of vitamin C (2 mg/kg body weight) and vitamin E (7 mg/kg body weight).

Group 1 – Control animals: The basal RAR activity in this group was 0.45±0.26 impulses/breath. After inhalation with normal saline, there was no change in RAR activity. In this *Group*, the 50 % increase in airway resistance (ED_{50}) was observed at the histamine dose of 0.32 mg/mL and the airway resistance increased from 0.0433±0.0024 to 0.0625±0.0038 $cmH_2O/s/mL$. At this dose alone, the RAR activity increased significantly compared to its corresponding control ($p<0.05$) and it was 4.37± 1.47 impulses/breath.

Group 2a (Early asthmatic response) – animals sensitised and challenged with ovalbumin: The basal RAR activity before ovalbumin challenge was 4.91 ± 1.27 impulses/breath which was significantly higher than that in *Group 1* ($p<0.01$). After ovalbumin challenge, the RAR activity increased significantly to 25.36± 5.01 impulses/breath ($p<0.01$) which was significantly higher than after saline inhalation in *Group 1* ($p<0.001$). Also, the airway resistance increased significantly from 0.0525±0.0044 to 0.0850± 0.0071 $cmH_2O/s/mL$ ($p<0.001$). After 30 minutes, there was complete recovery and the RAR activity returned back to basal value. In this background, the ED_{50} to histamine was achieved at the dose of 0.08 mg/mL, thereby indicating airway hyperresponsiveness. At this dose, there was a significant increase in the RAR activity (13.71± 3.64 impulses/breath, $p<0.05$) which was also significantly higher than that in *Group 1* ($p<0.05$). In this group, even a lower dose of 0.04 mg/mL produced a significant increase in the activity of RARs.

Group 2b (Antioxidant supplementation and Early asthmatic response) – animals fed with antioxidants, sensitised and challenged with ovalbumin: The basal RAR activity before ovalbumin challenge was 2.76± 0.64 impulses/breath which was significantly higher than that in *Group 1* ($p<0.01$), but not significantly different than that in *Group 2a*. After ovalbumin challenge, the RAR activity increased significantly to 4.27± 0.62 impulses/breath ($p<0.01$) which was significantly higher ($p<0.001$) than the RAR activity after saline inhalation in *Group 1* but was significantly lower ($p<0.01$) than the corresponding increase in RAR activity in *Group 2a*. Also, the airway resistance increased significantly from 0.0416± 0.0040 to 0.0633 ± 0.0055 $cmH_2O/s/mL$ ($p<0.01$), an increase by more than 50%, suggesting the early asthmatic response. After 30 minutes, there was complete recovery and the RAR activity returned back to basal value. In this background, the ED_{50} to histamine was achieved at the dose of 0.32 mg/mL. At this dose, there was a significant increase in the RAR activity (4.93 ± 0.51 impulses/breath, $p<0.05$) which was not significantly different compared to that in *Group 1* but was significantly lower compared to that in *Group 2a* ($p<0.05$). In this group, even a lower dose of 0.16 mg/mL produced a significant increase in the activity of RARs.

Group 3 (Xanthine-xanthine oxidase inhalation) – *in vivo* generation of oxidants: The basal RAR activity before xanthine-xanthine oxidase inhalation was 0.62± 0.15 impulses/breath which was not significantly different from that in *Group 1*. After xanthine-xanthine oxidase inhalation, the RAR activity increased significantly to 1.93 ± 0.28 impulses/breath ($p<0.05$) which was significantly higher ($p<0.01$) than the RAR activity after saline inhalation in *Group 1*. After 30 minutes, there was complete recovery and the RAR activity returned back to basal value. In this background, the ED_{50} to histamine was achieved at the dose of 0.16 mg/mL. At this dose, there was a significant increase in the RAR activity (2.17± 0.60 impulses/breath, $p<0.05$) which was not significantly different (impulses/breath) compared to that in *Group 1*.

These results indicate that there is sensitisation of RARs to histamine in a guinea pig model of asthma and this response is attenuated by oral intake of anti-oxidants.

2. Further studies on the effects of anti-oxidants in patients with obstructive sleep apnoea syndrome (OSAS)

The main objectives of the present study were: *i)* to confirm that there is oxidative stress in patients with OSAS, *ii)* to determine the beneficial effect of the anti-oxidant grape seed extract (GSE) in these patients.

Among the 2975 new patients attending the OPD at VPCI, 26 patients who satisfied the inclusion, exclusion criteria and who had an Epworth sleepiness score ESS) >10 were included in the study. Of these 26, only 20 patients stayed for the entire duration of the study. These patients were randomly divided into two groups of 10 each. In one group (Placebo group), the patients were put on placebo orally for 5 weeks. In the other group (GSE group), the patients were put on GSE (300 mg once a day) for 5 weeks orally. The status of the patients was assessed by the questionnaire given at the beginning and end of the study. Similarly, a split night sleep study (diagnostic + titration done on the same night) was done in the beginning and at the end of the study. Early morning fasting venous blood samples were collected before and after the drug treatment for determination of oxidant-anti-oxidant parameters. Blood pressure was measured at the start and end of the study also.

The mean age of the patients was 45.6±3.7 years in the placebo group and 41.1±3.3 years in the GSE group. The body weight and the BMI did not change in both the groups after the treatment period. There were decreases in the GSE group alone in the ESS, AHI, and the CPAP pressure required to keep the upper airway patent. In patients of both the groups, there was a significant increase in basal levels of lipid peroxidation products and a significant decrease in total reduced glutathione. A significant reversal in their levels was noted in the GSE group alone after the treatment period.

The results establish that there is oxidative stress in patients with OSAS and oral intake of the anti-oxidant GSE has therapeutic potential in them.

3. Initiation of the project "Hypothalamic control of high altitude pulmonary oedema"

4. Initiation of the project "Higher nervous control of pulmonary renal reflex"

5. Comparative evaluation of cardio-respiratory responses during six-minute walk test (6MWT) in chronic obstructive pulmonary disease and interstitial lung diseases

The 6MWT is a self-paced test which quantifies exercise capacity in terms of the distance walked in six minutes (6MWD). Since cardio-respiratory pathophysiology of COPD and ILD is different, responses of cardio-respiratory parameters such as dyspnoea, heart rate and degree of desaturation during the assessment of functional exercise capacity is likely to vary. The standard application of the 6-minute walk test does not take into account these differences. Since the range of responses is wider; a comprehensive evaluation of these parameters may provide more clinically relevant information of the disease.

This study is planned to investigate, *a)* Is there any difference in the cardio-respiratory responses of patients of COPD and ILD during 6MWT? and *b)* How are the cardio-respiratory responses during 6MWT related to severity of lung function data in terms of spirometry & DLCO?

6. Effect of pulmonary rehabilitation on cardiac autonomic dysfunction in chronic obstructive pulmonary disease

There is evidence that pulmonary rehabilitation programme improves exercise capacity and has

beneficial effects on dyspnoea, functional exercise capacity and health-related quality of life. Exercise training has also been reported to have a positive effect on autonomic modulation in cardiac patients and explains the well-documented prognostic improvement in this population.

Though improvement in autonomic nervous control after aerobic exercise training in patients with COPD has been reported, still it remains a relatively unexplored area and to address this gap, the present study is planned to evaluate the effect of pulmonary rehabilitation programme on the cardiac autonomic dysfunction.

Pulmonary Medicine

The Department of Pulmonary Medicine (earlier named as Department of Respiratory Medicine and prior to that Department of Clinical Research) was initiated by Prof. R. Viswanathan, the founder Director of VPCI around 1956. Prof. Vishwanathan along with Dr D.N. Shivpuri started work on the problems of bronchial asthma. This fundamental work has drawn the attention of physicians all over India and now there are number of centers; government as well as private, which are carrying out this work along the path and the direction shown by the Institute. Prof. R. Viswanathan was the first HoD of the Department followed by Prof. O. P. Jaggi and now Prof. S.N. Gaur.

The Department is involved in the patient care (Outdoor and Indoor) at Viswanathan Chest Hospital (VCH), the clinical wing of VPCI. The faculty is involved in individual research and theses work on different aspects of respiratory diseases as well as teaching of the postgraduate students in the subject – Pulmonary Medicine (DM, MD and DTCD) of University of Delhi. The Department conducts routine lectures, clinical demonstrations along with seminars, clinical meetings and journal clubs, ICU meetings, mortality meetings etc., regularly, as a part of teaching curriculum. The VCH has 24-hour emergency services.

Research

During the year, the following research activities were done;

- Body mass index and quality of life in different CT phenotypes in male patients of COPD: a comparative study,
- Study of cardiac autonomic dysfunction in chronic obstructive pulmonary diseases,
- To compare the inflammatory mediator profiles, pulmonary function tests and skin reactivity in obese and non-obese bronchial asthma patients,
- Comparison of mometasone furoate and ciclesonide aqueous nasal spray in adult allergic rhinitis patients,
- Effect of pulmonary rehabilitation on systemic inflammation, oxidative stress and functional status in chronic obstructive pulmonary disease,
- A study to evaluate the occurrence of metabolic syndrome in chronic obstructive pulmonary disease,
- Effect of pulmonary rehabilitation on systemic inflammation, muscle mass and function status in interstitial lung diseases,
- Correlation of the partial pressure of arterial carbon dioxide, End-Tidal carbon dioxide and transcutaneous carbon dioxide in patients with respiratory diseases,
- Assessment of nutritional status in COPD and asthma,
- Assessment of health related quality of life and work productivity in school going children with allergic rhinitis and/or asthma,
- Pattern of respiratory diseases and associated co-morbidities in patients attending Vallabhbhai Patel Chest Institute.
- Sensitisation with selected fungi in patients of asthma and chronic obstructive pulmonary disease and its correlation with Skin Prick testing and clinical presentation,
- To determine the occurrence and effect of nasal polyps in patients with bronchial asthma and/or allergic rhinitis,
- Effect of pulmonary rehabilitation on systemic inflammation, muscle mass and functional status in post tuberculosis sequelae,
- Effect of Ipratropium and Salbutamol on heart rate variability in chronic obstructive pulmonary disease,
- Study of sinonasal involvement in patients of interstitial lung diseases.

Radiodiagnosis and Imaging

The Department continued to provide routine diagnostic services to the patients attending the Viswanathan Chest Hospital of the Institute. The Department consists of three units:

i) CT Scan Unit,
ii) Ultrasound Unit and
iii) X-ray Unit.

***(i)* CT Scan Unit**

CT scanning is carried out using 64 slice CT scanner. A total of 2856 CT examinations were done during the period as per the details given in Table 1.

Table: 1: Number and type of CT examinations performed

Examination	**Number**
Chest CT	1447
PNS CT	1287
Others	14
CT guided FNAC	108
Total	**2856**

***(ii)* Ultrasound Unit**

A total of 424 Ultrasound examinations were done during the period as per the details given in Table 2.

Table: 2: Number and type of Ultrasound examinations performed

Examination	**Number**
Chest USG	265
Abdomen USG	112
USG guided FNAC	47
Total	**424**

***(iii)* X-Ray Unit**

A total of 22059 X-ray examinations were done during the period as per the details given in Table 3.

Table: 3: Number and type of X-ray examinations performed

Examination	**Number**
Chest X-ray (adult)	18018
Chest X-ray (child)	2001
PNS X-ray	2040
Total	**22059**

The Department continued to function on all holidays for emergency, indoor and ICU patients.

Respiratory Allergy and Applied Immunology

Research

1. Isolation and characterisation of a 28 kDa major allergen from blackgram (*Phaseolus mungo*)

Legumes are the major elicitors of IgE-mediated food allergy in many countries of the world. Purified major allergens are prerequisite for component resolved diagnosis of allergy. The present study was aimed to isolate and characterise a major allergenic protein from blackgram (*Phaseolus mungo*). Respiratory allergy patients with history of blackgram allergy were skin prick tested (SPT) and sera were collected from SPT positive patients. The blackgram extract was fractionated using a combination of anion exchange and hydrophobic interaction chromatography. The purified protein was characterised by indirect ELISA, immunoblot, ELISA inhibition, SPTs, stripped basophil histamine release, lymphoproliferation assay and digestibility assay. The purified protein separated at 28 kDa on 12% gel and showed IgE binding with 81% of blackgram hypersensitive patients' sera on immunoblot indicating it to be a major allergen. Periodic acid schiff's and meta-periodate treatment staining detected it to be a glycoprotein. The 28 kDa protein recognised 7/9 (77.8%) of blackgram positive patients by SPT, where as all nine patients showed significant histamine release on stimulation with protein as compared to controls. The 28 kDa protein remained stable up to 15 min on incubation with SGF. Bands of 14-16 kDa appeared after 15 min of pepsin digestion that remained stable up to 60 min of incubation. However, purified protein degraded within 5 min after incubation with SIF. The N-terminus-12 residues sequence of 28 kDa protein was GRREDDYDNLQL. A stretch of residues 'DDYDNLQL' showed homology with Rho-specific inhibitor of transcription termination (E = 0.42, Identity = 87%) and NBS-LRR type disease resistant protein from peanut (*Arachis hypogaea*) (E = 2, Identity = 77%). In conclusion, the purified 28 kDa protein is a potent major allergen that may have implication in diagnosis of black gram allergy.

2. A study of skin sensitivity to various food allergens in patients of bronchial and/or allergic rhinitis in India

Food allergy can manifests as adverse reactions of the gastrointestinal tract and the skin, including atopic dermatitis, acute urticaria and rarely life-threatening anaphylaxis. Food allergens are also known to trigger asthma and allergic rhinitis in atopic individuals. Food sensitisation in early infancy could lead to the development of respiratory allergy (bronchial asthma and/or allergic rhinitis). Skin allergy testing *via* skin prick test is a useful method to demonstrate hypersensitivity to a specific food antigen, which can be useful in treating patients.

To study the food allergen patterns in sensitive patients with respiratory allergy (bronchial asthma and/or allergic rhinitis) in India.

A retrospective study was conducted in patients with bronchial asthma and/or allergic rhinitis, attending department of respiratory medicine at Vishwanathan Chest Hospital, Vallabhbhai Patel Chest Institute, Delhi, India. Allergy testing was performed during the period of August 2008 to September 2011. A total of 53 patients consisting of 25(47.17%) males and 28(52.83%) females, were included in the study. Diagnosis of bronchial asthma and allergic rhinitis was made according to the GINA & ARIA guidelines respectively. Skin prick test was done with 66 different types of food allergens. Buffered saline and histamine were used as negative and positive controls respectively. Skin prick test was done by applying a drop of antigen on forearm, and pricking it with 26.5 gauge needle. Reading was interpreted after 15 to 20 minutes.

There were 25(47.17%) males and 28(52.83%) females. The maximum number of patients 18(33.96%) were between age group 20 to 29 years. Patients diagnosed with bronchial asthma were 10(18.87%), allergic rhinitis was 13(24.53%) and both bronchial asthma and allergic rhinitis were 30(56.60%). Significant skin positive reactions (2+ and above) were found in 20(37.74%) subjects which included 2(3.77%) patients of bronchial asthma, 5(9.43%) patients of allergic rhinitis and 13(24.53%) patients of bronchial asthma and allergic rhinitis both. The younger adults aged 20-29 years were the most commonly affected group with 9(16.98%) significant skin positive patients.

Most common food allergen was dal moong(9.43%) followed by dal arhar, dal moth, lobia, mustard leaves and almonds with 7.55% each, followed by rajma, dal raungi, ground nut, pista, beans, coconut dry,

onion and milk with 5.66% each, followed by jowar, kabuli chana, licorice, soyabean flour, cabbage and garlic with 3.77% each, followed by baker's yeast, cardamom small, coffee beans, coriander, dal masoor, mustard, saunf, sauth, wheat, cheeku, dhania leaves, orange, papaya, potato and radish with 1.89% each. Among non-vegetarian foods, prawn elicited positive skin prick test in 7.55% patients, followed by chicken 3.77% and egg white 1.89%.

The study concluded that 37.74% were sensitive to various types of food allergens which included 3.77% patients of bronchial asthma, 9.43% patients of allergic rhinitis and 24.53% patients of bronchial asthma and allergic rhinitis both. Sensitisation was most common in the younger age group 20 to 29 years with 16.98% patients. Dal moong (9.43%) was most common food allergen followed by dal arhar, dal moth, lobia, mustard leaves and almonds with 7.55% each. Among non-vegetarian foods, prawn elicited positive skin prick test in 7.55% patients.

3. Effect of indoor air pollution on health of children in biomass fuel- using house - holds in rural area

Indoor air pollution is recognised as an important cause of potential health risks to exposed populations throughout the world. Most significant source of indoor air pollution in developing countries is combustion of solid fuels, including biomass (wood, dung, and crop residues) or coal used for cooking and heating. The particulate matter <2.5µm in diameter (PM2.5), also called "fine" particle, are an important indicator of indoor air pollution.

To study correlation between respiratory illnesses related symptoms in children and level of particulate matter (PM2.5) in indoor air.

Questionnaire based survey of children from forty households was done for respiratory illness related symptoms in a village (Khanpurjupti Delhi-NCR). Simultaneous assessment of PM2.5 level in these houses was done using UCB Particle and Temperature Sensor (UCB-PATS), Berkeley Air monitoring group, USA. The instrument was kept for 24hrs in these houses and continuous reading of PM2.5 levels was done. The result was analysed statistically.

There were a total of 152 children from the 40 households included for the study. Out of these 29 children belonging to 20 houses had history of respiratory illness related symptoms. The PM2.5 level in the 40 households had an average minimum value of 2.52 µg/m3 and average maximum value of 17.62 µg/m3. In the 20 houses having children with respiratory symptoms, the PM2.5 level had average minimum value of 3.91 µg/m3 and average maximum value of 18.50 µg/m3. The PM2.5 level had average minimum value of 1.05 µg/m3 and average maximum value of 16.74 µg/m3 in the remaining 20 houses (with no children having respiratory symptoms). The PM2.5 values in the houses with children having respiratory symptoms were high than other houses.

Indoor air pollution from biomass fuel combustion result in increased level of PM2.5 in indoor air and is responsible for increase respiratory illness in children.

4. Asthma severity and obstructive sleep apnoea in adults

Obstructive sleep apnoea (OSA) has been reported to occur with increased frequency in asthma patients. Also, studies have found association of OSA with asthma symptoms and severity.

Patients with asthma underwent spirometry and were categorised into mild, moderate and severe obstruction. OSA symptoms were evaluated by Epworth Sleepiness Scale (ESS) and Berlin Questionnaire (BQ). Patients having high risk for OSA by ESS and BQ underwent home based sleep study. Skin prick test (SPT) against common allergens was done to diagnose atopy.

The study recruited 449 asthma patients comprising of 237(52.78%) males and 212 (47.21%) females. ESS was positive in 12% (54/449) and BQ was positive in 18% (79/449 of patients. SPT was positive in 90% (181/200) of patients. In the BQ positive asthma patients (79) SPT was positive in 66% (28/48 who underwent SPT). Out of 79 BQ positive patients, 18 underwent home sleep study and 16 were found to have OSA. Severe OSA was present in four, moderate in three, mild in nine. On spirometry of these (18), eight had mild obstruction, five moderate and five severe. Mild OSA patients (9) had mild obstruction in four, moderate in three and severe in two. In moderate OSA, one had moderate and two had severe obstruction. There was three and one

patient with mild and moderate obstruction, respectively in severe OSA group. With normal sleep study, one had severe and one mild obstruction. There was no correlation statistically in asthma severity and OSA severity.

There is high prevalence of obstructive sleep apnoea in asthma patients. Association of severity of asthma with severity of OSA needs further studies to find correlation, if any.

5. Trace elements in indoor airborne particulate matter of Delhi and its effects on respiratory allergy among children

Respiratory allergy in children has become a major public-health problem in developed and developing countries. Several epidemiological studies have investigated the association between exposure to air pollutants and respiratory allergy and found prevalence of allergic diseases have increased with air pollutants in Western developed countries. Air quality in Delhi is poor and airborne particulate concentration routinely exceed.

The present study was undertaken in Shahdara and Shahzada Bagh industrial locations of Delhi with the primary objective to determine the trace elements in indoor suspended particulate matter (SPM) and its effects on respiratory allergy in children.

Indoor SPM level was measured by the Handy Air Sampler (Low Volume Sampler) with 1 LPM (liter per minute) flow rate. The concentration of toxic elements was determined in indoor SPM using atomic absorption spectrometer (AAS). Respiratory health status of children was evaluated with history, examination and spirometric evaluation.

In total, 831children (59.7% male and 40.3% female) between ages 7 to 15 years were examined. Among these, 33.8% children were exposed to environmental tobacco smoke (ETS). Diagnosis of asthma, rhinitis and upper respiratory tract infection (URTI) was made in 11.8%, 38.9% and 36.2% respectively. The mean indoor SPM level was 1080±482 g/m3. Trace elements including Cr, Co, Ni, Pb, Cu, Zn, Mo and Cd were identified in the indoor SPM. The mean level of indoor SPM was high in the houses of Shahdara and Shahzada Bagh industrial areas of Delhi where children had asthma, rhinitis and URTI. The mean concentration level of Cr, Ni, Pb, Zn and Cu was significantly high in the houses where children had asthma. The mean concentration level of Cr, Co, Pb and Cu was significantly high in the houses where children had rhinitis. The mean concentration level of Cr, Pb and Cu was also significantly high in the houses where children had URTI. Cobalt and lead was statistically significantly high in the houses where environmental tobacco smoke exposure was present.

High concentration level of indoor SPM with presence of trace elements including chromium, cobalt, lead, copper, nickel and zinc may cause the respiratory diseases including asthma, rhinitis and upper respiratory tract infection in children.

6. Obstructive sleep apnoea in asthma and COPD patients and its relation to atopy

High prevalence of obstructive sleep apnoea (OSA) symptoms has been reported in patients with asthma and chronic obstructive pulmonary disease (COPD). This study was done to study occurrence of obstructive sleep apnoea amongst middle aged COPD and asthma patients and its relation to atopy.

Patients with asthma and COPD were evaluated for OSA symptoms by Epworth Sleepiness Scale (ESS) and Berlin Questionnaire (BQ). Patients having high risk for OSA by ESS and BQ underwent home based sleep study. Skin prick test (SPT) against common allergens was done to diagnose atopy.

Among 565 patients (337, 60% male and 228, 40% female) 449 were asthma and 116 COPD patients. ESS was positive in 12% (54/449) of asthma and 14% (17/116) of COPD patients. BQ was positive in 18% (79/449 of asthma and 16% (19/116) of COPD patients. SPT was positive in 90% (181/200) of asthma compared to 10% (20/201) of COPD patients. In the BQ positive asthma patients (79) SPT was positive in 66% (28/48 who underwent SPT), whereas in COPD (19) it was positive in 71% (5/7 who underwent SPT). Out of 98 BQ positive patients, 19 underwent home sleep study and 17 were found to have OSA. Thirteen patients from home sleep study group (19) underwent SPT, nine were found to be atopic (69%).

There is high prevalence of obstructive sleep apnoea amongst middle aged COPD and asthma patients. Also, there is strong association between OSA and atopy.

7. Relationship of atopy and exhaled nitric oxide in patients of allergic rhinitis

Fractional exhaled nitric oxide (FeNO) is an established non-invasive marker for assessment of airway inflammation. However, the effect of atopy on levels of nitric oxide is still a matter under study.

The objective of the study is to investigate the relationship, if any between atopy and FeNO in patients of allergic rhinitis.

Thirty-eight patients of allergic rhinitis were assessed for atopy and exhaled breath analysis of nitric oxide. Atopy was assessed by skin prick testing (SPT) against 58 common aero-allergens, with a wheal size of ≥3 mm as compared to buffer saline being positive. Patient is said to be atopic if at least one SPT result is positive, rest being labelled as non-atopic. The measurement of FeNO level was done by using NIOX chemiluminescence analyser.

There were 24 male and 14 female patients. The age group was from 8 years to 50 years with mean age of 22 years. After the SPT results, 22 patients were classified as atopic and 16 non-atopic. FeNO levels were assessed in patients of both the sub-groups, the average value being 20.65 ± 13.10 ppb. The levels in atopic patients were 25.13 ± 12.79 ppb. When compared to levels in non-atopic patients 14.5 ± 11.14 ppb, the FeNO levels in atopic patients were significantly higher with statistical correlation (p = .009). However, no correlation was found between the number of SPT positives and levels of FeNO.

The FeNO levels in atopic rhinitis patients were significantly higher than non atopic. The interpretation of FeNO in clinical practice should take in account the atopic status of the patient.

8. Effect of pulmonary rehabilitation on gas exchange, muscle cross section area and functional parameters in interstitial lung disease

Pulmonary rehabilitation has an important role in the management of interstitial lung diseses (ILD). This study evaluates effect of pulmonary rehabilitation on gas exchange, muscle cross sectional area and functional parameters in patients of ILD.

To evaluate 6-minute walk distance (6MWD), Mid Thigh Cross Sectional Area on CT ($MTCSA_{CT}$) and Carbon Monoxide Diffusion Capacity (DLCO) before and after pulmonary rehabilitation in patients of ILD.

Twenty-eight patients of ILD were randomly allocated to Control and Test groups. The control group received standard medications for 8 weeks while the test group was given supervised pulmonary rehabilitation along with standard medications for 8 weeks.

Mean values of 6MWD changed from 476.50±61.97m to 482.64±58.33 m in control group [p=0.369] and from 455.64±63.55m to 509.78±69.03m in test group [p=0.015].

Levels of DLCO changed from 11.88±4.38 mL/min/mmHg to 11.62±4.00 mL/min/ mmHg in control group [p=0.399] and from 10.80±3.73 mL/min/mmHg to 13.08±3.87 mL/min/mmHg [p=0.004] in test group.

Mean values of $MTCSA_{CT}$ changed from 9311.21±1987.21cm^2 to 9271.07± 1918.42 cm^2 in control group [p=0.646] and from 9485.21±2083.44cm^2 to 10330.71±2137.41cm^2 in test group [p=0.031].

The difference of means between control and test groups after pulmonary rehabilitation was significant for DLCO, $MTCSA_{CT}$ and 6MWD. Positive correlation was obtained between $MTCSA_{CT}$ and 6MWD [r=0.7, p=0.006].

Pulmonary rehabilitation causes significant improvement in muscle cross sectional area and functional parameters in ILD patients along with significant improvement in gas exchange.

Respiratory Virology

Research

1. Study of antigenic diversity and cross-reactive antibody generation to influenza virus in human samples

Influenza virus poses considerable economic burden both on the society and individuals in terms of consumption of health care resources and loss of productivity. The rapid spread of the disease, high attack rates in all age groups and occurrences of epidemics and pandemics continue to evolve new antigenic variants. Therefore, a continual evaluation of the genetic changes in the two surface proteins [haemagglutinin (HA) and neuraminidase (NA)] of the circulating influenza virus strains is very important. The assessment of pre-existing immunity in humans is also a defining factor in the prevention of another pandemic spread in the human population.

In this study, we aim to monitor the nucleic acid diversity in currently circulating strains of influenza virus isolates and analyse the antibody and cross-reactive antibody titers in human population. Till now, a total of 208 nasal and throat swabs have been collected from the patients at emergency rooms of Viswanathan Chest Hospital (VCH), VPCI, OPD of Kalawati Saran Children's Hospital and Base Hospital, Delhi Cantonment. Of the 208 samples, 39 patients were found to be infected with influenza A virus. The sub-typing of influenza virus positive samples was done by real time RT-PCR and it was found that three samples were positive for H1N1 (2009), eight for seasonal H1N1, 10 for H3N2 and four samples for both H3N2 and seasonal H1N1. Full length HA gene of all the positive samples was amplified and sequenced for phylogenetic analysis. The phylogenetic tree was constructed with NJ method it was observed that influenza H3N2 strain was more similar to A/Brisbane/11/2010, but bears to same clade as A/Pennsylvania/41/2010, placed with 96 bootstraps whereas another H3 positive sample (RV-51) was comparable to A/ south corolina/11/ 2010, shown to create a new clade on the tree. On the basis of this data, we generated the 'amino acid difference table' to analyse the patterns of changes with respect to the rest of strains. We also studied the N-Linked glycosylation sites with the help of Cubit applications software. The HA protein of sample RV-51 was found to have higher number (12) of glycosylation sites as compared to the HA of other samples.

The cross-reactive antibody titers were also measured in the blood sera of influenza A virus positive patients. While the serum antibodies of patients infected with pH1N1/09 virus or seasonal H1N1 virus were found to cross-react with the H3 and/ or sH1 antigen at 2 to 4- fold lower titers, the cross reactive antibody titer of the H3N2 positive sample was 4- fold higher with sH1 antigen.

2. Catalytic nucleic acid mediated gene silencing of M2 ion channel of influenza viruses

Since 1918, Influenza virus has become the major cause of morbidity and mortality, especially among the young children. Influenza A and C infect multiple species, while influenza B almost exclusively infects humans. The influenza A genome has attracted special attention as it has undergone may genetic drifts and shifts to give rise to pandemics in the past. The type A virus contains eight pieces of segmented negative-sense RNA (13.5 kilobases total), which encode 11 proteins (HA, NA, NP, M1, M2, NS1, NS2, PA, PB1, PB1-F2, PB2) necessary for the propagation of influenza virus in the host cell.

The RNA segment 7 of influenza A and B viruses encodes a membrane protein called the matrix protein playing crucial role in the virus life cycle. Any antiviral strategy that aims at reducing, in particular, the expression of this genome segment should, in principle, reduce the infectivity of the virus. We developed a specific antiviral approach at the molecular level and designed several novel 10–23 DNAzymes (Dz) and hammerhead ribozymes (Rz), specifically targeted to cleave at the conserved domains of the influenza virus M1 RNA. We sought to use antisense molecules with the hope that it will facilitate the ribozyme-mediated cleavage. We observed that the Mg^{2+} dependent sequence specific cleavage of M1 RNA was achieved by both the Dz and Rz in a dose-dependent manner. This combination of catalytic Dz and Rz with antisense molecules, in principle, resulted in more effective gene suppression, inhibited the whole virus replication in host cell, and thus could be exploited for therapeutic purposes. Since M2 is a spliced part of M1 protein and their gene segments are partially overlapping, the same approach is being followed for post transcriptional gene silencing by down-regulating the M2 transcript of influenza viruses.

3. Generation, characterisation and biological relevance of human monoclonal antibodies against pandemic influenza 2009 (H1N1) and seasonal influenza virus

Influenza viruses cause millions of cases of severe illness each year, thousands of deaths and considerable economic loss. Currently, two main countermeasures are used against influenza. First, small molecule inhibitors of the neuraminidase surface glycoprotein and the viral ion-channel M2 have been widely used and proven to be quite effective against susceptible strains. However, resistance to these antivirals has reduced their effectiveness and mutations associated with oseltamivir and amantadine are widespread. The second main countermeasure is vaccination. Current vaccines that are based on inactivated viruses elicit a potent immune response against viruses that are closely matched to the vaccine strain. While these vaccines are protective against vaccine viruses they are not effective against newly emerging viruses that contain antigenic variations known as antigenic drift and shift. In nature, environmental selection pressure generally plays a key role in selecting antigenic changes in the antigen determining spots of haemagglutinin, resulting in changes in the antigenicity of the virus.Virus specific IgG+ antibody-secreting B cells from infected individuals have been extensively used to generate high affinity monoclonal antibodies. The monoclonal antibody technology holds great promise for the development of effective passive antibody therapy to limit the spread of influenza viruses in a timely manner.

In this study, blood samples from influenza positive patients have been collected for peripheral blood mononuclear cells (PBMCs) and serum isolation. The serum samples of all the subjects were characterised by ELISA (enzyme linked immunosorbent assay) and haemagglutination Inhibition assay (HAI) for the determination of serum titer of influenza specific antibodies. PBMC's were isolated by from subjects showing high serum titer of antibodies by ELISA. Human lymphocytes were stimulated for transformation using TLR agonists CpG ODN 2006 and supernatants from persistently infected and transformed B95-8 cells containing Epstein-Barr virus. The transformed lymphocytes are presently being fused with HMMA2.5 cells (human-mouse heteromyeloma) for the generation of monoclonal antibodies.

4. Generation, characterisation and epitope mapping of recombinant monoclonal antibodies against pandemic influenza 2009 (H1N1)

The pandemic influenza 2009 (H1N1) reached pandemic proportions in a very short time and caused considerable socio-economic loss. Presently, there are no effective methods to contain this newly emerged virus. Therefore, a proper and clear insight is required to prevent an outbreak in the future and make preparations that may be planned well in advance. This study is an attempt towards generating therapeutic measures that may be taken to fight the danger of a global pandemic. The study aims to generate influenza virus neutralising monoclonal antibodies that will be selected from an antibody phage display library constructed from B cells of Balb/c mice infected with pandemic H1N1 and seasonal influenza virus. The antibodies will be characterised *in vitro* and used for epitope mapping of influenza virus antigens. Balb/c mice were hyperimmunised with the inactivated pandemic 2009 (H1N1) virus and their spleen was collected for isolation of total cellular mRNA. The cDNA was synthesised from the RNA sample and subjected to amplification of variable light chain (VL) and variable heavy chain (VH) genes using mouse IgG library primer set. The VL and VH genes were cloned and currently they are being screened for expression in bacterial system.

5. Construction and characterisation of functional ScFv antibodies against NP and NS1 proteins of pandemic influenza H1N1 (2009) virus

The nucleocapsid protein (NP) and the non-structural protein (NS1) of influenza A virus are among the two very important proteins for virus propagation in the host cell. The NS1 protein of the virus helps them to escape from the host immune system and to exploit the host machinery for the efficient propagation of the virus while the NP protein interacts with the viral RNA segments forming the RNP complex crucial for the transcription and replication of the vRNA. In this study, we have targeted the NP and NS1 proteins of influenza A virus for the development of recombinant antibodies. NP and NS1 genes have been amplified by polymerase chain reaction (PCR) from pandemic H1N1 (2009) viral RNA and cloned in mammalian expression vector. The clones are being screened for their expression in bacterial as well as mammalian systems. Simultaneously, the antibody heavy and light chain genes have been amplified from the spleen cells of hyper immunised mice. The genes have been cloned in both plasmid and phagemid vectors as a ScFv cassette. The clones are presently being screened for production of antibodies in different bacterial expression hosts.

6. A study of viral replication inhibition by down regulation of NS1 gene of influenza A virus

Non-structural protein 1 (NS1) of influenza A viruses counteracts the host immune response against the influenza viruses by not only inhibiting the nuclear export and maturation of host cell messenger RNA (mRNA), but by also blocking the dsRNA-activated protein kinase (PKR) mediated inhibition of viral RNA (vRNA) translation. Reduction of NS1 gene product in the host cell may be a potent antiviral strategy to provide protection against the influenza virus infection. We used siRNAs synthesised against the viral mRNA to down regulate the NS1 gene and observed its effect on inhibition of virus replication. When NS1 gene specific siRNA were transfected in Madin-Darby canine kidney (MDCK) cells followed by influenza A virus infection, approximately 60% inhibition in intracellular levels of NS1 RNA was observed. When siRNA was administered in Balb/c mice, 92% reduction in the levels of NS1 gene expression in mice lungs was observed. A significant reduction in the lung virus titers and cytokine levels was also detected in the presence of siRNAs as compared to the untreated control. The study was validated by the use of selectively disabled mutants of each set of siRNA. Our findings suggest that siRNA targeted against NS1 gene of influenza A virus can provide considerable protection to the virus infected host cells and may be used as potential candidates for nucleic acid based antiviral therapy for prevention of influenza A virus infection.

7. Antiviral effect of chemical compounds on pandemic influenza H1N1 (2009) virus propagation: an *ex vivo* study

The effective antiviral approaches with novel mechanisms of action are required to combat emerging and re-emerging influenza virus strains. In this study, we analysed the effect of chemical compounds, chloroquine and nitazoxanide, on replication of pandemic influenza H1N1 (2009) virus (pH1N1/2009) in MDCK cell line. Different concentrations of chloroquine (with or without NH_4Cl) or nitazoxanide were incubated with pH1N1/2009 virus infected MDCK cells and subjected to cell viability and RT-PCR assays for determination of their antiviral potential. A limited propagation of virus was observed in the compound-treated cells as compared to the virus controls.

Apart from these two compounds, we are also analysing the antiviral efficacy of certain novel chemical compounds for both seasonal and pandemic influenza viruses. Till now, we have screened a total of 12 compounds, out of which five have shown antiviral activity. Approximately, 45-60% inhibition of viral replication has been achieved using these compounds under *ex vivo* conditions.

Postgraduate Training and Teaching

The Institute was initially started with a Diploma course in Tuberculosis and Chest Diseases (DTCD). Later the MD and PhD courses were started. The Institute continues to conduct the DTCD course, MD courses in pulmonary medicine, biochemistry, microbiology, pharmacology and physiology, and PhD programmes (Medical Sciences) in various specialities relating to chest medicine and allied branches, *e.g.*, allergy and immunology, bacteriology, pulmonary medicine, mycology, pharmacology, physiology, virology, etc. During the year, the admission process of DM course in Pulmonary Medicine has been started.

DTCD

Session 2010 - 2012	Session 2011 - 2013
Dr Gaurav Jain	Dr Phalgoomi Chakma
Dr Aanchal Teotia	Dr Rajesh Karwal
Dr Mandeep Singh	Dr Pramod Tayal
Dr Aanchal Singh	Dr Shekhar Varshney
Dr Nirupam Sharma	Dr Neetima
Dr Baljeet Singh Virk	Dr Gunjan Khunger
Dr Ambika Sharma	Dr Santosh Jha
	Dr Ankur Agarwal
	Dr Anup Shilpi Khalkho
	Dr Mahammed Zuhaib

MD Degrees (Awarded)

(Session: 2008-2011)

Name	Discipline
Dr Mansi Gupta	Pulmonary Medicine
Dr R. Anandha Kumar	Pulmonary Medicine
Dr Sadananda Barik	Pulmonary Medicine
Dr Senthi S. Kumar	Pulmonary Medicine
Dr Shweta Bansal	Pulmonary Medicine
Dr Sushma Manral	Biochemistry
Dr Ankit Gupta	Microbiology
Dr Sushil Bhagwat Shendge	Pharmacology
Dr Kanimohzi S.	Physiology

MD Theses (Submitted)

(Session: 2009-2012)

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Mir Elias (Pulmonary Medicine)	Assessment of health related quality of life and work productivity in school going children with allergic rhinitis and/or asthma	Prof. Ashok Shah
2.	Dr Brijesh Prajapat (Pulmonary Medicine)	Effect of pulmonary rehabilitation on systemic inflammation, muscle mass and function status in interstitial lung diseases	Dr B.K. Menon, Dr V.K. Vijayan and Dr Vishal Bansal
3.	Dr Loveleen Sharma (Pulmonary Medicine)	Assessment of nutritional status in COPD and asthma	Prof. S.N. Gaur and Dr B.K. Menon
4.	Dr Suresh Sharma (Pulmonary Medicine)	Pattern of respiratory diseases and associated co-morbidities in patients attending Vallabhbhai Patel Chest Institute	Dr V.K. Vijayan and Dr M. Rahman
5.	Dr Chandrakant Raosaheb Tarke (Pulmonary Medicine)	Correlation of the partial pressure of arterial carbon dioxide, End-Tidal carbon dioxide and transcutaneous carbon dioxide in patients with respiratory diseases	Prof. Raj Kumar and Dr V.K. Vijayan
6.	Dr Neetu Beetan (Biochemistry)	Investigations on the role of polyphenolic acetates and calreticulin in hyperacetylation induced apoptosis in mice	Dr Vishwajeet Rohil
7.	Dr Ashima Jain (Microbiology)	Rapid molecular typing and Th1-Th2 cytokine profiling in patients suffering from tubercular lymphadenopathy	Prof. Mridula Bose and Dr Mandira Varma-Basil
8.	Dr Saurabh Bhatia (Pharmacology)	A clinical study to compare the efficacy, safety and plasma levels of two doses of theophylline in patients of bronchial asthma	Dr Kavita Gulati, Dr V.K. Vijayan and Prof. A. Ray
9.	Dr Rajeev Ranjan Mishra (Physiology)	Role of epithelium in the airway responses to hyperosmotic solutions in normal and sensitised guinea pigs	Dr Vishal Bansal, Prof. K. Ravi and Dr Ritu Kulshrestha

MD Theses (Pursued)

(Session: 2010-2013)

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Kshitiz Aggarwal (Pulmonary Medicine)	Sensitisation with selected fungi in patients of asthma and chronic obstructive pulmonary disease and its correlation with Skin Prick testing and clinical presentation	Prof. S.N. Gaur and Dr Anuradha Chowdhary
2.	Dr Swati Behera (Pulmonary Medicine)	To determine the occurrence and effect of nasal polyps in patients with bronchial asthma and/or allergic rhinitis	Prof. Ashok Shah
3.	Dr Seema Kumari (Pulmonary Medicine)	Effect of pulmonary rehabilitation on systemic inflammation, muscle mass and functional status in post tuberculosis sequelae	Dr B.K. Menon, Dr V.K. Vijayan, Dr Vishal Bansal and Dr Ritu Kulshrestha
4.	Dr Swapna Ramaswamy (Pulmonary Medicine)	Effect of Ipratropium and Salbutamol on heart rate variability in chronic obstructive pulmonary disease	Prof. S.K. Chhabra and Dr Vishal Bansal
5.	Dr Mayank Saxena (Pulmonary Medicine)	Study of sinonasal involvement in patients of interstitial lung diseases	Prof. Raj Kumar and Dr Ritu Kulshrestha
6.	Dr Jitender Sharma (Biochemistry)	Adenosine metabolism in bronchial asthma: a study on adenosine deaminase and 5'-nucleotidase activity and adenosine level in serum, lymphocytes and erythrocytes	Prof. S.K. Bansal, Dr V.K. Vijayan and Dr B.K. Menon
7.	Dr Dabet Rynga (Microbiology)	Phenotypic and molecular characterisation of clinical isolates of *Acinetobacter* spp.	Dr Malini Shariff and Dr Monorama Deb (V.M.M.C. & Safdarjung Hospital, New Delhi)
8.	Dr Razi Akhtar (Pharmacology)	A clinical study to evaluate the safety and efficacy of theophylline and its modulation by ascorbic acid in patients of bronchial asthma	Dr Kavita Gulati, Prof. A. Ray and Prof. S.N. Gaur
9.	Dr Puneet Kumar (Physiology)	Role of some inflammatory markers in obstructive sleep apnoea - effect of grape seed extract	Prof. K. Ravi and Dr V.K. Vijayan

MD-Ist Year
(Session: 2011-2014)

Name	Discipline
Dr Devi Jyoti Das	Pulmonary Medicine
Dr Gaki Nima	Pulmonary Medicine
Dr Nitesh Gupta	Pulmonary Medicine
Dr Shweta Paul	Biochemistry
Dr Anshu Mittal	Microbiology
Dr Poonam Sen	Microbiology
Dr Sandeep Madhukar Wankhede	Microbiology
Dr Santosh Kumar	Pharmacology

DM Theses (Pursued)

(Session: 2011-2014)

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)
1.	Dr Vikas Dogra (Pulmonary Medicine)	Body mass index and quality of life in different CT phenotypes in male patients of COPD : a comparative study	Prof. S.N. Gaur and Dr B.K. Menon

PhD Awarded/Submitted

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
1.	Mr Anil Singh Baghel (Biochemistry)	Studies on molecular cloning and expression of acetoxy drug: protein transacetylase of *M. tuberculosis* with special reference to the role of polyphenolic acetates as antituberculous drugs	Prof. H.G. Raj and Prof. M. Bose	Awarded
2.	Ms Nivedita Priya (Biochemistry)	Studies on the development of antiplatelet candidate drug	Prof. H.G. Raj and Dr A.K. Prasad (Chemistry Deptt., University of Delhi)	Awarded
3.	Mr Prashant Kumar (Microbiology)	Assessment of conserved epitopes of M1 of influenza virus fused to protein transduction domain (PTD) of Tat of HIV as a potential vaccine candidate	Dr Madhu Khanna and Dr Akhil Banerjee (NII, New Delhi)	Awarded
4.	Ms Rashmi Pasricha (Microbiology)	Functional analysis of *lprN* of *mce4* operon of *M. tuberculosis*	Prof. Mridula Bose and Prof. Vani Brahmachari (ACBR, University of Delhi)	Awarded
5.	Mr Masrat Rashid (Pharmacology)	Effect of Tadalafil (A novel phosphodiesterase-5 inhibitor) in hypoxia induced pulmonary hypertension in rats	Dr Anita Kotwani and Prof. M. Fahim	Awarded
6.	Ms Rashmi Anand (Pharmacology)	Experimental studies on the role of opioids in stress and their interactions with nitric oxide in rats	Prof. A. Ray and Dr Kavita Gulati	Awarded
7.	Ms Ruchi Bhagat (Physiology)	High altitude simulation on lung physiology and vagal afferent activity	Prof. K. Ravi and Dr Shashi Bala Singh (DIPAS, Delhi)	Awarded
8.	Mr Rakesh Pathak (Microbiology)	Role of *IspA* gene in the biology and pathogenesis of *M. tuberculosis*	Prof. Mridula Bose and Prof. Daman Saluja (ACBR, University of Delhi)	Submitted

PhD Theses (Pursued)

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
1.	Mr Rajesh Sinha (Microbiology)	Functional analysis of *mce1a* and *mce4a* gene of *Mycobacterium tuberculosis* H37Rv using overexpression approach	Prof. H.G. Raj, Prof. Mridula Bose and Dr A.K. Prasad (Chemistry Deptt., University of Delhi)	2008
2.	Mr Binod Kumar (Microbiology)	Catalytic nucleic acid mediated gene silencing of M2 ion channel of influenza viruses	Dr Madhu Khanna and Dr M.K. Daga (MAMC, New Delhi)	2009
3.	Ms Kushal Garima (Microbiology)	Expression analysis and protein profiling of drug efflux transporters in clinical isolates of *M. tuberculosis*	Prof. Mridula Bose and Dr Mandira Varma-Basil	2009
4.	Ms Nisha Rathore (Microbiology)	Regulationof expression of *mce4* operon of *M. tuberculosis:* search for upstream promoter activity and regulatory proteins	Prof. Mridula Bose and Dr Mandira Varma-Basil	2009
5.	Abhimanyu (Microbiology)	Genetic variants in the host innate and acquired immune response: search for risk loci in north Indians	Prof. Mridula Bose, Dr Mandira Varma-Basil and Dr J.N. Banavalikar (RBIPMT, Delhi)	2010
6.	Mr Anupam Prakash (Microbiology)	A study of *Cryptococcus* species in immunocompromised patients	Dr Anuradha Chowdhary and Prof. H.S. Randhawa	2010
7.	Ms Latika (Microbiology)	Generation, characterisation and biological relevance of human monoclonal Abs against pandemic H1N1 (2009) and seasonal influenza virus	Dr Madhu Khanna and Dr Sunil K. Lal (ICGEB, New Delhi)	2010
8.	Ms Roopali Rajput (Microbiology)	Construction and characterisation of functional scfv antibodies against NP and NS1 proteins of pandemic influenza H1N1 (2009) virus	Dr Madhu Khanna and Dr H.K. Pradhan (WHO, New Delhi)	2010

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
9.	Mrs Shallu Kathuria (Microbiology)	*Histoplasma capsulatum:* a study of its natural reservoirs and role in respiratory and systemic infections in immunocompromised patients	Dr Anuradha Chowdhary and Prof. H.S. Randhawa	2010
10.	Anshika Narang (Microbiology)	Efflux mechanism in *Mycobacterium tuberculosis:* to study the effect on drug susceptibility profile	Dr Mandira Varma-Basil and Prof. Mridula Bose	2011
11.	Naresh Kumar (Microbiology)	Expression analysis of an array of genes of *M. tuberculosis* clinical isolates from pulmonary tuberculosis and lymph node tuberculosis: search for mycobacterial factors associated with different clinical manifestation	Prof. Mridula Bose and Dr Mandira Varma-Basil	2012
12.	Pooja Singh (Microbiology)	Utilisation of cholesterol by *mce4A*(Rv3499) overexpressed *M. tuberculosis* H37Rv and the effect of calcium blockers	Prof. Mridula Bose and Dr Mandira Varma-Basil	2012
13.	Ms Sreemanti Guhathakurta (Pharmacology)	Studies on the possible mechanisms involved in the effects of UNIN-352, a polyherbal, anti-asthmatic Unani preparation in experimental animals	Prof. A. Ray, Dr V.K. Vijayan, Dr Kavita Gulati and Prof. B.D. Banerjee (UCMS, Delhi)	2007
14.	Mr Dhirendra K. Singh (Pharmacology)	Experimental studies with chelidonic acid, a molecule of plant origin, with possible therapeutic potential in bronchial asthma	Prof. A. Ray and Dr Kavita Gulati	2010
15.	Ms. Meenakshi Sharma (Pharmacology)	Studies on the possible role of NO in high altitutde stress induced neurobehavioural and immunological changes in rats	Prof. A. Ray, Prof. K. Ravi and Dr Kavita Gulati	2011
16.	Mr Jagdish Josh (Pharmacology)	Experimental studies on the possible role of nitric oxide (NO) during acute and chronic morphine in normal and stressed rats	Prof. A. Ray and Dr Kavita Gulati	2011
17.	Mr Nishant Rai (Pharmacology)	Experimental studies on the cellular and molecular mechanisms of action of UNIM-352, a polyherbal Unani preparation to validate its use in bronchial asthma	Prof. A. Ray and Dr Kavita Gulati	2011

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Year of Registration
18.	Mr Md. Shamsuzzaman (Pharmacology)	Studies on the mechanisms of theophylline induced cardiotoxicity in rats	Prof. A. Ray, Prof. K. Ravi and Dr Kavita Gulati	2012
19.	Mr Tarun Takhur (Pharmacology)	Pharmacological studies on the possible role of nitric oxide and NO mediated signalling pathways in the regulation of stress-induced immunomodulation in rats	Prof. A. Ray and Dr Kavita Gulati	2012
20.	Mr Anirudh Vashisht (Physiology)	Behaviour of pulmonary vagal sensory receptors with myelinated afferents during free radicals induced airway hyper-reactivity and its modulation by anti-oxidants in guinea pigs	Prof. K. Ravi, Prof. S.K. Chhabra and Prof. B.D. Banerjee (UCMS, Delhi)	2008
21.	Dr Ritu Kulshrestha (Physiology)	Pathophysiological studies in bleomycin induced pulmonary hypertension and fibrosis in rat model	Prof. K.Ravi and Prof. A.K. Dinda (AIIMS, New Delhi)	2009
22.	Mr Ravindra Sharma (Physiology)	Hypothalamic regulation of high altitude pulmonary oedema	Prof. K. Ravi, Prof. A. Ray and Dr P. Reddy (DIPAS, Delhi)	2011
23.	Mr Rishabh Charan Choudhary (Physiology)	Higher nervous control of the pulmonary renal reflex	Prof. K. Ravi and Dr Kavita Gulati	2011

Faculty Members Associated as Co-supervisors for PhD Theses of Other Institutions

Sl No.	Name (Discipline)	Title of Theses	Supervisor(s)	Status
1.	Mr Prabhjot Singh (Biochemistry)	Studies on enzymatic propionylation of proteins and related biological effects	Prof. J.K. Gambhir (UCMS, Delhi) and Prof. H.G. Raj	Awarded
2.	Ms Shipra Gupta (Biochemistry)	Studies on isolation and mechanism of action of the antihyperglycemic and hypolipdemic compound (s) from the leaf extract of *Casssia auriculata* in experimentally induced diabetic animals	Prof. S.B. Sharma, Prof. K.M. Prabhu (UCMS, Delhi) and Prof. S.K. Bansal	Awarded
3.	Ms Anju Sharma (Biochemistry)	To investigate the effect of histone hyperacetylation on the expression of genes involved in lung carcinogenesis	Prof. Jayashree Bhattacharjee VMMC and Safdarjung Hospital, New Delhi) and Dr Viswajeet Rohil	Pursued
4.	Ms Monika Joon (Microbiology)	Functional genomics of *mce* operons through the analysis of clinical isolates and knock out strains	Prof. Vani Brahmachari (ACBR, University of Delhi) and Prof. M. Bose	Pursued
5.	Ms Adila Parvin (Physiology)	Free radical mediated cardiovascular dysfunction in chronic heart failure: molecular and systemic mechanisms	Prof. Rashmi Babbar (MAMC, New Delhi) and Dr Anita Kotwani	Submitted
6.	Mr Jamal Ali Moiz, (Physiotherapy)	Effect of the addition of balance training to pulmonary rehabilitation for patients with COPD	Prof. M. Ezaj Hussain (JMI, New Delhi), Prof. S.N. Gaur and Dr Vishal Bansal	Pursued
7.	Ms Bellam Parveen (Virology)	Molecular characterisation and early detection of virus	Dr G. Narasimha (Sri Venkateswara University, Tirupati) and Dr Madhu Khanna	Pursued

Distinguished Visitors

- Dr Sanjib Bhattacharya, Chief Molecular Scientist and Principle Investigator, High Priority Pathogen Laboratory, Wisconsin (USA), participated in a scientific interaction with the Virology Research Group of Dr Madhu Khanna, Virology Department, VPCI (August 29, 2011).

- Dr P. Selvam , Professor & Head Department of Pharmaceutical Chemistry, Devaki Amma Memorial College of Pharmacy, Kerala, India, participated in a discussion and analysis of the data generated from the collaborative study on "Antiviral effect of chemical compounds" (September 15, 2011).

- Prof. Richard Vaughn-Jones, Director, Burdon Sanderson Cardiac Science Center, Department of Physiology, Anatomy & Genetics, University of Oxford, UK visited the Physiology department and interacted with the students appraised them of various scolarships available for future research at United Kingdom (October 13, 2011).

- Prof. David W, Denning, Faculties of Medicine and Life Sciences, University of Manchester, UK, Delivered a lecture entitled, "New Development in Aspergillosis" (February 7, 2012).

- Dr Jacques F. Meis, Department of Medical Microbiology and Infectious Diseases, Canisius Wilhelmina Hospital, Nijmegen, and Department of Medical Microbiology, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands, Delivered a lecture entitled, "Medical Mycology: A new kid on the block!" (February 16, 2012).

Awards/Honours

Prof. S.N. Gaur

- **"Prof. S.N. Gaur Oration Award"** instituted by the National College of Chest Physicians (India) – Rajasthan chapter from 2012.
- Awarded the **"J.J. Rao Oration Award"** of The Geriatric Society of India, at the 8th International Conference on Geriatric Care, held at Govt. Medical College and Guru Nanak Dev Hospital, Amritsar on 5th-6th November 2011. Title of the oration was, "Respiratory problems in elderly".
- Awarded the **"IFICON 2012 Oration Award"** of the Influenza Foundation of India at the King Institute of Preventive Medicine and Research, Chennai, India, held on 12th February 2012. Title of the oration was, "Role of viruses in respiratory diseases".
- **Guest of Honour** at the inaugural function of Annual International Conference of Biotechnology Society of India, BIOTECH 2012, held on 24th February 2012 at the Institute of Liver and Biliary Sciences, New-Delhi.
- **Editor-in-Chief and Publisher**, *Indian Journal of Chest Diseases & Allied Sciences*, an official publication of the V.P. Chest Institute and the National College of Chest Physicians (India).
- **Editor,** *Indian Journal of Allergy, Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **Secretary,** National College of Chest Physicians (India).
- **Secretary,** South Asia Association of Allergy, Asthma & Clinical Immunology (SAAAACI).
- **Member**, Board of Research Studies, Pt. BDS PGIMS, Rohtak.
- **Expert Member**, Workshop for preparing guidelines for management of Community Acquired Pneumonia, PGIMER, Chandigarh.
- **Member**, Advisory Board, Indian Journal of Geriatric Care.
- **Member,** Altered Immune Response (formerly, Auto-immunity, Immunomodulation and Secondary Immune Deficiency Committee), *Air Pollution and Indoor Allergen and Adverse Reaction to Food Allergy Committees,* American Academy of Allergy, Asthma and Immunology, U.S.A.
- **Member,** DOTS Plus Committee, DDG (TB), Government of India, New Delhi.
- **Member,** Standing Technical Committee, Tuberculosis Association of India, New Delhi.
- **Chairman,** Ethical Committee, New Delhi Tuberculosis Centre, New Delhi.

Prof. A. Ray

- **Invited Member,** DBT-Task Force on Medicinal and Aromatic Plants, New Delhi.
- **External Examiner** for DM (Clinical Pharmacology), P.G.I.M.E.R., Chandigarh.
- **Member,** Institutional Ethical Committee, Rajan Babu Institute of Pulmonary Medicine & Tuberculosis Hospital, Govt. of Delhi, Delhi.
- Medical Council of India **Assessor** to inspect and assess MD (Pharmacology) course at Kasturaba Medical College, Manipal. Karnataka.
- **External Examiner**, MSc (Pharmacology) at A.I.I.M.S., New Delhi.
- **Chairman**, Selection Committee for ICMR-CCRUM (Dept. of Ayush, GOI) collaborative project, ICMR, New Delhi.
- **Member**, ICMR- Fellowship Expert Group, New Delhi.

- **Member**, Expert Committee for CCRUM (AYUSH), Ministry of Health & Family Welfare, Govt. of India, New Delhi.
- **Member**, Expert Committee, CCRAS (AYUSH), Ministry of Health & Family Welfare, Govt. of India, New Delhi.
- **Expert**, FEG Member, ICMR, New Delhi.
- **Member**, Expert Committee, Ministry of Chemicals and Fertilizers, Govt. of India, New Delhi.

Prof. Mridula Bose

- **Member**, Editorial Board, International Journal of Mycobacteriology.
- **Constituent Member**, Asian - African Society for Mycobacteriology.
- **Member,** Editorial Board, *Indian Journal of Chest Diseases & Allied Sciences*, an official publication of the V.P. Chest Institute and the National College of Chest Physicians (India).
- **Patent**: Obtained a national patent for anti-TB compound No. 983/DEL/2011. International patent application filed.

Prof. Ashok Shah

- **President**, the Indian College of Allergy, Asthma and Applied Immunology for the years 2010-12.
- **Council Member**, the Asia Pacific Association of Pediatric Allergy, Respirology and Immunology (APAPARI).
- Nominated as **Co Chair**, Local Organising Committee, 2nd WISC of the WAO. The World Allergy Organisation's International Scientific Conference (2nd WISC) to be held at Hyderabad, India from December 6-9, 2012.
- Invited to be the **Guest Editor** of the October 2011 issue of the *Asian Pacific Allergy Journal* of the Asia Pacific Association of Allergy, Asthma and Clinical Immunology (APAAACI).
- **Member Society Representative** to Asia Pacific Association of Allergy, Asthma and Clinical Immunology (APAAACI) for 2011-2013.
- **Member**, World Allergy Organisation Education Council for 2012-13.
- **Editor**, *Indian Journal of Chest Diseases & Allied Sciences*, an official publication of the V.P. Chest Institute and the National College of Chest Physicians (India).
- **Associate Editor,** *Indian Journal of Tuberculosis*, an official publication of the Tuberculosis Association of India.
- **Section Editor (Infectious Diseases),** *Lung India*, an official publication of the Indian Chest Society.
- **Member,** Editorial Board, *European Respiratory Reviews.*
- **Member,** Editorial Board, *Clinical and Molecular Allergy*, a biomedical Central Journal.
- **Member,** Editorial Board, *Asian Pacific Allergy Journal* of the Asia Pacific Association of Allergy, Asthma and Clinical Immunology (APAAACI).
- **Member,** Editorial Board, *Open Allergy Journal.*
- **Member,** Editorial Advisory Board, *Chest* (Indian Edition), an official publication of the American College of Chest Physicians, U.S.A.
- **Member,** Editorial Board, *Indian Journal of Allergy, Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **Member,** Editorial Board, *Current Medical Trends*.

- **Member**, Technical Screening Committee of Biotech Consortium India Limited (BCIL) for due diligence of a project submitted by Arbro Pharmaceuticals limited, New Delhi in collaboration with All India Institute of Medical Sciences, New Delhi and LRS Institute of TB and Respiratory Diseases, New Delhi under the scheme of Small Business Innovation Research Initiative (SBIRI) of the Department of Biotechnology (DBT), Ministry of Science and Technology, GOI, 2010-2012.
- **Member**, Subgroup - Respiratory Medicine, Core Committee of Experts, for Standard Treatment Guidelines, Ministry of Health and Family Welfare, Government of India, 2011-12.
- **Member**, National Committee on "*Bibliographic Biomedical Database from Indian Literature*", Indian Council of Medical Research - National Informatics Centre, New Delhi.
- Medical Council of India **Assessor** for inspection of Mahatma Gandhi Medical College and Hospital (MGMC&H), Sitapura, Jaipur, under the Mahatma Gandhi University of Medical Sciences and Technology (MGUMS&T), Jaipur for increasing the seat in MD (Respiratory Medicine) course.
- **External Expert**, Technical Committee – LRS Institute of TB and Respiratory Diseases for purchase of cryoscopy for bronchoscopic intervention.

Prof. S.K. Chhabra

- **Editor**, *Indian Journal of Chest Diseases & Allied Sciences*, an official publication of the V.P. Chest Institute and the National College of Chest Physicians (India).
- **Member,** Editorial Board, *Indian Journal of Allergy, Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **Section Editor (Pulmonary Circulation),** *Lung India*, an official publication of the Indian Chest Society.
- **Member,** Selection Committee, Recruitment and Assessment Centre, Defence Research Deveolpment Organisation, New Delhi.

Prof. K. Ravi

- **Member,** Life Sciences Research Board, Defence Research Deveolpment Organisation, New Delhi.
- **Member,** MCI inspection Committee for Silchar Medical College, Assam.
- **Member,** Expert Committee for selection of Professor, AIIMS, New Delhi.

Prof. S.K. Bansal

- **Secretary**, Delhi Chapter - Association of Clinical Biochemists of India.
- **Member,** Executive Council (Ex Officio), Biotechnology Society of India, Since January 2011.
- **Member,** Board of Examiners in Medical Biochemistry for M.D., Faculty of Medical Sciences, University of Delhi.
- **Examiner,** Ph.D. Thesis (Biochemistry) Lucknow University, Lucknow.
- **External Examiner** for conducting the First Professional M.B.B.S. Oral and Practical Examination in Biochemistry at Chhatrapati Sahuji Maharaj Medical University, Lucknow, 25th-28th July 2011.
- **External Examiner,** Viva voce Ph.D. (Medical Biochemistry) Chhatrapati Sahuji Maharaj Medical University, Lucknow.
- **Member,** Board of Research Studies, Faculty of Medical Sciences, University of Delhi**.**

Prof. Raj Kumar

- **Member**, Editorial Board**,** *International Journal of Occupational and Environmental Health*, U.S.A.

- **Member,** Editorial Board, *Indian Journal of Chest Diseases & Allied Sciences*, an official publication of the V.P. Chest Institute and the National College of Chest Physicians (India).
- **Member,** Editorial Board, *Indian Journal of Allergy, Asthma and Immunology*, an official publication of the Indian College of Allergy, Asthma and Applied Immunology.
- **Section Editor (Occupational Disorders and Research Methods),** *Lung India*, an official publication of the Indian Chest Society.
- **Member,** Editorial Board, *Current Allergy and Asthma Report,* 2010.
- **Member,** Review Committee on Genetic Manipulation (RCGM), Department of Biotechnology, Government of India, New Delhi.
- **Joint Secretary,** Indian College of Allergy, Asthma and Applied Immunology, Delhi.
- **Treasurer,** South Asia Associacion of Asthma, Allergy & Clinical Immunology.
- **Member,** National Academy of Sciences India.
- **Secretary**, Society for Tobacco Control.
- **Member,** National Academy of Medical Sciences.
- **Member,** American Academy of Allergy, Asthma & Immunology.
- **Governing Council Member,** South Asia Thoraric Society.
- **Member,** Visiting Team for PG Medical Entrance Test, University of Delhi.
- **Member**, Interview Board of UPSC 2010 for selection of Senior Lecturer (Tuberculosis & Respiratory Diseases).
- **Head,** National Centre for Respiratory Allergy, Asthma and Immunology, V.P. Chest Insitute, 2011 onwards.
- **Resource Person**, "Review workshop on National Tobacco Control Program and COTPA, 2003". YMCA Tourist Hostel, Jai Singh Road, New Delhi.
- **Member**, Ethical Committee, Rajan Babu Institute of Pulmonary Medicine and Tuberculosis, Kingsway Camp, Delhi.
- **Friend of AAAII**, award by American Association of Allergy and Immunology of Indian Origin during AAAII meeting, Boston, Massachusetts.
- **Member**, Selection Board of DNB Candidates in respiratory medicine in Rajan Babu Institute of Pulmonary Medicine and Tuberculosis, Kingsway Camp, Delhi.

Dr Madhu Khanna

- **Editor**, *Indian Journal of Virology*.
- **Editor**, *Journal of Virology Research*.
- **Editor**, *International Journal of Immunology Research*.
- **Secretary General**, Biotechnology Society of India.
- **Joint Secretary**, International Association of Medical and Pharmaceutical Virologists.
- **Travel Grant** awarded by DST, Govt. of India to attend an international conference at Malta.

Dr Anuradha Chowdhary

- **Deputy Editor**, Mycoses, an official Journal of the Europeon Confedration of Medical Mycology.

Dr Mandira Varma-Basil

- Awarded **ICMR International Fellowship** to work in the Department of Infectious Diseases, University of Medicine and Dentistry, New Jersey, U.S.A., from January 28 – July 27, 2012).

Dr Anita Kotwani

- **Member,** Task Force Committee, Ministry of Health and Family Welfare, Govt. of India, to assess, review and suggest measures on Antimicrobial Resistance, and develop a National Antibiotic Policy.
- **Associate Editor**, International Journal of User-Driven Healthcare.
- **Technical Supervisor,** WHO, for two projects on price and availability of children medicines in Chhatisgarh and Orissa States.
- **Member,** National Working Group of the Global Antibiotic Resistance Partnership (GARP)-India.
- **Visiting Scholar** for learning Antimicrobial Stewardship Programme in the Department of Clinical Pharmacy, The University of *California*, *San Francisco* (*UCSF*), San Francisco, California, USA.
- **Member Secretary,** International Society for Pharmacoeconomics and Outcome Research (ISPOR), Indian Chapter.
- **Member**, Scientific Advisory Committee to the 1st Global Forum on Bacterial Infections: Balancing Treatment Access and Antibiotic Resistance, New Delhi.
- Interviewed as an **Expert** on antibiotic use, prices and availability of essential medicines in India by Center for Disease Dynamics, Economics & Policy, Washington DC.
- **Member**, Institute Ethics Committee (IEC), of Dr B. R. Ambedkar Centre for Biomedical Research (ACBR), University of Delhi, Delhi.
- **Member** of the Committee of Courses and Studies for Honours, Post Graduate, and Research Studies in Biomedical Sciences of Dr B.R. Ambedkar Center, Delhi University, Delhi.

Dr Malini Shariff

- **Awarded Best Paper** for Poster presentation (in general category) on 'Phenotypic testing of Beta lactamases in clinical isolates of *Acinetobacer species*' (by Rynga D, Monorama D, Shariff M.) at 4th Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter) AIIMS, New Delhi, February 25, 2012.

Dr Kavita Gulati

- Awarded **Membership** of National Academy of Medical Sciences.
- **Treasurer**, Society of Nitric Oxide and Allied Radicles.
- **Examiner** for BPharma of IP University for Pharmacology, Anatomy Physiology and Health Sciences.
- **Examiner** for BPTH and MPTH of Jamia Millia Islamia for Pharmacology.
- **Examiner**, MPharma of GTU (Gujarat Tech. University), LMCP, Ahmadabad, for Pharmacology.
- **PhD Examaminer** at LMCP, Ahmedabad, Gujarat.
- **Member,** Selection Committee for JRF and SRF and allied posts of DBT Projects New Delhi.
- **Member,** Selection Committee for Lab. Attendant post of DRDE Project, New Delhi.

Dr Vishwajeet Rohil

- I was given the **Scroll of Honour** at the Felicitation Function 2011, by University College of Medical Sciences (UCMS) & G.T.B. Hospital, Delhi for "outstanding meritorious services of the highest

standards for the cause of medical profession and in comparable contribution to humanity" on September 4, 2011.

- Elected as the **Executive Member** of Biotechnology Society of India in 2011 and appointed as Issue **Editor** for the BSI Newsletter.
- **Subject Expert** in the Selection Committee for the Walk-in interviews for Technical Assistant post on 24.12.2011 by the Department of Training and Technical Education, Govt. of NCT of Delhi.
- **External Examiner** (MLT programme) for the practical examinations for Clinical Biochemistry, Department of MLT, Integrated Institute of Technology, Dwarka, New Delhi, on 12-12-2011.
- **External Expert** for the Practical Examination / Viva Voce for B. Tech, Bioenergetics examinations, Guru Gobind Singh Indraprastha University, Kashmere Gate, Delhi.

Dr Vishal Bansal

- **Member**, Editorial Board, *Journal of Krishna Institute of Medical Sciences University*, a medical journal published by Krishna Institute of Medical Sciences University, Karad, Maharashtra.
- **Member**, Awards Committee for Surg Rear Admiral M.S. Malhotra Research Award-2010, by Defence Institute of Physiology and Allied Sciences, Delhi.
- **Member**, Awards Committee for DRDO Lab Awards and Cash Awards-2010, Defence Institute of Physiology and Allied Sciences, Delhi.

Dr M. Rahman

- **Member,** Editorial Board, *Indian Journal of Chest Diseases & Allied Sciences*, an official publication of the V.P. Chest Institute and the National College of Chest Physicians (India).

Dr Ritu Kulshrestha

- Received **Fellowship** to attend the Postgraduate Course on Lung, Mediastinal and Pleural Diseases. Department of Pathology, Medical University of Graz, Graz, Austria.
- Received **Best Paper Award** for the paper titled, "Correlation of microvascular changes of pulmonary arterial hypertension with FGF-2 expression in transbronchial lung biopsies" (by Ritu Kulshrestha, D. Soundarya), presented at the 4th Annual Conference of the Pulmonary Vascular Research Institute', South East Asia Region, Trivandrum 1-2nd October 2011.

Mr Rajesh Sinha (PhD Student)

- Awarded **Second Prize** for Poster presentation on "Cholesterol uptake in *M. tuberculosis*: The role of *Mce4A* protein" (by Rajesh Sinha, Neeraj K. Saini, Ajit Kumar, Rakesh Pathak, H.G. Raj, Mridula Bose) at the Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter-Winter Meet), New Delhi, December 3, 2011.

Mr Prashant Kumar (PhD Student)

- Awarded **'Young Scientist Award'** for oral presentation on "Matrix epitope coupled to HIV Tat protein transduction domain elicits CTLs to counter the influenza virus infection in mice" (by Prashant Kumar, Binod Kumar, Madhu Khanna) at the Conference of Association of Clinical Biochemists of India (ACBI), organised at Sir Ganga Ram Hospital, New Delhi on January 21, 2012.

Mr Binod Kumar (PhD Student)

- **Keystone Symposia Scholarship** worth US$ 1200 awarded to Mr Binod Kumar for 'Best Paper Presentation' at the Conference "Pathogenesis of influenza: virus-host interactions" organised by Keystone Symposia at Hong Kong, China on May 23-28, 2011.

- Awarded **First Prize** for oral presentation on "Down-regulation of M1 gene and inhibition of influenza virus replication in host cells using catalytic nucleic acid enzymes" (by Binod Kumar, Madhu Khanna, Prashant Kumar, Vikas Sood, Rajesh Vyas, A.C. Banerjea) at the Medical Virology session in VIROCON-2011 held at National Research Centre on Equines (ICAR), Hisar on December 29-31, 2011.
- Awarded **'Best Paper Award'** for poster presentation on "Catalytic efficiency of hammerhead ribozymes are significantly enhanced by antisense molecules targeted against the matrix gene of influenza virus" (by Binod Kumar, Roopali Rajput, Prashant Kumar, A.C. Banerjea, Madhu Khanna) at the BIOTECH-2012 Conference organised by Institute of Liver and Biliary Sciences, New Delhi on February 24-25, 2012.

Ms Roopali Rajput (PhD Student)

- Awarded **'Best Paper Award'** for poster presentation "Novel chemical compunds as potential blockers to the swine origin influenza A H1N1 (2009) virus replication" (by Roopali Rajput, Prashant Kumar, Binod Kumar, Madhu Khanna, Ashok K. Prasad) at the BIOTECH-2012 Conference organised by Institute of Liver and Biliary Sciences, New Delhi on February 24-25, 2012.

Sponsored Research Projects

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
1.	Prof. S.K. Bansal (Biochemistry)	Pharmacogenomics of bronchial asthma: a study on polymorphism in B2 adrenoreceptor (ADRB2) and corticotrophin releasing hormone receptor 1 (*CRHR1*) genes in responders non-responders to salbutamol and budesonide	D.B.T. March 22, 2010 (Three years)	62.31 Lakhs
2.	Prof. S.K. Chhabra (Cardiorespiratory Physiology)	Multicentric study of pulmonary function in normal adult in India: development of reference standards for spirometry, static lung volumes and single breath diffusion capacity	I.C.M.R. March 30, 2009 (Three years)	15.00 Lakhs
3.	Prof. S.K. Chhabra (Cardiorespiratory Physiology)	Heart rate variability in chronic obstructive pulmonary disease: associations with systemic inflammation and clinical implications	D.S.T. February 18, 2010 (Three years)	31.67 Lakhs
4.	Dr Vishwajeet Rohil (Clinical Biochemistry)	Studies on implications of epigenetic modulation due to histone hyperacetylation in tumour cells induced by drugs targeting protein acetylation system through a novel mechanism	U.G.C. January 18, 2010 (Three years)	9.90 Lakhs
5.	Dr Vishwajeet Rohil (Clinical Biochemistry)	To evaluate the molecular mechanism of development of COPD in smokers in north Indian population	I.C.M.R. March 29, 2010 (Three years)	17.28 Lakhs
6.	Dr Anuradha Chowdhary (Medical Mycology)	Systemic mycoses in HIV positive patients: a study of species spectrum of aetiologic agents, antifungal susceptibility pattern and epidemiologic aspects	I.C.M.R. March 1, 2009 (Three years)	23.36 Lakhs
7.	Dr Anuradha Chowdhary (Medical Mycology)	A study of genetic heterogeneity and molecular ecology of *Cryptococcus neoformans* and *Cryptococcus gattii*	D.S.T. June 3, 2009 (Three years)	39.35 Lakhs
8.	Dr Anuradha Chowdhary (Medical Mycology)	Fungal infections in HIV positive patients in Manipur state: a phenotypic and molecular study of aetiologic agents, antifungal susceptibility pattern, management and therapeutic management	D.B.T. March 1, 2011 (Three years)	35.15 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
9.	Prof. Mridula Bose (Microbiology)	Prospects for the development of anti-tubercular drugs based on transacetylase function of glutamine synthase	D.B.T. May 17, 2007 (Four years)	53.38 Lakhs
10.	Prof. Mridula Bose (Microbiology)	Correlation between genetic polymorphism and homeostasis of Th1 - Th2 cytokines in pulmonary and extra-pulmonary tuberculosis	C.S.I.R. May 17, 2007 (Four years)	28.69 Lakhs
11.	Prof. Mridula Bose (Microbiology)	Regulation of SOS response in mycobacterium by sigma factor and its role in virulence	D.B.T. March 25, 2010 (Three years)	41.62 Lakhs
12.	Prof. Mridula Bose (Microbiology)	Role of *lspA* gene in the biology and pathogenesis of *M. tuberculosis*	I.C.M.R. September 28, 2010 (Two years)	20.80 Lakhs
13.	Prof. Mridula Bose (Microbiology)	Functional analysis of *Mce4A* and *Mce1A* protein of *M. tuberculosis:* role in cholesterol transport and phagolysome fusion inside macrophages	I.C.M.R. December 9, 2011 (One year)	7.28 Lakhs
14.	Prof. Mridula Bose (Microbiology)	SP110 gene varients in defining susceptibility to tuberculosis in north indians	I.C.M.R. February 16, 2012 (One year)	9.36 Lakhs
15.	Dr Malini Shariff (Microbiology)	Phenotypic and genetic characterisation of *Streptococcus pneumoniae* isolates from clinical samples	D.B.T. June 30, 2008 (Three years)	25.51 Lakhs
16.	Dr Mandira Varma-Basil (Microbiology)	Drug resistance profiling and molecular typing of *M. tuberculosis* isolates from different community settings in North Delhi	I.C.M.R. March 22, 2010 (Three years)	41.91 Lakhs
17.	Dr Mandira Varma-Basil (Microbiology)	Expression profile of efflux related pumps in drug resistant *M. tuberculosis*	D.B.T. October 21, 2011	42.47 Lakhs
18.	Dr Ritu Kulshrestha (Pathology)	Role of angiogenesis, vascular remodelling, pulmonary receptor changes and their inhibition by phosphodiesterase-5 inhibitors in bleomycin induced pulmonary hypertension and fibrosis	D.S.T. (Fast Track Project) June 30, 2010 (Three years)	19.98 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
19.	Prof. A. Ray (Pharmacology)	Possible protective role of Livina (a polyherbal preparation) against anti-tubercular therapy (ATT)-induced hepatotoxicity	Day's Medical Stores Mfg. Ltd. June 6, 2003 (Eight years)	6.05 Lakhs
20.	Prof. A. Ray (Pharmacology)	A study to assess the efficacy of UNIM-352 (ZN_5) in bronchial asthma	Central Council for Research in Unani Medicine (CCRUM) March 11, 2005 (Six years and eight months)	7.21 Lakhs
21.	Prof. A. Ray (Pharmacology)	Studies on the possible mechanisms involved in the effects of UNIM-352, a polyherbal, anti-asthmatic unani preparation in experimental animals	Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH) September 29, 2006 (Five years)	28.29 Lakhs
22.	Prof. A. Ray (Pharmacology)	Pharmacological studies on the role of nitric oxide (NO) and NO mediated signalling pathways in acute and chronic hypoxia induced behavioural and immunological changes in rats	D.R.D.O. May 6, 2011 (Two years)	7.00 Lakhs
23.	Prof. A. Ray (Pharmacology)	Calcium phosphate nano particles co en-capsulating neuro therapeutic gene and drug for targeted therapy of neurodegenerative disorders	D.B.T. June 24, 2011 (Three years)	24.28 Lakhs
24.	Prof. A. Ray (Pharmacology)	Pharmacological studies on the effects of stress on inflammation and immunity in rats	U.G.C. June 29, 2011 (Three years)	6.33 Lakhs
25.	Prof. A. Ray (Pharmacology)	Preclinical studies of UNIM-051 and UNIM-053	C.C.R.U.M. July 30, 2011 (Upto 31.03.2012)	9.91 Lakhs
26.	Dr Anita Kotwani (Pharmacology)	Continued surveillance of antimicrobial resistance and use in the community and in-depth qualitative investigation for behaviour of antimicrobial drugs use for suitable interventions for rational use of antibiotics	W.H.O. August 27, 2007 (Three years and four months)	7.04 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
27.	Dr Anita Kotwani (Pharmacology)	Measuring medicine prices and availability in National Capital Territory of Delhi - using WHO-HAI methodology	W.H.O. May 2, 2011 (Seven months)	2.89 Lakhs
28.	Dr Kavita Gulati (Pharmacology)	Pharmacological studies on the possible role of nitric oxide (NO) and NO-mediated signalling pathways in the regulation of stress induced immunological changes in rats	I.C.M.R. September 29, 2009 (Three years)	15.01 Lakhs
29.	Dr Kavita Gulati (Pharmacology)	Experimental studies on the possible role of nitric oxide (NO) during acute and chronic morphine in normal and stressed rats	C.S.I.R. November 1, 2010 (Three years)	14.91 Lakhs
30.	Dr Kavita Gulati (Pharmacology)	Experimental studies on the cellular and molecular mechanism of action of UNIM-352, polyherbal unani formulation, to validate its use as a drug for bronchial asthma	C.C.R.U.M. April 28, 2011 (Three years)	14.00 Lakhs
31.	HoDs (Pharmacology and Pulmonary Medicine)	To augment the post-graduate teaching and research facilities in the Departments of Pharmacology and Pulmonary Medicine, VPCI under FIST Programme	D.S.T. January 19, 2011 (Five years)	29.50 Lakhs
32.	Prof. K. Ravi (Physiology)	Brain nitric oxide and high altitude stress	D.I.P.A.S. February 9, 2010 (Three years)	59.00 Lakhs
33.	Prof. K. Ravi (Physiology)	Higher nervous control of the pulmonary renal reflex	C.S.I.R. December 19, 2011 (Three years)	6.75 Lakhs
34.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	To support resource centre for tobacco control for expansion of tobacco cessation services at state/district level	W.H.O. 15 June 2011 - 14 June 2012 (One year)	2.70 Lakhs
35.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	To study the prevalence of obstructive sleep apnoea amongst middle aged chronic obstructive pulmonary disease (COPD and asthma) patients by a home based sleep study and atopy	U.G.C. December 3, 2009 (Three years)	11.55 Lakhs

Sl No.	Faculty Member (Department)	Title of Project	Funding Agency, Date of Sanction/Implementation and Duration	Budget (in Rs.)
36.	Prof. Raj Kumar (Respiratory Allergy and Applied Immunology)	Genetic association study of polymorphisms related to chronic obstructive pulmonary disease(COPD) and its measures in north Indian population: COPD genetics consortium	D.B.T. September 29, 2011 (Three years)	8.66 Lakhs
37.	Dr Madhu Khanna (Respiratory Virology)	Generation, characterisation and epitope mapping of recombinant human monoclonal antibodies against pandemic influenza 2009 (H1N1)	D.S.T. January 1, 2011 (Three years)	43.53 Lakhs
38.	Dr Madhu Khanna (Respiratory Virology)	Study of antigenic diversity and cross reactive antibody generation to influenza virus in human samples	D.R.D.O. April 6, 2011 (Three years)	45.21 Lakhs
39.	Mr Binod Kumar SRF ICMR Fellow	Catalytic nucleic acid mediated gene silencing of M2 ION channel of influenza virus	I.C.M.R. December 22, 2010 (Three years)	1.58 Lakhs
40.	Dr Ashima Anand (Principal Investigator) DST Project	Evaluation of a physiological intervention for reducing exercise induced breathlessness in healthy subjects patients with interstitial lung disease (ILD) patients with Eisenmenger Syndrome	D.S.T. November 16, 2010 (Three years)	64.25 Lakhs
41.	Prof. H.S. Randhawa (INSA Honorary Scientist)	*Cryptococcus neoformans:* A study of its natural habits, serotypes and reappraisal of selective isolation techniques	I.N.S.A. January 1, 2001 (Twelve years)	4.75 Lakhs

Orations/Guest Lectures

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
1.	Prof. S.N. Gaur	Awarded the "J.J. Rao Oration Award" of the Geriatric Society of India, title of the Oration was, "Respiratory problems in elderly"	Govt. Medical College and Guru Nanak Dev Hospital, and the Geriatric Society of India	8th International Conference on Geriatric Care Amritsar November 5-6, 2011
2.	Prof. S.N. Gaur	Lung ageing in health and disease	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011
3.	Prof. S.N. Gaur	Awarded the "IFICON 2012 Oration Award" of the Influenza Foundation of India, title of the Oration was, "Role of viruses in respiratory diseases"	The King Institute of Preventive Medicine and Research	Annual Conference of Influenza Foundation of India Chennai February12, 2012
4.	Prof. A. Ray	Pharmacovigilance in respiratory medicine	Society of Pharmacovigilance	11th Annual Conference of Society of Pharmacovigilance Patna November 18-20, 2011
5.	Prof. A. Ray	Nitric oxide regulates CNS-immune interactions during stress	Society for Free Radical Research International	International Conference on Emerging Trends in Free Radicals, Antioxidants and Nutraceuticals on Health, Disease and Radiation Biology Kolkata January 12-14, 2012
6.	Prof. A. Ray	Newer insights into traditional medicine research: a translational approach	School of Natural Products, Jadavpur University	12th International Congress of Ethnopharmacology Kolkata February 17-19, 2012
7.	Prof. Mridula Bose	Promising specific aminocoumarin candidate drug against multi-drug resistant TB	AICTE and Jamia Hamdard University	National Seminar on New Horizons in Drug Discovery Development New Delhi September 17, 2011

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
8.	Prof. Mridula Bose	Footprints of genetic susceptibility to TB: cytokine gene variants as possible biomarkers and future targets of immunotherapy	Amity Institute of Microbial Technology	At the Foundation Day of Amity Institute of Microbial Technology Noida (U.P.) September 23, 2011
9.	Prof. Ashok Shah	Allergic bronchopulmonary aspergillosis	Department of Pulmonary and Critical Care Medicine, Fortis Hospital	Symposium on Fungal Infections Mohali May 22, 2011
10.	Prof. Ashok Shah	Upper airways allergic inflammatory disorders	Tuberculosis Association of India and the Uttrakhand State Tuberculosis Association	66th National Conference on Tuberculosis and Chest Diseases (NATCON 2011) Dehradun November 18-20, 2011
11.	Prof. Ashok Shah	Bronchial anthracofibrosis: an emerging pulmonary disorder	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011
12.	Prof. Ashok Shah	Pulmonary mycosis	Army Hospital (Research and Referral)	Critical Pulmonary Update 2011 Delhi December 10-11, 2011
13.	Prof. Ashok Shah	Upper airways allergic inflammatory disorders	MGM University of Health Sciences, Navi Mumbai, Mahatma Gandhi Mission's Medical College and Hospital, Aurangabad and Aurangabad Chest Society and Physicians´ Association	45th Annual Convention of the Indian College of Allergy, Asthma and Applied Immunology (ICAACON 2011) Aurangabad December 16-18, 2011
14.	Prof. Ashok Shah	Upper airways allergic inflammatory disorders	Department of Pulmonary Medicine, U.P. Rural Institute of Medical Sciences & Research	Allergy and Asthma Update Saifai, Etawah (U.P.) January 27, 2012

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
15.	Prof. Ashok Shah	Upper airways inflammation in COPD	The Daiichi Sankyo Life Science Research Centre in India (RCI)	International Symposium on Airway Diseases: Etiology to Clinic Gurgaon February 24-25, 2012
16.	Prof. S.K. Chhabra	FEV_1/FVC 0.7% is a perfect marker of airway obstruction	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011
17.	Prof. S.K. Chhabra	Diagnostic aspects of IPF	Jaipur Golden Hospital	Current Trends in the Diagnosis and Management of Idiopathic Pulmonary Fibrosis New Delhi February 11, 2012
18.	Prof. S.K. Chhabra	Bronchodilator therapy in asthma and COPD	Daiichi Sankyo India Pharma Pvt. Ltd., and Ranbaxy Laboratories Ltd.	International Symposium on Airway Diseases: Etiology to Clinic February 24-25, 2012
19.	Prof. K. Ravi	Role of airway rapidly adapting receptors in the dyspnoea of acute heart failure	Christian Medical College	5th Annual State Conference of the Association of Physiologists of Tamil Nadu (APTCON-2011) Vellore October 7-8, 2011
20.	Prof. K. Ravi	Dysponea at high altitude	A.I.I.M.S.	The 57th Annual Conference of Physiologists and Pharmacologists of India (APPICON-2011) New Delhi December 13-17, 2011

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
21.	Prof. Raj Kumar	Allergy diagnosis and place of immunotherapy in asthma management	Association of Pulmonologists, Sri Lanka	3rd Annual Academic Sessions, "Respire"; of the Association of Pulmonologists of Sri Lanka Colombo, Sri Lanka October 7-9, 2011
22.	Prof. Raj Kumar	Allergy and immunotherapy in India	American College of Allergy, Asthma and Immunology (ACAAI)	Annual Meeting of the American College of Allergy, Asthma and Immunology (ACAAI) Boston, Massachusetts November 3-8, 2011
23.	Prof. Raj Kumar	Smoking cessation	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011
24.	Prof. Raj Kumar	IgE mediated food allergy in asthma and rhinitis; Indian experience	MGM University of Health Sciences, Navi Mumbai, Mahatma Gandhi Mission´s Medical College and Hospital, Aurangabad and Aurangabad Chest Society and Physicians' Association	45th Annual Convention of the Indian College of Allergy, Asthma and Applied Immunology (ICAACON 2011) Aurangabad December 16-18, 2011
25.	Dr Balakrishnan Menon	Confirming the diagnosis of OSAS	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011
26.	Dr Madhu Khanna	Down regulation of M1 gene of influenza A virus by novel siRNA-ribozyme-chimeric constructs	Institute of Liver and Biliary Sciences	BIOTECH-2012 Conference New Delhi February 24-25, 2012
27.	Dr Anita Kotwani	Inappropriate antibiotics use at the community level: a global overview Community-level goals to tackle resistance - what should be achieved by 2013	The Center for Disease Dynamics, Economics & Policy, Washington DC and New Delhi	1st Global Forum on Bacterial Infections: Balancing Treatment Access and Antibiotic Resistance New Delhi October 3-5, 2011

Sl No.	Faculty Member	Title of Lecture	Organiser(s)	Conference, Place and Date
28.	Dr Anita Kotwani	Access to affordable generics	FICCI	India Pharma Summit´ New Delhi November 29, 2011
29.	Dr Kavita Gulati	Translational research in safety pharmacology: a novel approach	Society of Pharmacovigilance	11th Annual Conference of Society of Pharmacovigilance Patna November 18-20, 2011
30.	Dr Kavita Gulati	Differential role for nitric oxide (NO) in anxiety and seizures	Society for Free Radical Research International	International Conference on Emerging Trends in Free Radicals, Antioxidants and Nutraceuticals on Health, Disease and Radiation Biology Kolkata January 12-14, 2012
31.	Dr Kavita Gulati	Translational research in pharmacovigilance: a novel approach in patient safety	Gujarat Technical University	Research Week, Gujarat Technical University at LM College of Pharmacy Ahmadabad March 17, 2012
32.	Dr Vishal Bansal	Non pharmacological management of chronic obstructive pulmonary disease (COPD)	Association of Pulmonologists, Sri Lanka	3rd Annual Academic Sessions, "Respire"; of the Association of Pulmonologists of Sri Lanka Colombo, Sri Lanka October 7-9, 2011
33.	Dr Vishal Bansal	Rehabilitation in India: challenges, how to implement & minimum requirements	PSG Institute of Pulmonology	"Pulmo Rehab-2012"- Pulmonary Rehabilitation 2012 - State of The Art - National Conference Coimbatore January 21-22, 2012
34.	Dr Ritu Kulshrestha	Coagulation with special reference to high altitude CEP course on haematology: basics and recent trends	DIPAS, DRDO	DIPAS, DRDO Delhi January 30-February 3, 2012

Conferences/Symposia/Seminars/Workshops/CMEs

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
1.	Prof. S.N. Gaur	Chaired a session on Haemoptysis evaluation: contribution of newer CT techniques	V.P.C.I., University of Delhi	Symposium on Thoracic Imaging Delhi April 5, 2011
2.	Prof. S.N. Gaur	Chaired a session on Newer modalities for management of stable COPD	LRS Institute of Tuberculosis and Respiratory Diseases	Post-graduate CME - 2011 North India New Delhi July 16-17, 2011
3.	Prof. S.N. Gaur	Chaired a session on Influenza; current status	Influenza Foundation of India	National Centre for Disease Control Delhi August 29, 2011
4.	Prof. S.N. Gaur	Participated as Faculty for the Workshop on Allergy testing Chaired a session on What is new in asthma?	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011
5.	Prof. S.N. Gaur	Chaired a session on 5-LO pathway: source of validated and non-validated targets for asthma and COPD	Daiichi Sankyo India Pvt. Ltd. (DSIN) and Ranbaxy Laboratories Ltd.	International Symposium on Airway Diseases : Etiology to Clinic Gurgaon, Haryana February 25, 2012
6.	Prof. S.N. Gaur	Presented a paper on *In silico* assessment of the potential allergenicity of trasgenes used for the development of genetically modified food crops	American Academy of Allergy, Asthma and Immunology (AAAAI)	Annual Meeting 2012of American Academy of Allergy, Asthma and Immunology (AAAAI) Florida, U.S.A. March 2-6, 2012
7.	Prof. S.N. Gaur	Chaired a session on COPD and lung cancer	R.N.T. Medical College	XI NCCP-Raj PULMOCON 2012 Udaipur March 3-4, 2012
8.	Prof. A. Ray	Lecture on: Preclinical studies on pharmacology methods	V.P.C.I., University of Delhi	Workshop on Advance Methods in Pre-clinical Pharmacology Delhi December 12, 2011

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
9.	Prof. Mridula Bose	Participated in a panel discussion on Facing the reality of multi-drug resistant tuberculosis: challenges and potential solutions in India	U.S. National Academy of Sciences, Institute of Medicine (IOM); Indian Council of Medical Research (ICMR) and Indian National Science Academy (INSA)	Workshop on "Facing the Reality of Multi-Drug Resistant Tuberculosis: Challenges and Potential Solutions in India" New Delhi April 18-19, 2011
10.	Prof. Mridula Bose	Lecture on: Promising specific aminocoumarin candidate drug against multi-drug resistant TB	NAID (USA)-India Forum	Workshop on TB Drug Discovery Research: Exploring Opportunities for Collaboration New Delhi April 20-21, 2011
11.	Prof. Mridula Bose	Lecture on: Emerging infectious diseases	Mirand House, University of Delhi	Mirand House, University of Delhi Delhi September 12, 2011
12.	Prof. Mridula Bose	Chaired asession on Improving TB care symposium	Department of Microbiology, A.I.I.M.S.	Improving TB Care Symposium New Delhi November 4, 2011
13.	Prof. Ashok Shah	Chaired a session on Radiology of idiopathic interstitial pneumonias	V.P.C.I., University of Delhi	Symposium on Thoracic Imaging Delhi April 5, 2011
14.	Prof. Ashok Shah	Lecture on: Pathophysiology of severe asthma	LRS Institute of Tuberculosis and Respiratory Diseases	Post-graduate CME - 2011 North India New Delhi July 16-17, 2011
15.	Prof. Ashok Shah	Chaired a session on Pulmonary hypertention	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
16.	Prof. Ashok Shah	Chaired the D.N. Shivpuri Oration	MGM University of Health Sciences, Navi Mumbai, Mahatma Gandhi Mission's Medical College and Hospital, Aurangabad and Aurangabad Chest Society and Physicians´ Association	45th Annual Convention of the Indian College of Allergy, Asthma and Applied Immunology (ICAACON 2011) Aurangabad December 16-18, 2011
17.	Prof. Ashok Shah	Chaired a Workshop on skin prick session	Department of Pulmonary Medicine, U.P. Rural Institute of Medical Sciences & Research	Allergy and Asthma Update Saifai, Etawah (U.P.) January 27, 2012
18.	Prof. Ashok Shah	• Moderated the session on Special considerations in allergic broncho-pulmonary aspergillosis • Presentation made to the Working Group of ISHAM: Special considerations in ABPA	ABPA Working Group of the International Society for Human and Animal Mycologists (ISHAM) and Society of Indian Human & Animal Mycologists (SHIAM)	9th National Conference of the Society of Indian Human & Animal Mycologists (SHIAM 2012) Siliguri February 9-12, 2012
19.	Prof. Ashok Shah	Chaired a session on Chronic obstructive pulmonary disease	All India Institute of Medical Sciences	Medicine Update 2012 New Delhi February 12, 2012
20.	Prof. S.K. Chhabra	Environment and human respiratory health	Academic Staff College, Jawahar Lal Nehru University	16th Refresher Course in Environmental Sciences New Delhi April 26, 2011
21.	Prof. S.K. Chhabra	Management of community acquired pneumonia	LRS Institute of Tuberculosis and Respiratory Diseases	Post-graduate CME-2011 North India New Delhi July 16-17, 2011
22.	Prof. S.K. Chhabra	Ozone air pollution	Centre for Science and Environment	Workshop on Toxic Air and Our Health: Dialogue with Doctors New Delhi August 31, 2011

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
23.	Prof. S.K. Chhabra	Convener of the Workshop on Pulmonary function tests Chaired the sessions on • Rehabilitation for COPD • Literature review of the year	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011
24.	Prof. K. Ravi	Presented a poster on A possible vagal sensory mechanism for the respiratory systems in climbers with cardiac problems	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011
25.	Prof. Raj Kumar	Lectures on: • Interstitial lung disease • Management of COPD and bronchial asthma	Indian Institute of Coal Management (IICM) and Coal India Limited	CME on Occupational Medicine Ranchi April 7-9, 2011
26.	Prof. Raj Kumar	Chaird a session on Allergy and immunology Hands on Practical training in workshop on allergy	Association of Pulmonologists, Sri Lanka	3rd Annual Academic Sessions, "Respire"; of the Association of Pulmonologists of Sri Lanka Colombo, Sri Lanka October 7-9, 2011
27.	Prof. Raj Kumar	Chaired sessions on • Choosing an appropriate treatment strategy in asthma • Respiratory disease among agricultural workers	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011
28.	Dr Balakrishnan Menon	Organizing Secretary	V.P.C.I., University of Delhi	Symposium on Thoracic Imaging Delhi April 5, 2011
29.	Dr Balakrishnan Menon	Papers presented on • Evaluation of real time polymerase chain reaction in rapid diagnosis of exudative tubercular effusions • Effect of pulmonary rehabilitation on gas exchange, muscle cross section area and functional parameters in interstitial lung disease	European Respiratory Society	21th European Respiratory Society Annual Congress (ERS - 2011) Amsterdam, Netherlands September 24-28, 2011

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
30.	Dr Balakrishnan Menon	Chaired a session on Maintenance therapy of stable asthma	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011
31.	Dr Balakrishnan Menon	Lecture on: Role of chest X ray in RNTCP	Babu Jagjivan Ram Hospital	CME on RNTCP New Delhi March 22, 2012
32.	Dr Mandira Varma-Basil	Lecture on: Rapid molecular diagnostic techniques	Miranda College, University of Delhi	Add-on Course on Medical Biotechnology Delhi September 15, 2011
33.	Dr Anuradha Chowdhary	Chaired a session on Great debate on mycology	Max Super Specialty Hospital, Saket	Sepsis Congress 2011 New Delhi November 11-12, 2012
34.	Dr Anuradha Chowdhary	Presented papers on Molecular identification and *in vitro* antifungal susceptibilities of clinical *zygomycetes* isolated in Delhi, India Blastomycosis in India: report of an imported case and current status	Department of Medical Microbiology, Banaras Hindu University	XXXV National Conference of Indian Association of Medical Microbiologists (MICROCON 2011) Banaras Hindu University, Varanasi November 23-26, 2011
35.	Dr Anuradha Chowdhary	Presented a paper on Azole resistance in *Aspergillus fumigatus* isolates due to TR/L98H mutations in the *cyp*51A gene	Indian Association of Medical Microbiologists, Delhi Chapter	Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter-Winter Meet) New Delhi December 3, 2011
36.	Dr Anuradha Chowdhary	Lecture on: Drug resistant fungal infections	University of Toronto	Workshop on Global Health and Disease Treatment Infectious Diseases Canada-India Research Centre of Excellence University of Toronto Canada January 5-6, 2012
37.	Dr Anuradha Chowdhary	Presented a paper on First isolations in India of multiple-triazole resistant *Aspergillus fumigatus* strains, carrying the TR/L98H mutations in the *cyp*51 A gene	International Society for Human and Animal Mycology and European Society of Clinical Microbiology and Infectious Diseases	5th Advances Against Aspergillosis Istanbul, Turkey January 26-28, 2012

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
38.	Dr Anuradha Chowdhary	Presented papers on *Schizophyllum commune* as an emerging fungal pathogen: A review and report of two cases Blastomycosis in India: report of an exotic case and current status First environmental isolation of *Cryptococcus gattii*, molecular type VGIII/AFLP5, from decayed wood inside trunk hollows of a *Manilkara* hexendra tree in Delhi, India	The Society of Indian Human & Animal Mycologists	9th National Conference of the Society of Indian Human & Animal Mycologists (SIHAM 2012) Siliguri, Darjeeling February 9-12, 2012
39.	Dr Anuradha Chowdhary	Presented papers on *Schizophyllum commune* as an emerging fungal pathogen: report of two cases and literature review First environmental isolation of *Cryptococcus gattii*, molecular type VGIII/ AFLP5, from decayed wood inside trunk hollow of a *Manikara Hexandra* tree in Delhi, India	Indian Association of Medical Microbiologists (IAMM), Delhi Chapter	MICRO-D-CON 2012, 4th Annual Conference of Indian Association of Medical Microbiologists AIIMS, New Delhi February 25, 2012
40.	Dr Madhu Khanna	Presented a poster on Cross protective effect of antisense oligonucleotide developed against the common 3NCR of influenza A virus genome	European Scientific Working Group on Influenza (ESWI)	The 4th ESWI Influenza Conference Malta September 11-14, 2011
41.	Dr Madhu Khanna	Participated as Secretary General, Biotechnology Society of India	Institute of Liver and Biliary Sciences	BIOTECH-2012 Conference New Delhi February 24-25, 2012
42.	Dr Anita Kotwani	Presented papers on • Irrational use of antibiotics and role of pharmacists: an insight from a qualitative study in New Delhi, India • Patient self-management of asthma: a study in an emergency room of a chest hospital in Delhi, India	International Society for Pharmacoeconomics & Outcome Research (ISPOR)	Annual Conference of International Society for Pharmacoeconomics & Outcome Research (ISPOR) Baltimore, U.S.A. May 21 - 25, 2011

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
43.	Dr Anita Kotwani	Presented papers on • Trends in antimicrobial use among outpatients in New Delhi, India • Antibiotic prescribing practices of primary care prescribers for acute respiratory tract infections and diarrhoea in New Delhi, India • Factors influencing antibiotic prescribing by primary care doctors in Delhi, India: qualitative study • Can the Indian Government improve access to medicines through generic drug stores? • Impact of standard treatment guidelines and patient education on asthma control and knowledge in asthmatic patients: a controlled trial	International Network for the Rational Use of Drugs, U.S.A., Harvard Medical School and Harvard Piligrim Health Care Institute, U.S.A.	The Third International Conference for Improving Use of Medicines (ICIUM) Antalya, Turkey November 14-18, 2011
44.	Dr Anita Kotwani	Member of Scientific Committee Reviewer for abstracts submitted Judge for poster presentation	The Center for Disease Dynamics, Economics & Policy, Washington DC and New Delhi	1st Global Forum on Bacterial Infections: Balancing Treatment Access and Antibiotic Resistance New Delhi October 3-5, 2011
45.	Dr Malini Sariff	Presented a poster on Antibiotic resistance pattern of *Streptococcus pneumoniae* isolates in Delhi	Haffkine Institute for Training, Research and Testing	International Workshop on Antimicrobial Resistance Mumbai November 11-13, 2011
46.	Dr Malini Sariff	Presented a poster on Phenotypic testing of Beta lactamases in clinical isolates of *Acinetobacer* species	Indian Association of Medical Microbiologists (Delhi Chapter)	4th Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter) AIIMS, New Delhi February 25, 2012

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
47.	Dr Kavita Gulati	Presented a paper on A clinical study to assess the protective role of Livina against antitubercular drug induced liver dysfunction	National Institute of Allergy and Infectious Diseases and NIH	Indo-NIAID TB Drug Discovery Forum-Exploring Opportunities for Collaboration New Delhi April 20, 2011
48.	Dr Kavita Gulati	Awarded membership of National Academy of Medical Sciences	Institute of Medical Sciences & SUM Hospital	Annual Conference of NAMS and Convocation for MAMS Bhubaneswar, Odisha October 14-16, 2011
49.	Dr Kavita Gulati	Presented a paper on Translational research in respiratory medicine: evaluation of the efficacy and pharmacodynamics of UNIM 352 a polyherbal drug, in bronchial asthma	National College of Chest Physicians (India) and Indian Chest Society	National Conference on Pulmonary Diseases (NAPCON-2011) New Delhi November 27-30, 2011
50.	Dr Kavita Gulati	Organising Secretary Lecture on: Whole body plethysmography and its use for respiratory pharmacology studies	V.P.C.I., University of Delhi	Workshop on Advanced Methods in Pre-clinical Pharmacology Delhi December 12, 2011
51.	Dr V. Rohil	Presented a paper on Chronic obstructive pulmonary disease	Gauhati University	57th Annual Technical Session Assam Science Society Gawahati March 16, 2012
52.	Dr Vishal Bansal	Conducted a practical workshop as a Resource person on Pulmonary function/exercise testing Chaired a session on Diffuse lung diseases	Association of Pulmonologists, Sri Lanka	3rd Annual Academic Sessions, "Respire"; of the Association of Pulmonologists of Sri Lanka Colombo, Sri Lanka October 7-9, 2011
53.	Dr Vishal Bansal	Joint Organising Secretary Conducted a practical workshop as a Faculty on oxygen assessment	PSG Institute of Pulmonology	"Pulmo Rehab-2012"-Pulmonary Rehabilitation 2012 - State of the Art - National Conference Coimbatore January 21-22, 2012

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
54.	Dr Ritu Kulshrestha	Lecture on: Principles, techniques and guidelines for fixation and grossing of the lung	Subharti Medical College, Meerut	´CME cum Hands on Workshop on Grossing of Surgical Pathology Specimen´ Meerut, U.P. November 5, 2011
55.	Dr Ritu Kulshrestha	Presented a paper on Correlation of microvascular changes of pulmonary arterial hypertension with FGF-2 expression in transbronchial lung biopsies	Pulmonary Vascular Research Institute, South East Asia Region	4th Annual Conference of the Pulmonary Vascular Research Institute, South East Asia Region Trivandrum October 1-2, 2011
56.	Dr Ritu Kulshrestha	Presented papers on • Morphometric evaluation of vascular remodelling and correlation with pulmonary pathology in bleomycin induced model of pulmonary fibrosis • Vascular effects of oral N-acetylcysteine in bleomycin induced model of pulmonary fibrosis and hypertension	The American College of Chest Physicians (ACCP)	CHEST 2011 Honolulu, Hawaii October 22-26, 2011
57.	Dr Ritu Kulshrestha	Presented a poster on Correlation of pulmonary arteriolar remodelling on transbronchial lung biopsies with computed tomographic indicators of pulmonary hypertension	The Pulmonary Vascular Research Institute	The 6th PVRI Annual General Meeting & 5th Scientific Workshops & Debates Cape Town, South Africa February 6-10, 2012
58.	Ms Anju Sharma (PhD Student) *(Guide: Dr V. Rohil)*	Presented a poster on Lung cancer: an epigenetically regulated disease	Association of Clinical Biochemists of India	ACBICON 2011, 38th National Conference of Association of Clinical Biochemists of India Gwalior December 2-6, 2011

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
59.	Ms Anju Sharma (PhD Student) *(Guide: Dr V. Rohil)*	Presented a poster on Role of polyphenolc acetates in lung cancer	Indian Association for Cancer Research (IACR)	31st Annual Convention of Indian Association for Cancer Research (IACR) and an International Symposium on ´Cancer Genomics and Its Impact in the Clinics´ Navi Mumbai January 26-29, 2012
60.	Ms Pooja Singh (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on An improved protocol for extraction of mycobacterial lipids	Punjab University, Chandigarh	52nd "International Conference on Microbial Biotechnology for Sustainable Development" Chandigrah November 3-6, 2011
61.	Ms Nisha Rathor (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Experimental validation of transcriptional start site of *mce4* operon of *M. tuberculosis*	Punjab University, Chandigarh	52nd "International Conference on Microbial Biotechnology for Sustainable Development" Chandigrah November 3-6, 2011
62.	Mr Abhmanyu (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Spectrum of serum cytokine responses to pulmonary and lymph node tuberculosis in north indians in search of biomarkers specific to this population	Department of Medical Microbiology, Banaras Hindu University	XXXV National Conference of Indian Association of Medical Microbiologists (MICROCON 2011) Banaras Hindu University, Varanasi November 23-26, 2011
63.	Mr Rajesh Sinha (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Cholesterol uptake in *M. tuberculosis:* role of *Mce4A* protein	Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter)	Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter-Winter Meet) New Delhi December 3, 2011
64.	Mr Abhmanyu (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Differential serum cytokine levels are associated with cytokine gene polymorphisms in north Indians with active pulmonary tuberculosis	Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter)	Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter-Winter Meet) New Delhi December 3, 2011

Sl No.	Faculty Member	Role/Topic	Organiser(s)	Conference, Place and Date
64.	Mr Abhmanyu (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Differential serum cytokine levels are associated with cytokine gene polymorphisms in north Indians with active pulmonary tuberculosis	Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter)	Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter-Winter Meet) New Delhi December 3, 2011
65.	Ms Kushal Garima (PhD Student) *(Guide: Prof. Mridula Bose)*	Presented a poster on Are we looking infections due to non-tuberculous mycobacteria?	Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter)	Annual Conference of Indian Association of Medical Microbiologists (Delhi Chapter-Winter Meet) New Delhi December 3, 2011
66.	Ms D. Soundarya (Junior Research Fellow) *(Guide: Dr Ritu Kulshrestha)*	Presented a paper on Role of bFGF signalling and the adventitial fibroblast in vascular remodelling: an experimental study of bleomycin induced pulmonary fibrosis	The AU-KBC (Anna University - K B Chandrasekhar) Research Centre	International Conference on Angiogenesis: Basics and Applications Chennai March 1-3, 2012

Participation in Advanced and Specialised Training Programme by Faculty Members

Sl No.	Participant (Department)	Course Title/ Topic	Training Duration	Host
1.	Prof. S.K. Bansal (Biochemistry)	Safety Aspects in the Research Application of Ionising Radiation RA-37	January 9-17, 2012	Radiological Physics & Advisory Division (RPAD), Bhabha Atomic Research Centre, Mumbai, Government of India, in collaboration with Indian Association for Radiation Protection (IARP). *(Secured 1st Rank in the Examination)*
2.	Dr Vishwajeet Rohil (Clinical Biochemistry)	DNA Sequencer (Genetic Analyzer)	August 5 - 12, 2011	Invitrogen Bioservices India Pvt. Ltd. Gurgaon (Haryana)
3.	Dr Anita Kotwani (Pharmacology)	Antimicrobial Stewardship Programme	May 31-June 3, 2011	Department of Clinical Pharmacy, The University of California, San Francisco (UCSF), USA
4.	Dr Kavita Gulati (Pharmacology)	Workshop on Medicinal Plants: Scientist, Grower and Industry Interaction	March 23, 2012	Indian National Science Academy, New Delhi
5.	Dr Ritu Kulshrestha (Pathology)	Postgraduate Course on Lung, Medistinal and Pleural Diseases	July 10-17, 2011	Department of Pathology, Medical University of Graz, Graz, Austria

Short Term Specialised Trainings Imparted by Faculty Members

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
1.	Ms Astha Jain B.Tech (Biotechnology) Amity Institute of Biotechnology, Amity University, Noida (U.P.)	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	May 16 - June 15, 2011
2.	Ms Ineet Kaur B.Tech (Biotechnology) Amity Institute of Biotechnology, Amity University, Noida (U.P.)	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	May 16 - June 15, 2011
3.	Ms Smriti Sanjgotra B.Tech (Biotechnology) Amity Institute of Biotechnology, Amity University, Noida (U.P.)	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	May 23 - June 22, 2011
4.	Mr Amit Kumar B.E. (Biotechnology) Delhi Technological University, Bawana Road, Delhi	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	June 8 - July 31 2011
5.	Ms Sakshi Aggarwal M.Sc. (Biotechnology) Department of Biotechnology, Faculty of Natural Sciences, Jamia Milia Islamia, New Delhi	Techniques in biochemistry	Prof. S.K. Bansal (Biochemistry)	June 20 - July 19 2011
6.	Ms Prema Adhikari MSc (Biochemistry) Department of Chemistry, C.C.S. University, Meerut, Uttar Pradesh	Clinical biochemistry and biotechnology	Dr V. Rohil (Clinical Biochemistry)	February 16 - June 15, 2012

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
7.	Mr Indresh Kumar Singh MSc (Biochemistry) Department of Chemistry, C.C.S. University, Meerut, Uttar Pradesh	Clinical biochemistry and biotechnology	Dr V. Rohil (Clinical Biochemistry)	February 16 - June 15, 2012
8.	Mr Sanjay Tevatiya MSc (Biochemistry) Department of Biosciences, Jamia Millia Islamia, New Delhi	Clinical biochemistry and biotechnology	Dr V. Rohil (Clinical Biochemistry)	March 7 - June 6, 2012
9.	Ms Preeti Khatri MSc (Biotechnology) Indian Institute of Technology Roorkee, Roorkee, Uttarakhand	Total lipid extraction from *M. tuberculosis* H37Rv and its analysis by TLC	Prof. Mridula Bose (Microbiology)	May 5 - July 5, 2011
10.	Mr Gaurav Tyagi MSc (Microbiology) Benaras Hindu University, Varanashi (U.P.)	To study the role of cholesterol in modifying the apolar lipid profile of *M. tuberculosis*	Prof. Mridula Bose (Microbiology)	May 9 - November 16, 2011
11.	Ms Harshul Arora MSc (Biotechnology) Madurai Kamraj University, Maudrai, Tamilnadu	Differential expression of genes of *Mycobacterium tuberculosis* from clinical isolates of pulmonary and lymph node tuberculosis	Prof. Mridula Bose (Microbiology)	May 16 - July 15, 2011
12.	Ms Indu Bisht BSc (Biomedical Science) Bhaskaracharya College of Applied Sciences, University of Delhi, Dawaraka, New Delhi	Molecular typing of *M. tuberculosis* isolates from patients of pulmonary tuberculosis	Prof. Mridula Bose and Dr Mandira Varma-Basil (Microbiology)	May 20 - July 20, 2011
13.	Ms Aditi BSc (Biomedical Sciences) Saheed Rajguru College of Applied Sciences, University of Delhi, Vasundhara Enclave, Delhi	Comparison of molecular diagnostic techniques for identification of *Mycobacterium tuberculosis* and non-tuberculous mycobacteria	Prof. Mridula Bose and Dr Mandira Varma-Basil (Microbiology)	May 27 - July 27, 2011

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
14.	Ms Akansha Sharma BSc (Biomedical Sciences) Saheed Rajguru College of Applied Sciences, University of Delhi, Vasundhara Enclave, Delhi	Molecular typing of *M. tuberculosis* isolates from patients of pulmonary tuberculosis	Prof. Mridula Bose and Dr Mandira Varma-Basil (Microbiology)	May 27 - July 27, 2011
15.	Ms Antara Mazumdar BSc (Biomedical Sciences) Saheed Rajguru College of Applied Sciences, University of Delhi, Vasundhara Enclave, Delhi	Expression profile of efflux releted genes in *M. tuberculosis*	Prof. Mridula Bose and Dr Mandira Varma-Basil (Microbiology)	May 27 - July 27, 2011
16.	Mr Rohit Bhardwaj BTech (Biotechnology) (Delhi Technological University, Delhi)	Analysis of expression profile of *lspA* gene of *M. tuberculosis* in *in vitro* SDS stress	Prof. Mridula Bose (Microbiology)	June 1 - July 21, 2011
17.	Ms Alpana BSc (Medical Microbiology) (Gayatri College of Biomedical Sciences, Dehradun)	Insertion of point mutation at annotated translation start site of *yrbE4A* gene of *mce4* operon of *M. tuberculosis*	Prof. Mridula Bose (Microbiology)	July 5 - September 24, 2011
18.	Ms Swati MSc (Biotechnology) (Lovely Professional University, Phagwara, Punjab)	Expression and purification of *Mce4A* protein of *M. tuberculosis*	Prof. Mridula Bose (Microbiology)	February 1 - April 30, 2012
19.	Ms Vaishali MTech (Biotechnology) (Amity Institute of Biotechnology, Amity University, Noida, U.P.)	Cloning and expression of *CFP-10* gene of *M. tuberculosis*	Prof. Mridula Bose (Microbiology)	March 5 - May 5, 2012
20.	Ms Jyoti Singhal B.Sc (Biomedical Science) Saheed Rajguru College of Applied Sciences, University of Delhi, Vasundhara Enclave, Delhi	Traing on pathology techniques	Dr Ritu Kulshrestha (Pathology)	May 25 - July 25, 2011

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
21.	Ms Sugandha Sharma BTech (Biotechnology) Maharishi Markandeshwar University, Mullana, Ambala, Punjab	Research methodology and training	Dr Kavita Gulati (Pharmacology)	March - May 2011
22.	Mr Anil Kumar Bichhwaliya BSc (Biotechnology) University of Rajasthan, Jaipur	Research methodology and training	Dr Kavita Gulati (Pharmacology)	March - May 2011
23.	Ms Eshita Wattal BTech (Biotechnology) University Institute of Engineering & Technology, Maharishi Dayanand University, Rohtak, Haryana	Research methodology and training	Dr Kavita Gulati (Pharmacology)	March - May 2011
24.	Mr Pawan Poonia BSc (Biotechnology) University of Rajasthan, Jaipur	Research methodology and training	Dr Kavita Gulati (Pharmacology)	March - May 2011
25.	Mrs. Kanis Fatema, Mrs. Suparna Biswas and Mr. Md. Fazlul Haque Paramedical staff form National Institute of Diseases of the Chest and Hospital (NIDCH), Dhaka, Bangladesh	Pulmonary rehabilitation	Dr Vishal Bansal (Physiology)	April 4-22, 2011
26.	Mrs. Kanis Fatema, Mrs. Suparna Biswas and Mr. Md. Fazlul Haque Paramedical staff form National Institute of Diseases of the Chest and Hospital (NIDCH), Dhaka, Bangladesh	Respiratory allergy	Prof. Raj Kumar (NCRAAI and Respiratory Allergy and Applied Immunology)	April 4-22, 2011

Sl No.	Name, Subject and Organisation	Course Title/Topic	Faculty Member (Department)	Period
27.	Dr Bashir Ahmed, Assistant Professor, Respiratory Medicine, NIDCH, Dhaka, Bangladesh Dr Mahmud Rahim, Assistant Professor, Respiratory Medicine, NIDCH, Dhaka, Bangladesh Dr Shimul Kumar Bhowmik, Registrar, NIDCH, Dhaka, Bangladesh Dr Abdullah Al Mujahid, Registrar, NIDCH, Dhaka, Bangladesh Dr Kh. Hafizur Rahman, RMO, NIDCH, Dhaka, Bangladesh Dr Md. Mainul Hasan, RMO, ICU, Dhaka, Bangladesh	Topics of Pulmonary Medicine including allergy (sking prick testing/ immunotherapy), bronchoscopy simulator, radiology, pulmonay funcion testing, sleep laboratory, pulmonary rehabilitation and intensive care unit management, etc.	Prof. S.N. Gaur (Pulmonary Medicine) Prof. Ashok Shah (Pulmonary Medicine) Prof. S.K. Chhabra (Cardiorespiratory Physiology) Prof. Raj Kumar (NCRAAI and Respiratory Allergy and Applied Immunology) Dr B. Menon (Respiratory Allergy and Applied Immunology) Dr Vishal Bansal (Physiology)	August 16-24, 2011
28.	Mr Mojahid-Ul-Islam M.Sc. (Biomedical Science) Dr Ambedkar Centre for Biomedical Research, University of Delhi, Delhi	RNAi mediated inhibition of matrix gene transcript suppresses influenza A virus propagation in embryonated chicken eggs	Dr Madhu Khanna (Respiratory Virology)	May 3 - July 3, 2011

"Symposium on Thoracic Imaging" held on 5th April 2011. *Dignitaries on the dais (left to right)*: Dr V.K. Vijayan, Director, VPCI; Prof. Sneh Bhargava, Former Director, A.I.I.M.S., New Delhi; Prof. P.N. Tandon, Chairman, Governing Body, VPCI; Dr B.K. Menon, Organising Secretary of the Symposium.

"Workshop on Advanced Methods in Pre-clinical Pharmacology" held on 12th December 2011. *Dignitaries on the dais (left to right)*: Prof. A. Ray, Convener of the Workshop; Prof. S.N. Gaur, Director (Acting), VPCI; Dr Richard Milis, Vice President, Stoelting, U.S.A.; Mr Taj Hudson, Manager, Biopac, U.S.A. and Dr Anita Talwar, Managing Director, Gentech Marketing & Distribution Pvt. Ltd., New Delhi.

Prof. Rajendra Prasad, (Presently Director, VPCI), Director, Uttar Pradesh Rural Institute of Medical Sciences & Research, Saifai, Etawah, Uttar Pradesh, receiving the memento for the "NCCP (I) Prof. R. Viswanathan Memorial Oration" from Prof. P.N. Srivastava, Chairman, (NBA) and Chancellor, Manipur (Central) University at the "National Conference on Pulmonary Diseases" (NAPCON-2011), the 13th Joint Conference of Indian Chest Society (ICS) & National College of Chest Physicians (NCCP) India, held on 27th-30th November 2011 at India Habitat Centre, New Delhi.

Institute celebrated the Republic Day Parade function on 26th January 2012.

List of Publications

1. Abhimanyu, Jha P, Jain A, Arora K, Bose M. Genetic association study suggests a role for SP110 variants in lymph node tuberculosis but not pulmonary tuberculosis in north Indians. *Hum Immunol* 2011;72: 576-80.

2. Abhimanyu, Mangangcha IR, Jha P, Arora K, Mukerji M, Banavaliker JN, Brahmachari V, Bose M. (Indian Genome Variation Consortium). Differential serum cytokine levels are associated with cytokine gene polymorphisms in north Indians with active pulmonary tuberculosis. *Infect Genet Evol* 2011;11:1015-22.

3. Amonkar G, Kulshrestha R, Gruber Moesenbacher U. Hemodynamic disorders involving lung. In: Kulshrestha R, Vaideeswar P, Amonkar G, Gruber-Mosenbacher U, Popper HH, Editors. *Gross Lung Pathology: A Color Atlas*. Vidyanilyam Prakashan, Delhi. 2011; pp 83-94.

4. Anand R, Gulati K, Ray A. Pharmacological evidence for the role of nitric oxide in the modulation of stress-induced anxiety by morphine in rats. *Eur J Pharmacol* 2012;676:71-4.

5. Arora N, Kukreja N, Nair S, Gaur SN, Singh BP. Allergen immunotherapy: current approaches for management of allergic rhinitis and asthma. In: Facinelli BC, Editor. (1st ed). *Immunotherapy: Activation, Suppression and Treatments*. Nova Science Publishers, N.Y., U.S.A. 2011; pp131-57.

6. Bansal Vishal. *Reviewed and contributed in Chapters*; Chapter No. 43: Introduction to the Function and Control of Gastrointestinal System, Chapter No. 46: Biliary Secretion and Excretion and Chapter No.57: The Male Reproductive System. In: Tandon OP, Tripathi Y, Editors. (13 Edition). *Best and Taylor's Physiological Basis of Medical Practice* Lippincott Williams and Wilkins, Wolters Kluwer Health, Delhi, 2012; pp 681-9, 751-69 and 937-53.

7. Bhagat R, Yasir A, Vashisht A, Kulshreshtha R, Singh SB, Ravi K. High altitude simulation, substance P and airway rapidly adapting receptor activity in rabbits. *Respiratory Physiology & Neurobiology* 2011;178:329-36.

8. Bhalla Payal, Singh NP, Ravi K. Attenuation of angiotensin converting enzyme inhibitor induced cough by iron supplementation: role of nitric oxide. *J Renin–Angiotensin-Aldosterone System* 2011;12: 491-7.

9. Bose M. Female genital tract tuberculosis: how long will it elude diagnosis? (Commentary). *Indian J Med Res* 2011;134:13-4.

10. Bose M. Decoding population genetics: impact on tuberculosis control and treatment. Editorial. *Indian J Chest Dis Allied Sci* 2012;54: 5-7.

11. Chhabra SK. Agreement and differences between venous and arterial gas analysis. *Ann Thorac Med* 2011;6:154.

12. Chhabra SK, Chhabra P. Gender differences in perception of dyspnea, assessment of control, and quality of life in asthma. *J Asthma* 2011;48: 609-15.

13. Chhabra P, Chhabra SK. Effect of smoking on body mass index: A community-based study. *Natl J Community Med* 2011;2:325-30.

14. Chhabra SK. Respiratory system: structure and function. In: Munjal YP, Editor-in-Chief (9th Ed.). *API Textbook of Medicine* Jaypee Brothers Medical Publishers (P) Ltd, New Delhi. 2012; pp1986-9.

15. Chhabra SK, Gupta Mansi. Exhaled breath condensate analysis in chronic obstructive pulmonary disease. *Indian J Chest Dis Allied Sci* 2012;54:27-38.

16. Chhabra SK, Vijayan VK, Rahman M, Mittal V, Singh PD. Regression equations for spirometry in children aged 6 to 17 years in Delhi region. *Indian J Chest Dis Allied Sci* 2012;54:59-63.

17. Chowdhary A, Hiremath SS, Sun S, Kowshik T, Randhawa HS, Xu J. Genetic differentiation and clonal expansion of environmental populations of *Cryptococcus gattii* in India. *Environ Microbiol* 2011;13:1875-88.

18. Chowdhary A, Kathuria S, Randhawa HS, Gaur SN, Klaassen CH, Meis JF. Isolation of multiple-triazole-resistant *Aspergillus fumigatus* strains carrying the TR/L98H mutations in the *cyp51A* gene in India. *J Antimicrob Chemother* 2012;67:362-6.

19. Chowdhary A, Randhawa HS, Sundar G, Kathuria S, Prakash A, Khan ZU, Sun S, Xu J. Comparison of antifungal susceptibility profiles of clinical and environmental isolates of *Cryptococcus neoformans* var *grubii* and *Cryptococcus gattii* serotype B from north-western India. *J Medical Microbiol* 2011;60:961-7.

20. Chowdhary A, Randhawa HS, Singh V, Khan ZU, Ahmad S, Kathuria S, Roy P, Khanna G, Chandra J. *Bipolaris hawaiiensis* as etiologic agent of allergic bronchopulmonary mycosis: first case in a paediatric patient. *Med Mycol* 2011;49:760-5.

21. Chowdhary A, Randhawa HS, Boekhout T, Hagen F, Klaassen CH, Meis JF. Temperate climate niche for *Cryptococcus gattii* in Northern Europe. *Emerg Infect Dis* 2012;18:172-4.

22. Chowdhary A, Randhawa HS, Meis JF. Environmental prevalence of *Cryptococcus neoformans* and *C. gattii* in India: An update. *Critical Rev Microbiol* 2012;38:1-16.

23. Espinel-Ingroff A, Chowdhary A, Cuenca-Estrella M, Fothergill A, Fuller J, Hagen F, Govender N, Guarro J, Johnson E, Lass-Flörl C, Lockhart SR, Martins MA, Meis JF, Melhem MS, Ostrosky-Zeichner L, Pelaez T, Pfaller MA, Schell WA, Trilles L, Kidd S, Turnidge J. *Cryptococcus neoformans-Cryptococcus gattii* species complex: An International study of wild-type susceptibility endpoint distributions and epidemiological cutoff values for amphotericin B and flucytosine. *Antimicrob Agents Chemother* 2012 [Epub ahead of print]

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28. Gaur SN, Agarwal K. An approach to the diagnosis of allergic disorders. In: Shankar PS, Vora A, Bendre S, Editors. *Immunology in Clinical Practice* Academy of Respiratory Medicine, Mumbai. 2011; pp101-12.

29. Gaur SN, Agarwal K. Defence mechanisms of the lung. In: Wang DY, Gaur SN, Editors. *Allergic Rhinitis and Asthma* Kontetntworx Publishers, New Delhi. 2012; pp 3-14.

30. Gaur SN, Agarwal K. Immunotherapy. In: Wang DY, Gaur SN, Editors. *Allergic Rhinitis and Asthma* Kontetntworx Publishers, New Delhi. 2012; pp 116-25.

31. Gaur SN, Agarwal K. The link between allergic rhinitis and asthma. In: Wang DY, Gaur SN, Editors. *Allergic Rhinitis and Asthma* Kontetntworx Publishers, New Delhi. 2012; pp 97-106.

32. Gaur SN, Kumar Raj, Lohia AK, Agarwal K. Sensitivity to common aeroallergens in allergic rhinitis as a predictor of bronchial hyperreactivity and development of asthma. *Indian J Allergy Asthma Immunol* 2011;25:61-6.

33. Gruber Moesenbacher U, Kulshrestha R, Sandhyamani S. Paediatric and developmental lung disease. In: Kulshrestha R, Vaideeswar P, Amonkar G, Gruber-Mosenbacher U, Popper HH, Editors. *Gross Lung Pathology: A Color Atlas.* Vidyanilyam Prakashan, Delhi. 2011; pp 71-82.

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37. Gupta S, Sharma SB, Singh UR, Bansal SK. Salutary effect of *Cassia auriculata* induced atherosclerotic environment in Streptozotocin rats. *Cardiovasc Toxicol* 2011;11:308-15.

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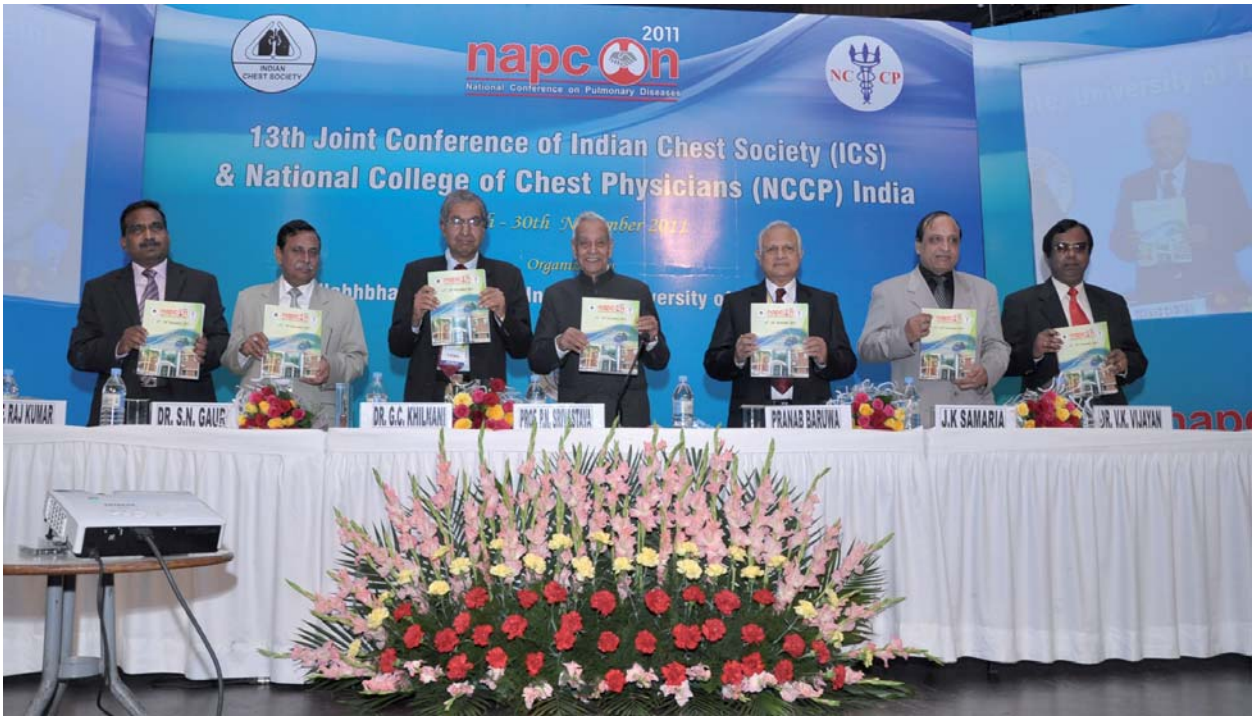

"National Conference on Pulmonary Diseases" (NAPCON-2011), the 13th Joint Conference of Indian Chest Society (ICS) & National College of Chest Physicians (NCCP) India, held on 27th-30th November 2011 at India Habitat Centre, New Delhi. Releasing of Souvenir Book at the Inaugural Function. ***Dignitaries on the dais (left to right)*****: Prof. Raj Kumar, Organising Secretary of the Conference; Prof. S.N. Gaur, Secretary, NCCP (I) and Director (Acting), VPCI; Prof. G.C. Khilnani, President, NCCP (I); Prof. P.N. Srivastava, Chairman, (NBA) and Chancellor, Manipur (Central) University; Prof. Pranab Baruwa, President, ICS; Prof. J.K. Samaria, Hon. Secretary, ICS and Dr V.K. Vijayan, Organising Chairman of the Conference and former Director of VPCI.**

Valedictory Function of NAPCON-2011. ***Dignitaries on the dais (left to right)*****: Dr V.K. Vijayan, Organising Chairman of the Conference and former Director of VPCI; Prof. J.K. Samaria, Hon. Secretary, ICS; Dr Narayan Mishra, President Elect, ICS; Prof. P.N. Tandon, Chairman, Governing Body, VPCI; Prof. G.C. Khilnani, President, NCCP (I) and Prof. S.N. Gaur, Secretary, NCCP (I) and Director (Acting), VPCI.**

Vallabhbhai Patel Chest Institute

University of Delhi, Delhi-110007, India

Phone: 91-011-27402400, 27667102, 27667441, 27667667, 27666182

Fax: 91-011-27666549; Website: www.vpci.org.in